ENVIRONMENTAL HEALTH INDICATORS FOR NEW ZEALAND:

THE DEVELOPMENT AND IMPLEMENTATION OF A CORE DATASET

Prepared as part of a Ministry of Health Contract

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Background

This report was commissioned by the Ministry of Health under the 2001/2 ESR/MoH environmental health work programme. The goal of the project being to develop a functional core set of environmental health indicators [EHI's]for New Zealand.

Findings

There has been significant global interest in the development of EHI's for a number of years but beyond specific projects and programmes this has not translated into a widely accepted set of practical tools or processes.

Increasing concerns in a variety of settings as to the interactions of the environment and human health have prompted the wish to further develop the ability to characterise and measure the extent and nature of these interactions.

Two principal indicator models [composite index and core indicators] are identified from the literature and the merits and demerits of each examined. It is concluded that the core indicators model [currently being piloted by the WHO] has most applicability to the New Zealand situation and it is proposed that this approach be adopted.

Examination of current NZ data in relation to the WHO dataset show that many indicators are collected, albeit by differing agencies using differing methods thereby making consistent interpretation difficult for human health related purposes.

Summary

There is a demonstrable need for a set of indicators in NZ that will enable robust informed decisions about actions to maintain and improve human health through the protection and improvement of the environment.

There is increasing consensus about the optimum methods to approach this. For NZ at this time it is proposed that a variation of a model being piloted by WHO Europe be adopted and that the further development of this programme be based on such a model. A detailed programme of work and related information is appended to this end.

RECOMMENDATIONS

- Progress as per schedule to establish a core set of environmental health indicators for New Zealand with the steps as outlined in appendix one to this report.
- That the Ministry of Health be actively involved in facilitating collaboration with the Ministry for the Environment and other key agencies.
- The WHO European core set of indicators should be used as the preliminary core set and benchmark for New Zealand
- Consultation should focus only on issues/indicators which are New Zealand specific, e.g. Maori consultation, meningococcal disease rates.
- New Zealand should establish and maintain active collaboration with the WHO in tandem with WHO's European indicator project
- Explore opportunities to increase collaboration with WHO and other local and regional agencies.
- Prioritise resources on how the indicators are to be represented rather than on what indicators are to be measured.

1 INTRODUCTION

Historically it has proved difficult to correlate changes in health outcomes causally with environmental effects. However increased understanding of the impact of human activity on the environment, the emergence of new environmental threats and their potential to increase environment- related disease, and the public's response to these issues have refocused attention on this area.

Large amounts of data on the state of the environment are collected, including aspects hazardous to human health, but they are rarely linked explicitly to health outcomes; conversely, many health outcomes are measured which are not appropriately linked to environmental hazards. The independent monitoring of the state of the health and the state of the environment by different agencies using differing methodologies makes it difficult to maximise the availability of useable links between environmental exposure and health outcome, hence appropriate and timely remedial action becomes difficult. This leads to a reliance on ad-hoc epidemiological studies and findings.

Many countries are trying to address this linkage issue by developing indicators of human health with a clear and understood linkage and effect to the environment, often termed environmental health indicators (EHIs). The development of EHI's can provide decision-makers with an important tool in identifying and prioritising issues affecting both human health and the environment locally, as well as the ability to monitor, analyse and compare trends nationally and internationally.

The Institute of Environmental Science and Research (ESR) has been commissioned by the Ministry of Health (MOH) to develop a functional set of EHI's for New Zealand, thereby providing timely information to all stakeholders, including local communities and policy makers. This process has two principal phases, namely:

I. Creation of base line data and information in environment health:
- Literature review of frameworks
- Audit current available data

II. Construction of a prototype set of environmental health indicators:
- Identify key issues in consultation with an expert panel
- Design a model database of indicators

This report addresses phase I above and outlines the project plan for progression through phase II. In so doing the report

- Provides background information on the issues and the context of environmental health indicator development and implementation.
- Provides examples of the principal frameworks that have been developed internationally
- Critiques these with special reference to their applicability to the New Zealand situation
- Makes recommendations with respect to a New Zealand approach.

