

Progress and pitfalls in the provision of tertiary education for sustainable development in New Zealand

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Abstract

This paper provides background information for the Parliamentary Commissioner for the Environment's upcoming review of New Zealand's (NZ's) progress towards sustainable development, and exploration of opportunities for enhancing environmental sustainability. It focuses on tertiary education for sustainability in NZ, and aims to contribute towards enhancing the sector's ability to deliver graduates with the knowledge and skills necessary to progress sustainable development.

A review is conducted of key relevant developments in NZ and abroad. The review is used to develop a set of expectations for tertiary education for sustainability. The expectations are categorised in terms of underlying values, the nature of the programmes themselves, the knowledge and understanding they provide, target audiences, institutional requirements and educational research and development. They provide a 'wish list' for tertiary education against which future progress can be measured.

An overview is provided of relevant tertiary education programmes and courses available in NZ, and the extent to which they appear to meet expectations. They emanate from a range of disciplines, although science, engineering/technology and planning programmes are the most common. Business and law programmes are the least common, and some disciplines such as medicine, arts, humanities and education have no whole, named programmes. Coverage at a vocational level does not appear to be widespread.

While science-based programmes are still the most common, their content varies from those that focus almost entirely on understanding the natural and physical aspects of sustainability, to those that appear highly multidisciplinary, including socio-economic sources and management-oriented solutions.

A survey of programme coordinators suggests that institutional support for interdisciplinary programmes in general, and sustainability-related programmes in particular, tends to be low. Most respondents identify difficulties in having programmes approved, and in developing and delivering them. The most commonly identified difficulties are to do with low status and a lack of resources, including time, funding and suitably qualified staff.

Key recommendations for tertiary providers include increasing staff recruitment, adopting a more interdisciplinary approach and making their own operations sustainable. Key recommendations for central government are: to provide a more conducive and supportive ideological context and incentives for institutions, staff and students; to change the way academic staff performance is assessed; to create better links between curricula in secondary schools and tertiary institutions, and to reduce bureaucratic requirements.

Acknowledgments

The authors wish to thank the Office of the Parliamentary Commissioner for the Environment for funding this research, and the programme coordinators who responded to the survey, provided their insights on challenges and institutional requirements and peer reviewed the draft paper. Thanks also to Zeb Stone for the initial collation of information on programmes and courses.

1 Introduction

This paper presents the results of research undertaken in response to the Parliamentary Commissioner for the Environment's recent call for background papers to contribute towards a review of New Zealand's progress towards sustainable development, and exploration of opportunities for enhancing environmental sustainability. The research focuses on tertiary education for sustainability¹ in New Zealand (NZ).

This area of focus was chosen because education has long been recognised as having an essential role to play in sustainable development (or the transition to sustainability) (e.g., WCED 1987: 46; IUCN/UNEP/WWF 1991: 53-56; UN 1992: 264-269). However, education for sustainability involves a wide range of activities, ranging from the non-formal types of awareness campaigns carried out by local government and community groups, to the formal types of education provided by schools, technical institutes, colleges of education, wananga and universities. While recognising the importance of all of these types of activities, international developments, with their focus on equity and poverty alleviation, pay much attention to the 'basic' side of formal education that is necessary for alleviating poverty (e.g. literacy) (see WCED 1987: 54, 56; UNGA 2002 and 2003; UNESCO 2003 and 2005).

In New Zealand (NZ), where 'basic' education is of less concern, attention tends in the past to have focused on non-formal public awareness activities and environmental education in schools (e.g., see MfE 1998: 16-19). Tertiary education for sustainability has not received much attention in its own right. In *Learning to care for the environment: a national strategy for environmental education*, there is a clear focus on schools and school curricula, as well as non-formal types of activities involving members of the public, tangata whenua and business (MfE 1998: 17-19).

The 'roles and activities' chapter of the strategy does emphasise the importance of tertiary institutions, calling for teacher training on environmental education and for more broadly available environmental courses and programmes to be available (MfE 1998: 27). However, none of the priorities identified in the strategy specifically identify tertiary education (ibid). There seems to be an assumption that these services are available, and no attention is paid to the unique institutional context nor the institutional challenges that may be inherent in providing them.

In a more recent report, the Parliamentary Commissioner for the Environment reviewed progress towards sustainable development in NZ (PCE 2002). The report recognises the importance of tertiary education, particularly in terms of capability and capacity building, and identifies the need for courses that develop skills in 'systems thinking and integrated analysis' (PCE 2002: 131). The issue of institutional barriers is hinted at in a comment on how paradoxical it is for education that is meant to lead to critique of the 'dominant culture' to be funded by government institutions that are part of that culture (PCE 2002: 57). The review shows links between tertiary education and other strategically significant areas of interest (e.g., see PCE 2002: 14, Fig. 4), but there is no detail on the nature of the linkages.

Tertiary education receives more explicit attention in *See change: learning and education for*

¹ While it is recognised that the details of what constitutes sustainability can be highly contested, this paper has chosen to take a broad approach consistent with the PCE's most recent reviews of sustainable development and learning and education for sustainable development (see PCE 2002, 2004). The term 'tertiary education for sustainability' has been chosen for this paper because 'education for sustainability' is the term favoured in those reviews. The term is used in reference to tertiary education that aims to build capacity for sustainable development (or the transition to sustainability). See PCE 2002 (pp 29-37) for a full discussion on terminology.

sustainability, the PCE's 'think piece', but emphasises that there is very little research to draw upon (see PCE 2004: 75).

It is hoped that this paper will assist in this regard. The paper aims, through the PCE's upcoming review of progress towards sustainable development in NZ, to contribute towards enhancing the tertiary education sector's ability to deliver sustainability-ready graduates.

The paper is limited in its scope to the relevant *teaching* activities of NZ's public tertiary education providers. Research activities have been purposefully excluded because of the timeframe and the resources provided for the paper.

The specific objectives are:

1. To provide an overview of sustainability-specific programmes offered by public tertiary education providers that are directly and the courses that contribute to them, and to relate them to expectations regarding NZ's needs in this regard;
2. To provide insights into the institutional arrangements for the delivery of those programmes and courses, and how they work, and
3. To make recommendations for institutional frameworks that would enhance the ability of the sector to more effectively provide for NZ's sustainable development needs.

The research conducted for objective 1 is limited to whole, sub-doctorate programmes that incorporate sustainable development, sustainability, environmental or resource management, or similar terms in their titles. They have been chosen because they have traditionally been associated with sustainable development and can be expected to include relevant content. It is acknowledge that in limiting the research in this way, it excludes programmes that, while not named for sustainability-related content, may include individual courses. This limitation is again due to time and resource constraints.

The rest of the paper is structured as follows:

Section 2 provides a summary of expectations derived from major international and NZ developments of relevance to tertiary education for sustainability;

Section 3 provides an overview of programmes and courses, and a qualitative assessment of the extent to which they live up to certain expectations;

Section 4 provides a summary of programme coordinator's opinions regarding the challenges faced in making such programmes available, and the institutional changes that would assist, and

Section 5 draws key conclusions from the results and makes recommendations for improvement.

In addition, there are three appendices. Appendix 1 provides key points raised by a review of major developments in NZ and abroad and used as a basis for developing the summary of expectations in section 2. Appendix 2 contains a list of tertiary education institutions, relevant whole, named programmes and contributing courses. Appendix 3 contains an unedited list of points raised by survey respondents regarding institutional issues and options for improvement.

2 Tertiary education for sustainability – summary of expectations

It is not possible within the constraints of this paper to identify, let alone provide detailed

insights into *all* of the sustainability-related developments that have occurred in NZ and abroad. Others have already done so to varying degrees (e.g., see Knight and PRISM 2000 for a thorough overview). The main aim of this section is to provide a set of expectations against which tertiary education for sustainability in NZ can be assessed. The review therefore focuses only on key developments of direct relevance to this subject.

Key international developments reviewed are:

- the UN Conference on the Human Environment, held in Stockholm in 1972;
- the UN Education, Scientific and Cultural Organisation's (UNESCO) Intergovernmental Conference on Environmental Education, held in Tbilisi in 1977;
- publication of *Our Common Future*, the report of the World Commission on Environment and Development (WCED), in 1987;
- publication of *Caring for the Earth: A strategy for sustainable living*, developed by the World Conservation Union (IUCN), the UN Environment Programme (UNEP) and the World Wide Fund for Nature (WWF), in 1991;
- the UN Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, and the resulting programme of action, *Agenda 21*;
- launch of the *Earth Charter*, after a decade-long consensus building process amongst predominantly non-governmental organisations, at the Peace Palace in The Hague in 2002;
- the World Summit on Sustainable Development, held in Johannesburg in 2002, and
- the declaration, in 2002, of 2005 – 2014 as the UN Decade of Education for Sustainable Development (DESD).

