

Reducing Exposure of People and Wildlife to Contaminants Landcare Research

Programme overview

The programme represents a substantive development in applied science that addresses three primary environmental concerns - firstly, what harmful chemicals are in the environment, secondly, what are the effects of these harmful chemicals, and, thirdly, how can the harmful chemicals and their effects be reduced and/or mitigated?

The aim of the programme is to achieve improved capability for assessing and mitigating the impacts of contaminants in air, land, and water. The programme incorporates basic science research with applied science in relation to environmental contaminants and the development of services to end-users.

It is evident that the programme has the potential, through scientific validation and mitigation techniques, to benefit New Zealand's 'clean and green' environment status both nationally and internationally. This will affect urban and rural environments, as well as the health of people and ecosystems. It is proposed to achieve the aims of the programme through a new generation of 'effects-based' environmental performance indicators integrated with traditional chemical assays.

The programme combines the multidisciplinary field of ecotoxicology with the work of chemical and physical scientists, medical researchers and environmental engineers. This synergy facilitates the development and testing of new approaches and technologies for the management of the environment by end-users, such as Regional and District Councils, other Crown Research Institute teams, community groups and Iwi.

Uptake by end-users of the services developed (e.g. Ecological Risk Assessment (ERA) web-based tool) has been gradual, although the application phase of the research and services is still relatively new, and potential demand could be substantial in the future.

Links with Other Research Identified

The programme has a number of important linkages within a collaborative research environment, which have been supported by Foundation funding. These include, environmental and geological consultants, other CRIs, Regional and District councils, New Zealand and overseas universities, health authorities, Government agencies, private companies, and Māori.

The programme team considers that they are establishing a 'one-stop-shop' resource-base for ecotoxicological research in New Zealand through their knowledge, expertise, data, services and international collaborations and recognition. The programme has the potential to contribute to an important technology platform in ecotoxicology, both in New Zealand and internationally.

Useful Outcomes

New Knowledge

The programme is contributing new knowledge to environmental toxicology and health. This is evident from:

- A range of effects-based ecotoxicology tests for assessment of New Zealand environmental health status with respect to contaminants.
- New multi-agency techniques in air pollution research, through collaboration with international research teams.
- The development of a new contaminants database specifically on New Zealand standards for heavy metals and BTEX (hydrocarbons).

Specific/Useful benefits

Private benefits

- Sales of services through CENTOX.
- Commercial environmental health research contracts, associated with the programme.

Environmental Benefit

- The application of ecotoxicological tests by the programme team, in association with end-users, to reduce the effects of different contaminants.
- Contribution to hazardous waste management through a secondment to the Ministry for the Environment (Mfe) hazardous waste programme.

Social Benefits

- A key achievement of the programme is considered to be their expanding the networks of end-users, researchers and government agencies with an increased awareness of the effects of environmental contaminants in New Zealand.
- The ERA website, providing regional and local authority resource managers and environment protection officers with a reasonably extensive, accessible and user-friendly tool for decision-making with respect to ecological risk.

Spillover Benefits

- Agro-ecosystems benefits - These are evident from research applications focusing on demonstrating to users good ecotoxicology to identify risk; and, strategies for the reduction of pesticides in horticulture and agriculture.
- Health benefits - This will be event from the mitigation of risk and exposure to environmental contaminants affecting health.
- Potential economic benefits - These could be gained in having quality, 'clean' horticultural products for overseas markets, or potential reductions in fiscal liability through reduced negative impact of contaminants.

Capability building

The programme team is considered to be the most capable group of environmental toxicologists in New Zealand. They can credit the first two New Zealand PhDs in environmental toxicology, one of whom is Māori (James Ataria).

CENTOX is a centre of excellence in environmental toxicology, and used by the programme team to promote their capability in waste/pollution remediation.

International collaboration is particularly important to the programme to continue building New Zealand capability, which is critical to the maintenance and development of the programme.

Process

The programme envisages their assisting agencies at the national level in policy development, and at the regional and local levels with improved processes and tools for monitoring and reducing the impact of contaminants.

There are a wide range of users, both current and potential, including health authorities, Regional and District Councils, industry, Government agencies, community groups, Māori, and international users. It is evident that ERA and CENTOX are accessible channels for building relationships between the programme and end-users.

The programme needs to establish solid linkages with end-users and pursue strategies to promote uptake of their services and expertise. There has been some progress in this respect to date, and a number of strategies have been used. While the programme team have worked successfully with Mfe at a national level, there appears to be a gap at the local level with uptake limited largely to the Canterbury, Tasman and Marlborough regions.

The programme has identified a number of important future milestones related to ecotoxicology and remediation of contaminants, covering, reducing human health risks, informed environmental management, cost-effective biosensor tools, reduced pesticide input, and development and integration of Māori environmental indicators.

Wider Issues

Landcare Research have realigned their research on waste minimisation to focus more on urban environments. The ecotoxicology programme is also being changed to focus on contaminants in urban environments.

The applied programme is relatively new, requiring skills and expertise that are not well established in New Zealand. Consequently, the programme team consider they are thinly spread, and the potential development of the programme is likely to encounter problems with critical mass affecting their ability to meet demand. They see a need to produce more environmental toxicologists within New Zealand, and expertise, to both maintain the programme and allow the potential developments in the future. Critical mass is seen as a potential issue for the programme.

Research and expertise with respect to toxicology, however, is also available through ESR and NIWA. This raises two issues. Firstly, critical mass regarding toxicology capability in New Zealand could be ameliorated through a greater level collaboration, rather than continuing the present policy of establishing an autonomous ecotoxicological enterprise. Secondly, the demarcation between the CRIs regarding research on contaminants and the effects on the environment, and animal and human health is unclear. The Foundation will need to review this issue in the near future.

Summary

The programme has the potential to make an important contribution to the 'clean and green' quality of the New Zealand environment. The applied research is innovative,

practical and contemporaneous with international developments in ecotoxicology, but dependent on on-shore and offshore collaboration. The programme has the potential to be of economic, social and environmental benefit to New Zealand if nationwide uptake and application is achieved.

Programme developments to date, such as CENTOX and ERA, are likely to see the programme team increasingly involved in consultation services to end-users. There is also a need for the expertise in toxicology to be more widely spread through New Zealand, and critical mass may be an issue in this regard.