

Weed R&D: Contributing to and influencing weed policy in Australia?

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Introduction

As a weed scientist, I hope that my findings will be seen as innovative and relevant by my peers, but just as importantly, I hope they are of use in influencing decision makers to develop policies and strategies that will result in improved weed management. Informing public policy with sound science has long been recognized as a vital need for the effective management of natural resources and the environment, including the management of threats such as invasive species. However, in the case of weed research, how effective has science been in contributing to and influencing policy in Australia?

This paper looks at the current links between science and weed policy in Australia and discusses ways in which these links could be strengthened.

How is weed policy currently developed in Australia?

In Australia, weed policy is integrated and coordinated between policy areas across Federal, State/Territory Governments and regional natural resource management authorities or Local Government.

National policy is developed through the Australian Weeds Committee, a sub-committee of the Land, Water and Biodiversity Committee responsible to the Natural Resource Management Ministerial Council of the Commonwealth Government. National policy is outlined in the National Weeds Strategy.

State/Territory Governments have responsibility for weed legislation and policy development at the State level and all have current weed strategies.

At the regional level, it is principally the responsibility of natural resources management authorities/boards and local government to develop priorities for management of weed species, based on their impact on economic, environmental and social values. These bodies develop regional weed management plans in consultation with the community, private and public land managers.

Who are the providers of weed science in Australia?

Weed R&D is carried out by a range of organizations in Australia including Commonwealth and State/Territory Government Departments, CSIRO, Universities

and some private consultants. The principal weed R&D organization is the Cooperative Research Centre for Australian Weed Management, formed in 2001 under the Commonwealth Government's Cooperative Research Centre Program. It comprises seven core and 13 supporting participant organizations made up of Commonwealth and State government departments, CSIRO, Universities and industries.

It should be stated that generally in Australia, there seems to be a clear separation between policy bodies/government funding organizations and providers of weed research.

Are there formal links between weed policy and science?

To investigate links between weed science and weed policy, an analysis of Commonwealth, State, Australian Weeds Committee, Weeds CRC and Council of Australian Weed Societies documents and reports was carried out. Information from each document referring or alluding to research and policy is listed in Appendix 1.

Discussion

An investigation of current weed policy at the Commonwealth and State/Territory level indicates that weed policy in Australia is principally developed through a process of stakeholder consultation that includes R&D stakeholders. But are the scientists really having an impact on policy? The main references to weed research in the national and state weed strategies do not refer to the use of science to better inform policy development but to 'strengthen the national research, education and training capacity to ensure ongoing cost effective, efficient and sustainable weed management' as listed in the National Weeds Strategy (Anon. 1999) or 'Research about pests, and regular monitoring and evaluation of pest control activities, is necessary to improve pest management practices' as listed in the Queensland Weeds Strategy (Anon. 2002) or again 'Identify and prioritize research programs to support integrated weed management' as listed in the Weed Plan for Western Australia (State Weed Plan Steering Group 2001). The only indirect references to linkages between science and policy are Goal 4 of the Australian Weeds Committee (Anon. 2002) with the

objective 'To ensure that key stakeholders are consulted and have the opportunity to comment on AWC Papers and initiatives as appropriate' and in the Victorian Pest Management – a Framework for Action (Anon. 2002a) that states 'Research managers will be encouraged to take part in collaborative programs that address priority issues in Victoria'. Lonsdale (2002) reviewing the Commonwealth and State weed strategies, commented on deficiencies relating to planning, implementation, resources and review/reappraisal, but did not comment on issues of research and policy (see http://www.weeds.crc.org.au/publications/talk_broch_post.html). This study indicates that there are opportunities to better link science with policy development when reviewing the National and State weed strategies.

