Economic instruments in establishing water security in Australia's Murray Darling Basin

James Horne, Principal, James Horne and Associates

Type of tool: economic instruments
Issue: agriculture, cities, watersheds
Location: Murray Darling Basin, Australia

Challenges and objectives

The OECD green growth strategy argues water security, defined as ensuring access to adequate quantities of water, of acceptable quality, for human consumption, productive and environmental uses, through effective application of demand and supply policies, can act as an engine for sustainable growth. This case study outlines the role of three economic instruments in this process in Australia's Murray Darling Basin (MDB).

Water is a valuable resource, critical – indeed essential – to economic development. Australia's challenge, one shared by many countries around the world, has been to put in place framework conditions such that water can contribute to economic growth more fully than has been the case in the past, in the context of sustaining environmental outcomes.

Australia's approach to water policy in the MDB in particular is to recognise that water use, be it for human consumption, production or to provide ecosystem services, is a valuable and scarce input that needs to be priced properly and managed actively to be used effectively. In a global context, Australia accounts for only a very small proportion of the world's water resources. And if the FAO data of water availability per capita were used, one would think Australia is well endowed with water resources. And in a sense that is true, but the catch is that most of it is in the tropical north of the country, a long way from the bulk of the population and mid-latitude irrigated farming country. Only around 6% of runoff occurs in the MDB, which accounts for around 40% of Australia's agricultural production.

The key objective under Australia's broad blueprint for water management is a nationally compatible, market, regulatory and planning based system for managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes. Sustainable water use needs to recognise the importance of the environment *per se*, and its role generating future economic output and services.

This case study examines three economic instruments that are being used to achieve this objective.

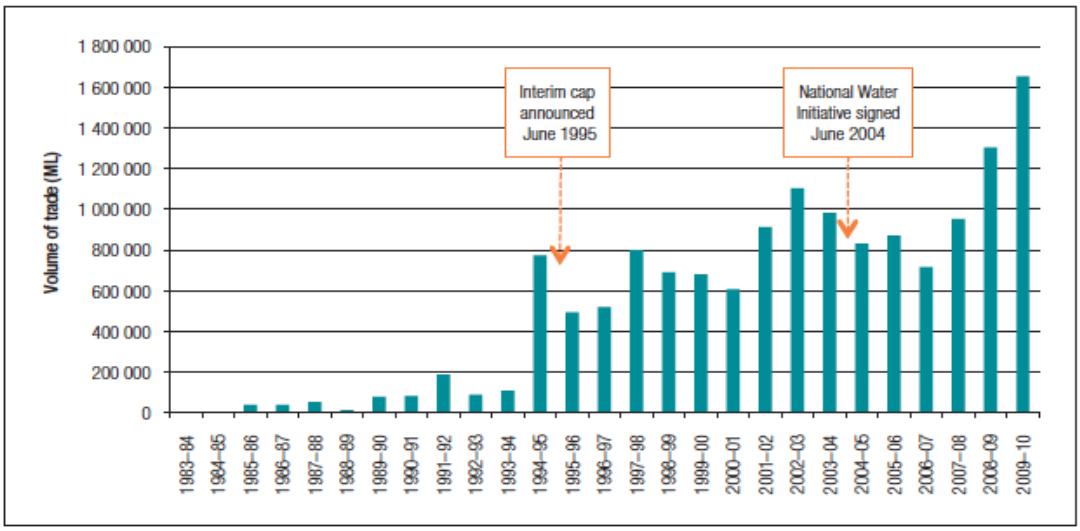
Approach one: water markets and water trading

The first instrument I will focus on is the use of water markets and specifically water trading. Water trading is a key feature of water management in the MDB, but not all water rights are traded.

In 2009-10, water markets in the MDB accounted for over 90 per cent of both the entitlement trade and the trade in seasonal allocations (or trade in actual water) nationally. Trading of entitlements in the MDB (around 1800 GL) was equivalent to around 10 per cent of the stock of entitlements, while trade in allocation water (around 2300 GL) was equivalent to around 40 per cent of the water used in 2009-10. This compares with water entitlement trade of under 100 GL in 2003-04 and trade in allocation water of around 980 GL. The intensity of trading varies across the MDB, with much higher rates of trading in some trading zones than in others – it is most intense in what is known as the 'southern connected system'. Hydrologically, and therefore economically, the main market comprises what is called the southern connected system, and is made up of around half of the 23 river Basins. The overall trade in entitlements was valued at around AUD $2.6 billion, while the trade in allocation water was over $360 million (much lower than in 2008-09 because of the wetter season and greater availability of water in storages (NWC, 2011; MDBA, 2011a,).

