Macro approach for water sharing in unregulated rivers

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Abstract

Water Sharing Plans are a major component of Australia's National Water Initiative (NWC 2004). These plans manage the extraction of water by trying to find an optimal balance between environmental requirements, economic productivity and social equity. They set: extraction limits, the volume of water that can be extracted annually; dealing rules which control the trade of water; and access rules, which specify when extraction is allowed. In order to complete plans for the entire State of New South Wales within a specified timeframe, a broad 'macro' approach to the development of water sharing plans was required. The approach balanced water sharing rules by considering: instream values, the risk to those instream values posed by the existing and possible increases in extraction; the hydrologic stress, the extraction value, and the economic dependency of the local community on extraction. The approach clarified values and risks, and the broad-scale relative assessments showed where water sharing rules need to strongly protect valuable natural assets and where more intensive management was required to share the water resource between competing users.

Keywords

Macro plans, water sharing, instream value, hydrological stress, community dependency, indigenous water*,* unregulated rivers, water policy

Introduction

Water Sharing Plans are a major component of Australia's National Water Initiative. They assist in managing the extraction of water from rivers by setting: extraction limits, the volume of water that can be extracted annually; dealing rules which control the trade of water; and access rules, which specify when extraction is allowed. The large number of sub-catchments and extraction licence holders in NSW's unregulated rivers required a method that was quick and effective and utilized existing knowledge and information.

Rivers have enormous value to society (Driml *et al,* 2005). They are assets with economic, environmental, social, aesthetic and heritage values. Developing a water sharing plan is essentially a problem of resolving conflict caused by the competition for a scarce resource. It requires the synthesis of information across the natural and social sciences disciplines, the consideration of community input, and the interpretation of results in a legal and policy framework. The final balance between conflicting values requires judgements by managers, the community and government.

The Macro Plans therefore attempted to incorporate systems thinking to address as wide a range of values and components as possible. Being able to categorise values, and the risk to those values, even into relative categories (high, medium and low) can greatly assist in determining the trade-offs necessary both within sub-catchments and between sub-catchments. This paper sets out the rationale for the 'macro' approach. A full description is available at Macro Water Sharing Plans The Approach for Unregulated Rivers (Department of Natural Resources 2006).

Background

The Macro Plans were developed for unregulated rivers which form the majority of rivers in NSW. Approximately 14,000 licensed extractors; including cities, towns and industries, as well a much larger number of basic rights users, extract water from the unregulated rivers.

NSW has a diverse range of unregulated rivers and estuaries. Rivers range from permanently flowing rocky streams fed from mountain springs to western wetland systems that are inundated only every few years. The estuaries range from coastal lagoons that open to the ocean several times a decade to drowned valleys with large daily tidal exchanges. Rainfall patterns also vary, from winter rainfall and dry summers in the south to summer rainfall in the north. Development of a consistent and rapid approach across this complexity and variety presented a challenge.

In the first round of water sharing plans completed in 2003, only 20 unregulated sub-catchments of the 650-plus sub-catchments in NSW were completed. The first round involved Water Management Commitees made up of representatives from stakeholder groups. These committees based their decisions on the balance of argument from information provided by government agencies and researchers. Although this process provided significant peak stakehoder involvement, the rate at which plans were developed was slow. In addition, by focusing on single sub-catchments, the ability to understand the catchment context within which the individual plans were placed and the ability to have cross sub-catchment tradeoffs were limited.

For this round of plans it was decided that the approach would cover a larger scale (hence the term macro) and be developed by first undertaking a technical assessment which gathered and synthesized existing information and included an explicit trade off method. Regional Panels, consisting of government agency representatives developed draft water sharing rules based on these technical assessments during 2005-2006. This was followed by an extensive consultation process which begun in late 2005. The technical assessment was at a reconnaissance level and identified and classified the major factors necessary for developing water sharing rules. More detailed assessments are required only for those areas where the initial technical assessment was insufficient to get reasonable stakeholder agreement or where agreed specific investigations are required to complete a plan. Areas with major planning difficulties were either initially excluded from the macro approach or excluded as those difficulties became apparent. The macro plans were to be completed within a short time frame so that resources could then be re-focused on the more detailed assessments in difficult areas to complete all water sharing plans within the timeframes spelled out in the National Water Initiative.