2 BACKGROUND

2.1 Definition

A strict definition of environmental causes of disease would be all those that are not genetic.[i] However if a sufficiently long time frame is taken, all diseases have some environmental component, even diseases primarily of genetic origin. This definition is clearly of limited practical application, hence, the definition for environmental risk factors used in this report is similar to that proposed by Smith et al[ii], that is, delimited by the following boundaries:

- Not genetic factors
- Not smoking, but including passive smoking.
- Non-nutritional elements of diet only, e.g food additives, infectious agents, pesticides, other food supply contaminants.
- Behavioural factors related to personal and household hygiene.
- A modest component of environmental risk in the direct and indirect risks of malnutrition to account for degraded soils, floods, and other human-engendered impacts on the quantity, quality and distribution of food.
- A component of injuries is assigned to environmental factors.
- A small component of environmental risk is included in every disease category.
- Included also are health impacts of the natural environment, such as dust exposure and natural disasters, however,
- Excluded are the component caused by human activities, such as desertification and global warming.

2.2 Burden of Human Disease associated with the Environment

Using these boundaries, Smith et al have estimated the global burden of disease from environmental factors. They calculated the percentage of each disease attributable to environmental causes, focusing on the 22 categories of disease that cause at least 1% of Disability-Adjusted Life Years (DALYs) lost.

In so doing they defined attributable as 'the component that would be eliminated if environmental risk factors were reduced to their lowest feasible values'. The approximate nature of these calculations should be emphasised reflecting the lack of a complete understanding and quantification of the way environmental exposures are involved in the onset and development of relevant human disease.

Within these limitations it was estimated that approximately one third of all DALYs lost attributable to environmental factors, are related to cancer, and approximately one fifth are related to cardiovascular disease, equating to an estimated 15 million DALYs lost per annum. Extrapolating from these estimates, and in proportion to its population size, NZ could expect to lose approximately 90,000 DALYs due to environmental causes per annum.

3 OVERVIEW OF ENVIRONMENT AND HEALTH INDICATORS

3.1 Introduction

Environmental health indicators are point measurements of factors covering environmental hazards, health outcomes and management processes. Indicators are developed with explicit consideration of policy and practice, for example, it must be easy to comprehend what changes in the indicator mean in terms of modifications to current practice[iii].

Several methods were used to review current knowledge and thinking on EHI's, these included formal on line search of bibliographic databases, search of local literature sources and communication with various key groups and individuals, locally and internationally.

In summary, two broad indicator types can be distinguished, namely, specific and composite indicators. These two indicator types reflect the two principal types of analytic frameworks, one used primarily by WHO – Europe, the other by the United States Environmental Protection Agency [USEPA]. The USEPA are developing an environmental health index with respect to environmental exposure to toxic chemicals, whereas WHO-Europe is piloting a core set of 54 indicators covering eleven environmental 'issues'.

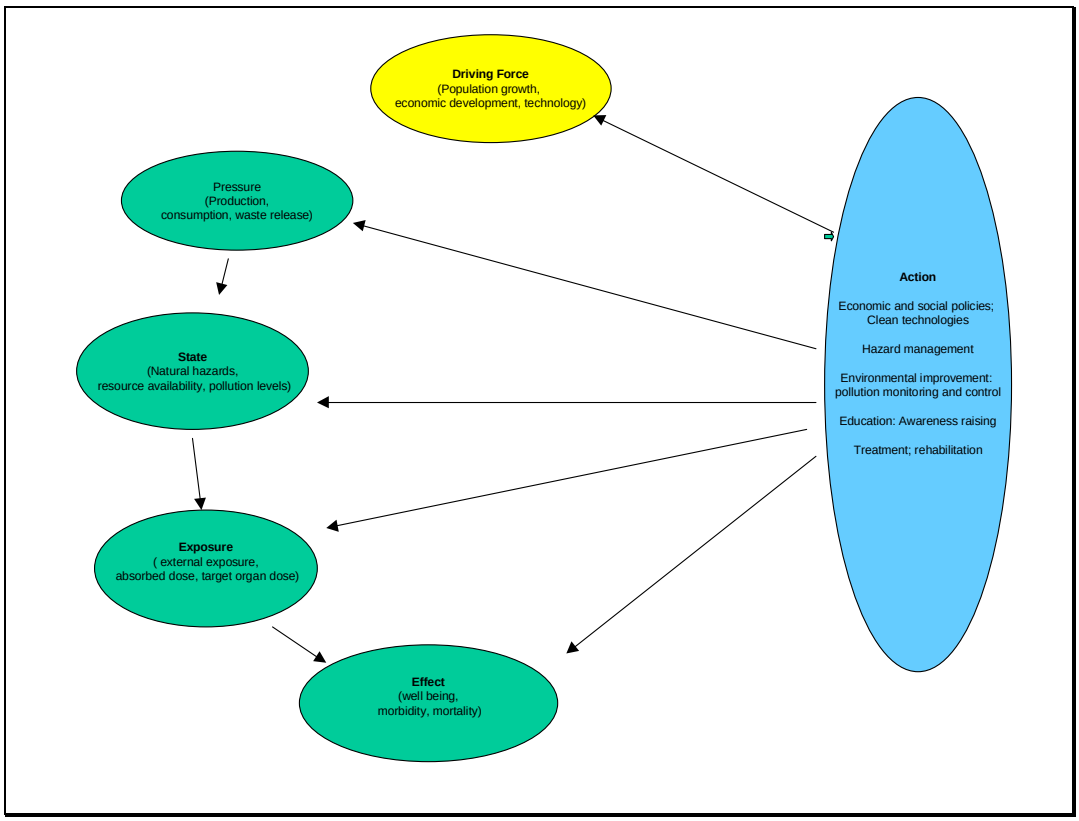
3.2 Environmental versus Health Indicators