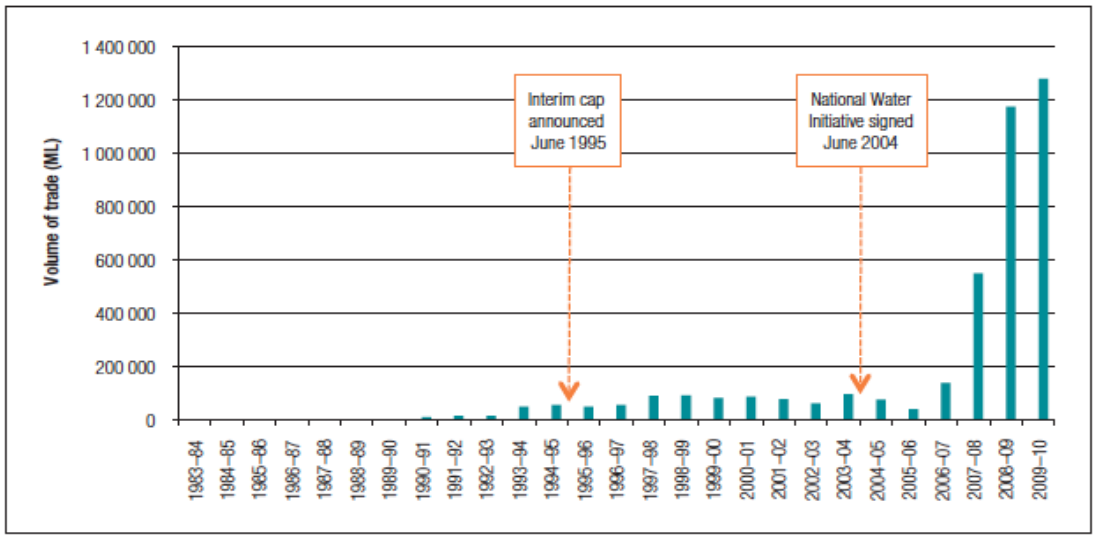
Both the markets for allocation water and for water entitlements have grown substantially in recent years, as shown in Charts 1 and 2 below for the southern MDB.

Chart 1: Volumes of allocation water traded in the southern MDB



Source NWC, 2011

Chart 2: Volume of Entitlements traded in the southern MDB



Source NWC, 2011

There are a number of reasons for this growth:

- In the allocation water market, changes to rules on carryover – allowing more to be carried over from one year to the next – provided an incentive to purchase forward to reduce risks around water availability in the following year. Transaction costs also fell progressively. Necessity was probably an additional driver, reflecting the extended and deep drought, but only time will tell how much impact that had.

- In the case of the entitlement market, the Water Act 2007 – a piece of national legislation – gave the impetus to removing some of the key remaining constraints to trade by making separation of land and water a reality in key MDB states. This separation is not yet national: Western Australia, for example, lags behind the progress achieved within MDB notwithstanding commitments to the approach. There are some areas where markets will not make any sense (for example, the so called wild rivers in northern Australia, where use of water for agriculture, industry or communities is a tiny proportion of available water).

Water markets that allow efficient water trading of both water entitlements (the right to use a certain share of available water) and water allocations (the actual water that each year accrues or is allocated to an entitlement, and can be used by the entitlement owner – be they irrigator, urban commercial business or environmental water manager) have made a demonstrably positive impact on economic growth. A 2010 study of water trading in the southern MDB indicated that it increased economic activity by some $370 million in 2008-09, and that economic activity increased in each of the three states where the trading occurred. This study suggests that all major industries – dairying, rice and horticulture – benefited from water

trading (NWC, 2011). Previous studies over the past decade all agree on the basic conclusion, that water trading in properly developed markets boosts economic activity and growth.

