Commissioner
Environmental Sustainability
Victoria

Science, Policy, People

State of the Environment Reporting 2013, Victoria

Plenary and Indicator Selection Intensive Summary

9 March 2011
Burnley Campus
Melbourne School of Land and Environment
The University of Melbourne
500 Yarra Boulevard Richmond Victoria

State Government
Victoria

SCIENCE, POLICY, PEOPLE
State of the Environment Report 2013

Plenary and Indicator Selection Intensive March 9, 2011 Summary

OVERVIEW

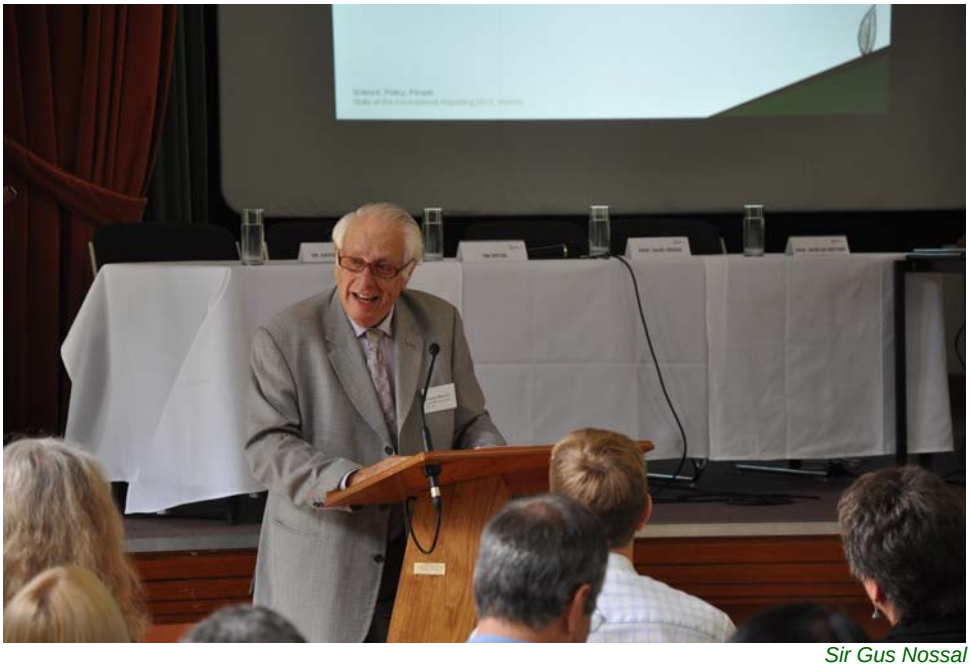
The Indicators Selection Intensive hosted by the Office of the Commissioner for Environmental Sustainability was conducted to assist Professor Kate Auty, the Commissioner in finalising a list of indicators to guide the development of the three Foundation Papers and the State of the Environment report as described in the *Science, Policy, People* framework document.

The reporting structure for the 2013 State of the Environment report uses an approach that frames the effects of environmental change in a human context. More specifically, it seeks to explain how natural and human-caused changes in the environment affect the well-being of Victorians in terms of Natural, Human, Social and Economic Capitals. To this end, the reporting structure will incorporate both quantitative and qualitative data at multiple scales.

The Foundation Papers and State of the Environment report will make use of information that describes issues connected with environmental change. Information will be sought that:

> ***Measures***: quantitative reporting, e.g. land-use change and habitat loss
> ***Explains***: in-depth analysis of complex interactions, e.g. social impacts of extreme events
> ***Explores***: examines underlying concepts, e.g. relationship between social, economic and natural capitals.*

The proceedings began with three keynote speeches, followed by a panel discussion and plenary guiding their critique was: *what important story are you telling by selecting this indicator?* To conclude the day, each table reported back to the entire group with their recommended indicators, and a short "big picture" discussion was held. Proceedings were chaired by Dr Graham Mitchell, Chief Scientist of the Department of Sustainability and Environment and the Department of Primary Industries.



