

Accounting for Nature

A Model for Building the National Environmental Accounts of Australia

WENTWORTH GROUP OF CONCERNED SCIENTISTS

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Accounting for Nature

“Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth”

Millennium Assessment, 2005¹

Why is it that the latest speculation on a 0.25 per cent increase in interest rates receives front page coverage in our daily newspapers, yet the most comprehensive assessment of the health of the world’s ecosystems ever undertaken by science was largely ignored?

It was ignored because the link between future prosperity and functioning natural systems remains an abstract concept, unreconciled with everyday living.

Our taxes are now making major investments in our environment. Australian governments currently spend over \$8 billion a year on the environment². In 2007, the Commonwealth Government alone spent \$4.3 billion³. Yet, because we have no accounting system in place, we do not know if these investments are improving or maintaining our natural capital.

Economic accounts present a statistical picture of the structure of the economy and the detailed processes that make up production and its distribution. This information is used by Treasury, the Reserve Bank, governments, financial markets, businesses and individuals to guide policy and inform investment plans.

These accounting systems evolved at a time when the natural world seemed endless and our focus was on managing the industrial revolution, not our natural environment.

Australia now needs to confront the challenge of managing our natural capital with the same discipline with which we manage our economy.

Australia needs an environmental accounting system that will, in an economically effective way:

1. Provide annual national, state/territory-wide and regional (catchment) scale reports which measure the health and change in condition of our major environmental assets;
2. Underpin the long-term catchment management and land use planning decisions by Commonwealth, state/territory and local governments, and regional authorities; and
3. Improve the cost effectiveness of public and private investments in environmental management and repair.

The benefits to Australia are enormous: we will create the platform for managing our natural resources as effectively as our national economic accounting systems have underpinned the management of our economy. National Environmental Accounts will enable us to track changes in our natural capital over time, just as financial balance sheets measure financial positions.

Future prosperity requires building a 21st century economy that is profoundly different to that of the 19th and 20th centuries. A 21st century economy needs to account for nature. We need to value the services that nature provides us – clean water, healthy soils, native vegetation – and we need to monitor the health of our natural world.

National Environmental Accounts are fundamental to this future. They should be core business of government in the 21st century.

The National Environmental Accounts of Australia

Why is it that whilst our environmental assets account for more than 40 percent of the total value of Australia, changes in their value are not included in measurements of national income⁴?

Why is it that a \$5 billion Commonwealth program attempting to redress the *“radically altered and degraded Australian landscape”*, highlighted in the 1996 State of the Environment Report, receives a damning condemnation from the Auditor General⁵? He said that they could not make an informed judgement as to the progress of the programs towards either long term or even intermediate outcomes.

The lack of an environmental accounting framework is a fundamental weakness of Australian environment policy. It can not be fixed by simply re-structuring the delivery of existing programs. It can only be fixed by building a national, but regionally based monitoring, data collection, evaluation and reporting system.

There are parallels in economic policy during the rapid industrialisation of our economy in the early part of the 20th century. It was not until 1945 that Australia produced its first set of economic accounts. They have been progressively improved over the last six decades.

The National Environmental Accounts of Australia would catalogue our natural capital in a way that can both inform policy and guide future public and private investments at a local, catchment, statewide and national scale, across the Australian landscape. It would build on and correct the data gaps that have plagued the State of the Environment reporting process.

The National Environmental Accounts of Australia should be built on ten design principles:

1. National Environmental Accounts need to be based on a regional data collection and reporting framework.
2. Regional data collection and reporting would measure the ‘health’ of five environmental assets, and publish an annual report on any change in their condition in each region:
 - Land (native vegetation, native fauna, soils);
 - Water (rivers, wetlands and estuaries);
 - Atmosphere (greenhouse emissions which cause climate change);
 - Marine and coastal resources (fish stocks, reefs, beaches and estuaries); and
 - Towns and cities (air quality, waste, water use, consumption).
3. National Environmental Accounts should be produced annually, as an aggregation of the regional (catchment) accounts, using an agreed common scaling standard.
4. National Environmental Accounts must be based on scientific measurements of specific indicators to measure the health and change in condition of each asset in each region and the threats to those assets.
5. Data collection will need to be coordinated at a regional scale and delivered ‘fit for purpose’ within a cooperative, but tightly specified national framework, acquired from a range of existing and new national, state/territory and local sources, as appropriate.