Of course such markets just do not appear out of nowhere. They reflect the legal and social history of the country or river basin in question. Water markets in the MDB are based on:

- Secure, well-defined property rights for water access entitlements that in essence are just like other real property, i.e. they are transparent, can be mortgaged, and are tradeable. This is important for all users – be they farmers, commercial interests or environmental water managers managing water for the environment. These entitlements are fully separated from land, and generally provide access to a share of the consumptive pool each year (that is, the relevant authorities announce allocations as the water year progresses, which are a percentage of a nominal quantity).

- Policy actions that have largely eliminated barriers that impede market activity – in Australia's MDB the market framework reflects a key role played by the 2007 Water Act and by virtue of that legislation, a key role by the competition regulator, and introduction of market and charge rules that address issues which had hitherto stymied market growth. Some barriers to trade (such as the Victorian application of the 4 per cent rule) do remain but the worst of these should be eradicated over the next few years. Transparent access to trading information across the MDB is still work in progress, through the development of a national water market system (Australian Government, 2011a; Bureau of Meteorology, 2011a; Bureau of Meteorology, 2011b; ACCC, 2010).

Well-developed markets allow market participants to actively manage their water assets and inputs into production, in the same way as they manage other assets and inputs into production. Prices formed in transparent allocation markets will reflect short term scarcity of actual water, while prices for water access entitlements will reflect market views on reliability of products and the relative demand for those products over the foreseeable future.

For example:

- If it is more profitable to sell the water and not grow a crop, potentially keeping other crops such as perennials alive, that can occur.

- If it is more efficient to sell the allocation water and buy fodder to feed dairy cows, rather than growing the fodder on-farm with irrigation, that can occur (water can thus be substituted in some cases).

- Water assets with different reliability characteristics can be put together in a portfolio that can reduce risk, compared with the original product held by the farmer.

- Water assets can become an explicit part of active balance sheet management.

These sorts of actions allow available water to shift to areas of highest return and it enables risk to be reduced. As water in all forms becomes priced in the market it comes to reflect scarcity, thus encouraging water saving innovation.

Markets can be a key tool in sustaining ecosystem services, and provide a transparent way to cost (as distinct from valuing) ecosystem services. They provide a tool that can be used by environmental water managers to make decisions on use of their water portfolio.

One of the biggest developments in recent years has been the setting up of a national Environmental Water Holder, where water entitlements can be held and water accruing to those entitlements used to generate a healthy environment, from a national rather than a state based perspective (which from time to time may be different), adding significantly to the security of water available to the environment.

One of the next steps in water market development is to examine the benefits of setting up a market for capacity sharing of delivery rights. This reflects congestion for delivery of water in peak growing seasons; a market for water delivery will assist in extracting further value out of this scarce resource.

Water trading and the environment

While a cap on overall use was put in place in 1996 ostensibly to halt further deterioration in the environment and ecosystem functions, little action was taken on restoring a sustainable balance between the needs of the environment and other users in the MDB until 2004 when *'The Living Murray'* programme was introduced. It sought to purchase (largely through investments in works and measures) 500 GL of water entitlements for the environment (MDBA, 2010). Significant results have been achieved, but it was more expensive than direct purchase would have been, and the benefits harder to verify until after the fact.

Economic concepts can also be used to underscore the potential benefits from water trading between irrigators and the environment. 'To achieve maximum social gain, the distribution of water between the environment and irrigators should be set so that the marginal value of water for the environment and marginal value of water to irrigation are equal (Horne, A et al, 2010).

Water purchases by government can be directly from willing sellers. Indeed this is at the heart of a $3 billion water entitlement purchase programme commenced in 2008 by the national government, and over half has already been spent. Water can be purchased at market prices, meaning that existing entitlement holders who choose to sell can be appropriately compensated in a clear and transparent way, and ensures taxpayer funds can be properly accounted for. There has been no shortage of willing sellers. Indeed, prices paid in tenders

over the past year have declined, reflecting the state of the market in general (Department of Sustainability, Environment, Water, Population and Communities, 2011a). By purchasing entitlements with the same rights and obligations as irrigators, there can be no question that the environment is not paying its way, and the cost of restoring and maintaining the environment can be made more transparent.

This approach allows large adjustments in the balance of water available to the environment compared with other uses, as envisaged in the MDB Basin Plan processes, can be achieved at least cost and provides significant relative flexibility compared to infrastructure investments.

Environmental water managers can sell water back into the market in years that it is surplus to requirements, potentially generating revenue to purchase water in years when the manager's allocation is less than requirements.