There is increasing evidence that the Weeds CRC is beginning to influence weed policy at the National level and contributing information that may lead to policy changes at the State level. Its Strategic Plan (CRC for Australian Weed Management 2004) states that it will 'Increase awareness of weed issues ... and provide accurate knowledge on which to base policy and management decisions'. It has also raised awareness of the impact of weeds through wide distribution of its 2020 Vision Statement (Martin 2003), a document that proposes eight new weed action programs, and by reporting on the economic impact of weeds in Australia (Sinden *et al.* 2004). A strategy of the Weeds CRC is to compare the economic impact of weeds to the impacts of other serious forms of land degradation, namely salinity, sodicity and acidity. Sinden *et al.* 2004 indicate that even at its lowest estimate, the 'net annual impact of weeds (\$3442m) is an order of magnitude higher than the gross estimates at farm gate given for salinity (\$187m), acidity (\$1585m) and sodicity (\$1035m)'. Armed with this information, the Weeds CRC is arguing for increased resources for weed management because issues like salinity currently receive significantly more political and financial support at Commonwealth and State level. The Weeds CRC has also been active in attempting to close a legislative loophole at Commonwealth level that allows the importation of known weed species into Australia. It has recently raised the issue of the need to review the permitted seeds list at Commonwealth level (Schedule 5 of the *Quarantine Proclamation 1998*) through publications (Spafford-Jacobs *et al.* 2004), submissions to the Commonwealth Senate Committee on invasive species (Environment, Communications, Information Technology and the Arts Reference Committee 2004, see Recommendation 16) and a media campaign. This campaign has influenced a review of the permitted list by Biosecurity Australia, currently under way.

It is interesting to note that the Council of Australian Weed Societies (see <http://home.vicnet.net.au/~weedss/>) does not have a specific objective on influencing weed policy, but refers to itself as 'can express a National view on all issues relating to weeds' and again 'a representative voice on matters pertaining to weeds and weed science and technology'. Of its Council Members, only the Weed Society of Western Australia lists 'Lobby governments on weed related issues...' as an objective relating to influencing policy.

In Victoria, an interdisciplinary mix of scientists, economists, extension specialists and policy makers have joined in a project to re-assess the Victorian noxious weeds list (Weiss personal communication). This is a massive task aimed at prioritizing pest plants based on economic, environmental and social impacts at the State level, as well as each of the 10 Catchment Management Authority levels. Another project using an interdisciplinary approach has developed a rapid response policy for new and emerging weeds, a contingency plan and a network of volunteer 'weed spotters' (Department of Primary Industries 2005). An attempt was also made in the former Victorian Department of Natural Resources and Environment (DNRE) to influence policymakers in improving coordination of invasive species policy and legislation. This was done by holding a Chief Scientists Invasive Species/Biosecurity Symposium in 2002 resulting in a number of recommendations to the Department's Executive (Bruzzese unpublished). Unfortunately, the recent separation of DNRE into a Department of Primary Industries and a Department of Sustainability and Environment has reduced the momentum produced at the Symposium. The recent formation of Biosecurity Victoria as a Division of the Department of Primary Industries is a step forward, although weeds are not part of its current responsibilities.

An important challenge for weed scientists when briefing policy makers is the fact that scientific uncertainty is quite different from political uncertainty. Scientific and political time frames are very different. Policy makers are often required to make reactive decisions on the best possible information and cannot wait for results of long-term ecological studies or impacts of biological control programs. In spite of this challenge, a number of options are available for improving linkages between science and policy. Common sense and a literature scan indicate the following possible courses of action:

- Develop a much closer interface between researchers and policy makers so that each understands the agenda (Wiltshire 2000).
- Scientists should clearly articulate where research projects are contribut-

ing to national, state and regional weed strategies.

- The deliberate development of projects that require the interdisciplinary mix of scientists, economists, extension experts and policy makers to achieve integrated outcomes.
- Develop a policy apprenticeship program for young scientists. Such a scheme called the 'Graduate Recruit Program' is currently under way in the Victorian Department of Primary Industries where young scientists are exposed to a series of scientific, extension and policy projects over a period of two years. A similar approach has been proposed by Carden (2004) who suggests 'strengthening key individuals within a generation of researchers who will in the future be in a position to implement or encourage policy change'.
- Scientists should translate relevant science for policy makers through appropriate briefings when the opportunity arises (International Association for Great Lakes Research 2003). Carden (2004) lists this as 'dissemination of research results to policymakers, in appropriate formats'.
- Scientists serving in positions of science adviser must recognize, not necessarily accept, political or other constraints under which decision-makers are acting (Bolin 1994).
- Scientists should contribute to independent think-tanks to provide policymakers with scientific advice (Gewin 2003). The Wentworth Group (2002) is one such Australian think-tank concerned with the sustainability of the Australian landscape. In the case of weeds it may be appropriate for the Council of Australian Weed Societies (CAWS) or the Weeds CRC to officially create such a think-tank, or alternatively, this could be a task for the Invasive Species Council.
- Identify opportunities for scientists to take short-term positions or short-term work experience in policy areas (Gewin 2003) to give them a greater understanding of policy needs.
- Development of a Member of Parliament-Scientist pairing scheme as done by the Royal Society in 2001 (<http://www.royalsoc.ac.uk>) where a scientist shadows an MP for one or two weeks and in turn, the MP visits the scientist's lab. This helps scientists identify the methods and structures through which they can pass their knowledge to parliamentarians, while the MP becomes acquainted with the scientific community and its work. Again, this may be a project for CAWS or the Weeds CRC.
- Investigate novel ideas such as 'Public Ecology' (Robertson and Hull 2003), an approach to environmental inquiry and decision making that does not expect