Sir Gus Nossal

* Information categories defined by Elissa Waters, Spatial Analysis & Research, Department of Planning and Community Development

KEYNOTES PRESENTATION AND PLENARY DISCUSSION

As an introduction to the 2013 series of State of the Environment reporting, and to begin a conversation on a critical topic, the Commissioner opened the Intensive with three Keynote presentations and an expert panel discussion on climate change communication.

The Governor of Victoria, Professor David de Kretser, delivered the first keynote address and emphasised the need for an educated public and the importance of providing tangible examples that might help convince people of the need to take action for environmental sustainability. Professor de Kretser drew an analogy with childhood obesity and its link to cardio-vascular disease in later life, elaborating on the difficulty of taking action over a long period well before the severity of the consequences becomes apparent. Professor de Kretser's speech prompted Dr Mitchell to invoke Mark Twain: "Few things are harder to put up with than the annoyance of a good example."

Sir Gustav Nossal followed Professor de Kretser, remarking that some scientific issues are so emotive that it is difficult to have a proper debate. He drew a comparison to the campaign against vaccinations – where one study casting doubt over the safety of vaccinations single-handedly caused childhood immunisation rates to drop from over 90% of the population to 72%. He observed that today's parents have no experience of epidemics, and that complacency towards the importance of the greater good had set in, even when nine subsequent studies comprehensively rejected the original paper. Unfortunately, once suffered, the damage done to public opinion can be hard to counter.

With this in mind, Sir Gus provided five guidelines for how scientific issues should be communicated to the public:

1. Don't dismiss the opposition, and take their complaints seriously.
2. Never play the person, only the issue.
3. Be patient, as you may need to repeat your message.
4. Avoid technical jargon.
5. Don't shy away from using statistics to support your argument.

In all of this, he said you should assume of your audience "infinite intelligence and zero knowledge": it is important not to patronise people, but to ensure they are provided with thorough and rigorous information, in a clear and calm manner, giving voice to ideas and possible conclusions.

The third speaker was Dr Saffron O'Neill from the University of Melbourne's School of Land and Environment, who presented findings from empirical studies on climate change communication. As context for her talk, she observed that climate change is no longer a purely scientific issue; it now has very strong cultural, political and ethical dimensions. She emphasised that this is not about brainwashing people into rational action, nor is there a silver bullet that will magically conjure unanimous support for climate action. Four key conclusions were identified:

1. Information is not enough: the *type* of information is critical; it must be compelling and targeted to ensure people care and are able to take action.
2. Fear won't work: it is important to be upfront about the probable impacts of climate change, but resorting to fear tactics tends to result in denial, apathy and issue avoidance; it can also damage the trust levels within existing relationships.
3. Seeing peers engaged in pro-environmental behaviour can be very influential, as social networks are a trusted source of advice.
4. People need to be engaged; words and images are important, but they're not everything, and care needs to be taken to avoid messages being seen as 'spin'.

For the panel discussion, the keynote speakers were joined by Commissioner Auty, climate scientists Professor Dave Griggs (Monash Sustainability Institute) and Dr Penny Whetton (CSIRO), and business leaders Tim Orton (Nous Group) and Dr Chris Mitchell (CO_2 Australia).

Much of the conversation amongst the panel, and then including the members of the audience, elaborated on the issues raised by the keynote speakers.

The idea was raised that there is not a deficit of information available, but perhaps instead a surplus of often conflicting or otherwise confusing information. A particular emphasis should be made to inform young people about the issues. Added to this scenario is the need to somehow communicate the uncertainty of climate science to the community. Significant barriers exist in this area, as even amongst highly scientifically literate members of the public there is confusion about what is meant by "uncertainty".

Panel members L-R: Dr Saffron O'Neill, Mr Tim Orton, Prof Dave Griggs, Dr David de Kretser Governor of Victoria, Prof Kate Auty, Sir Gus Nossal, Dr Chris Mitchell and Dr Penny Whetton.

This difficulty is a subset of a greater problem: that of language. One participant commented that the language in the current technical and policy debate being played out in the media is already too far removed from the average person. To that end, it was agreed that it is critical to engage people on their terms, which may mean using different language depending on the audience, or different modes of communication. As an example, it was observed that politicians, more accustomed to the back-and-forth of parliamentary debate, are not keen on Powerpoint presentations. Without making people feel connected to the situation, through effective communication, it will be impossible to get them to take action.