6. Indicators used for evaluating the health of each asset class, and the frequency of data collection, may vary from region to region and from indicator to indicator, but within nationally accredited accounting standards.
7. An independent, expert based National Environmental Accounts Advisory Council, chaired by Australia's Chief Scientist and reporting under an Act of Parliament to the Australian Environment Minister, should be created to establish these accounting standards, accredit and monitor the regional reporting process, and publish the annual national report.
8. National Environment Accounting Standards should set out the criteria for the selection of indicators most relevant to each region, and define the method for determining a common single rating standard for what is considered 'healthy' for each asset type in each region.
9. The Australian Bureau of Statistics should be responsible for the management of the underlying data bases that make up the environmental accounts and the public release of the raw data as it is collected.
10. Commonwealth funding of all environmental programs (to Commonwealth, state/territory, regional and local government agencies) should be tied to the supply of any required data to a standard consistent with the data accreditation standards.

Reform of this scale requires a radical rethink of environmental monitoring and reporting in Australia.

Its successful implementation will require leadership from the Commonwealth government in establishing the accounting framework, setting the standards for data collection, negotiating intergovernmental agreements and auditing the assembly and reporting of the information.

State governments have constitutional responsibility for the management of a significant portion of Australia's environment. They too will be major beneficiaries of a robust environmental accounting framework. They should contribute to these reforms by providing the institutional support for regional (catchment management) authorities to undertake data gathering and reporting programs.

The Australian Bureau of Statistics is a world class information management institution. It is the official statistical agency of Commonwealth, State and Territory governments. It is sensible therefore to charge them with managing the National Environmental Accounts, using the *Census and Statistics Act, 1905* – the same legislation which regulates the economic accounting standards.

By building on existing programs, such as the National Greenhouse Gas Inventory, avoiding duplication of existing data collections at national, state/territory and local levels, and by reprioritising existing government programs, it is possible to build the National Environmental Accounts of Australia with little or no additional cost to the Budget.

Australia's Environmental Assets

The National Environmental Accounts would describe both the health of and any change in the condition of Australia's environment assets.⁶

Eventually, Australia should aim to build a set of National Environmental Accounts covering the complete range of indicators of environmental assets. The first set of accounts however, should report on five major environmental asset classes.

Under this model biodiversity is monitored within the asset classes.

Land

Three major environmental assets in Australia's terrestrial landscapes which should form the first set of environmental accounts are:

- native vegetation: extent (through the existing *National Carbon Accounting System*⁷) and condition (through an expanded *Atlas of Australian Birds*⁸);
- native fauna: distribution (by mapping areas of viable habitat for nationally listed threatened species and listing the major threats to each of those areas); and
- soil condition: by monitoring whether land is managed within its capability.

Native vegetation underpins the health of landscapes. It provides a vast range of environmental services – keeping rivers healthy, reducing soil and wind erosion, providing habitat for animals to control pests, influencing local weather patterns, reducing salinity, and as a carbon sink to reduce the impact of climate change. We have existing high resolution maps of the extent of native vegetation across Australia.

Native birds provide an excellent surrogate for assessing the condition of native vegetation. They are well distributed across all habitat types, they play a wide variety of ecological roles (pollinators, insectivores, predators) and they exploit a wide variety of resources (insects, fruit,

fish). They are also cheap to count, their taxonomy is stable, there is a huge volunteer base of reliable observers, and there are some existing long-term data sets. Within 3 to 5 years we can build a cost effective system to gain, for the first time in our history, an understanding of the health of ecosystems, at a regional and national scale.

Healthy soils are fundamental to healthy, functioning landscapes. They have nutrient cycling and moisture holding capabilities and they support diverse populations of flora and fauna both above and below the ground. Managed well, soils circulate chemical elements, water and energy for great human benefit. Managed poorly, it is impossible to imagine an optimistic future for the landscapes on which we depend.⁹

Water

Due to the high variability of rainfall and runoff, with its significant annual and seasonal variations, monitoring river health is one of the more expensive, least developed and time consuming processes of data gathering.

The health of freshwater systems is dependent on two factors:

- volume: where is it, how much, and who owns and manages it; and
- quality: measuring river, wetland and estuary health.

Volume: The Commonwealth Government has approved a \$480 million, ten year program to establish new capacity in the Bureau of Meteorology for water data collection and reporting standards which will be mandatory across the nation. This will provide the foundations for a nationwide monitoring and reporting program and create a comprehensive set of water accounts for Australia.