scientific knowledge to be perfect or complete, but produced in collaboration with a wide variety of stakeholders in a process of participation and deliberative democracy.

This review indicates that while the Weeds CRC has taken the lead scientific role in influencing weed policy in Australia, there are significant opportunities for other organizations and individual weed scientists to actively involve themselves in better informing and influencing policy with science, especially at the State and regional levels. To conclude, I would like to quote Maureen O'Neil (O'Neil 2003), President of Canada's International Development Research Centre who states:

'And if there is one lesson we have learned, it is that researchers must come to understand how policy-makers think, and how policy processes function. They need to understand the timelines of policy decision and execution, the pressures that policy-makers experience, the choices they face. Very often, the science that researchers need most is political science.'

Acknowledgements

I would like to thank the many colleagues who supplied documents for this review. Dr. Rachel McFadyen, Dr. Nigel Ainsworth, Dr. Robin Adair and Dr. David McLaren are thanked for their comments on the manuscript.

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Appendix 1. Links between weed science and policy in Commonwealth, State/Territory, Australian Weeds Committee and Weeds CRC documents.

1. Australian Weeds Committee (Anon 2003)

Goal 1. Providing national policy and planning solutions to weed issues.

Objectives: To provide advice and develop policy positions and papers for national weed issues in alignment with broader policy objectives and the prevailing Natural Resource Management framework.

Goal 3. Providing policy and planning advice to Natural Resource Management Standing Committee (NRMSC) and Primary Industries Standing Committee (PISC) on recognized national weed issues or as directed by NRMSC. Identify and facilitate implementation of action on significant weed issues.

Objectives: To provide policy advice via papers to the relevant Standing Committee.

Goal 4. Building linkages with NRMSC, PISC, Plant Health Australia Limited, CRC for Australian Weed Management and other weed research agencies on weed issues.

Objectives: To ensure that key stakeholders are consulted and have the opportunity to comment on AWC Papers and initiatives as appropriate.

2. National Weeds Strategy (Anon. 1999)

Weed research needs to be coordinated to maintain a balance between activities directed towards immediate problems and those that will ensure long-term sustainability.

Research is effective only when the results reach, and are adopted by, those responsible for weed management.

In the *Roles and Responsibilities* section, none are identified for scientists and no mention is made in the document of the role of science in policy developments.

Goal 3. To provide the framework and capacity for ongoing management of weed problems of national significance.

Objective 1. To strengthen the national research, education and training capacity to ensure ongoing cost effective, efficient and sustainable weed management.

Action 1. Integrate and coordinate weed research, education and training programs throughout Australia.

3. Weeds CRC Strategic Plan 2004–2008 (CRC for Australian Weeds Management 2004)

The Cooperative Research Centre for Australian Weed Management was set up to enhance the sustainability of farming systems and natural ecosystems across Australia through the development and promotion of integrated weed management systems based on excellent science.

Goals relating to policy

Increase awareness of weed issues, improve skills in weed detection and management through education and training, and provide accurate knowledge on which to base policy and management decisions.

Outputs relating to policy

Improving the skills of those currently responsible for weed management.

Benefits relating to policy

Rapid and efficient transfer of outcomes of weed research to farmers and policy makers.

Quality information on weed issues delivered to policy makers, weed managers, scientific experts and the general public.

A national skills base of highly qualified people for weed research, policy and management.