Environmental indicators are usually distinguished from health indicators even though they may have linkages, for example, atmospheric emissions (environmental indicator) contrasts with respiratory disease mortality rate (health indicator) [iv]. Environmental indicators describe the environment without any explicit reference to human health, whereas health indicators describe human health status without explicit reference to the environment.

With increasing understanding of the relationships between environmental exposure and health, both environmental and health indicators can be transformed, where appropriate, into environmental health indicators, thereby reflecting the health outcome from exposure to an environmental hazard, based on the application of a known environmental-exposure health-effect relationship.

These linkages in the environmental health effect chain are summarised in the DPSEEA framework in Figure One [v,vi], which is an extension of the OECD pressure-state-response sequence. This framework can be applied to the development of EHI's, and is useful when trying to address unacceptably high levels of an indicator.

Figure 1: DPSEEA Framework



3.3 Criteria for Indicator Development

The first step in any such process is the definition of the desirable characteristics of any set of indicators. Such characteristics include availability, validity, reliability, responsiveness and the ability to be analysed and disaggregated by specific variables of interest.

They should also be able to be compared across communities, and cover as broad a range of concerns as possible without compromising validity. A 'useful' indicator is also one that responds to stressors of concern, and thereby serves as an early warning of potential adverse effects.[vii]

WHO has described a set of fourteen criteria for EHI development (Table One) and, whilst it is realised that few indicators could fulfil all of these criteria, although only the first four are considered to be essential.

Table One: WHO criteria list for environmental health indicators

1.	*Based on a known linkage between environment and health*
2.	*Sensitive to changes in the conditions of interest*
3.	*Directly related to a specific question of environmental health concern*
4.	*Related to environmental and/or health conditions which are amenable to action*
5.	Consistent and comparable over time and space
6.	Robust, unaffected by minor changes in methodology/scale used in construction
7.	Unbiased and representative of the conditions of concern
8.	Scientifically credible, i.e reliable and valid
9.	Easily understood and applicable to potential users
10.	Available soon after the event or period to which it relates
11.	Based on data which are available at an acceptable cost-benefit ratio
12.	Based on data of a known and acceptable quality
13.	Selective, so that they help to prioritise key issues in need of action
14.	Acceptable to the stakeholders.

3.4 Indicator Types

There are two recognised indicator types, namely specific and composite. Experience suggests however that the development of many indicators may be required to accurately reflect the many different hazards and outcomes of interest, which may however in turn lead to information overload and confusion.

As a consequence there have been attempts to condense a wide range of information into a single measure or index, for example, instead of producing separate indicators for exposure to each air pollutant, composite indicator of exposure reflecting all air pollutants of interest have been derived. Composite indicators, equally, are subject to a considerable number of problems, resulting from difficulties with data quality, aggregation and weighting.