Key developments in NZ reviewed are²:

- the release, in 1995, of the *Environment 2010 Strategy*, the first nationally publicised response to Agenda 21 and a statement of the then government's strategy on the environment;
- the publication, in 1997, of *The State of New Zealand's Environment*;
- the national strategy for environmental education, *Learning to care for our environment*, published by the Ministry for the Environment (MfE) in 1998;
- the PCE's review of progress towards sustainable development in NZ in the 10 years after UNCED, entitled *Creating our future: sustainable development in New Zealand* and published in 2002;

² Note that developments were limited to those that have occurred at a national level since UNCED and that are directly relevant to education for sustainability. This is because national initiatives of direct relevance to education for sustainability have tended occur after UNCED. While there were many national activities in the preparatory phase for UNCED, developments since have reflected UNCED's principles. It is not, therefore, considered necessary (or possible within the constraints of this paper) to review them individually.

- the Department of the Prime Minister and Cabinet's 2003 *Sustainable Development Programme of Action*, and
- *See change*, the PCE's 2004 'think piece' on learning and education for sustainability.

A summary of key points that were raised by the review and are considered relevant to tertiary education for sustainability is provided in Appendix 1. Table 1, below, presents these key points in terms of broad areas of interest, principles that emerge for each of them, broad areas of focus and specific areas of interest. The contents of the table can be viewed as a wish list for education for sustainability in general and tertiary education, in particular, where distinguishable. Māori terms for the principles regarding underlying values were provided by one of the reviewers. They are included in the table to show that the principles emerging from the literature appear consistent with tikanga Māori.

Table 1. Tertiary education for sustainability – summary of expectations

BROAD AREAS OF INTEREST	PRINCIPLES	AREAS OF FOCUS	SPECIFIC AREAS OF INTEREST
1. Underlying values	Respect/caring <i>Kaitiakitanga</i>	Ecosystem integrity & human quality of life	Protection, restoration, enhancement. Health, sufficiency & well being.
	Recognition of common interest <i>Whakapapa</i>	Interconnectedness & interdependence. Past, present & future.	Life supporting services. Relationships between people & environment.
	Acceptance of responsibility. <i>Tino rangitiratanga</i>	Individual & collective responsibility	Stewardship, precautionary action
	Persuasion & empowerment <i>Manakitanga</i>	Communication of values, development of skills, involvement.	Education 'for' the environment & sustainability.
	Inclusiveness <i>Whanangatanga</i>	Cognisant of & appropriate to local context	Public participation in decision-making & development
	Equity <i>Oritetanga</i>	Political, economic, legal rights	Democracy, access. Women, youth, indigenous people.
2. Nature of programmes	Holistic	Whole systems, interactions within & between.	Systems thinking. Links & relationships between components.
	Interdisciplinary	Roles & responsibilities, contributions	Building capacity within & across disciplines, integrating activities.
	Outward looking	Cognisant of global implications & concerns. Recognition of role within global context.	Recognising wider implications of actions. Considering best practice options.
	Locally cognisant	Understanding local contexts & respecting the need for locally appropriate responses.	Programmes that resonate with local needs, activities and culture.
	Transformative	Using knowledge to change values, attitudes & behaviour	Critical thinking, awareness, skills & participation.

Continued overleaf

Table 1 continued. Tertiary education for sustainability – summary of expectations

BROAD AREAS OF INTEREST	PRINCIPLES	AREAS OF FOCUS	SPECIFIC AREAS OF INTEREST
3. Nature of knowledge & understanding (content)	Cover impacts & implications of environment/society interface	Bio-physical & ecological realities. Effects of human activities (ecosystems, & human well being), now & in the future. Different scales. Indicators & monitoring.	Ecosystems: land, freshwater resources, marine environment, bio-diversity & biosecurity, urban environments. Production & consumption: industry, energy, transport, wastes. Human health effects.
	Cover sources	Human values, aspirations, systems & activities. Critique & self-awareness.	Economics, politics, culture, ethics, morality & spirituality, & associated strategies & systems.
	Cover solutions	Integrating ecological & social imperatives Creative thinking, problem solving, skills.	Associated institutions & instruments for change, including policies, control measures, programmes, incentives, disincentives.
4. Target audiences	All ages	Individuals, groups, communities	Professional & personal responsibilities & actions
	All levels of education	Pre-schools to tertiary education & training; community & continuing education	Developing & integrating the curriculum within & across levels
	Formal & non-formal types of education	From pre-, primary & secondary school children & tertiary students to general public	Appropriate methods of instruction/ communication & media
	All disciplines & sectors	Occupation-specific, general core	Work & workplace related
	All political levels	National, local & community	Links within & between government agencies, private & public sectors.
	All ethnic groups	Different sensitivities, needs & potential for contribution. Emphasis in NZ on tangata whenua.	Input & involvement. Appropriate approaches & methods. Building capacity & participation.

Continued overleaf

Table 1 continued. Tertiary education for sustainability – summary of expectations

BROAD AREAS OF INTEREST	PRINCIPLES	AREAS OF FOCUS	SPECIFIC AREAS OF INTEREST
5. Institutional requirements	Coordination	Commitment & creative leadership. Frameworks for decision-making.	Strategies, structures & systems. Priorities, policies & programmes.
	Integration	Acknowledgement of diversity & different contributions to be made	Relationships, collaboration & partnerships. Integrated analysis of effectiveness.
	Facilitation	Identifying needs, resources & materials. Enhancing accessibility.	Training & supporting leaders. Building synergies, managing conflicts of interest.
	Flexibility	Recognise, respect & reflect differences	Adaptation to specific needs & varying contexts.
	Communication & promotion	Determination of messages, methods & media. Social marketing.	Internal & external. Oral, written, electronic. Popular & professional.
	Review, re-orientation & re-design	Extending & enhancing existing curricula. Developing new ones.	Objectives, content & skills, as well as approaches to teaching, learning & assessment.
6. Educational research & development	Development of pedagogy	Evaluation of effectiveness. Identification of barriers, gaps.	Development of indicators, monitoring & communicating results. Influence of sustainability principles on social, economic & environmental decision-making.
	Cooperation	Support for interdisciplinary research & development	Building of relationships & collaborative efforts. Involvement of a range of disciplines.
	Action-orientation	Review potential, develop understanding of mechanisms, put results into practice	Communication of results so that potential for application is enhanced.

From the table it can be seen that six broad areas of interest emerge: 1) underlying values; 2) the nature of educational programmes; 3) the nature of the knowledge and understanding conveyed; 4) target audiences; 5) institutional requirements, and 6) educational research and development. Each has its own set of principles, areas of focus and specific areas of interest. The principles will be used in section 3.2 and 4 below to provide a broad, qualitative assessment of the extent to which tertiary education for sustainability in NZ appears to deliver on expectations.

3 Overview of relevant tertiary programmes and courses

3.1 Summary of available programmes and courses

The first part of objective 1 was achieved by means of a desktop study. Academic calendars and prospectus' from all public providers of tertiary education in NZ, including 8 universities, 20 polytechnics and institutes of technology, 4 colleges of education³ and 3 wananga, were studied. Private training establishments were excluded because there are over 200 of them, they tend to be quite narrow in focus, and they account for only 17% of all tertiary enrolments. The time available for the research did not warrant including them and it is unlikely that their exclusion would have had a significant effect on the results.

The tertiary institutions studied accounted for 83% of all EFTSs (equivalent full-time students) enrolled in tertiary education in 2004 (a total of 470,500 EFTSs) (MoE 2006). The whole, relevant programmes they offer and contributing courses are presented in Appendix 2, together with the contact details of course coordinators. Table 2 provides an overview of the data presented in Appendix 2. In summary, all eight universities (100%), eight of the 20 polytechnics or technical institutes (40%) and two of three wananga (60%) offer sustainability-related whole programmes, while none of the colleges of education appear to do so.

Table 2. Number of sustainability-related programmes offered by type of programme (level) and provider

PROGRAMME TYPE	PROGRAMMES OFFERED (no. by type of provider)			
	University	Polytechnic/ tech. institute	Wananga	Total
Undergraduate level				
- Certificate	-	9	1	10
- Diploma	2	12	-	14
- Bachelor's	20	4	2	26
<i>Undergraduate total</i>	22	25	3	50
Graduate level				
- Bachelor's (hons)	5	-	-	5
- Graduate certificate	2	1	-	3
- PG certificate	1	-	-	1
- Graduate diploma	5	1	-	6
- PG Diploma	6	-	-	6
- Master's	27	-	-	26
<i>Postgraduate total</i>	46	2	0	48
TOTAL	68	27	3	98

³ Note that the Auckland College of Education was considered separately from The University of Auckland, despite having recently become part of the latter. This was because of the distinct nature and role of colleges of education. It was considered useful for them to have their own category, so that their contributions could be compared. As it turned out, there was nothing to compare.

Of the 98 programmes offered, half are at undergraduate level (50 or 51%)⁴ and almost half are at graduate level (48 or 49%). Of the undergraduate level programmes, 22 (44%) are offered by universities and 25 (50%) are offered by polytechnics/technical institutes, while wananga offer 3 (6%). Of the graduate level programmes, 46 (96%) are offered by universities and only 2 (4%) are offered by polytechnics/technical institutes. Wananga do not offer any post-graduate level programmes.

Of the undergraduate level programmes, half are bachelor's degrees (26 or 52%), 14 (28%) are diplomas and 10 (20%) are certificates. The universities offer the majority of bachelor's degrees (20 or 77%), with the remainder spread between polytechnics/technical institutes (4 or 15%) and wananga (2 or 8%). The polytechnics/technical institutes offer the majority of certificates and diplomas (21 or 88%).