By establishing the Commonwealth Environmental Water Holder (CEWH) as a statutory position in 2007, the national government can ensure Basin-wide environmental interests are looked after, and ensure that water actually gets used as promised. Transparency is at the centre of these arrangements, and the CEWH is required to provide an annual report setting out activity and performance. To repeat the point made above, with water a scarce commodity, with competing uses, it provides governments and society transparent access to the cost of providing ecosystem services. 'Planned' or rules based environmental water, or water set aside for the environment after diversions for agriculture, hitherto has been far from transparently managed, although there is no intrinsic reason why this should be so.

Approach two: government subsidies

The second instrument I will focus on is the use of government subsidies to increase the efficiency of water use, and to promote water security. Programmes with strong public good components may well justify government subsidies.

Three such programmes, which have been progressively implemented over the past 4 years, cover:

- funding of better water information through the Bureau of Meteorology (BOM);
- funding of cutting edge research (CSIRO water availability studies and the Water Information Research and Development Alliance between CSIRO and the BOM); and
- increasing consistency, timeliness and transparency of market information, (including through the National Water Market programme being developed by the Commonwealth and the Australian states and territories).

These programmes are gradually increasing the transparency and availability of market information, enabling better decision-making and risk management, hence enhancing water security.

Governments have also sought to increase the efficiency of the irrigation sector through a suite of programmes that offer varying incentives to change. One such programme rolled out by the national government has supported the funding of irrigation modernisation planning, aimed at getting irrigators to assess the viability of their districts out into the future, in a climate change environment. Questions that have needed answering include: Is it worth upgrading capital investments in the irrigation district? Should particular channels be closed? Irrigators can make decisions against a market background for their water assets.

Some irrigation modernisation studies came to the conclusion that significant parts of existing irrigation networks (in some cases 30 per cent) had no future, and should be closed. A $650 million open tender based government investment programme in NSW is to provide incentives to achieve this and to fund other proposals to improve efficiency in the Macquarie River valley (Department of Sustainability, Environment, Water, Population and Communities (2011). Results thus far are apparently encouraging – with tracts of irrigation channels in Trangie, Tenandra and Marthaguy in NSW being rationalised, and water recovered for environment (held by the Commonwealth Environmental Water Holder) at what appears to be relatively low cost multiples – the cost above the market price for water is the price for securing significant on the ground regional reform.

The case for investments of this sort (other programmes are also operating) rests on their impact on building strong community support for genuine, lasting change. It must be based on cost effectiveness, and net value to the community at large. Many projects to do not pass the test, and governments need to be very clear about expectations. Sometimes that is not the case.

State priority projects

The national government has sought proposals from state governments that might merit national government funding, flowing out of a MDB institutional reform package in 2008. Over AUD $3 billion was originally earmarked for these projects (Australian Government, 2011b). Project proponents were required to develop assessable business cases and much effort was put into testing the viability of projects.

From publicly available information, many projects that were raised by state governments and irrigators alike do not appear to meet the viability test, and there is a persistent (and persisting) attitude at a state level that these funds should simply be handed over without a stringent testing process and without guarantees that lasting reforms would be realised. The original proposed $1 billion investment in Northern Victoria Irrigation Renewal Project (NVIRP) was committed before any serious investigation had been undertaken, and at best only offered modest returns of environmental water at very expensive multiples. In a sense it was a political commitment of funding to ensure passage of an overall reform programme. Expenditure of this type is fraught with danger, as it encourages rent seeking and decision-making that is not focused on generating long-term sustainability and net benefits to the

society. (Following an extended period of negotiation, a contract was signed in October 2011 for a commitment of $953 million for NVIRP stage 2, for a water return to the Commonwealth of 102GL. Separately, a second 102 GL of water savings will be purchased at an additional cost of $219 million.)

There are examples of very good infrastructure projects where government assistance has the potential to produce significant overall public benefits. For example, the NSW government proposed to require all irrigators to upgrade meters to a given standard. The final detailed business case and pilot work indicated substantial benefits from the project, particularly ensuring that irrigators extracted only their allocated water (NSW Office of Water, 2011). Making whole systems subject to consistent metering increases transparency and confidence of all parties in the value of entitlements and access to water.