3.5 Environmental Health Indices [aggregate indicators]

A number of attempts have been made to aggregate divergent health impacts associated with different types of environmental exposures such as air pollution, residential noise into a single index. This involves integrating impact/effect measures (e.g. life expectancy, quality of life) with exposure measures (e.g. population exposure distribution, exposure response relations).[viii]

These aggregates, or indices, are limited by:

- The lack of precision of population exposure assessments;
- The unknown shape of the exposure-response curves at low environmental exposure levels;
- The translation of exposure-response information from one species to another as well as from one population to another.

They involve the aggregation, with weighting, of numerous point estimates [with varying levels of accuracy] into one or more health impact indices.

Example: The United States Environmental Protection Agency

The USEPA (United States Environmental Protection Agency) has evolved a distinct environmental indicator strategy in the process of researching human health risk assessment needs for their strategic plan.[ix] The principal goal of the work being the evaluation of the effectiveness of public health policies and related interventions. The evaluation is to be carried out periodically by examining changes in exposure to a given pollutant and the relationship to changes in health outcomes associated with the given exposure.

As a result the EPA has presented a methodology to develop an environmental health index with respect to toxic chemicals.[x] The Office of Pollution Prevention and Toxics convened a working group to explore the development of an indicator or indicators based on the extensive EPA Toxics Release Inventory (TRI) that could track changes in human health and environmental impacts. The EPA suggests that the index may consist of a set of four distinct indices to separately track:

- Chronic human health,
- Acute human health,
- Chronic ecological,
- Acute ecological impacts.

The objective being to calculate a unitless value that reflects the overall risk-related impacts of releases and transfers of all included TRI chemicals from all reporting facilities to each environmental medium for a given period.

Various factors are considered in calculating this risk, including:

- The inherent toxicity of the chemical
- The environmental fate and transport of the chemical
- The degree of contact between the contaminated medium and the human or ecological receptors
- The size of the exposed population.

Four main elements are used to compute each indicator:

- Quantity of chemicals released or transferred
- Adjustments for chemical-specific toxicity
- Adjustments for pathway-specific exposure potential
- Adjustment to reflect the size of the potentially exposed population.

This model has a large theoretical foundation, but is essentially untested. The approach is reductionist in nature as it sums all the measured chemicals and threshold values to a site specific risk value. This site and chemical specificity is a major limitation in interpretation especially in identifying the underlying causes of changes to the indicator values. The indicator should be able to track reductions resulting from both government and industry actions. However, it would not be easy to assess the relative magnitude of reductions attributable to a particular type of action, unless specific attributions can be made.

This approach does however enable analysis of the relative contribution of differing pollutants to environmental impacts, and serves as an analytical basis for setting priorities for pollution prevention, regulatory initiatives, enforcement targeting, and chemical testing and may be appropriate for specific localised sites, or for communities living in proximity to high-risk areas,

It is important however to contextualise chemical hazards, in that, whilst modern industry has given rise to many occupational hazards and to the dispersal of small amounts of many potentially toxic chemicals, most developed countries now tightly control public exposure to the extent that any associated risk is difficult if not impossible to detect.[xi] The result is that many of the major environmental hazards that determine human health outcomes are now qualitatively and quantitatively quite different, for example: poverty, population growth, and the production of greenhouse gases.

3.6 Environmental Health Indicators

Attempts to formalise the construction of a core set of environmental health indicators have been difficult in practice, as consensus has been difficult to establish about the core problems to be addressed. However WHO are currently piloting a model in Europe, which is discussed below.

Example: World Health Organisation Framework

WHO has taken a leading role in developing both the concept and use of EHI's. Their initial priority was to provide information on such basic issues as drinking water, sanitation and shelter. However with the emergence of the practice of "environmental epidemiology" attention has focused on the complexities involved[xii,xiii] and stimulated the search for more sophisticated and scientifically valid indicators.

To date, WHO programmes, rather than attempting a comprehensive approach to the area, have derived specific EHI's in the context of specific programmes, the Healthy Cities Programme is an example of such an initiative.[xiv]

More recently however, the WHO European Office, through its regional Centre of Environment and Health, have developed a methodology for a core set of EHI's for the WHO European region to be piloted by a select group of countries. [xv]

The interim report for this project was published in 2000. It focuses on the establishment of a common "core" set of environmental health indicators to enable countries to monitor and adjust their policies while also enabling international comparisons throughout the European region. The eleven environmental areas selected are:

- Ambient and indoor air quality,
- Housing and settlements,
- Noise,
- Waste and soil pollution,

- Radiation,
- Sanitation,
- Drinking water,
- Food safety,
- Recreational waters,
- Chemical emergencies,
- Workplace.