Of the graduate level programmes, just over half (27 or 56%) are master's degrees. Honours degrees, graduate diploma's and post-graduate degrees make up the next largest group, 17 in total (35%) and 5 or 6 (10 or 13%) each. Graduate certificates and post-graduate certificates make up the remaining 4 (8%). The universities offer all of the master's degrees (100%) and the majority of the remaining graduate/post-graduate diplomas/certificates and honours degrees (19 or 91%). The polytechnics/technical institutes offer 2 (10%) of the remaining graduate certificates/diplomas.

3.2 Programmes and courses in relation to expectations for tertiary education for sustainability

In addition to providing a basic overview of what's on offer with regard to tertiary education for sustainability, objective 1 aimed to provide insight on the extent to which tertiary programmes and courses meet expectations regarding NZ's sustainable development needs. In order to achieve this, major developments in NZ and abroad were reviewed, particularly in terms of what they appear to expect regarding education for sustainability (see s2, above).

The data generated in the overview of programmes and courses (see Appendix 2), do not provide sufficient detail to enable an accurate assessment to be made of the extent to which they provide for all of the expectations. This is particularly so for expectations in category 1, underlying principles/values (see Table 1, pp 5-7). To do so would require far more in-depth research. However, the connection with tikanga Māori (see p5) is worth noting and suggests that these values are incorporated in programmes and courses that focus on Māori perspectives and responses to environmental and natural resource management.

The data are sufficient to make broad comments regarding some of the expectations in categories 2, 3 and 4, regarding the nature of programmes, knowledge and understanding and target audiences, respectively. Expectations regarding institutional requirements and research and development will be considered in light of the results of the survey of programme coordinators (s4, below).

Please note that the assessment is not meant to be a critique of individual programmes and courses. Rather, it is an attempt to gain a first-off and broad view of whether a range of sustainability-related needs appear to be provided for in NZ.

In terms of category 2, the *nature of programmes*, it is difficult to determine from the data how *holistic* or *transformative* programmes are. Some programmes include courses that

⁴ Percentages are rounded to nearest 1%.

cover a wide range of subjects from different disciplines (see below), and the titles of a few courses themselves suggest some degree of holism (e.g., 'integrative studies in resource management', Massey, and 'sustainable production and consumption systems', UoA). However, without knowing how well courses covering different disciplines are integrated within programmes, and without detailed information on their content, it is not really possible to make any comments on how holistic they are. Similarly, the extent to which programmes and courses are transformative could only be assessed if detailed data were available on the effectiveness of programmes in this regard.

Some reviewers' comments do provide further insights and suggest that The Open Polytechnic's Graduate Diploma in Sustainability Management, The University of Canterbury's Bachelor of Natural Resources Engineering and The University of Auckland's Master of Planning Practice, are examples of holistic and transformative programmes.

It is possible to comment, at least broadly, on the extent to which the principle of *interdisciplinarity*⁵ appears to be reflected by the programmes that are on offer in NZ. Table 3 shows the range of disciplines represented. (There are also some disciplines where such programmes are obviously thin on the ground, and others that are not represented at all, such as medicine and the arts.) The majority of programmes appear to be dominated by a single disciplinary tradition. In order of prevalence these are science, engineering or technology, planning or policy, architecture, business or economics, and law. Others, such as those containing the terms 'management', 'development' and 'studies' in their titles, as well as Māori-oriented programmes, appear to extend beyond such traditional discipline bases. They appear to be more multi-disciplinary in their nature, although the extent to which this occurs is again variable. One of the reviewers emphasised that the management 'label' was used because the interdisciplinary nature of the programme meant that it was too difficult to gain approval for a science 'label'. It's interesting to note that while the latter would have been the reviewer's preference, 'old school people' and approach prevented this from occurring.

There is also variation in the extent to which discipline-based programmes incorporate other disciplines. Some appear heavily oriented towards their specific discipline (e.g. some of those that are based in the natural or physical sciences, engineering or law), while others clearly include a mix of disciplines.

One reviewer noted that while their science and technology courses include broader, conceptual elements of sustainability, lack of time and high costs limit the extent to which teachers can provide for more 'practical exposure'. He also expressed concern about how difficult it is to get any non-core courses into science and technology programmes, for example.

⁵ Note that the term 'interdisciplinary' is used in reference to programmes that include a range of disciplines in an integrated way. 'Multi-disciplinary' will be used later in the document in reference to programmes that clearly include a range of disciplines, but are either not integrated or for which integration is not possible to discern.

Table 3. The extent to which programmes appear to reflect traditional discipline bases, extend beyond them or appear non-traditional in their nature

	Traditional discipline base	Extension beyond traditional discipline base			
		Combined with other discipline	'Development'-oriented	'Management'-oriented	'Study'-oriented
Anthropology (Māori)		4			
Architecture	2	1			
Business/economics	3				
Engineering/technology	11	2		3	
Law	1				
Planning/policy	8	2			
Science	13	3	2	15	
Non-traditional			3	16	10

Programmes appear to vary in the way they source courses that extend beyond their traditional discipline bases. On one end of the spectrum are programmes where the majority of courses are strongly discipline based, are sourced from within the discipline, and where students are able to randomly select only a few courses outside the discipline. At the other end are programmes where it is compulsory to undertake specific courses from other disciplines, and where those courses are sourced from outside (e.g. science-based programmes that incorporate courses from business, politics and law schools/departments). However, some disciplines, such as planning, are inherently interdisciplinary in nature, so generalising in this regard may not be helpful.

Some tertiary education providers appear to have less traditionally defined and more multidisciplinary divisions (e.g., Lincoln University's Environment, Society and Design Division). The Open Polytechnic has a division dedicated specifically to 'Environment and Sustainability'. Lincoln, in particular, appears to have highly multi-disciplinary programmes (e.g., its Bachelor of Environmental Management and Master of Resource Studies) and interdisciplinarity is enhanced through 'heavy engagement' with other divisions.

Apart from this, it is impossible to determine from the data the extent to which multi-disciplinary divisions/schools/departments and programmes are actually interdisciplinary. To determine this, data would be needed on whether the different disciplines are offered as discreet parts or whether their content is integrated. From the authors' experience, integration can rely heavily on the nature of projects that are set and how they are assessed.

Table 3 shows that science still dominates as a discipline base for sustainability-related programmes, followed by engineering/technology and planning. The courses in almost two thirds of science-based programmes appear to extend beyond purely typical science subjects. Again, the extent to which this occurs varies.

In terms of the *outward looking* nature of programmes, a number of course titles include references to the global nature of sustainability, e.g. 'global environmental change', 'international environmental policy', 'international rural development', 'rich world, poor world, the making of the third world', and 'international business and sustainability'. In addition,

there are courses that by their nature are outward looking, e.g. those that cover climate change and weather systems. Many courses are obviously *locally cognisant*, e.g., 'sustainable development and NZ', 'NZ biodiversity and biosecurity' and 'NZ society, structure, culture and change', while many must be by implication (e.g., 'coastal processes', 'resource consents').

Some courses are clearly both outward looking and locally cognisant, e.g., 'Māori, local and global environment perspectives'. The majority of course titles do not specify whether they are global and/or local in their perspectives, and it is possible that many of these incorporate both. Obvious examples are topics such as 'biodiversity', 'ecology', 'macro-economics', 'environmental law', 'water science and technology', but it is not possible from the data to determine whether this is the case or not.

In terms of Category 3, the *nature of knowledge and understanding*, all universities offer under- and post-graduate programmes that cover environmental and/or natural resources science or management. It seems reasonable to assume, therefore, that *impacts and implications of the environment/society interface* are being adequately covered at university level. However, only six polytechnics/technical institutes (30%) offer such programmes, suggesting that sustainability may not be covered to a great extent at a vocational training level. (It is possible that single courses are provided within a greater range of institutions.) It is interesting to note that 2 out of 3 wananga do offer such programmes, possibly reflecting the significance that tangata whenua appear to place on environment/natural resource management.

The programmes that are offered do appear to vary in their focus. Emphasis tends to depend on the school/department in which programmes are housed. Programmes housed in science, for example, tend to have a combination of courses covering the physical and biological sciences. They include few courses of obvious relevance to the other part of the sustainability equation, human well-being, nor the values, aspirations, systems and activities that are the source of environmental problems and solutions. (Although again, the extent to which this can be discerned from the data is limited.) When such courses are included, they tend to focus on environmental/resource management policy or law. It seems reasonable to assume that these programmes develop knowledge and skills to understand, study, monitor and manage bio-physical and/or ecological realities (i.e. the state of the environment), as well as the scientist's most obvious societal interface: law and/or policy. It also seems reasonable to assume that they are not actively working to develop knowledge and skills necessary to contribute to the broader social change processes necessary for sustainable development.

In terms of *sources* and *solutions*, there appears to be less coverage overall of the extent to which human values, aspirations and systems contribute to the problems, although it is not possible to be certain. Environmental/resource management and planning-oriented programmes do tend to include courses that cover bio-physical/ecological realities and aspects of production and consumption, as well as *sources* (e.g., economics, politics, culture, ethics) and *solutions* (e.g., governance, policy and law, social change).