Quality: A number of frameworks have been developed for evaluating river, wetland and estuary health. For example, the National Framework for the Assessment of River and Wetland Health¹⁰ recommends six sets

of indicator classes: catchment disturbance; hydrological change; water quality and soils; physical form; fringing zone; and aquatic biota.

The actual indicators used will often vary from catchment to catchment. The data from the indicators can be converted into an index on a scale of 0 to 1 to allow the results to be aggregated and displayed graphically, both within catchments over time and between catchments.

Greenhouse Gas Emissions

Under the United Nations Framework Convention on Climate Change, Australia has committed to reporting annually on Australia's greenhouse gas emissions, based on internationally agreed accounting rules.

This reporting system is already in place. It is reliable, authoritative and provides a detailed source of information on the state and trends in Australia's greenhouse gas emissions. This information, when provided at a regional scale, will give an indication of our carbon footprint.

The National Greenhouse Gas Inventory would therefore form a core of the National Environmental Accounts of Australia.

Regional greenhouse gas emissions accounts may differ in structure from the national accounts, with a focus on household and business consumption, and measuring terrestrial carbon balances in agricultural and natural landscapes.

Marine and Coastal Resources

Australia's Economic Exclusion Zone extends 370 km (200 nautical miles) from the coastline of Australia and its external territories. We are directly responsible for over 8 million km² of the world's marine environment, an area that exceeds the Australian continental land mass.

To do this we must understand marine ecosystems and the biological limits to their use.

Two environmental assets in Australia's marine and coastal waters should form the basis of the first set of environmental accounts, using indicators to measure the condition of fish stocks (both commercial and recreational), and habitats (reefs, beaches, seagrass, mangroves).

Coastal and marine resources would be assessed by regional and state authorities to three nautical miles, whereas other marine resources are measured by the Commonwealth based on bioregional assessments.

Towns and cities

Four major environmental assets in Australia's urban centres should form the first set of national environmental accounts:

- air quality;
- consumption of materials;
- waste management; and
- water use.

Pollution is already monitored in urban areas, through the National Environmental Protection Measures¹¹. Data are provided to the Commonwealth under agreement with participating States and Territories, who disseminate the information annually.

National Accounting Standards

If you can't measure it, you can't manage it.

National Environment Accounts need to be built on scientific measurement, just as our national economic accounting system is based on measurable financial information.

Fundamental to the success of the National Environmental Accounts will be the level of confidence that the information being collected is scientifically accurate and reliable, and comparable across time and space. Statutory environmental accounting standards are required to guarantee the quality of data collection. Formal Commonwealth accreditation is required to ensure consistency in the selection of indicators, methods and standards of collection and reporting.

Each regional, State, Territory and Commonwealth institution would need to agree to co-ordinate data collection and provision of data to the Australian Bureau of Statistics, and to adhere to a National Environmental Accounting Standard.

The national standard should also be used to drive cost efficiency in the data collection, so that the information collected can be used at multiple scales for multiple purposes by multiple users.

One of the primary roles of the national standard is to establish a process for determining 'healthy' – the benchmark for each environmental asset. This standard will be used by regional authorities to determine the benchmark for each of the indicators in their region.

A starting point for the national standard is to recognise a universally accepted definition that a healthy ecosystem has three attributes¹²:

- vigour, which refers to the level of productivity or 'pulse' of an ecosystem;
- organisation, which refers to the structure or number of interactions within an ecosystem (healthy ecosystems have many interactions

– complex food webs – whereas disturbed systems are highly simplified and have fewer interactions); and

- resilience, which refers to an ecosystem's ability to recover following disturbance (healthy ecosystems 'bounce back' after a disturbance, unhealthy ones do not).

Indicators for each of the five environmental asset classes (land, water, etc) would be selected on the basis of their cost effectiveness in measuring the health (vigour, organisation, resilience) of that environmental asset in each region.

Once the indicators have been selected for each environmental asset in each region, benchmarks are then defined for each indicator, based on the best available science. These benchmarks become a standard for the environmental asset in a 'healthy' condition.

A National Environmental Accounts Advisory Council would oversee the development, maintenance and improvement to the national standard over time. It should comprise independent experts in each of the environmental assets and the Australian Statistician, be chaired by the Australian Chief Scientist and report to the Australian Environment Minister. It would:

- accredit monitoring and reporting standards (including rules for selection of indicators and consistency of ranking systems);
- oversee regional capacity building in environmental monitoring;
- oversee audits of data collection;
- provide expert assessment that regional accounts and report cards satisfy monitoring and reporting standards; and
- approve the annual National Environmental Accounts for public release.