Fifty four "core" indicators have been identified in these eleven areas and classified into three main categories, namely:

- Health and population indicators,
- Environmental indicators and
- Action indicators.

In considering the core indicators, a number of factors were considered including:

- The purpose of data collection,
- Ability to interpret the data,
- Regularity of publication
- Information structure,
- Data flow design,
- Data presentation.

The eleven main steps in the development of environmental health indicators used by WHO are:

- Specification of the problem to be addressed. *(e.g.ionising radiation linked to the outcome of childhood leukaemia).*
- Specification of the environment-health relationship on which the indicator will be based. *(e.g poor sanitation linked to higher rates of infection.)*
- Specification of the point in the DPSEEA framework at which the indicator will be targeted.
- Specification of the parameter on which the indicator will be based, i.e. the particular measure of the environment or health which will be used. *(e.g atmospheric nitrous oxide concentration.)*
- Specification of the statistical form of the indicator, (simple frequency, rates, ratio's, measures of rate of change etc.)
- Specification of the denominators and levels of aggregation required for the indicator, *(e.g. the level of geographic aggregation, denominator population.)*
- Specification of the baseline or reference data against which the indicator will be standardised.
- Specification of the form in which the indicator will be presented. *(e.g.map.)*
- Specification of the data needs and models or methods required to calculate the indicator.
- Assessment of data availability and quality.
- Computation and testing of the indicator in a pilot area.

Table Two shows the core indicators in their operational forms. Background material was prepared by an expert group; proposals for operational data were then distributed for consultation, and through consultation the core indicators were finalised. Fourteen

countries are initially piloting the indicators including Armenia, Bulgaria, Czech Republic, Estonia, Finland, Hungary, Latvia, Lithuania, the Netherlands, Poland, Romania, Slovak Republic, Spain and Switzerland. The next step will be the design of the information system to provide a framework for the data collection, reporting, processing, analysis, presentation and information dissemination.

Table Two: Core Set of Environmental Health Indicators (Source WHO, 2000[xv])

Air Quality	Incidence of skin cancer Topicality of permits on use of radioactive substances Effective monitoring of radiation activity
Kilometres driven/transport mode/person Consumption fuel by type-road transport Emissions of air pollutants Ambient concentrations air pollutants Infant mortality: respiratory disease Overall mortality: respiratory disease Overall mortality: circulatory diseases Participation in international agreements and initiatives (environmental) Policies: environment tobacco smoke exposure.	**Water and sanitation**
	waste water treatment coverage exc. recreat water microbe content exc. drinking water microbe content exc. drinking water chemical content access to drinking water access to safe drinking water supply from public water supplies access to adequate sanitation outbreaks of water-borne diseases diarrhoea morbidity children diarrhoea mortality children
Housing and settlements	
Living floor area/person Population living in substandard housing Mortality: external causes children<5 yrs Scope + application house building regs. Land use and urban planning regulations	**Food safety**
	Monitoring chemical hazards in food Food-borne illness
Traffic Accidents	**Chemical emergencies**
Mortality from traffic accidents Rate of injuries by traffic accidents	Sites with large quantities chemicals Mortality from chemical incidents Regulatory req's land-use plan planning Chemical incidents register Poison centre service Medical treatment guidelines Government preparedness
Noise	
Population annoyance by source Sleep disturbance by noise Application of regulations, restrictions and noise abatement measures	
Waste and contaminated lands	
Hazardous waste collection Contaminated land area Blood lead level in children Hazardous waste policies Municipal waste collection	**Workplace**
Radiation	Occupational fatality rate Rates of injuries Standardised mortality ratio by occupation Sickness absence rate Statutory reports of occupational disease
cumulative radiation dose UV light index	

4 AUDIT OF CURRENT INDICATOR DATA IN NEW ZEALAND

A preliminary audit of data in New Zealand was undertaken to assess the availability of 'local' information in relation to the suggested WHO indicator dataset, including information on the collecting agency.

The results show extensive coverage, with a large variety of central and local government agencies involved in the process. The main data gaps and inconsistencies lie in the housing and noise area and where the data are collected by local bodies. A more detailed subsequent analysis will illustrate this in detail.