Equally, there are many projects that have been proposed that do not meet a basic cost benefit test. Making sound investment decisions is critical: governments need to be prepared to invest only in projects that make sound economic sense, rather than make funding available on a 'my share' basis. As a ground rule, investing in infrastructure network projects, or other investments need to have a clear rationale, and a clear understanding of benefits and costs. It will be critical to invest in areas that deliver results rather than provide funding to 'wish list' projects of dubious quality. Water savings are likely to be second best compared with market purchases, as their source will often be determined by the location of the project, not environmental need. Interest groups and the states will continue to make claims for 'their' share of these reforms. This will not always coincide with optimising national outcomes for the MDB as a whole.

Overall (and at the risk of repetition), injection of government funding into water infrastructure, particularly if it can cost effectively result in additional water for the environment as a part of a rebalancing programme, can accelerate the pace of reform, and ensure the support of key sectors. However, poor investments in large projects can lock inefficiencies into the asset network for long periods. These assets will need to be maintained over time, and often this cost burden is shifted back onto the agricultural sector. Insufficient attention being paid to benefit cost analysis can result in poor public investment of scarce resources, and governments and communities not achieving the level of water security and sustainability that was originally sought.

Approach three: legislation and regulations

The third set of economic instruments I focus on cover legislation and regulations.

The 2004 National Water Initiative – an intergovernmental agreement that the Commonwealth and state governments have agreed to pursue – remains the central framework document for water management in Australia. However, in parts it has been strengthened by national legislation, which includes a new institution (the Murray Darling

Basin Authority (MDBA)) and additional roles to two existing independent institutions, the BOM and the Australian Competition and Consumer Commission (ACCC).

Getting the MDB back onto a sustainable footing and keeping it there is at the heart of the *Water Act 2007*, which seeks to accelerate the pace of reform. It has been bolstered by a 2008 intergovernmental agreement between MDB states and territory. The *Water Act* seeks to facilitate achieving the objectives of the national water initiative, inter alia, by providing for water planning at a basin level in the MDB, to be undertaken by an independent, expert-based body with a whole-of-Basin focus.

- The activities of the former Murray Darling Basin Commission (MDBC) are now undertaken by the Murray Darling Basin Authority (MDBA) on the basis of a corporate plan, not via the convoluted decision making of the past. This provides the states and the Commonwealth with an initial decision-making role, but then allows the MDBA to get on with implementation.

- The MDBA is also responsible for preparing the Basin Plan. This basin-wide planning document will for the first time set enforceable sustainable diversion limits for every catchment and aquifer in the Basin. The Basin Plan will also include an Environmental Watering Plan, designed to put the environment back on a sustainable footing.

There are two steps in arriving at sustainable diversion limits. First, there is a need to ascertain what the current sustainable diversion limit is and then, second, to understand how future climate might affect this limit. These limits are to be based on 'best available science'. The legislation requires that the MDBA manage the resource at a basin level, 'optimising environmental, economic and social outcomes'.

These sustainable diversion limits have yet to be determined, but from the work done thus far it is clear that the major step in the short to medium term is to get the MDB back onto a sustainable footing, on the basis of the climate we already have. That is a large step in its own right in some catchments, likely involving reductions in water use by industry and agriculture of at least one quarter. The CSIRO water availability studies that have been undertaken have underscored the need for an adaptive management framework in water planning to adjust the rights of all users (irrigators and farmers, urban users and the environment) in a transparent way. Models need to be open, transparent and verifiable, entitlement frameworks clearly defined and the market well functioning important to make best use of the resource in the Australian context.

(The MDBA is currently undertaking extensive consultation with governments, research agencies and affected communities as they go about preparing the proposed Basin Plan. The process has been delayed several times, and is now well over a year behind the original schedule. The latest advice is that proposed plan will be released in late 2011 for comment before being 'made' by the responsible Minister sometime in 2012.)

A key factor underpinning recent growth in entitlement trade in the MDB was the strengthened role of the national competition regulator, the ACCC under the *Water Act 2007*. The ACCC was given the responsibility to develop new water market, charge and trading rules that would reduce or eliminate all major remaining impediments to trade.

- The market rules on transformation and termination fees now allow irrigators to transform their water right into a title that can be freely traded, without needing the approval of an irrigation infrastructure operator, and ensure termination fees do not create barriers to trade. This overcomes perceived problems relating to stranded assets and control of water assets by other than the ultimate owner even after separation from land (Australian Government, 2009).