4. Weeds CRC 2020 Vision Statement (Martin 2003)

Proposes eight new action programs at national level totalling \$268 million over 10 years

- Safeguard Australia program.
- Eradication of new invasive plants program.
- Invasive species action program.
- Invasive plants biocontrol program.
- Weeds research infrastructure program.
- National weed awareness program.
- Weed Warriors program.
- Web Page program.

5. Council of Australian Weed Societies (<http://home.vicnet.net.au/~weedss/>) and its Council Members

The Council of Australian Weed Societies is an independent body that can express a National view on all issues relating to weeds and their management. The Council is composed of delegates from State Societies that have weeds as their major focus.

Objectives:

- encourage and foster the study and promotion of weed science and technology in Australia and, in particular,
- to provide, for member organizations, a representative voice on matters pertaining to weeds and weed science and technology,
- to assist in the co-ordination of the activities of member organizations,
- to encourage a wider interest in weed science and technology by promoting the investigation of all aspects of weeds and their management,
- to encourage the formation of Weed Societies within areas of Australia where they do not exist,
- to encourage educational organizations, particularly at tertiary levels, to provide adequate training in weed science and technology,
- to encourage continuing training for weed scientists, technologists and others involved with weeds.

The Weed Society of New South Wales (<http://nb.au.com/nswweedsoc/Society.html>)

- To increase the general public and policy makers awareness of the effects of weeds and their management.

The Weed Society of Queensland (<http://www.wsq.org.au/>)

- To encourage the investigation of all aspects of weeds and weed control.
- To encourage the study of weed science and the dissemination of its findings.

The Weed Management Society of South Australia (<http://www.wmssa.org.au/>)

- Promote best practice weed management based on scientific principles.
- Promote opportunities for exchange of information and ideas based on research and practice.

The Weed Society of Victoria (<http://home.vicnet.net.au/~weedsoc/>)

- To promote wider awareness and interest in weeds and their management.
- To promote opportunities for exchange of information and ideas based on research and practice for those interested in weeds and their management.
- To encourage the study of weeds and the dissemination of its findings.

The Weeds Society of Western Australia (<http://members.iinet.net.au/~weeds/>)

- Encourage, promote and foster the study and understanding of weeds and weed management... etc.
- Provide a representative voice on matters pertaining to weeds, particularly in Western Australia.
- Lobby governments on weed related issues such as maintenance of quarantine and provision of adequate funding for weed research and education.

The Tasmanian Weed Society (<http://www.tasweeds.org/constitution.htm>)

- Provide opportunities for those interested in weed management to exchange information and ideas based on research, experience and practice.
- Encourage the investigation of all aspects of weed management.
- Encourage the study of weed management and the dissemination of findings.

6. Victorian Pest Management – a Framework for Action (Anon. 2002a)

Research is a key for building the capacity for land and water managers to affect change.

Research is the most cost effective long-term approach for minimizing the impact of established pests and will continue to be a priority

under this framework.

Research managers will be encouraged to take part in collaborative programs that address priority issues in Victoria

Objective 9. Ensure effective research.

Action 14. Provide a coordinated and strategic focus across NRE to ensure that pest management research is based on appropriately developed priorities

7. Victorian Pest Management – a Framework For Action. Weed Management Strategy (Anon. 2002b)

Goal 3. A Victorian community that is fully aware of the economic, social and environmental impacts and threat of weeds, and has the knowledge to act to minimize their damage.

Objective 10. Align research into the development of cost-effective and sustainable weed management practices with the needs of the 'Weed Management Strategy' and Regional Weed Action Plans.

8. WeedPlan – a Tasmanian Weed Management Strategy (Anon. 1996)

Opportunities for change

Increasing emphasis of Government and industry funded research into long-term, sustainable weed management measures.

Tasmanian Weed Management Committee (TWMC) responsibility

Advise on and coordinate weed research programs at State level.

Specialist Working Group responsibility

Provide expert advice on weed issues to TWMC

Tasmanian Government role

Encourage responsible weed management by... Developing and implementing effective policies and programs.

Provide leadership, coordination and resources for research, assessment, education and public awareness programs on weeds.

Research

Resources for weed research will always be limited.

An important measure of the success of research is the adoption of results by client groups. There is a need to ensure that research results are implemented successfully. If they are not, the reasons for the lack of implementation or success should be investigated.