Conceptual framework

The National Water Initiative requires "*high conservation value ecosystems that are dependent on surface and groundwater systems must be identified as part of the plans and their values protected'*. The NSW Water Management Act (2000) also requires "*water sources to be classified as to the extent of their conservation value (that is, the extent to which their intrinsic value merits protection from risk and stress".* Therefore, the macro approach is based on determining and using environmental values.

Many environmental flow approaches rely on using one or more attributes, for example wetted perimeter, and plotting this against flow to find an optimum value or point of inflection. Extraction above that point is viewed as surplus to the environment and therefore available for extraction (Schofield et al 2003). This assumption contrasts sharply with value based approaches that have traditionally sought out those areas of high conservation value and recommend total protection under the precautionary principle since many would argue that our understanding of impacts is limited, particularly when dealing with high levels of diversity or rare species requirements. Recent planning has tried to accommodate both approaches by allocating a percentage of area or sub-catchments for total protection while applying the attribute based methods elsewhere. The macro approach adopted by NSW has tried to blend both approaches across entire catchment by using both spatial and temporal considerations in the environmental and socio economic tradeoffs.

Pierson et al (2002) divided their methodology for estuaries into two phases, a preliminary (reconnaissance level) phase covering; value of estuary, changes to inflow, and vulnerability of the estuary, and a detailed phase. They also concluded that there needs to be some attempt to predict risks on the basis of currently-available knowledge, given the imperative to protect and maintain estuaries in the face of strong and increasing pressure to extract fresh water. The macro approach where possible set water sharing rules based a preliminary phase assessment combined with an assessment of risk.

It is a widely accepted principle of ecological protection that existing high value features should be protected before the restoration of lower value features (Rutherford 2000). This concept of prioritisation can be extended to the optimisation of environmental values in water sharing planning. Thus water sharing rules should not be uniform across all sub catchments, but should:

- give greater protection to areas of higher instream value,
- allow greater extraction in areas where extraction brings greater social and economic benefits, or instream values are lower, and
- allow for more intensive management in areas where both instream and extraction values are high.

Unregulated rivers are characterised by numerous licences distributed throughout the catchment. Unlike regulated rivers where extraction is controlled by the location of infrastructure such as dams and weirs, the location of extraction from unregulated rivers can be continuously adjusted through transferring the rights to extract water (i.e. licence trading). This allows unregulated rivers to be managed by considering spatial, in addition to temporal, flow factors. Water trading therefore becomes a major tool in managing unregulated rivers in addition to the traditional access rules, which restrict the amount and timing of extraction. If the instream values can be spatially located then trading rules can be established to prevent movement of water extraction into sensitive locations and encourage the transfer of extraction out of those locations. Similarly, if hydrological stress can be determined, trading rules can be designed to stop increased stress through licence transfers.

The Technical Assessment

To manage the extraction of water from water sources essentially requires the manager to understand and evaluate three fundamental items of information:

- the quantity of water being extracted, relative to the natural flow both daily and annually,
- the social and economic benefits which this extraction provides, and
- the risk of harm that occurs as a result of extraction.

Benefits and harm must be assessed against all environmental and socioeconomic values. The Macro Plans used sub-catchment classifications based on the following indicators of these three fundamental items of information:

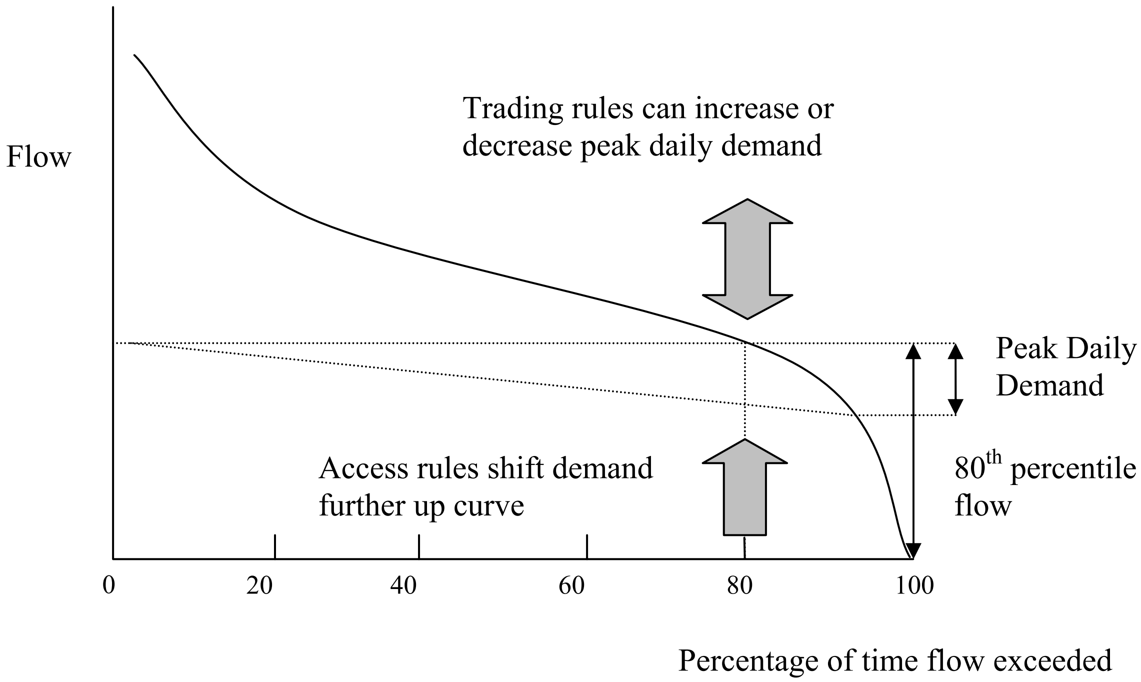
- Hydrologic stress (ratio of peak extraction to flow at a chosen flow probability) was used as the indicator for the level of extraction relative to flow.
- An assessment of the financial value of water extraction (based on current uses) and the vulnerability of the local community to economic change (called “dependency”) was used as indicators of the benefits of extraction.
- An assessment of instream value, based on Dunn (2000) and Bennett et al (2002), with modifications as noted below, was used as indicators of the instream values at risk of harm from extraction.

Assessments were undertaken numerically, and then converted into low, medium or high classifications. These indicators are discussed in greater detail below.

Hydrologic stress

Hydrologic stress is an important concept. It is used to indicate the risks to instream values caused by extraction, as an attribute for naturalness in the determination of instream value (see Instream Value below), and as an indicator of the degree of competition between extractors. In most cases hydrologic stress was calculated by first deriving a flow duration curve, a curve that shows the percentage of time a flow is equalled or exceeded. The low flow hydrological stress equated to the ratio of peak daily demand for extraction to the 80th percentile flow for the critical month (see Figure 1). The daily crop demand (i.e. peak daily demand) was calculated by multiplying evapotranspiration (in the driest month) with a specific crop factor for the area of that crop irrigated. These values were totalled for all crops in the sub-catchment. Cumulative hydrological stress was determined for downstream sub-catchments. It is recognised that hydrologic stress is dependent on the chosen flow probability. Nevertheless, it provides an indication of stress that is consistent across unregulated streams.

Figure 1 Flow duration curve showing hydrologic stress and how this changes with trading or access rules.



Economic values and community dependency

The relative dependence of local communities on water extraction for irrigation was based on the volume and economic value of water extracted, and the social benefit of water extraction. The economic value of water extracted was based on irrigated crop gross margins and area of crops obtained through the volumetric conversion survey in 2000. The Australian Bureau of Statistics (ABS) Index of Social Advantage and Disadvantage (A&D) was extrapolated from local government area (LGA) information. Departmental officers reviewed this information and considered whether local information (both quantitative and qualitative) would provide a more realistic picture of community dependency.