One participant noted that the discussion suggested we had failed, and that perhaps the presence of climate change at the forefront of public debate should be seen as a sign of success in the communication approach. It has, however, become an economic issue (eg. the cost-benefit analyses of Stern and Garnaut), with environmental issues almost taking on secondary importance. Science has done an excellent job in defining the causes of the problem, but the solutions now rest with political and economic frameworks. We have, however, failed to frame climate change as a social issue: it was said that in a climate-constrained future what people will value needs to be articulated.

In doing so, the audience was told that we should consider that people fear the unknown impacts of climate change, but also fear the unknown costs of taking action. Giving people options of how to avoid losses may represent an effective way of providing a sense of agency, and of empowering the community.

Advocating action towards this empowerment in a climate-constrained future was identified as a fraught issue. The public was seen as generally trusting scientists when they are talking about science, but it was agreed there is a danger of straying into the "advocate" space, which can undermine public confidence and trust in the objectivity of experts. It was deemed important for scientists to remain as trusted sources, but there was no consensus on how a scientist might engage in advocacy without tarnishing this trust. NGOs were identified as having an important role to play as advocates, in particular reaching different audiences. In all these communications, however, it must be remembered that what is *said* is less important than what is *heard*, and *from whom* it is heard.

For the State of the Environment report, it was felt that a primary role is to *inform* the community, and to demonstrate that policy can have a unified and effective solution to climate change. These policies should be informed by compelling case studies. The report should be more dynamic than simply assessing the environment at a single time-point, and should provide more information on societal adaptation to climate change and other environmental threats. Finally, the State of the Environment report needs to be the beginning of a wider conversation on issues of critical importance – engaging

both the community and decision-makers to ensure effective and timely responses to the impacts of society on the environment and impacts of the environment on society.

THEMATIC TABLES

Below are summaries from each of the thematic tables of experts. The experts provided both specific comment on the list of indicators with which they were presented, and general comments on the approach and direction of the 2013 State of the Environment report. They were asked to rank each indicator as one of high, medium or low priority.

Aquatic Ecosystems

The initial concern of the table was determining the "story" that will be told by the indicators. The experts were reticent to suggest one in particular, although several themes did emerge upon discussion of the indicators, including: impact of changes in catchment and land use; impact of changes in river regulation; public health/water supply; changes in water sources (extraction v surface water). Climate variability and extreme events were also seen as potential focal points for indicator discussion in the reports.

Changes to the indicators themselves were generally few, with most indicators identified as high priority. Additional suggested indicators included a measure of dissolved oxygen and certain metrics around invasive aquatic species. Most indicators identified as low priority were able to be represented through other indicators (ie. pesticide levels in rivers cf. water quality), or were more related to other thematic areas (ie. area of salt affected land as more of a Land issue than Aquatic Ecosystems issue). Another important note was the inclusion of lakes in the discussion of wetlands, as well as rivers and estuaries.

The development of the Water & the Environment Foundation Paper was seen as a real opportunity to investigate the connections between indicators more deeply, and provide a richer analysis of some of the water data than currently exists. Resourcing this endeavour was raised as a point for further discussion.

Climate and Air Quality

The table agreed that most of the indictors relating to climate change and air-quality were of high priority with some being very high. In the “very high” category were: particle levels, health impacts, temperature, sea level, impacts of extreme weather, timing of biological events, trends in greenhouse gas emissions, energy use. Light pollution is an important emerging issue. Snow cover functions as an indicator of changing temperature in an area with few thermometers as well as having wide ranging social implications. Some indicators, such as soil carbon stocks were thought to be of high priority for policy makers but of low priority to the general public.

Those indicators that were rated low priority were largely concerned with changes in energy use and generation. The participants on this table didn’t think that these were unimportant but considered them to be more relevant to energy policy issues rather than climate and atmospheric science. Indicators concerning the effects of climate change on stocks and flows of water are very closely related and could be represented by hydrological drought as a high-level indicator.