Research needs

- to discourage over-reliance on herbicides for weed control,
- to encourage the adoption of long term solutions to weed problems,
- to encourage land and water rehabilitation as an integral part of weed management programs where appropriate,
- to educate and train land and water managers in weed management techniques,
- increase training and education in integrated weed management and overall land and water management, especially in non-agricultural courses,
- to encourage research into weed management techniques which are consistent with sustainable land and water management,
- to encourage greater networking between the various groups involved in weed control research and
- to facilitate the adoption of research results by land and water managers and users.

Strategic Action

- Develop a priority list for weed management research in Tasmania

9. Queensland Weeds Strategy 2002–2006 (Department of Natural Resources and Mines 2002)

Principles related to research and policy

Research about pests, and regular monitoring and evaluation of pest control activities, is necessary to improve pest management practices.

Research bodies

Universities and other education facilities are playing a vital role linking academic research to practical natural resource problems. In relation to weed management, they are:

- undertaking and promoting research.
- training and educating groups and individuals in pest management science and technology and
- ensuring genetic material imported or released is assessed for weediness in line with the draft Code of Practice for Evaluation and Release of Tropical pasture Plants.

2.4. Assessment

Desired outcome: Reliable information is available as a basis for decision making

2.4.1 Data collection

To acquire, and to make readily available, data on the distribution, abundance and current management status of weeds.

2.4.2. Assessment and data analysis

To determine future directions for managing individual weed species, based on sound data.

2.4.3. Biology and impacts

To develop an understanding of the biology, ecology and impacts of weeds.

2.4.4. Social assessment

To develop and apply an understanding of community, government and individual attitudes.

2.5. Planning, responsibility and resourcing

Desired outcome: Strategic directions are established, maintained and owned by all stakeholders.

2.5.5. Legislation, policy and compliance

To implement clear and workable legislation and policy in support of weed management.

2.7. Effective management systems

Desired outcome: Integrated systems for managing the impacts of weeds are widely implemented.

2.7.1. Development of weed management practices

To develop new or improved weed management practices.

10. New South Wales Weed Strategy (Anon. 1998)

Desired outcome. Development and implementation of programs to reduce environmental degradation and the loss of biodiversity through weed invasion.

How to achieve outcome. Undertake and promote research into the development and release of biological control agents for major weeds.

Desired outcome. Development and promotion of sustainable, cost-effective management systems for the control of weeds in crops, pasture and forestry.

How to achieve outcome

- Continue and extend development of cost-effective integrated weed management strategies for major classes of weeds.
- Develop decision support systems to help landholders plan weed control programs and to measure the economic costs of weeds.
- Continue to investigate causes of herbicide resistance and species-shift and investigate strategies to avoid or alleviate these problems.
- Develop and release biological control agents for major weeds.
- Provide information on best-practice weed management through media, publications, public and private consultants
- Promote control options that will lead to a reduction in use of herbicides.

11. ACT Weeds Strategy 1996–2006 (Anon. 1996)

2. *Roles and responsibilities*

- All stakeholders and interest groups will be invited to contribute to developing priority weed control programs, and will be encouraged to participate in these programs.

3. *Priorities for weed control*

- The ACT Parks and Conservation Service will make available advice on best practice for integrated weed control, and appropriate technical information.
- The ACT Parks and Conservation Service will provide a central contact point for the communication of information on priority weed control programs.

4. *Identifying and recording the extent of weed problems*

- Government agencies will identify and map weed species occurring on the land they manage.

5. *Resources available for weed control*

Technology resource provider: ACT and NSW Government agencies, CSIRO, Land and Water Research and Development Corporation, other research and development corporations.

6. *Creating awareness of weeds*

The ACT Parks and Conservation Service and other agencies/organizations/community groups will conduct field demonstrations on identification of weeds and best practice in weed control in urban and rural settings.

12. A Weed Plan for Western Australia (State Weed Plan Steering Group 2001)

Principles related to policy and research

- Effective weed management requires a coordinated approach involving all relevant stakeholders.
- Appropriate and effective policy and legal frameworks are required to support the statewide management of weeds.