However, some of these courses appear to be generated within science-based schools/departments, while others appear to be generated by other disciplines (e.g. economics, politics). The depth with which they cover sources and solutions cannot be determined from the data. An important question that needs to be asked is whether courses on sources and solutions that are generated within science faculties/divisions/colleges are substantive enough when compared to those that are generated by relevant outside experts (e.g. lawyers developing law courses for non-lawyers, economists developing economics courses for non-economists).

This is important in terms of a more fundamental question, which is whether it is better for

schools/departments to have in-house experts from a range of disciplines to contribute to the development and delivery of multi-disciplinary programmes, or to collaborate with other faculties to do so. There are benefits and disadvantages for both. The former provides enhanced opportunities for integration and true inter-disciplinarity, but can result in professional isolation if the school/division is housed within another faculty. The latter may provide greater legitimacy and reduces the risk of professional isolation, since contributing experts are housed within their own disciplines, but it can make integration difficult. It may also be difficult to rely on on-going contribution from those who are not line managed by the school/division that offers the programme. (See Stone and Breuckner 2004 for further comment in this regard.)

It seems reasonable to assume that sustainability-related engineering programmes offer the most detail on impacts of various aspects of urban settlement and production, as well as the engineering/technology-based solutions to them, while planning/policy and law degrees provide the most detail on institutional sources and solutions of direct relevance to their own disciplines⁶. Architecture and landscape programmes obviously provide insights on solutions specific to buildings and the built environment.

In terms of category 4, *target audiences*, the focus for this paper was tertiary education, and comments have been made earlier with regard to relevant *levels of education, disciplines and sectors* (see section 3.1 and above). It is not really possible, within the constraints of the paper to consider the other principles in this category. However, there are important questions to be raised in this respect. Many tertiary providers already extend the *age groups* they cater for by providing community and continuing education, and most engage with secondary schools. Others, e.g. Northland Polytechnic recognise the role they play in 'second chance' education, whereby people of all ages are able to 're-engage with the education system', and alter their programmes accordingly. Could tertiary institutions in general do more in this respect? They are probably less active in terms of *non-formal* education, and could they potentially play more of a role here? Another important question is what their role should be in terms of *political* activity or advocacy?

With regard to *ethnicity*, many programmes include individual courses that cover Māori perspectives on environmental or resource management. A few, notably Massey University's Post-graduate Diploma in Māori Resource and Environmental Management, Te Wananga o Aotearoa's Certificate in, and Bachelor of Environmental Management, and Te Whare Wananga o Awanuiarangi's Bachelor of Environmental Studies (Te Ahu Taiao), are dedicated to this topic. It would be interesting to know the extent to which other programmes reach Māori (and, indeed, other ethnic groups within NZ, particularly those that are non-Western in their origins and may have quite different perspectives on the environment and sustainability).

4 Institutional arrangements for delivery

The second and third objectives for this study aimed to provide insights on the institutional arrangements for the delivery of sustainability-related tertiary programmes and courses, and how they work. The methodology used for this part of the project consisted of an email survey sent to teaching staff responsible for coordinating the whole, named programmes and courses identified for the first objective. A total of 37 coordinators were identified and all were invited to participate in the survey⁷.

⁶ Note that the similarities probably end there, given planning's inherently interdisciplinary nature.

⁷ Note that time constraints meant that the sample was drawn from the first draft of the list of programmes and courses. A few additional programmes (and hence coordinators) were identified in the review process. While these coordinators were not included in the survey, the original sample is

The survey focused on three key questions. First, coordinators were asked about how their institution supports the provision of sustainability-related programmes and courses. The second question focused on the challenges and difficulties staff face in making those programmes and courses available. Here, coordinators were asked to identify challenges and difficulties in terms of gaining approval, development and delivery of the programmes. In the third and final question, coordinators were asked to identify potential changes – both internal and external – that would improve their institution’s ability to deliver sustainability-related programmes and courses. The survey had a response rate of over 62%, with a total of 23 coordinators participating. Fifteen respondents were from universities, seven were from polytechnics and one respondent was from a wananga. Their responses are summarised below, according to the three questions posed.

4.1 Institutional support for the provision of sustainability-related programmes and courses

Two thirds of respondents (65%) qualified overall institutional support for these programmes and courses in a positive manner. However, almost half of respondents pointed out that while there is a degree of support within their institutions and specific departments for individuals wanting to teach sustainability-related topics and courses, there is no overall, institution-wide commitment to either the teaching of sustainability or the application of sustainability principles within the organisation. In this sense, initiatives are viewed as originating in a ‘bottom-up’ rather than ‘top-down’ manner. Another key issue raised relates to the way institutions approach sustainability teaching. While most participants see a need for a multidisciplinary approach to the teaching of sustainability-related programmes and courses, some respondents point out the lack of support from their institutions with regards to inter and multidisciplinary forms of teaching. Furthermore, it is reported that financial mechanisms – a key indicator of adequate support – are designed in such a way that ‘single disciplines’ dominate the allocation of resources.

4.2 Challenges and difficulties teaching staff face in making sustainability-related programmes and courses available

Participants were asked to identify challenges and difficulties faced related to ‘gaining approval’, ‘development’ and ‘delivery’ of the programmes and courses. The majority of respondents identified challenges or difficulties in terms of all three areas of interest (20, 20 and 21 out of 23, respectively).

With regards to gaining approval for sustainability-related programmes and courses, two key challenges were identified. First, a large degree of bureaucracy, specifically on the part of CUAP⁸ and TEC⁹, that results in time delays and excessive paperwork. One of the participants indicated that the process for gaining approval takes approximately eighteen months. The second important issue identified relates to the status of sustainability-related programmes and courses within the institutions. In this sense, participants indicated that these programmes and courses are perceived to be of ‘*lower academic quality*’ by strongly discipline-based departments and that they face resistance within the institution from staff who do not see the value in such programmes and courses.

In addition to those identified above, there is a wide range of challenges and difficulties

considered to have been sufficiently large and random to be representative of the range of views.

⁸ Committee for University Academic Programmes

⁹ Tertiary Education Commission

sustainability-teaching staff face, including: the pressure of a market driven system which requires that demand for a specific course or programme is *'proven'*, which in turn requires resources not always available (e.g. time, money and human resources); lack of institutional support, where teachers must use their own time to develop these courses and there is no formal budget allocation until the course is up and running; an overall pressure to *'rationalise'* teaching and *'cut'* subjects, rather than introduce new ones; the cost of the NZQA¹⁰ approval process; a lack of political support for interdisciplinary teaching; an overall lack of support from management staff, and a difficulty in achieving uptake by students – either due to their strong *'traditionalist'* discipline-base or the influence that lack of awareness of sustainability related issues at secondary school level has on their career choices.

In terms of programme and course development, the most important challenge sustainability-related teaching staff face is lack of institutional support. This is manifested in terms of: insufficient financial resources; inadequate time allocation; refusal to appoint staff into programmes even when there is student demand, and refusal to appoint staff into positions that become vacant within existing programmes. In addition, some participants feel they are not being recognised or rewarded for their efforts in developing these programmes and report a lack of willingness from their institutions to commit additional resources. As with the process of gaining approval, participants also mentioned other difficulties they face in developing sustainability-related programmes and courses. These include: cost associated with creating and delivering programmes and courses, as well as making them technologically and factually up-to-date; cost of making resources available electronically to avoid cost of relocation for remote students; cost of employing suitably qualified programme writers; competition (i.e. pressure to provide a programme that is distinctive from the many other options available within the tertiary sector); difficulty maintaining student numbers; a disappearance of *'university culture'* (evidenced by a shift towards commercialisation and managerialism, where sustainability-related courses are perceived as costly and not servicing *'market needs'*), and finally, difficulty incorporating sustainability concepts in mainstream disciplines.

The final part of the question about challenges and difficulties referred to those encountered in delivering sustainability-related programmes and courses. The single most pressing issue identified by the respondents is a lack of suitably qualified staff to teach the courses. This appears to be either the result of unwillingness on the side of their institutions to recruit staff or a difficulty *'sharing'* staff across departments. The latter appears due to guest staff not being appropriately compensated for their work or a lack of availability of suitably qualified staff. While this was most commonly reported in the non-university sector, it is also encountered in universities. This lack of teaching staff in turn results in a disproportionate teacher/student ratio (i.e. too many students and not enough teachers), particularly in the university sector. One reviewer did point out that the extent to which this occurs appears to vary.

Other challenges for delivery reported by participants include PBRF¹¹ requirements, which take the focus off teaching and onto research, making time and resource commitments to teaching programmes suffer. They also reinforce the disciplinary categorisation of staff and appear to penalise those who undertake (or wish to undertake) strongly interdisciplinary research. Further challenges include: difficulties in attracting enough students to make programmes financially viable; geographical limitations for delivering practical content of the programmes; difficulty getting buy-in from students about sustainability issues as sustainability and environmental issues are becoming stale, and the contradictory messages

¹⁰ New Zealand Qualifications Authority

¹¹ Performance Based Research Fund

that result when sustainability-related programmes are delivered in campuses with no real commitment to sustainability issues and without even basic activities such as recycling and energy conservation.