- Charge rules relate to fees levied by infrastructure operators for water storage and delivery services and state agencies for the provision of water planning and management services. The rules put in place now prevent these charges from being levied to hinder trade, including interstate trade, and making rules that might favour certain types of users. (ACCC, 2011).

- The new trading rules, yet to be determined (and which will be the responsibility of the MDBA), will address remaining artificial trade barriers. (ACCC, 2010).

The new role given to the BOM also deserves mention. The enhanced emphasis on transparent and reliable water information (in part illustrated by the development of a national water account (BOM, 2011b) will assist market participants address heightened risk and uncertainty. Research being conducted with the CSIRO, to develop new research tools to address user needs over coming decades will facilitate adaptation to climate change and promotion of green growth (BOM, 2011a).

All of the above (and other additional elements that will further contribute to strengthening the water management framework, such as increased compliance to reduce water theft) will need to be implemented in conjunction and cooperatively with state and territory governments. But there is little doubt that the higher national profile federal legislative provides should assist in better using the nation's scarce water resources to achieve green growth outcomes. Overall, the new legislation and regulations that flow from it are making a substantial contribution to a freer, more transparent market, and hence a positive contribution to efficiency and consequent economic growth and environmental sustainability.

Lessons learnt from implementation

Water reform is both iterative and adaptive. Australian experience suggests concerted, sustained action is required over long periods of time. Ongoing political commitment is required to 'finish the job'. This requires government, communities and business to work

together. Finishing the task of putting in place the regulatory framework, completing development of information systems and above all 'making the Basin Plan', the overarching regulatory framework for managing the MDB, are all essential for strong effective water markets, for environmental sustainability and water security in coming decades, as climate change or increased climate variability heightens the risk of doing business. Further development of existing water markets will help to secure a sustainable future.

Each of the economic instruments discussed in this paper can contribute to a more effective use of water resources, and better, more sustainable economic and environmental outcomes. Used together the economic instruments can be mutually reinforcing. There is no inevitability about ongoing decline in environmental outcomes as economic growth proceeds. Indeed, looking after the environment will assist in sustaining long-term economic outcomes.

The Australian experience shows that there are substantial benefits for both economic and environmental outcomes from developing strong, transparent water markets, treating water transparently for what it is – a scarce resource. Having a price set for both water entitlements (the long run value for the water asset) and for water in the allocation market (the price reflecting scarcity in a particular year) will help society understand the nature of scarcity and the implicit value of the cost of tradeoffs between the environment and agriculture. Valuation of ecosystem services (an issue not discussed in this paper) is critical to making correct long-run tradeoffs, and is an issue Australia is only now starting to put in the necessary investments. Good information is necessary to undertake this task, and it is only in the past few years that adequate resources are being applied to this task. In many economies this is not the case. Without adequate information, it is almost impossible to make good policy of any sort.

All reform models need to be country specific, though the key elements of framework may well be the same. The Australian 'toolkit' follows closely the TEEB model, but the emphasis placed on each element will differ from country to country (see TEEB, 2009).

Key lessons from the Australian experience in the MDB are:

1. Moving from water management built around an engineering model to a framework with a market-based overlay takes time and persistence.

2. Significant benefits have accrued to rural and regional Australia from introduction of a market based approach, notwithstanding initial reticence. More flexible and adaptable systems have increased innovation and sustainability, and result in higher output in nearly all circumstances, but particularly in years of extreme water shortage.

3. Markets and prices alone will not solve everything and are not suited to all circumstances. A strong clear system of entitlements, and a transparent effective regulatory and

compliance framework buttressed by sound, transparent information is important. A holistic (legislative) framework helps to achieve this outcome.

4. Australia's case illustrates how clear separation of land from water allows scarcity to express itself in the market.

5. Strong due diligence is necessary when governments consider subsidising investments to promote efficiencies in water use: it is critical to ensure all investments have a positive benefit cost ratio.

6. In a market based world, environmental managers can actively manage available 'environmental' water. It is important to achieve environmental objectives as efficiently as possible. Water markets allow (perhaps force) managers to think much more strategically about what is trying to be achieved. Used properly it can increase accountability and transparency of environmental objectives.

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