Instream Value

Instream value is the value of retaining water in a river. Three different types of values contribute to instream value; ecological (intrinsic), economic (non-extractive use) and place (cultural) values. In most instances high instream value equates to high conservation value except where a significant terrestrial value contributes to the river's conservation value or high instream values result from high economic non extractive values. In the first case extraction of water sharing rules would not affect the terrestrial values.

Dunn (2000) found that none of the existing environmental flows assessments are designed to identify rivers of high ecological value. Assessing ecological values requires a different perspective from that of assessing the condition or health of a river Dunn (2000). Dunn developed a set of criteria, with a group of attributes for each criterion, by comparing assessments for terrestrial biodiversity. Bennett *et al* (2002) re-phrased Dunn's attributes of high ecological value to indicators of a range of ecological values from low to high.

In developing the macro plans, ecological values were grouped into four criteria as recommended by Dunn (2000); naturalness, diversity, rarity and special features. Representativeness was not considered as a criterion for inland sub-catchments since there are currently no freshwater aquatic bioregions. However, representativeness was used for estuaries where coastal bioregions (Environment Australia 1998), were used in conjunction with condition assessments from the National Land and Water Resources Audit (National Heritage Trust. 2002) to select representatives of each estuary type. The availability of data sets was the main consideration for deciding on appropriate attributes.

Bennett *et al* (2002) identified that high level aggregation of data can be contentious; however, this step was required to enable the apportioning of draft trading and access rules to sub-catchments. Dunn (2004), in a survey of Australian river scientists and managers, found that overall; naturalness was considered the most important criterion. However, the mean values for the criteria were sufficiently close to warrant adopting equal weighting for the Macro Plans. The major exception was rarity where threatened species and communities were given a significantly higher weighting. This was based on their specific legislative requirements and discussion with ecological scientists in agencies charged with protection of threatened species. Thus, the Dunn (2002) approach was modified as follows:

- Threatened species were categorised according to their likely impact of extraction. In general, fish and some frogs were given greater weight than plants or water birds.
- Water sources that were the only location where a threatened species occurred in a major catchment were given higher value than where the species had a wider distribution.
- Water sources that scored highly on the above criteria would be classified as medium or high value, regardless of how low their score was on other criteria.

This is consistent with Pierson et al (2002) assessment for estuaries, except the macro approach has used an additional category of value (medium) and the use of weightings may always give "pristine " sub-catchments high instream value.

Risk to instream values

Setting access rules requires an assessment of the *risks* to instream values from water extraction. In some cases, for example, if extraction is a very small proportion of flow, extraction may not significantly affect instream values. Risk is generally defined as consequence × likelihood. The consequence is equivalent to the value of the asset under threat (the consequence of losing a high-value asset is more than that of losing a low-value one). The likelihood of impact is the level of hydrologic stress (if a greater percentage of flow is extracted, the likelihood of damage is greater).

Thus, the method calculates the risk to instream values as:

Risk to instream value = instream value × hydrologic stress

The impacts of extraction do not occur just in the sub-catchment where extraction takes place, but may cumulatively affect downstream sub-catchments. Therefore, the assessment included a calculation of downstream impacts in the assessment of risk.

Indicative water sharing rules

A spreadsheet was developed to incorporate available information and allow consistent analysis across the State. The analysis was undertaken at the catchment scale for rivers, and at the marine bioregion scale for estuaries. A series of tables (see Table 1 and 2) were then used to interpret the findings and provide indicative rules for both the trading of rights to extract water (dealings rules) and the extraction of water (access rules). The Manning and Namoi catchments, a coastal and an inland catchment respectively, were used to trial the macro approach. The spreadsheet was amended to address issues identified in those trials.

The indicative water sharing rules were developed from rules currently in place; experience gained from the first round of water sharing plans and the River Flow Objectives. The access rules considered natural changes in the flow regime. For example, "cease to pump when there is no visible flow" is commonly used. These changes allow for management that is simple and effective without intensive monitoring and compliance arrangements.