4.3 Options to improve the institution's ability to deliver sustainability-related programmes and courses

Participants identified a number of changes, both within their institutions and externally, that they consider would help improve the delivery of sustainability-related courses. At an internal level, the three most important changes identified were increased staff recruitment, a multidisciplinary approach to sustainability-teaching and the need for providers to genuinely become sustainable (i.e. to practice what is preached). In addition, reduced bureaucracy, increased resource allocation (including time, money, human resources and physical space), staff up-skilling and capacity building, and greater support and commitment from management staff were amongst the other significant internal changes identified.

With regards to external changes, respondents pointed to increased support from central government as the most significant change needed. Participants identified a number of specific examples where government support of sustainability-related teaching can be improved. The most common of these have been incorporated into the recommendations presented in section 5, below.

In addition, some respondents also identified the need for the private sector (e.g. industry groups) to provide increased support in sustainability-teaching by investing directly in education of future participants in the field.

5 Conclusions and recommendations for enhancing contributions

Much has been said and written over the past couple of decades to emphasise the importance of education for sustainable development. However, tertiary education for sustainability can be considered to be a bit of a moving target – we know what we want it to achieve in broad terms, but not much research has gone into what it involves, particularly from an institutional perspective. This paper has tried to assist in this regard by reviewing relevant developments in NZ and abroad, and using key points raised by the review to develop a set of expectations for tertiary education for sustainability.

A broad brush assessment of the extent to which these expectations are met in NZ suggests that the institutional context could be improved. While there is a wide range of programmes, the majority fall within the natural and physical sciences, engineering/technology and planning. Only a few programmes are available that focus on the role of business, economics or law in the transition to sustainability. There are none at all within medicine, education, the arts and humanities (although those which focus on Māori resource management, could be considered to be exceptions in terms of the latter). It appears that programmes that are available vary widely in the extent to which they provide the knowledge and understanding considered necessary for sustainability to be achieved. Sustainability-related tertiary teaching has only marginally extended into non-traditional areas and is not extensively available at a vocational level. These limitations may be largely to do with what appears to be a broadly unsupportive institutional context.

Responses to a survey of programme coordinators suggest that while support may be available at an individual level, institutional support for interdisciplinary programmes, in general, and sustainability-related programmes, in particular, tends to be low. There appear to be difficulties in having programmes approved, and in developing and delivering them.

It is apparent from coordinators' comments that the *ideological context* within which tertiary

education for sustainability is provided needs to change, and a number of reviewers wished to see this emphasised. Two recommendations that are particularly pertinent require relevant government agencies and tertiary institutions to:

1. Recognise and affirm that sustainability-related programmes are a vital part of the tertiary sector; critical for guiding NZ into the future, and
2. Enhance recognition of the need for sustainability-related programmes by TEC in its strategy and funding.

The remaining key recommendations identify specific ways to improve the institutional context for tertiary education for sustainability¹². They are organised according to categories 5 and 6 of the expectations synthesised from key developments and summarised in Table 1, above (p 7). Note that some recommendations could fit into more than one category.

Institutional context

3. Coordination, integration and facilitation
 - Create a centre of excellence dedicated to sustainability-related education;
 - Place more emphasis in the revised science curriculum on education for sustainable futures as a discipline area;
 - Create resource centres for sustainability in all schools and tertiary institutions;
4. Flexibility
 - Reduce bureaucracy, including at TEC level;
 - Change the PBRF to
 - Eliminate penalties for interdisciplinary sustainability-related research,
 - Maximise opportunities sustainability-related teaching to be research led;
 - Allow for some specialist teachers within the tertiary system rather than expecting every staff member to be research driven¹³;
 - Change institution-specific rules regarding what constitutes legitimate research activity;
 - Appoint inter, or multi-disciplinary teaching staff with trans-departmental access membership and access;
5. Communication and promotion
 - Require public sector staff to receive sustainability education (e.g. via staff secondments);
 - Fund teacher training for secondary and tertiary science staff interested in gaining sustainability-related qualifications;

¹² Note that emphasis is placed here on the most common recommendations provided by programme coordinators in response to the survey and emphasised during the peer review process. A broader set of recommendation can be found in Appendix 3.

¹³ Note that this recommendation was contentious amongst reviewers. On the one side there are strong feelings that all teaching should be research led, while on the other the opinion is that a teaching only focus should be accepted and provided for at tertiary level. It is also useful to note that some reviewers believed that recommendations regarding interdisciplinarity should extend beyond sustainability-specific research.

- Provide student scholarships to enable good students to complete their degrees in closer to full-time study, rather than having to fit study around paid employment;
 - Provide more incentives for students to carry on postgraduate studies.
6. Review, re-orientation and re-design
- Provide financial incentives from the government to institutions developing and implementing sustainability-related programmes (including assistance with developing curricula);
 - Ensure that curriculum development in secondary schools is linked to university entrance requirements as incentive for students to take sustainability-related courses;

Educational research and development

7. Development of pedagogy
- Undertake a strategic assessment to
 - identify specific skills necessary to achieve sustainability,
 - assess the quality and reach of all programmes and courses that are available and
8. Cooperation
- Ensure an appropriate mix of degrees and graduates across the necessary disciplines, and
9. Action-orientation
- Enhance opportunities for students' sustainability learning to engage with policy-making at the central and regional level.

Appendix 1 – Summary of relevant outcomes of major developments

A2.1 International developments

The Stockholm conference was the first international conference to recognise the implications of environmental degradation for humankind. It recognised environmental education as critical for responding to and reversing these implications, and provided a platform from which to launch subsequent efforts (UNESCO, 1977).

The Tbilisi conference focused entirely on environmental education, emphasising its crucial role in providing the ‘knowledge, understanding, values and skills’ necessary to respond to ‘environmental problems and opportunities’ (UNESCO, 1977: 12). Environment is defined in its broadest sense, including the natural and built environment, as well as the technological and social environment, with the latter including economic, cultural, historical, moral and aesthetic elements (UNESCO 1977: 27). The goals of environmental education are identified as: 1) fostering awareness and concern; 2) providing opportunities for developing relevant knowledge, values, attitudes, commitment and skills, and 3) changing behaviour in individuals, groups and society (UNESCO 1977: 26).

The Tbilisi Declaration includes a set of principles for environmental education that have formed the basis for subsequent international efforts (including Agenda 21’s chapter on ‘promoting education, public awareness and training’ – UN 1992: 264). They stress that environmental education be:

- provided to all ages, at all levels, through formal and non-formal education, as well as the media;
- comprehensive and life-long, preparing people as individuals, group members and professionals to recognise environmental problems and contribute to solutions;
- holistic and interdisciplinary, recognising interdependencies between people and the environment, between the past, present and future, and between national communities;
- outward-looking, while also being community-specific, customised to reflect local contexts and maximise involvement, and
- linked with legislation, policies, control measures and government decision-making (UNESCO 1977: 24, 25).

The following recommendations are of direct relevance to tertiary education.

Recommendation 6 calls for organisational structures that enable the coordination, integration and facilitation of environmental education initiatives (UNESCO 1977: 29).

Recommendation 7 calls on states to create a specialised unit to train leaders, develop curricula, prepare references, and determine methods and media (UNESCO 1977: 30).

Recommendation 8 identifies the general public, special occupational or social groups, professionals and scientists as target populations (UNESCO 1977: 30, 31).

Recommendation 10 lists a broad range of professionals who have direct and indirect impacts on the environment, and calls for their education to include a “common core of interdisciplinary environmental studies dealing with both the natural and

human environments [and] related to their professions” (UNESCO 1977: 31).

Recommendation 11 calls for incentives for professionals to undertake further environmental education and for it to be available in the form of both continuing education and specialist post-graduate education (UNESCO 1977: 31, 32).

Recommendations 12 and 13 have the most extensive implications for tertiary education. Recommendation 12 calls for recognition of the negative effects of disciplinary isolation, and recommends the inclusion of environmental issues in each discipline, as well as the flexibility necessary to enable existing curricula to be modified and new curricula to be developed, including interdisciplinary ones. It calls for the development of criteria that recognise and reflect individual needs and varying contexts, and can be used as the basis for relevant environmental content. It recommends research into, and support for effective curriculum and programme development, including identifying, prioritising and supporting the contributions that various disciplines can make. It calls for curricula to include ecological concepts, bio-physical systems and relevant socio-economic aspects, and for research to be “problem- and action-oriented”. It includes a recommendation that teachers be provided with initial as well as in-service training. (UNESCO 1977: 32, 33)

Recommendation 13 focuses specifically on universities as centres for research, teaching and training, the latter in both a formal and non-formal sense. It stresses the importance of educational development, and calls for a review of the potential for conducting research in this regard. It recommends building relationships between all disciplines and encouraging close cooperation between the institutions they represent. The importance of developing relevant resource materials is also noted. (UNESCO 1977: 33, 34).

Recommendation 14 focuses on vocational and technical education and calls for the environmental implications of all such work to be included. Recommendation 15 extends to include implications for the work environment itself. (UNESCO 1977: 34, 35)

Recommendations 17 and 18 focus on teachers and call for environmental education to be included in their pre-service training, as well as on-going in-service training (UNESCO 1977: 35, 36).