The effects of extremes are vital. The table participants agreed that drought impacts were important but should be included in a wider consideration of the effects of extreme weather, such as storms, floods, heatwaves, fires etc. This would be a more effective indicator of the social effects of climate change. Similarly, measuring rainfall is a high priority but indicators used should show variability and extremes rather than average values. Other metrics, such as atmospheric pressure and sea surface temperature, provide a better measure of changing weather than average rainfall but are less well understood by the public. The proposed solution was to use these indicators to tell a narrative of likely changes to weather systems (synoptic change) in south east Australia.

Regional climate change projections were thought to contain large uncertainties when based on large-scale state or national projections. However, these could be used in conjunction with qualitative data to show a range of likely outcomes as a result of climate change in regional Victoria.

Land

The table participants made clear that their comments on the indicators were strictly from the point of view of the importance of each indicator to land use, and that, while some indicators may be rated as low priority in that context, it is possible that those considering social or economic impacts may produce differing recommendations. On that theme, however, another key message was that many of the biophysical indicators are only valuable when applied in a local or regional context (not state-wide), or when related to social or economic outcomes.

One issue relevant to several indicators was that the Commissioner should compare, metaphorically, apples with apples when reporting: the appropriate measure should be against the best-in-class and worst-in-class of a particular system, rather than across systems that may be an unfair comparison. For example, soil acidity in a specific area of farmland should be compared against other farmland, not against soil in alpine regions or in national parks.

The table consistently returned to *changes in land use/land tenure/land cover* as a critical indicator that in many respects governs all subsequent analysis. Specifically, peri-urban areas should be a focus, not just around Melbourne but also around regional centres such as Bendigo and Warrnambool. Societal impacts of these changes were identified as being an important component of the final report.

Some specific indicators that sparked extensive discussion include:

- snow cover: while ultimately, from a Land point of view, given a rating of low priority, it was acknowledged that this indicator flows into many other important areas
- regional climate change projections were considered to be of great value for local engagement; people are primarily interested in how their local area is going to be affected by climate change
- some indicators were considered “distortionary”, such as off-farm income and ratio of land value to production value – these were seen as being subject to too many other variables that render the indicator meaningless
- other indicators that incorporated subjective elements (eg. use of “best practice” on agricultural land) were thought to be more appropriate for case studies rather than as indicators per se
- of the soil health indicators, soil organic carbon and soil pH were considered most valuable
- expenditure on natural resource management would be very valuable and interesting, but the figures for private NRM are hard to get and figures for public NRM are hard to disentangle; although, money spent does not necessarily equate to results achieved
- indicators on the economic side of primary industries needed further refinement, perhaps focussing on productivity growth, export revenue, or yield per unit of land or unit of water.

Marine and Coastal

There appeared to be a high level of agreement amongst participants in relation to what indicators should be cut, what should be kept, and their priority ranking. For some indicators, there was debate about their listed category (whether a 'trend', 'consequence' or a 'management' indicator). Some indicators were recommended for exclusion on the basis that they were very blunt measures that failed to provide meaningful information. For example, 'amount of coast in protected area system' and 'areas of Victoria's coastal waters protected in marine parks' are easy to measure, but they do not provide information about whether a representative sample of habitat types and habitat condition is protected, which participants argued is at least what is needed to evaluate the effectiveness of our management response.

The main themes, where there was apparent general agreement on the table, were:

- Indicators for marine and coastal environments are very location- and context- specific: some rank as high priority in some areas, and low priority or irrelevant in others (eg. some are relevant only to some estuaries and bays).
- It is important that coastal and marine indicators capture the relationship between 'upstream' catchment activities/processes and the health of coastal areas, particularly estuaries and bays.
- Some of the indicators need to be made more coastal specific, if the data is available.
- Management of the marine environment is different to management of the terrestrial environment because all marine areas are public land. Also, management approaches between marine and terrestrial environments can be different (eg. an ecosystem based approach is used more widely than a threatened species based approach in marine environments).
- It is important to stick with a core group of indicators over time to facilitate direct comparisons between State of the Environment reports.
- For some of the indicators, it is often difficult to separate drivers or stressors from responses.

Additional indicators suggested by the table included: catchment inputs (an important stressor in estuaries and bays); diffuse inputs; extreme weather events (indicators on this theme were lists for other tables); changes in species distributions (difficult to measure due to temporal uncertainty - ie. is a change in distribution permanent?); biological responses to environmental changes (difficult to measure); and coastal inundation and erosion.