Regional Data Collection and Reporting

This proposed model for the National Environmental Accounts adopts a new approach, built from a regional framework and aggregated upwards into a standardised, national environmental accounting framework.

The regional framework for the National Environmental Accounts creates the opportunity to convert the current regional action plans from a wish list of projects to a strategic plan for the future management and repair of Australia's natural capital.

Each of the 56 Natural Resource Management regions in Australia would produce annual Regional Reports, which would summarise the health of each region¹³. The initial level of detail will vary from region to region in the early years until regional capacity and adequate data collection systems are built. Whilst the reporting of data is based on a regional scale, many of the data sets will be collected nationally. Satellite monitoring of vegetation is one example.

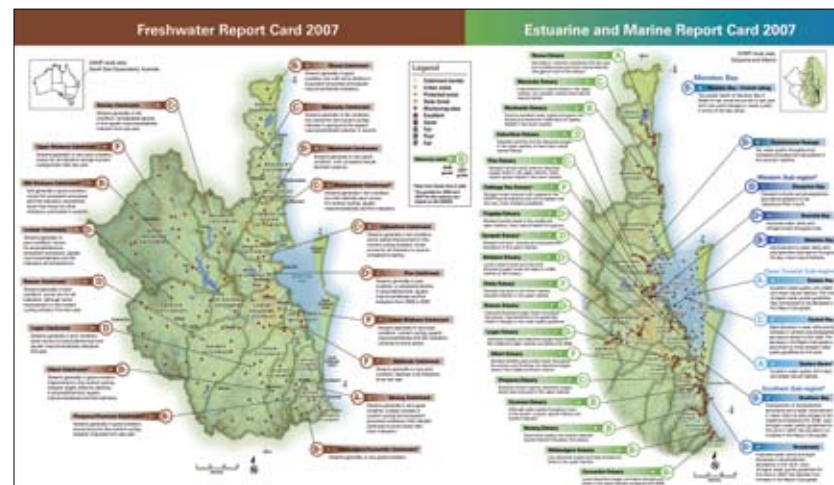
Regional data collection and reporting would be aggregated, using the National Environmental Accounting Standard, to produce the annual regional and national accounts. The same data collected for regional scale assessment would be used to produce the national accounts and visa versa, yielding significant cost savings by removing duplication.

Annual Regional Report Cards would report on the health of each environmental asset, as well as the change in condition of those assets over the previous year and years.

Data supply and alignment of data are key issues. In some cases these accounts may require new collections, but mostly it is about extracting or standardising data collection from existing systems. Because these data sets are owned by a range of Commonwealth, state/territory and local government agencies, a formal agreement, backed by national legislation is required to establish the framework for producing these accounts.

Once developed and operational, regional bodies should expect the annual report cards and the underlying accounts to be used to guide local, regional, state and national policy development. The data would be publicly available in a form to guide private investments and property management plans.

Annual regional report cards could be modelled on the South East Queensland Aquatic Ecosystem Health Report Card



A Common Currency to Measure our Landscape

Before money was invented people exchanged goods and services on a barter system. The creation of money, a common currency of exchange, revolutionised the world's economic system. It has taken infinite complexity and created a single unit of exchange in each country and exchange rates between currencies. From this foundation, the world has built the global financial system.

Environmental accounts are still in the dark ages. Creating a common currency to compare environmental assets is crucial in accounting for nature.

No single indicator can provide a complete picture of environmental health. Different indicators are often needed to monitor the same asset in different regions.

By adopting the same principles from the world's economic accounting systems, the process should become relatively straightforward.

Indicators for each environmental asset class are selected on the basis of their cost effectiveness in measuring the health of that environmental asset. Benchmarks are based on the best available science. They represent the standard for describing each environmental asset in a 'healthy' condition.

Once benchmarks have been established for all indicators, standard accounting practices can then be used to convert each indicator into a common metric (a scale of 0 to 1).

This creates a common currency to allow an unweighted comparison:

- between environmental assets in each region;
- between the same environmental asset in different regions; and
- changes within and between each asset over time.

An environmental asset in each region would receive an:

- A, where the data measures an indicator at or above the benchmark;
- B rating, for data at or above 84% of the benchmark;
- C rating, for data between 67% and 83% of the benchmark;
- D rating, for data between 50% and 66% of the benchmark; and an
- F rating, for an indicator less than 50% of benchmark.