For rules covering the trading of the right to extract water (see Table 1), the indicative rules recommended reducing hydrologic stress in sub-catchments with high instream value and maintaining the existing stress levels for those sub-catchments with high hydrologic stress and medium or low instream value. Where both the instream values and hydrologic stress were medium or low, trading into the sub-catchment was allowed up to a specified level of hydrologic stress.

For access rules, the applicability and implications of rules vary across river types. For example, a rule like "cease to pump when there is no visible flow" may be seen as favouring extraction in a permanent flowing gaining stream, but when applied at the end of a losing stream it may be considered to favour the environment. The approach therefore relied on first determining which of the following river type best described each sub catchment:

- gaining stream
- connected stream
- losing, terminal or effluent stream
- tidal pool, and
- estuary

The access rules were classified into 4 levels (see Table 2). The question, "what is the minimum acceptable requirement for river management" becomes the basis for the Level 4 rule. Conversely, "what level of risk is acceptable in high conservation sub-catchments", becomes the requirement for Level 1 rules. Level 2 and 3 rules varied depending on the level of economic dependency and risk to instream values. Where both are high, intensive management is warranted and the cost of setting up systems to apportion environmental share on a daily basis may be justified. Where both are low, simpler less resource intensive rules are recommended.

Access rules generally have a greater short term impact on extractors than trading rules. How hydrological stress can indicate the appropriate rules for both access and trading is demonstrated in Figure 1. Trading rules can either increase or decrease peak daily demand whereas access rules generally shift demand further up the flow duration curve by setting cease to pump limits. If both rules are used in tandem they can be very effective and minimize impact on extractors. For example, if an area has high conservation values and no trades are allowed into that area, then over time the peak daily demand will decrease through trading licensed volumes out. For a major portion of time this would have the same effect as a stronger access rule. Similarly, it would be undesirable to have the benefits of an access rule diminished through trades into an area increasing the peak daily demand. Over time it is anticipated that extraction will be eliminated from many high conservation areas through trading.

Table 1. Low-flow trading rules

	Low hydrologic stressor hydrologic risk	Medium hydrologic stress or hydrologic risk	High hydrologic stress or hydrologic risk
High instream values	Trades are not allowed into or upstream of sub-catchment.	Trades are not allowed into or upstream of sub-catchment	Trades are not allowed into or upstream of sub-catchment
Medium instream values	Trades may be allowed into sub-catchment, but only up to a specified % of flow stress (which should be well below 50% hydrologic stress)	Trades may be allowed into sub-catchment , but only up to a specified % of flow stress (which should be well below 50% hydrologic stress)	No net-gain trades are allowed into or upstream of sub-catchments
Low instream values	Trades may be allowed into, sub-catchment but only up to a specified % flow stress (but no more than 50% hydrologic stress)	Trades may be allowed into sub-catchment , but only up to a specified % flow stress (but no more than 50% hydrologic stress)	No net-gain trades allowed into or upstream of sub-catchments

Table 2. Indicative low-flow water access rules for gaining flow stream.