Much of the current data collection does however fit into the WHO framework, and could, in the first instance provide an important comparative dataset. The initial analysis is presented in Table Three. More detailed information on each indicator will be provided in the Indicator Manual in phase II of the project.

Table Three: NZ Data Sources & WHO Indicator Dataset

Health Indicators

Indicator Code	Indicator	Source of Information
Mortality		
Air_E1	Infant mortality due to respiratory disease	NZHIS
Air_E2	Mortality due to respiratory diseases, all ages	NZHIS
Air_E3	Mortality due to diseases of the circulatory system	NZHIS
Hous_E1	Mortality due to external causes in children under 5 years of age	NZHIS
Traf_E1	Mortality from traffic accidents	LTSA
WatSan_E3	Diarrhoea mortality in children	NZHIS
Work_E1	Occupational fatality rate	NZHIS/NODS
Work_E3	Standardised mortality ratio (SMR) by occupation	Not collected on regular basis
Morbidity		
Traf_E2	Rate of injuries by traffic accidents	LTSA
Rad_E1	Incidence of skin cancer	NZHIS
WatSan_E1	Outbreaks of water-borne diseases	ESR/MOH
WatSan_E2	Diarrhoea morbidity in children	Paediatric Surveillance unit
Food_E1	Food-borne illness	ESR/MOH
Work_E2	Rates of injuries	ACC
Work_E4	Sickness absence rate	Not collected
Work_E5	Statutory reports of occupational diseases	NCDS
Other health		
Noise_E1	Population annoyance by certain sources of noise	Not collected
Noise_E2	Sleep disturbance by noise	Not collected
Waste_Ex1	Blood lead level in children	ESR/MOH
Chem_E1	Mortality from chemical incidents	ESR- under development/MOH

Environmental Indicators

Indicator Code	Indicator	Source of Information
Air Quality		
Air_P2	Emissions of air pollutants	Mfe, NIWA, ESR, MOH
Air_Ex1	Ambient concentrations of air pollutants: population-based exposure	Mfe, NIWA
Water Quality		
WatSan_S1	Exceedance of recreational water limit values for microbiological parameters	Regional councils, city councils
WatSan_S2	Exceedance of WHO drinking water guidelines for microbiological parameters	Regional councils, city councils, ESR
WatSan_S3	Exceedance of WHO drinking water guidelines for chemical parameters	Regional councils, city councils, ESR,MOH
Food Safety		
Food_Ex1	Monitoring chemical hazards in food: potential exposure	MOH
Transport		
Air_D1	Kilometres driven per transport mode per person	LTSA/MFE
Air_D2	Consumption of fuel by type from road transport	LTSA/MFE
Waste and contaminated lands		
Waste_P1	Hazardous waste generation	Mfe, regional councils
Waste_S1	Contaminated land area	Regional councils
Chem_P1	Sites containing large quantities of chemicals	Regional councils, Fire Service
Housing conditions		
Hous_S1	Living floor area per person	Not collected (other crowding ind. used)
Hous_Ex1	Population living in substandard housing	Not collected
WatSan_P1	Waste-water treatment coverage	Regional councils, city councils
WatSan_Ex 1	Access to drinking water complying with WHO guideline values	Regional councils, city councils, ESR, MOH
WatSan_Ex 2	Access to safe drinking water	Regional councils, city councils, ESR, MOH
WatSan_Ex 3	Supply from public water sources	Regional council
WatSan_Ex 4	Access to adequate sanitation	Regional councils, city councils
Other		
Rad_Ex1	Cumulative radiation dose	NRL
Rad_Ex2	UV light index	NIWA

Action Indicators

Indicator Code	Indicator	Source of Information/ Availability of data
Air quality		
Air_A1	Participation in international agreements and environmental initiatives	Available
Air_A2	Policies to reduce environmental tobacco smoke exposure	MOH
Housing and settlements		
Hous_A1	Scope and application of building regulations for housing	Housing NZ, City council
Hous_A2	Land use and urban planning regulations	Regional council and city council

Noise		
Noise_A1	Application of regulations, restrictions and noise abatement measures	Available
Waste and contaminated lands		
Waste_A1	Hazardous waste policies	Available
Waste_A2	Municipal waste collection	City council
Radiation		
Rad_A1	Topicality of permits on the use of radioactive substances	NRL
Rad_A2	Effective environmental monitoring of radiation activity	NRL
Chemical emergencies		
Chem_A1	Regulatory requirements for land-use planning	Regional Council
Chem_A2	Chemical incidents register	NPC, MOH
Chem_A3	Poison centre service	NPC
Chem_A4	Medical treatment guidelines	NPC
Chem_A5	Government preparedness	Civil Defence

5 DISCUSSION

In the last two decades, there has been increasing interest in the field of environmental health indicators with more recently increasing understanding of the issues involved in the development of these indicators.