Social (two tables)

The two tables discussing social indicators encountered the same issues, and to a large extent proposed similar responses, and are thus presented here together.

Although the *Science, Policy, People* framework and the reporting structure provided some clarity, the difficulty for our social experts was to come to terms with the interface between the social indicators and the biophysical indicators without knowing exactly what the *narrative* of the State of the Environment report will be. This was resolved by considering the indicators in terms of their effectiveness in telling one (or more) of three important stories:

1. The capacity for people* to change their behaviour.
2. The impact of environmental change on people.
3. The impact of people on environmental change.

(* There was some debate as to what "people" means in this context and it was agreed that it could mean individual, community or system.)

A fourth category might be “human responses to environmental impacts”, though this is arguably a subset of the first. Further, the narrative should define the timeframes for analysis, well-defined goals linked to those timeframes, and the spatial scale of interest (eg. global v local). It should also provide a link between the biophysical indicators and social/public values – without this link, it will be difficult to report on indicators as a means to drive policy change, investment and community action. It was suggested that aggregation of indicators (eg. ecological footprint) might be a suitable way of bridging the gap between technical assessment of specific issues and broader public awareness.

A different way of articulating this was to focus on trends: what are people doing to contribute to a particular trend, and what are the consequences both for people and on people (from which point discussions of remedies can begin). Priority areas for tracking trends include: health and wellbeing indicators; consumption patterns; generation of waste; water and land use and their sustainability. A connection should be drawn between *social needs* and *environmental limits*.

Examples of "the capacity for people to change their behaviour" included resilience and mitigation indicators. It was also noted that most indicators in this category were notoriously difficult to measure and would most likely require case studies and qualitative analysis. Prioritised indicators included: capacity to conduct and apply research and development aimed at improving environmental sustainability; and land managers' capacity to change and adopt sustainable management practices.

Examples of "the impact of environmental change on people" indicators that were prioritised included impacts of extreme weather events and bushfire risk.

Examples of "the impact of people on environmental change" included population indicators. Prioritised indicators included: change in average house size versus household size; urbanised area of Melbourne; change in car ownership figures; and uptake of bicycle use.

Questions were raised over the appropriateness of using *projections* as indicators. It was unclear to the experts how certain projections fit into an overall narrative, and it was suggested that projections ought to be clearly linked to existing trends in other indicators.

There were also a number of suggested indicators by the experts to address perceived gaps in the current list:

1. quality of science communication activities
2. indicators related to increasing temperatures: heat stress, vector-borne disease, water/food disease related to temperatures, and the resultant social impacts of these
3. purposeful management of land use in respect to perceptions and/or experience of environmental change
4. monitoring of phosphorus use and uptake of alternative sources of phosphorus (this indicator was preferred to use of fertilisers and pesticides indicators)
5. measure economic diversity (this indicator was preferred to "community resilience" indicator)
6. change in car ownership figures and uptake of bicycle use.

It was also asserted by the experts that although they respected the importance of clear indicators it was critical that the State of the Environment report remain focussed on the "big drama" of environmental issues rather than on the "snippets" stories of particular indicators.

A successful report will provide knowledge for the future rather than information on the status quo. It will stitch together a comprehensive story and will focus on change in the environment - in fact, it should be called a "State of the *Change in the* Environment" Report.

Terrestrial Ecosystems

The discussion of terrestrial indicators identified 5 main issues:

1. Indicators need to be divided into 3 categories - stressors, outcomes and actions. Currently, the indicator list is dominated by stressor indicators.
2. Comparing current trends in biodiversity (e.g. extent of native vegetation) to estimated 1750 levels (prior to European settlement), is not recommended. Indicators should assess recent changes to determine current management performance and impacts of ongoing changes in environmental conditions. In addition, it is important to communicate that a return to 1750 conditions is not the goal (or even possible), and to acknowledge that natural change has occurred since 1750.
3. It is important to ensure that both species and ecosystem levels are assessed to determine a range of environmental changes. For example, trends in the distribution/abundance of species and vegetation quality can demonstrate subtle changes as a result of climate change. It was also noted that not all change is bad e.g. natural variation.
4. Indicators should also assess the likely future condition of ecosystems and species. The resilience of ecosystems (eg. connectivity) and species (eg. populations, genetic variation) needs to be assessed, along with the adequacy of refugia. The effects of climate change must also be incorporated into this analysis (eg. changing habitat requirements as a result of environmental change). This information will inform the preparedness of management for future changes.
5. Assessments of management effectiveness are needed, including assessments of cost effectiveness.