	Low dependence on extraction	Medium dependence on extraction	High dependence on extraction
High risk to instream values	▪ LEVEL 1. RULES ▪ Cease to pump to maintain a specified depth of flow at end of water sources. ▪ Specific flow rule for instream values. ▪ Cease to pump to allow flows at or below the 80th percentile to pass end of water (specified by height or volume).	▪ LEVEL 2. RULES ▪ Cease to pump to maintain specified depth of flow at end of water sources. ▪ Specific flow rule for instream values, and/or ▪ Cease to pump to allow flows at or below the 90th percentile to pass end of water sources (specified by height or volume). ▪ Environment to receive high proportion (i.e. 70% of daily flow.	▪ LEVEL 3. RULES ▪ Cease to pump to maintain specified depth of flow at end of water sources. ▪ Specific flow rule for instream values. ▪ Cease to pump to allow flows at or below the 95th percentile to pass end of water sources (specified by height or volume). ▪ Environment to receive no less than 40% of daily flow share.
Medium risk to instream values	▪ LEVEL 2. RULES ▪ Cease to pump to maintain specified depth of flow at end of water sources. ▪ Specific flow rule for instream values. ▪ Cease to pump to allow flows at or below the 90th percentile to pass end of water source (specified by height or volume).	▪ LEVEL 3. RULES ▪ Cease to pump to maintain specified depth of flow at end of water source. ▪ Specific flow rule for instream values. ▪ Cease to pump to allow flows at or below the 95th percentile to pass end of water sources (specified by height or volume).	▪ LEVEL 4. RULES ▪ Cease to pump to maintain a visible flow at end of water source. ▪ Consider specific flow rule for instream values.
Low risk to instream values	▪ LEVEL 3. RULES ▪ Cease to pump to maintain a specified depth of flow at end of water sources. ▪ Consider specific flow rule for instream values. ▪ Cease to pump to allow flows at or below the 95th percentile to pass end of water source (specified by height or volume). ▪ Consideration of special cases.	▪ LEVEL 4. RULES ▪ Cease to pump to maintain a visible flow at end of water source. ▪ Consider specific flow rule for instream values.	▪ LEVEL 4. RULES ▪ Cease to pump to maintain a visible flow at end of water source. ▪ Consider specific flow rule for instream values.

Freshwater flows to estuaries

For estuaries, an additional consideration of inflow sensitivity was included. Inflow sensitivity was defined as the extent to which freshwater inflows are likely to affect the biophysical processes of the estuary, in particular the salinity regime. Variability of inflow sensitivity was determined by the physical attributes of the estuary. A drowned river valley such as Sydney Harbour is open to the ocean, well flushed and generally characterised by marine features. Barrier estuaries such as the Richmond and Clarence Rivers are generally long and attenuated, water exchange may be slow, and a salt wedge may migrate up or down the estuary depending on freshwater inflows. Saline coastal lagoons have intermittent openings and are generally sensitive to changes in freshwater inflow. Attributes from Roy *et al.* (2001) were used to derive sensitivities to both low and high flow. The hydrologic stress from extraction in the catchment was either increased or reduced depending on the level of inflow sensitivity.

The Overall Planning Process

The overall planning process is set out in Figure 2. Lessons learnt from the first round of water sharing plans provided the foundation for the macro plans. This included:

- stakeholder views which were extensively canvassed through the first round of water sharing plans, and
- an extensive policy framework, dealing with a range of unregulated river management issues including daily flow sharing, freshwater flows to estuaries, setting sustainable extraction limits, and town water supplies

These policies were supplemented by a set of addition policies developed during the macro planning process and included considerations such as incentives for high flow conversions in coastal catchments, and dual cease to pump levels to encourage best practice riparian management. Water policies are important for water sharing considerations because they set the bounds of tradeoffs, consider broader government initiatives such as redressing indigenous disadvantage, and resolve issues between peak stakeholder groups.

To overcome some problems with the lack of, or quality of data, and to utilise local knowledge, multi-agency regional panels were convened from regional agency staff from the Departments of Natural Resources, Environment and Conservation and Primary Industries, with assistance from local Catchment Management Authorities. These panels reviewed the outcomes of the technical assessments, modified where required the instream values, hydrological stresses and economic dependencies; compared the indicative rules against existing rules and recommended draft rules for the plans. Where issues could not be resolved at a regional level, these were resolved at interagency workshops.