Key actions relating to policy and research

- Apply risk assessment methodology for determining weed management priorities in coordinated management programs.
- Establish an appropriate policy and legislative base for effective management of all serious weeds across the State.

Components and desired outcomes relating to policy and research

2. *Roles and responsibilities*

- Foster and support research and development of weed management systems based on best management practice.

6. *Policy support and regulation*

- An appropriate policy and legal framework to support patch, local, regional and statewide management of weeds.
- Promote sound weed management through appropriate policies and codes of practice.

8. *Education, training and research*

- Identify and prioritize research programs to support integrated weed management.

9. *Monitoring and evaluation*

- Promote a consistent system for monitoring weed status.
- Conduct regular regional forums to review stakeholder participation and support.

13. A Weed Strategy for South Australia (Weed Strategy Committee 1998)

South Australian Weed Advisory Committee comprises representatives of:

- Integrated weed management research.
- Weed control technology.

Principles related to policy and research

- Successful weed management requires a coordinated approach involving all levels of government in establishing appropriate legislative, educational and coordination frameworks in partnership with industry, land managers and the community. Its efficiency depends on integrated planning.

Components and desired outcomes relating to policy and research

1. Coordination and integration

Develop one efficient comprehensive process for reducing the impact of weeds in SA in consultation with SAWAC.

- Establish a broad based weed advisory group to implement this strategy.

3. Priorities and planning

Use objective processes to set priorities and plan weed management programs in consultation with SAWAC.

- Establish regional priorities and bioregional planning.
- Develop a risk assessment system to prioritize weeds for control programs.
- Prioritize target weeds of regional significance.

4. Research and education

Prioritize state weed research programs and ensure funding directed to priority programs in consultation with SAWAC.

- Identify priorities for research programs on environmental and agricultural weeds.
- Establish mechanisms to pool resources for research and development of innovative approaches to weed control.
- Conduct and direct research into control of weeds that are either potentially proclaimed or already proclaimed under the Animal and Plant Control Act.
- Extension of best practice for integrated weed management.
- Develop training programs to broaden the expertise of local animal and plant control officers, local government employees and recognized community groups.

5. Resources

Allocate resources appropriately and use them efficiently for the implementation of weed management programs.

- Fund research on prediction and risk analysis of new weeds.
- Package information and support community groups.
- Provide technical support to local government and community groups using infrastructures such as Agricultural Bureaux.

6. Legal Framework

Establish community roles and responsibilities within an appropriate legal framework.

- Revise control requirements and policies for plants proclaimed under the Animal and Plant Control Act.

7. Roles and Responsibilities

Ensure stakeholders are aware of and committed to their roles and responsibilities in weed management.

14. NT Weeds Management Strategy 1996–2005 (Hills, 1996)

Objectives related to policy and research

1. Preventing introduction and spread.

- To continue surveillance of, and research into known and potential weeds in their current habitats in other countries.

2. Ensuring weed management is an integral part of weed management.

- To develop policies / management plans for weeds.

3. Learning more about weeds in the Territory is an essential basis for weed management.

- To initiate, support, collaborate in or conduct research into the impact of weeds and the further development of safe, integrated and cost-effective weed management.
- To adapt and develop economic assessments to assist decision making in planning, implementing and monitoring weed management programs and practices.

5. Providing appropriate legislation for weed management.

- To consult with landholders, industry groups and community groups in the revision of the Northern Territory Noxious Weeds Act.

15. Report on weeds in Victoria (Environment and Natural Resources Committee 1998)

- 22 recommendations, none of which relate directly to research.
- Recommends research institutions represented on Victorian Weeds Advisory Committee.
- Recommends the creation of an Environmental Weeds Information Coordinator to disseminate current information on weed research programs and innovations in weed control methods.
- Five research organization made written submissions and seven attended public meetings.
- Victorian Weed Science Society made written submission.

16. Turning back the tide – the invasive species challenge. Commonwealth Senate Committee Report. (ECITAR Committee 2004)

- 27 recommendations, 15 of which relate to weeds and one to research.
- Recommendation 20: The committee recommends that the Commonwealth Government provide certainty of funding to research institutions such as CSIRO and CRCs, to enable them to undertake long-term research projects.
- three research organizations made written submissions and attended public meetings.
- three State weed societies and Council of Australian Weed Societies made written submissions and another attended a public meeting.