Recommendation 19 focuses on the development and provision of teaching aids and materials. It recommends that basic principles be developed for the preparation of such resources, and that there be an emphasis on cost effectiveness. It calls for both teachers and learners to be involved, and for adaptation and improvisation where possible and according to particular contexts. (UNESCO 1977: 36)

The remainder of the recommendations deal with a range of national, international and trans-national mechanisms designed to assist in implementation, and include some detail on the role of UNESCO.

The WCED’s 1987 report, *Our Common Future*, focuses on the nature of sustainable development and the need for collective endeavours in response to concerns and challenges. It identifies education as being part of the means whereby individuals can be persuaded to “act in the common interest” (WCED 1987: 46). However, the report emphasises that major environmental issues arise from inequities in political and economic power (ibid.). While its focus with regard to education is therefore on making basic education available (e.g., WCED 1987: 54, 56), the report does also stress the need for comprehensive environmental education that spans the disciplines and provides insights on the relationships between natural and human resources, and between development and environment (WCED

1987: 113). It echoes the Tbilisi Declaration's calls for formal and non-formal environmental education to "foster a sense of responsibility" and to develop the capacity for monitoring, protecting and enhancing the state of the environment (ibid.). It emphasises the importance of teacher training, for curriculum and resource development, and for communication and collaboration in this regard (WCED 1987: 114).

Caring for the Earth (IUCN/UNEP/WWF, 1991) was published in the run-up to the UNCED in Rio de Janeiro in 1992. It defines nine principles necessary to achieve "sustainable living" and provides an integrated set of actions for implementing them. The principles cover the need for: respect and caring for life; improving human quality of life; conserving vitality and biodiversity; minimising depletion of non-renewable resources; keeping within carrying capacity; changing attitudes and practices; empowering communities; establishing national frameworks for integration, and creating a global alliance (IUCN/UNEP/WWF 1991: 9-11). Each principle is accompanied by a set of actions, and further actions are allocated to particular sectors or areas of interest: energy, business, industry and commerce, human settlements, farm and rangelands, forest lands, freshwaters, and oceans and coastal areas (see IUCN/UNEP/WWF 1991: 174-177, for a summary.)

Because of the action-oriented nature of *Caring for the Earth*, the need for education is implicit throughout, and mentioned usually in terms of raising awareness, developing knowledge and disseminating information appropriate to specific principles, sectors and areas of interest. The chapter on changing personal attitudes and practices (Ch. 7) is more explicit, including actions to: 'motivate, educate and equip individuals to lead sustainable lives'; review environmental education; make it integral at all levels of formal education, and determine and meet relevant training needs (IUCN 1991: 53-56). From an institutional perspective, the focus is on developing and implementing integrated and appropriate policies at national and local levels (e.g., see pp 65-76). The final chapter (Ch. 17) contains broader, institutional actions for implementing the strategy as a whole. Those with an educational angle focus on promotion of sustainability strategies within and outside government, and publicity campaigns (e.g., see p168).

The Rio Declaration contains 27 principles of relevance to environment and development (see UN 1992: 9-11). The first six draw attention to the centrality of human well being, the concurrent need for environmental protection, the sovereign rights of States (including their right to develop), and the significance of poverty and the 'least developed and ... most environmentally vulnerable' (UN 1992: 9). Principle 7 focuses on the integrity of the 'Earth's ecosystem', and the spirit of partnership and cooperation necessary to 'conserve, protect and restore [its] health' (UN 1992: 9, 10). The remaining principles focus on a range of specific aspects, including: environmental protection and responsibility; production and consumption; demography; legislation, liability and compensation; economic systems, instruments and international trade; trans-boundary transfer of harm; the precautionary approach; environmental impact assessment; natural disasters and emergencies; the roles of women, youth and indigenous people; protection of the environment and resources of oppressed, dominated or occupied people, and dispute resolution (UN 1992: 10-11). Principles 9 and 10 are particularly relevant to tertiary education because they focus on capacity building, public participation and access to information (UN 1992: 10).

Like *Caring for the Earth*, *Agenda 21* focuses on action for change, and education is implicit in the changes that are advocated. The actions are contained within sections on: society and economy; conservation and resource management; roles of relevant groups, and broad mechanisms for implementation. Each section includes a set of chapters, each with their own areas of interest, objectives, activities and means of implementation. While some form of education would be necessary to implement the majority of the actions proposed within *Agenda 21*, the section on implementation contains three chapters of direct relevance to tertiary education. They cover appropriate technology transfer, cooperation and capacity building (Ch. 34, pp 252-256), science (Ch. 35, pp 257-263) and education, awareness and

training (Ch. 36, pp 264-269). Of these three, the latter is the most relevant to tertiary teaching, particularly the programme areas devoted to 're-orienting' education and promoting training (UN 1992: 264). Re-orientation includes developing awareness, enhancing accessibility and integrating efforts across all sectors, educational levels and programmes, while training includes promoting flexibility and adaptability, strengthening national capacities and extension to all management areas, including marketing, production and finance (UN1992: 264-268).

The *Earth Charter* differs from *Agenda 21* in that it has been developed largely by individuals and non-governmental organisations (rather than States), and its focus is predominantly on values, particularly the need to show respect and responsibility for the 'community of life' (see ECI 2002). It calls for human conduct to be guided by, and assessed in terms of, a set of 'interdependent principles for a sustainable way of life' (ibid). Ecological integrity, social and economic justice, democracy, non-violence and peace are central themes (ibid). While promotion is included as a requirement for most principles, Principle 14 focuses specifically on formal education and life-long learning (ibid). It advocates that the knowledge, values and skills necessary for 'sustainable living' be integrated in education for all ages and all disciplines, including the sciences, arts and humanities, as well as 'moral and spiritual' education (ibid). Educational institutions are amongst the groups called on to provide 'creative leadership' (ibid).

The 10-year follow-up to UNCED, the 2002 World Summit on Sustainable Development (WSSD), recognised that very little traction would be achieved in terms of environment and development without first addressing gross inequities in social justice and wealth. Two of the outcomes of the summit were a reaffirmation of the importance of education for sustainable development (ESD), and a resolution by the UN General Assembly to declare 2005 to 2014 as the United Nations Decade of Education for Sustainable Development (UNDESD) (see UNGA 2003). The Decade was envisaged as a means whereby the policies, programmes and frameworks resulting from the WSSD could be implemented (UNESCO 2003: 5). The declaration calls for governments to integrate education for sustainability into their educational strategies and actions, and designates UNESCO as lead agency (UNGA 2003). It also calls for the development of a 'draft implementation scheme' to clarify relationships between UNDESD and other initiatives (e.g., the Dakar Framework for Action adopted at the World Education Forum in 2000 and the UN Literacy Decade), and to make recommendations on how governments can promote and improve education for sustainability in their educational strategies and action plans (ibid).

The resultant 'consolidated international implementation scheme' was developed by UNESCO in consultation with trans-governmental agencies, governments and non-governmental organisations (NGOs), and was approved by their Executive Board in 2005 (see UNESCO 2005, Annex I). The scheme identifies goals for the decade, explains the nature of education for sustainability and its links to other initiatives, describes a recommended 'partnership approach', sets out milestones for achievement, and identifies a set of strategies for success (UNESCO 2005, Annex I, pp 1-18).

The overall goal of the DESD is to 'integrate the principles, values and practices of sustainable development into all aspects of education and learning' (UNESCO 2005, Annex 1: 1). The broad goals are to provide for a transition to sustainable development and to enhance the profile and role of education at a national level (UNESCO 2005, para 5). Specific objectives include networking, increasing the quality of teaching and learning, assisting countries to attain the Millennium Development Goals (see <http://www.un.org/millenniumgoals/>), and providing opportunities for incorporating education for sustainability into educational reform (UNESCO 2005: paragraph 5 and Annex I: 2).

In the framework document that presented the draft scheme for consultative purposes, education for sustainability was defined as '*a process of learning how to make decisions that*

consider the long-term future of the economy, ecology and equity of all communities' (UNESCO 2003: 4). Its aims were identified as providing the learning necessary to enable 1) recognition of the challenge of sustainable development, 2) collective acceptance of responsibility for it and 3) appropriate action, all within the context of respect for human dignity (UNESCO 2003: 3, 4).

The final scheme avoids defining education for sustainability in these terms, emphasising rather its role in preparing people to 'plan for, cope with, and find solutions for issues that threaten ... sustainability' (UNESCO 2005, Annex I: 3). It does, however, draw attention to the values-based nature of sustainability and, while stopping short of prescribing a particular set of values, does note that the UN's history 'carries with it a host of values related to human dignity and rights, equity, and care for the environment', and that sustainability requires extending these to incorporate future generations (ibid). However, emphasis is placed throughout on the need for education for sustainability to incorporate a 'locally relevant and culturally appropriate' values component (ibid). The scheme does echo the earlier framework (and other UN initiatives) by identifying four 'major thrusts' of achievement - basic education, re-orientation, public awareness and training - each with their own goals and audiences (UNESCO 2003: 4, 5; UNESCO 2005, Annex I: 2, Annex II: 4, 5).