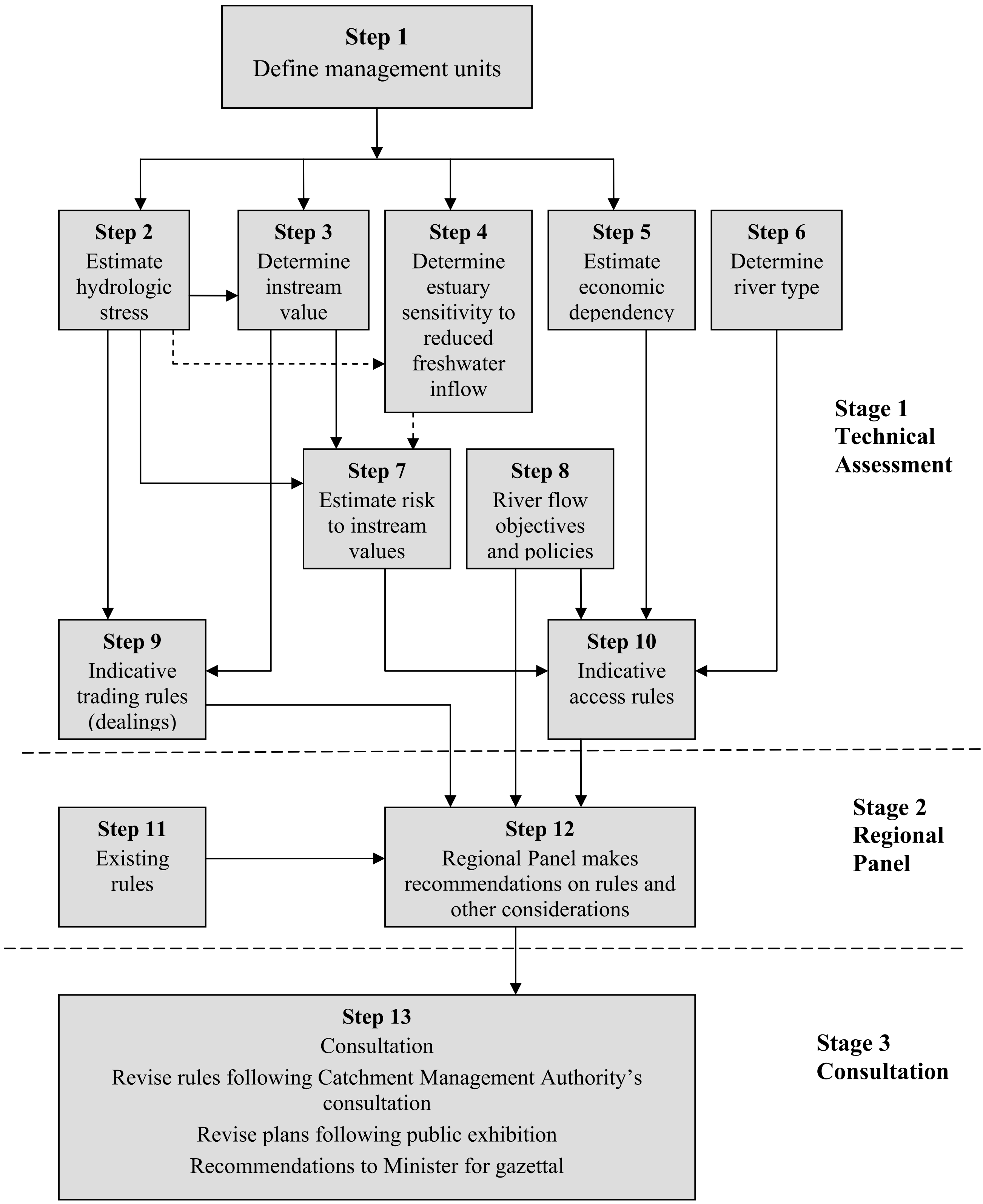
A macro approach based on ecological values and recharge was used to develop sustainable yields for 75 groundwater sources. This parallel planning process allowed the interaction between the plans to be considered. Where the interaction was significant a single plan covering both surface and groundwater was developed.

Targeted and public consultations provided all stakeholders with the opportunity to understand the technical assessment and how and why water sharing rules are being proposed. Consultations involved meeting with interest groups to discuss how the existing water sharing rules would interact with draft macro plans. In some areas, there was significant change for water users. For example, up to 50% of licence holders had no cease to pump conditions on their licences at all prior to the macro plans.

Stakeholder groups were consulted at the local and “peak body” level and most importantly, were provided the opportunity to review the proposed draft water sharing rules and make comment on them. Multi-agency regional panels than reviewed the issues raised during consultation, and where appropriate, made modifications.