There are a variety of approaches and endpoints emanating from differing agencies with the principal issue of divergence being whether a 'core set' of environmental health indicators is more useful than environmental health 'indices' that attempt to summarise the overall picture.

Both approaches have their limitations [but will evolve over time], for example, the 'core set' approach can provide an overwhelming volume of information,[xvi] whereas the composite indices may not reveal the particular aspect of the environment needing remedial attention.[xvii] After consideration of the merits and demerits of these two principal approaches it is proposed that New Zealand proceeds with the 'core set' approach for several reasons.

- The WHO 'core set' approach is more widely accepted with a longer track record.[xviii]
- The opportunity to collaborate with the WHO as the core indicators are being piloted in Europe[xix]
- Extensive research and consultation has been undertaken by WHO and detailed documents published to serve as a basis for action.
- It is unlikely that a reasonable New Zealand approach would differ significantly from that of the WHO.
- Utilising the WHO approach will aid in international benchmarking.

While the WHO core set may well, in significant part, be transferable to New Zealand there are several points for discussion and consultation. Firstly, New Zealand may wish to emphasise locally relevant health issues e.g meningococcal disease rates. Secondly, NZ may want to include health issues related to specific environmental hazards e.g. earthquakes, geothermal emissions, ozone depletion. Thirdly consideration will needed to issues of particular concern for Maori, with special reference to the Treaty of Waitangi, and for Pacific peoples.

Hence whilst the WHO EHI set can form the core set for New Zealand, additional New Zealand specific indicators can be added after appropriate consultation.

As the WHO work expands there may be opportunities for collaboration with other regional countries. It will be important to take advantages of these opportunities as they arise and maintain contact with these potential partners. The advantages of collaboration are clear, for example, NZ will be able to benchmark its' data against that from overseas and in this way contribute to the growth of knowledge and understanding in this complex area globally.

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APPENDIX – PROJECT PLAN

Main Activities Planned	Timeframe									Milestone	Verifiable Indicator	Deadline
	2001			2002								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun			
Literature review	●	●								Framework identified	Report	24th November 2001
Identify the data available in NZ and who has it	●	●								Brief situation analysis of data availability		
Develop template by identifying key indicator attributes from WHO analysis		●								Template designed and set up on Access and Excel		
Identify sources of data and the form the data is in		●	●							List of data sources and types	Indicator Manual Part I	28th December 2001
Fill in indicator spreadsheet		●	●	●						Detailed indicator spreadsheet		
Define data gaps			●	●						Gap analysis		
Incorporate comparable standards			●	●						Indicator spreadsheet		
Compile prelim list of indicators			●	●						Complete detailed list of indicators		
Compile list of criteria to prioritise next set of indicators				●	●					Prioritisation criteria list	Indicator Manual Part II	

Main Activities Planned	Timeframe									Milestone	Verifiable Indicator	Deadline
	2001		2002									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun			
Identify key players locally and overseas												
Establish collaboration locally												
Establish overseas collaboration												
Set up consultation committee												
Undertake consultation process										Consultation document		30th April 2002
Compile list of final indicators											Indicator Manual Part III	31st May 2002
Send for review												
Revise final list										Final list		
Creation of prototype database										Database established	Operational database	
Pilot of prelim EHI's locally												

Note:

Indicator Manual (I) would include a completed feasibility study whereby each indicator would be assessed comprehensively using the aid of template questionnaires. Issues like feasibility, usefulness, indicator modifications, alternative indicators, availability, accessibility and quality will be considered for each indicator. The gaps in information would then become apparent. Indicator manual (II) would include a prioritisation list for the set of indicators not being measured and a list of NZ specific indicators, which can form part of the basis for the consultation document.

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