Re-orientation and training are probably the most relevant of the domains to tertiary education in NZ. The original framework calls for a review of existing curricula in terms of their objectives and content, as well as approaches to teaching, learning and assessment. The aim is to ensure that programmes provide the skills necessary to think creatively and critically, to communicate in oral and written forms, to collaborate and cooperate, and to manage conflict, decision-making, problem solving and planning, all in ways that will facilitate progress towards sustainable development (UNESCO 2003: 5). The framework also emphasises that all sectors of the workforce must contribute, and that vocational and professional training, must both play a role in ensuring this happens (UNESCO 2003: 5).

The framework also identifies ten 'key themes' that underpin education for sustainability and are consistent with other international developments that focus on basic education for all and literacy (e.g., see UNESCO 2002, UNGA 2002) (UNESCO 2003: 6). The themes address issues to do with alleviating poverty, ensuring gender equality, promoting health, conserving and protecting the environment, transforming rural areas, respecting human rights, intercultural understanding and peace, making production and consumption sustainable, respecting cultural diversity and providing access to information and communication technologies (UNESCO 2003: 6-8).

The final implementation scheme focuses more on processes than on these particular outcomes. It outlines a set of strategies that include vision-building, advocacy, consultation, partnering, networking, capacity building, training, research, development, innovation, information and communication technologies, monitoring and evaluation (UNESCO 2005, Annex I: 11-16). It provides examples of how to put the strategies into practice and the infrastructure and resources that may be necessary to do so, but again these are process, rather than outcome based.

The partnership approach is described in terms of the potential partners from within government, civil society, non-governmental organisations (NGOs) and private enterprise, and processes at international, regional, national and community levels (UNESCO 2005, Annex 1: 5-9).

A2.2 Relevant developments in New Zealand

In NZ, the enactment in 1991 of the Resource Management Act (RMA) could arguably be considered to be the first nationally significant development of direct relevance to sustainable development. By requiring resources to be sustainably managed and by enshrining public

participation in decision-making for this purpose, the RMA can, in the words of a former Minister for the Environment, be considered to have effectively 'made the environment everyone's business' (MfE 1997: 1). The lead up to UNCED in Rio in 1992 included a number of activities and reports, mainly on NZ's achievements to that point. These are not included here because the activities and materials that have arisen since tend to reference Agenda 21, and it is therefore considered sufficient to do the same.

In NZ, as in many other countries, education for sustainability is still in the process of evolving, and its roots tend to lie in the activities of the environmental movement and environmental education (e.g. see PCE 2002: 57). The NZ Ministry for the Environment (MfE) has defined environmental education as '*a multi-disciplinary approach to learning that develops the knowledge, awareness, attitudes, values and skills that will enable individuals and the community to contribute towards maintaining and improving the quality of the environment*' (MfE 1995: 57; MfE 1998: 9). In *Learning to care for our environment: a national strategy for environmental education* (MfE, 1998), MfE identifies four common elements of environmental education: the influence that it is expected to have on values, attitudes and behaviour; its multi-disciplinary nature; the contribution it is expected to make to protect and manage the environment, and the inclusion of both formal and non-formal types of learning activities (MfE 1998: 9).

The strategy uses the Tbilisi Declaration (see A2.1, above) as the basis for identifying five objectives (or components) of environmental education: awareness, participation, attitudes and values, knowledge, and skills (MfE 1998: 10). It distinguishes between three types of activities: those that provide information *about* the environment; those that develop skills *in* the environment, and those that promote action *for* the environment (MfE 1998: 11).

The strategy also includes a set of strategic priorities and actions. The priorities are: to encourage integration and coordination; to evaluate and improve effectiveness; to maintain and enhance the capacity of *tangata whenua*, individuals and communities to contribute to environmental management; to incorporate environmental education across the school curriculum, and to promote environmental education for business (MfE 1998: 17, 18).

In the Parliamentary Commissioner for the Environment's (PCE's) 2002 report *Creating our future: sustainable development in New Zealand*, environmental education, with its focus on environmental protection, is considered to be just one aspect of education for sustainability (PCE 2002: 57). The PCE draws attention to the need for not just 'an ecologically informed citizenry', but also one that is able to critique the role dominant culture plays in promoting unsustainable practices and to use the democratic process for effecting change (PCE 2002: 57). Because sustainable development links 'bio-physical and ecological realities' with 'human values and aspirations', it is the *interface* between society and environment that is important (see PCE 2002: 3). It follows that the role of education for sustainability is to build capacity for integrating environmental and social imperatives (the latter including those that are economic, political, cultural, ethical or spiritual) (see PCE 2002: 36).

While the narrower focus of environmental education tends to keep it within the domain of agencies responsible for natural resources (e.g., MfE and the Department of Conservation), *Creating our future* points out that education for sustainability needs a much broader support base (including, for example, the Ministry of Education, Ministry of Economic Development, Ministry of Social Development and Ministry of Health) (PCE 2002: 58). This raises the issue of the need for strategic direction and clear priorities for action, and better links, coordination and integration between environmental and other government agencies (*ibid*).

Creating our future draws attention to the importance of education for all ages and sectors (including public and private), and that is both formal to informal (PCE 2002: 58, 59). However, no detail is included on tertiary education for sustainability. Where formal education is concerned, the focus appears to be on schools, while local authorities, non-

governmental organisations and the private sector are the focus of informal education (PCE 2002: 58, 59).

Despite this, *Creating our future* provides useful insights into what sustainable development requires, and by implication, our educational needs. Reference is made to the 'prism' of sustainability, a tetrahedron with social, environmental, economic and institutional imperatives at its corners, and its faces representing areas of integration (PCE 2002, Fig. 2.3: 36). The prism is useful because it emphasises that institutional mechanisms are necessary for implementation. The report also draws attention to particular social dimensions that need to be considered, including political, moral or ethical, and spiritual ones (PCE 2002: 36). It points out that the RMA's emphasis on physical/environmental effects has been to the detriment of these and other social effects (PCE 2002: 25). This is emphasised by Peet's (2000) comments about the need to manage a complex social system nested within a complex natural system (cf. PCE 2002: 31).

More detailed insight on the nature of the economic element of sustainable development is evidenced in a quote from Constanza (1994, cf. PCE 2002: 31), who draws attention to the importance of the *scale* of life-supporting vs. economic systems, the *distribution* of resources *within* current, and *between* current and future generations, and accounting for natural resource allocation in terms of natural capital.

Further insights on the role education for sustainability can play are provided by the criteria used for the PCE's 'stocktake' of progress towards sustainable development (PCE 2002, Appendix 2: 137-156), as well as the 'expectations' for progress (PCE 2002: 27, 28). The criteria for the stocktake are based on the UN Secretary General's 2001 report on implementing Agenda 21 (cf. PCE 2002: 138). They fall into three categories: ecosystems, consumption and production, and the involvement of tangata whenua (the latter included in response to NZ's unique social context) (PCE 2002: 138). The ecosystem category is divided into land and resource management, marine environment, biodiversity, biosecurity and urban environments, while consumption and production is divided into energy, waste and tourism (ibid). (Note that freshwater resources, transport and industry were used for the UN Secretary General's report, but excluded from the PCE's stocktake. This is because the latter was limited to investigations undertaken by the PCE and there were none in these sub-categories (ibid).

These categories and sub-categories, although environment-focused are used to organise the stocktake, and institutional arrangements for each are identified (PCE 2002: 139-159). The report's 'expectations' (against which progress was measured) provide further insight into the types of institutional changes that are necessary for effecting the transition to sustainable development. They include: a national sustainable development strategy; relevant legislation; relevant programmes (central and local government, as well as other sectors); a set of sustainable development indicators; barriers identified and being addressed; influence of sustainable development principles on social, economic and environmental policy-making, and public awareness programmes (PCE 2002: 27, 28, 123, 124).

No specific mention is made in the findings of tertiary ESD, although some are of direct relevance (see PCE 2002: 123-124). The recommendations include a section on capacity and capability, which identifies the need for tertiary institutions to provide courses that develop skills in 'systems thinking and integrated analysis' of relevance to sustainable development (PCE 2002: 131).

A more recent PCE report focused solely on environmental and sustainability education (PCE 2004). The purpose of *See change: learning and education for sustainability* was to stimulate debate and action (PCE 2004: 130). The report emphasises education for sustainability's role as a source of empowerment, providing the knowledge and skills

necessary for people to recognise the problem, understand what can be done and contribute, as individuals and collectively, to change (PCE 2004: 15). The report emphasises the need to critique the social, cultural and economic sources of non-sustainability and to re-design systems and institutions so that they enhance the potential for quality of life now and in the future (PCE 2004: 15, 49).

See change reiterates that little attention is paid at a central government level to formal ESD, and that the few initiatives there are tend to focus on environmental education at school level. The report draws attention to the important role that the tertiary education sector can play as a source of professionals who are able to provide goods and services in ways that contribute towards the solutions (PCE 2004: 74). The report points out that while over a thousand university presidents and vice chancellors have formally committed their institutions to sustainability, teaching activities in this regard are usually driven by individuals and that they are often peripheral to the mainstream activities of the institution, unsupported and ad-hoc. The authors quote Springett and Kearins' assertion that core curricula, such as those offered by business schools, for example, remain 'largely untouched by ... [the] ethos or substance' of sustainable development (cf. PCE 2004: 75).