In the same way economic ratings agencies use + and – to create finer categories, so too can the environmental monitoring scheme create sub-classes of A+, B-, C+, etc.

A positive change in condition, for example from a C+ to a B- would score a B- with a Δ or a ☺ it's getting better! If the condition changes in the negative, for example, from a C+ to a C, it would score a C with a ∇ or a ☹ . No change, no smile: ☹

A scientific panel would interpret whether change is natural or human induced. Behind each symbol would be a collection of data that provides the basis for the interpretation of positive, negative or no change.

This method of creating a common currency allows the National Environmental Accounts to deliver national, state/territory-wide and regional (catchment) scale reports on the health and change in condition of our natural resource assets.

This information would then underpin long-term catchment management and land use planning decisions by all levels of government and regional (catchment) authorities. It would be used to guide investment decisions. It would also contribute to broader reviews of our progress as a nation, such as in the five yearly Intergenerational Reports¹⁴.

Informing Policy and Guiding Public Investments

Our taxes are making major investments in our environment.

However, we have no environmental accounting system in place, and are therefore unable to evaluate if this funding is being directed towards the most cost effective environmental outcomes. People work too hard to see their taxes being wasted.

Many environmental monitoring programs lack economic or environmental rigour. There is too much focus on process and too little focus on measuring outcomes for the resources invested. In many cases, the money is being spent in such an ad hoc manner that it removes any realistic chance of detecting change¹⁵.

The National Environmental Accounts would revolutionise the cost effectiveness of public and private investments in environmental management. They would allow for future project funding by the Commonwealth, state/territory and local governments, to be based on a transparent evaluation of the cost effectiveness of projects in improving the condition of environmental assets.

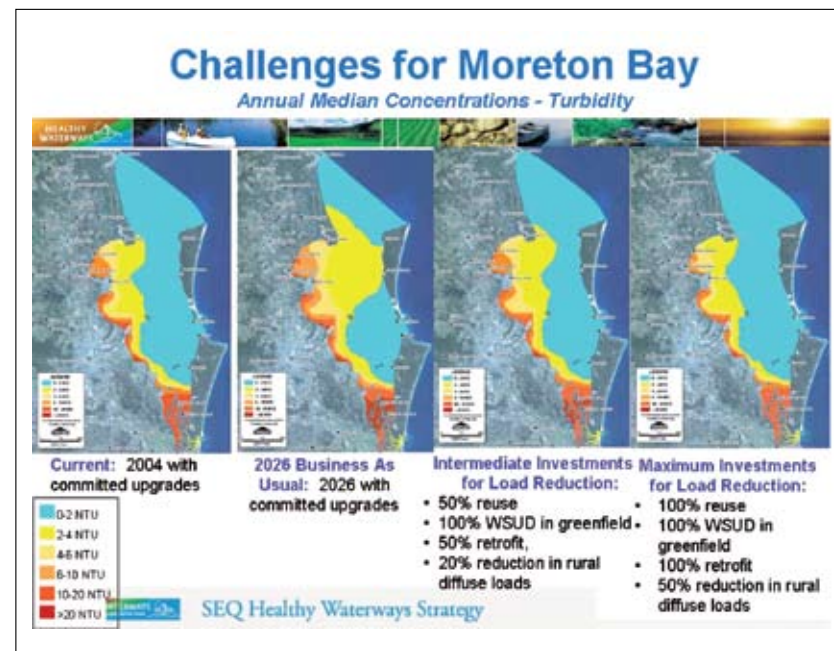
The formula is simple: *Cost Effectiveness = Change in environmental health/ Project cost (\$)*.

With this, the National Environmental Accounts would eventually become the cost benefit analysis tool for environmental management and public conservation investments.

These accounts would not only dramatically improve the design and delivery of regional investment programs, they would also improve the cost effectiveness of project funding.

For example, the South East Queensland Healthy Waterways Partnership uses the 10 years of data in models developed by the CRC for Catchment Hydrology to evaluate the cost effectiveness of future investment options for managing the health of Moreton Bay¹⁶.

This modelling shows the risks of a business as usual approach versus a targeted investment of \$480 million over 15 years to revegetation of river corridors in the affected catchments, at an average cost of \$10 per rate notice. It reveals the most cost effective way to reduce the impact of population growth and improve the health of the Moreton Bay estuary.



Investment options for addressing turbidity in Moreton Bay

Institutional Design and Funding

Whilst the principles for building a regionally-based National Environmental Accounts framework are relatively straightforward, the institutional challenges are enormous.