The draft water sharing plans will be exhibited together with a background document. The background document sets out the results of the technical assessment and any subsequent changes as a result of the regional panels deliberations.

Figure 2. Planning process for macro plans



Indigenous considerations

Macro water sharing plans recognise the importance of rivers and groundwater to Aboriginal culture and include some mechanisms to address three areas of Aboriginal interest. They:

- include an allowance for Aboriginal cultural use of water from unregulated rivers. This includes traditional practices, manufacturing traditional artefacts, hunting, fishing, and gathering, recreation, cultural and ceremonial purposes,
- recognise Aboriginal cultural values attached to unregulated rivers. Where possible, water sharing rules will be designed so as to protect Aboriginal sites. For example, high flow extraction will be prohibited from some south coast rivers so that traditional fish traps can continue to function. Whilst there is a paucity of published data about Aboriginal in-stream values, through the process of consultation and engagement with Aboriginal communities, access rules will be progressively aligned to protecting Aboriginal values; and
- acknowledge disadvantage in Aboriginal communities by making commercial irrigation licences available in many coastal unregulated rivers. Whilst the unregulated rivers will generally be embargoed from the issuing of new irrigation entitlement, Aboriginal commercial licences will be exempt from the embargo where high flow extraction may be viable with available allocations set at a limit.

Pathway to environmentally sustainable levels of extraction

In areas and situations where there is insufficient information to set appropriate rules, the plans allow for adaptive management by bounded changes to water sharing rules. If new information regarding flow requirements for river and estuaries is likely to become available within the life of the plan, the plan can specify circumstances in which changes to the rules can be made, and the extent of those changes.

The planning process contained a mechanism to limit adverse social and economic impacts. Where the existing rules were not consistent with the regional panels' recommended rules, then the degree of immediate change, and hence effect on extractors, was bound to the next higher level of rule as a first step, unless a higher level of protection could be realised by other means with minimum socio-economic impact. The panels then determined a timeframe and the further steps required to achieve the recommended rules during the life of the plan.

Except in those catchments covered by the Murray-Darling Basin cap and those coastal catchments identified as having both high and low flow sensitivity to freshwater extraction, daily access rules are more important than annual limits for achieving sustainable outcomes. Annual available water determinations will be used to ensure that extraction stays within the annual limits set by the water sharing plans. These annual limits are set for each catchment.

Conclusion

The bulk of NSW river biodiversity lies in unregulated rivers. An approach which idenified, protected, enhanced and restored the unregulated river values, whilst fostering the social and economic benefits was required. The macro approach combined existing data with a risk management framework to explicitly manage the trade-offs required to develop water sharing plans. It provided draft rules for over 600 water sources including 151 estuaries. This technical assesment provided a context for regional panels, stakeholders and the community to consider indicative water sharing rules and develop the final rules through a series of consultations.

By considering value in a spatial context and the interdependency of the rules the approach could identify tradeoffs that may not be as obvious under a process of successive detailed assessments. The approach identified information gaps, and where more intensive investigations are required to either understand water behaviour (for example, the hydrodynamics of some estuaries) or where the tradeoff require a more detailed assessment of instream and /or economic values.

The assessment for the Macro approach gives a snap shot in time. Water trading, climate change, changes in demand patterns and improved understanding of the social, economic and environmental values of unregulated rivers will occur over the life of a Macro Plan. Trying to predict and monitor change in such a dynamic environment is difficult. The plans will however allow those changes to occur in a manner that will maintain the desired environmental and public benefit outcomes.

The method also highlights that our biggest information gap is not in scientific ecological data (though more information in selected locations would indeed be useful), but in

- socio-economic and water use information,
- understandings of how ecological values are measured and assessed,
- use of risk and vulnerability in assessments, and
- integrating natural and social scientific understandings into broader management requirements for rapid assessment approaches.

The macro approach considers a wide range of factors, addresses the real community concerns of value and risk, and balances the various conflicting values. Significantly, most stakeholders readily understand the approach, are willing to accept or comment on the assessments, and appreciate the procedural fairness.

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