See change also draws attention the multi-disciplinary or cross-cutting nature of sustainable development and the difficulties this provides in terms of tertiary institutions that tend to be drawn according to traditional, discipline-based lines (PCE 2004: 75). The report asserts that integrating education for sustainability into tertiary institutions would require changes to education practices, particularly 'the way knowledge is sliced up into disciplines', and structure (PCE 2004: 75).

Reform of the tertiary sector in 2002 was designed to make more explicit its contribution to national objectives (which include environmental sustainability) (MoE 2002, cf. PCE 2004: 77). However, *See change* reports that neither environmental sustainability nor the research and skills deemed necessary to achieve it are included in the government's 35 actions for reform (PCE 2004: 78). There is no mention of environmental sustainability within the subsequent Statement of Tertiary Education Priorities (STEP), nor is it included in the guidance or assessment procedures for the charters and profiles that tertiary institutions are now required to develop (PCE 2004: 78, 79).

See change concludes that tertiary education for sustainability is simply not a priority for the government, and that the apparent focus on economic, social and cultural development serves to maintain the status of environmental sustainability at the 'fringe' of most institutes (PCE 2004: 79). It advocates a set of areas of focus and action. Focus needs to be on:

- quality of life, particularly why ecological footprints in NZ are so large;
- the 'bigger picture, particularly in terms of the sources of problems and the collective responsibility necessary to deal with them;
- capacity building, particularly in terms of the support, encouragement and assistance necessary to build on efforts to date;
- learning through informal as well as formal education;
- social marketing, and
- methods appropriate to different cultural backgrounds (PCE 2004: 130, 131).

Areas identified for action are categorised according to various sectors: local government, central government, primary and secondary schools, tertiary education, community groups and businesses (PCE 2004: 132-134). Actions for local government focus on public

participation; actions for central government focus on commitment, messages and coordination; actions for schools focus on extending from education 'in' and about' to 'for' sustainability and professional development; actions for tertiary education focus on extending learning beyond traditional discipline bases; actions for community groups focus on broadening engagement and empowerment, and actions for business focus on supporting those already involved and challenging the rest (PCE 2004: 132-134).

Appendix 2 - List of relevant tertiary programmes and contributing courses

See Excel spreadsheet in separate file entitled Appendix 2. Note that data in the spreadsheet are organised in three sheets, covering universities, polytechnics/technical institutes and colleges of education and wananga.

Appendix 3 – Points raised by survey respondents

Abbreviations:

TEC = Tertiary Education Commission

CUAP = Committee for University Academic Programmes

PBRF = Performance Based Research Fund

1 Institutional support for the provision of programmes and/or courses

Most respondents (65%) qualified overall institutional support for these programmes and courses in a positive manner. The number of (sustainability-related) courses and programmes offered by each institution appears to be a key indicator of adequate support. At a more specific level, participants' responses for this part of the survey were mostly centred in the following key issues:

Overall support vs. individual support/freedom

Almost half of respondents pointed out that while there is a degree of support within their institutions and specific departments for individuals (teachers) wanting to teach sustainability-related topics and courses, there is no overall, institution-wide commitment to either the teaching of sustainability or the application of sustainability principles within the organisation. In this sense, initiatives are viewed as originating in a 'bottom-up' rather than 'top-down' manner.

Discipline based vs. multidisciplinary approach to sustainability teaching

The teaching of sustainability-related courses and programmes is seen by most participants as requiring a multi-disciplinary approach. However, in some cases respondents point out the lack of support from their institutions with regards to inter and multidisciplinary teaching. Furthermore, it is reported that financial mechanisms are designed in such a way that 'single disciplines' dominate.

2 Challenges and/or difficulties teaching staff face in making sustainability-related programmes and courses available

a. Challenges for gaining approval

- CUAP and TEC bureaucracy – Time delays and excessive paperwork required ¹⁴*****
- Internal resistance within the institution from staff who do not see the value in such programmes or courses **
- Programmes and courses perceived as of 'lower academic quality' by strongly 'discipline-based' departments and staff ***
- Lack of support from management
- Lengthy process (estimated 18 months by one respondent)***
- Market driven system requires that demand for a specific course or programme is proven, and this sometimes is difficult to do due to resource constraints (time, money and human resources stretched).

¹⁴ * denotes number of respondents

- Identifying the emphasis/focus on sustainability issues
- Lack of institutional support, where teachers must use their own time to develop these courses and there is no formal budget allocation until the course is up and running.
- Overall pressure to 'rationalise' teaching and 'cut' subjects, rather than introduce new ones.
- Cost of NZQA approval process
- Lack of political support for interdisciplinary teaching
- Uptake by students of discipline-based programmes difficult
- Lack of awareness of sustainability related issues at secondary school level make uptake of these courses at a tertiary level difficult in some cases

Only three respondents stated that there were no challenges with regards to gaining approval.

b. Challenges for development

- Cost (creating and delivering, as well as making them technologically and factually up-to-date; also cost of making resources available electronically to avoid cost of relocation for remote students)
- Competition: to provide a programme that is distinctive from the many other options available within the tertiary sector
- Lack of institutional support: refusal to appoint staff into programmes even when there is student demand and refusal to appoint staff to positions that become vacant within sustainability-related programmes. Lack of recognition or reward for the effort expended, misunderstanding of language and value system, lack of commitment of additional resources ***
- Lack of resources: financial (which in some cases are misappropriated); time (development is done in staff's 'own' time). *****
- Difficulty maintaining student numbers
- Cost of employing suitably qualified programme writers
- University culture disappearing, shift towards commercialisation and managerialism. Within this context, sustainability-related courses perceived as costly and not servicing 'market needs'
- Understanding of key staff (in faculty)
- Incorporating sustainability concepts in mainstream disciplines is difficult in some cases (i.e. sustainability concepts difficult to quantify)

Only three respondents stated that there were no challenges with regards to developing programmes and courses.

c. Challenges for delivery

- PBRF requirements take the focus off teaching and onto research. Time and resource commitments to teaching programmes suffer as a result
- Lack of suitably qualified staff to teach the courses *****
- Difficulty attracting enough students to make programme financially viable**
- Disproportionate teacher/student ratio (too many students, not enough teachers)
- Difficulty 'sharing' specialist staff across departments (as 'lending' departments sometimes not appropriately compensated)
- Human resources limitations (over stretched / under recruited)
- Geographical limitations for delivering practical content of the programmes

- Difficulty getting buy-in from students about sustainability issues. Sustainability and environmental issues are becoming stale.
- Lack of institutional support and contradictory messages (e.g. delivering sustainability-related programmes in campuses with no real commitment to sustainability issues like recycling, energy conservation, etc).

Only two respondents stated that there were no challenges with regards to delivering programmes and courses.

3 Options to improve the institution's ability to deliver sustainability-related courses and programmes

a. Internal changes

- Integrated, multidisciplinary approach to sustainability-related teaching. Development of multidisciplinary collaboration frameworks for teaching and research (e.g. establishment of a 'sustainability-related' teaching and research centre)****
- Staff upskilling and capacity building **
- Shift towards becoming 'sustainable' institution in the wider sense (practice what is preached). Issues of energy, waste, building/construction, etc.****
- Staff recruitment****
- Greater institutional support (recognition and affirmation from the senior management that these courses are a necessary part of the curriculum and provide an important part of a student's education) **
- Minimise bureaucracy. More flexibility of 'academic services and registry' procedures **
- Availability of sustainability-related programmes to all undergraduate students (any discipline)
- Greater resource (human, financial) allocation for sustainability topics, including allocation of physical space **
- Shift from a market driven system to a quality teaching driven one
- Greater promotion of sustainability-related courses and programmes

b. External changes

- Increased support from Central Government: ****
 - recognition and affirmation that sustainability-related programmes are an important part of the tertiary sector, enhanced recognition of the need for sustainability-related programmes by TEC in its strategy and funding
 - requirements within the public sector for sustainability education.
 - (e.g. staff secondments between the institutions and Central Government in sustainability areas)
 - more opportunities for student-sustainability learning to engage with policy-making at the central and regional level
 - student scholarships to enable good students to complete their degrees in closer to full-time study - rather than having to fit study around paid employment.
- Financial incentives from the government to institutions developing and implementing sustainability-related programmes (including assistance with developing curricula) ***
- Changes to PBRF:

- to allow for specialist teachers within the tertiary system rather than expecting every staff member to be research driven
 - Rules of what constitutes legitimate research activity
- Increased investment from the private sector (industry groups) on education of future participants in the field
- Curriculum development in secondary schools linked to university entrance requirements as incentive for students to take sustainability-related courses.
- Creation of centre of excellence dedicated to sustainability studies
- Reduce bureaucracy at central government and TEC level **
- Support from external organisations and the private sector (e.g. agreements to acknowledge the need for an increase in high-quality and innovative sustainability-related teaching and research) **
- More incentives for students to carry on postgraduate studies
- More emphasis in the revised science curriculum on education for sustainable futures as a discipline area
- Funding for teacher training for secondary and tertiary science staff interested in gaining sustainability-related qualifications

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