Success will require a level of co-operation between environment agencies within and across governments to a degree never achieved before in Australia.

It will require:

- a framework agreement by the Council of Australian Governments;
- national legislation to ensure consistency of data collection;
- an overhaul of existing (often wasteful) Commonwealth and state/territory agency research and monitoring programs;
- building regional environmental accounting units across Australia; and
- tied funding to create the incentive to drive these reforms.

These challenges do not diminish the massive self interest for Australia in managing the health of our nation's natural capital, in understanding the impact of policies, and whether the billions of dollars of public investments and tax incentives are having the desired impact.

COAG Agreement

A COAG National Environmental Accounts Framework will need to:

1. Establish the National Environmental Accounts Advisory Council to develop an agreed National Environmental Accounting Standard;
2. Agree to national legislation to institutionalise monitoring and contributing data according to the national standard across the different levels of government;

3. Agree that Commonwealth and state/territory data sets will be aligned to the new national standard and supplied to the regions; and
4. Accept that all future Commonwealth environment and natural resource management program funding (to Commonwealth agencies, State, Territory and local governments, and regional authorities) will be tied to the supply of data for the National Environmental Accounts on time, and according to the national environmental accounting standard.

Staging

The National Environmental Accounts have the advantage of being built on information systems created from past investments in science and monitoring, such as the National Greenhouse Gas Inventory, continental mapping of native vegetation, and the national system for collecting air pollution data in major cities.

Whilst there will be gaps, it is possible to produce the first full set of regionally based, National Environmental Accounts within 4 years.

Phase 1 (2008) would comprise a COAG agreement to develop the National Environmental Accounts of Australia which:

- are based on a regional data collection and reporting framework;
- measure the health and change in condition of each environmental asset in each region;
- establishes an independent expert based, National Environmental Accounts Advisory Council; and
- links funding of environment programs of Commonwealth and State agencies to the delivery of these annual accounts.

Phase 2 (2009) would:

- have the National Environmental Accounts Advisory Council develop the environmental accounting standards;
- align existing data held by Commonwealth, state/territory and local government agencies, so that they are fit for purpose for the regional accounting framework; and
- select up to 6 regions across Australia to trial the regional report cards.

Phase 3 (2010) would see:

- the completion of the regional trials and release of the 6 report cards; and
- the establishment of 56 environmental accounting units across Australia to build capacity in all regions.

Phase 4 (2011) would see:

- the production of 56 regional report cards, which by necessity will be of variable quality, but of sufficient standard for public release and incorporation into the National Environmental Accounts; and
- the release of Australia's first National Environmental Accounts report.

Capacity Building

A regionally based national environmental accounting framework will require the establishment of environmental accounting units (ideally within the 56 Regional Natural Resource Management bodies) across Australia.

As the capacity for regional organisations to undertake this program will vary from region to region, targeted funding and technical support will be needed to resource and skill regional bodies. It will also require an overhaul of the excessively bureaucratic reporting requirements that are

currently imposed on regional NRM bodies, allowing them to focus on monitoring for outcomes rather than reporting on inputs.

Funding

The SEQ Healthy Waterways Partnership provides a template for delivering regional monitoring in a cost effective way. Through contractual partnerships, they sample 30 freshwater indicators at 100 sites twice a year and 250 estuarine sites every month, with an annual budget of less than \$3 million.

These data sets are used to produce the annual report card. The same data are used by 20 different agencies, including the Environment Protection Agency, 4 universities, 18 local councils, CSIRO, and the SEQ Catchments regional body.

Extrapolated across Australia, an investment of less than \$200 million would represent less than 3 percent of public environment funding. However, we do not recommend the creation of a \$200 million program. By removing duplication of existing data gathering currently spread across government agencies and by re-prioritising existing research and monitoring programs, the building of the National Environmental Accounts should be revenue neutral.

The Commonwealth should lead this reform, by redirecting investments in existing Commonwealth programs, such as the State of Environment Reporting, Land & Water Australia, the National Land and Water Resources Audit, CSIRO, Geosciences Australia, Bureau of Rural Science, ABARE and others. Reprioritising less than five percent of these and other Commonwealth programs alone would secure over \$50 million per annum^{17,18}.

State/territory governments should also undertake a similar rationalisation of existing programs, and agree to provide regional bodies with resources for the assembly of the regional accounts and for the collection of regional data.

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