CONVERGENCE SESSION

The clear message from the day's proceedings is that the divide between the biophysical and social indicators, including economic measures, is capable of being narrowed. The effective communication of information about environmental trends and the impact of climate change to an increasingly interested public is a core consideration for State of the Environment reporting in Victoria. The Commissioner's framework *Science, Policy, People* provides a conceptual framework which can integrate environmental, social and economic concerns in a manner which informs its readers, and introduces strategic proposals for consideration by decision makers across government and more broadly.

LIST OF ATTENDEES

Key Note Presenters and Panel Members

Prof Kate Auty (Commissioner for Environmental Sustainability, Vic)
Prof Dave Griggs (Monash University)
Prof David de Kretser (Governer of Victoria)
Dr Chris Mitchell (CO_2 Australia)
Dr Graham Mitchell (Foursight Associates)
Sir Gustav Nossal (Foursight Associates)
Dr Saffron O'Neill (University of Melbourne)
Mr Tim Orton (Nous Group)
Dr Penny Whetton (CSIRO)

List of Academic & other Experts

Carol Adams (Latrobe University)
Alex Arbuthnot (Victorian Farmers Federation)
Stefan Arndt (University of Melbourne)
Lu Aye (University of Melbourne)
Ruth Beilin (University of Melbourne)
Karl Braganza (BOM)
John Carnie (Department of Health)
Deli Chen (University of Melbourne)
Mick Clarke (Latrobe University)
Catherine Dale (City of Boroondara)
Vivienne Filling (Ai Group)
Jane Fisher (Department of Primary Industries)
Christine Forster (Victorian Catchment Management Council)
Mick Gawith (Hindmarsh Shire Council)
Dave Griggs (Monash University)
Leanne Gunthorpe (Department of Primary Industries)
John Handmer (RMIT)
Sue Hendy (COTA, Victoria)
Ary Hoffmann (University of Melbourne)
Ray Ison (Monash University)
Paul James (RMIT)
Roger Jones (Victoria University)
Stefan Kaufman (EPA)
Bruce Kefford (Department of Primary Industries)
David Kennedy (University of Melbourne)
Mick Keough (University of Melbourne)
Joan Ko (ARUP Consulting)
Sam Lake (Monash University)
Randall Lee (EPA)
Steve Livesley (University of Melbourne)
Kevin Love (Department of Sustainability and Environment)
Ralph Mac Nally (Monash University)
Richard MacEwan (Department of Primary Industries)
Stuart McConnell (EPA)
Rod Marsh (Net Balance)
Monica Minnegal (University of Melbourne)
Chris Mitchell (CO_2 Australia)
Graham Mitchell (Foursight Associates)
Mick Murphy (Victorian Catchment Management Council)
Gustav Nossal (Foursight Associates)
Tim O'Brien (Arthur Rylah Institute)
Noelene O'Keefe (Department of Human Services)
Brendan O'Malley (EPA)
Saffron O'Neill (University of Melbourne)
Craig Pearson (University of Melbourne)
Gerry Quinn (Deakin University)
Bethany Roberts (Department of Sustainability and Environment)
David Robinson (EPA)
Rob Roggema (RMIT)
Ian Rutherfurd (Department of Sustainability and Environment)
Sabine Schreiber (Department of Sustainability and Environment)
Gillian Sparkes (Department of Sustainability and Environment)
Michael Timpano (Department of Sustainability and Environment)
Tony Varcoe (Parks Victoria)
Dugal Wallace (Department of Sustainability and Environment)
Sean Walsh (EPA)
Elissa Waters (Department of Planning & Community Development)
Dale Watson Department of Sustainability and Environment)
Corey Watts (Climate Institute)
Penny Whetton (CSIRO)
Kylie White (Department of Sustainability and Environment)
Nick Williams (University of Melbourne)