

Part Two - Literature Review

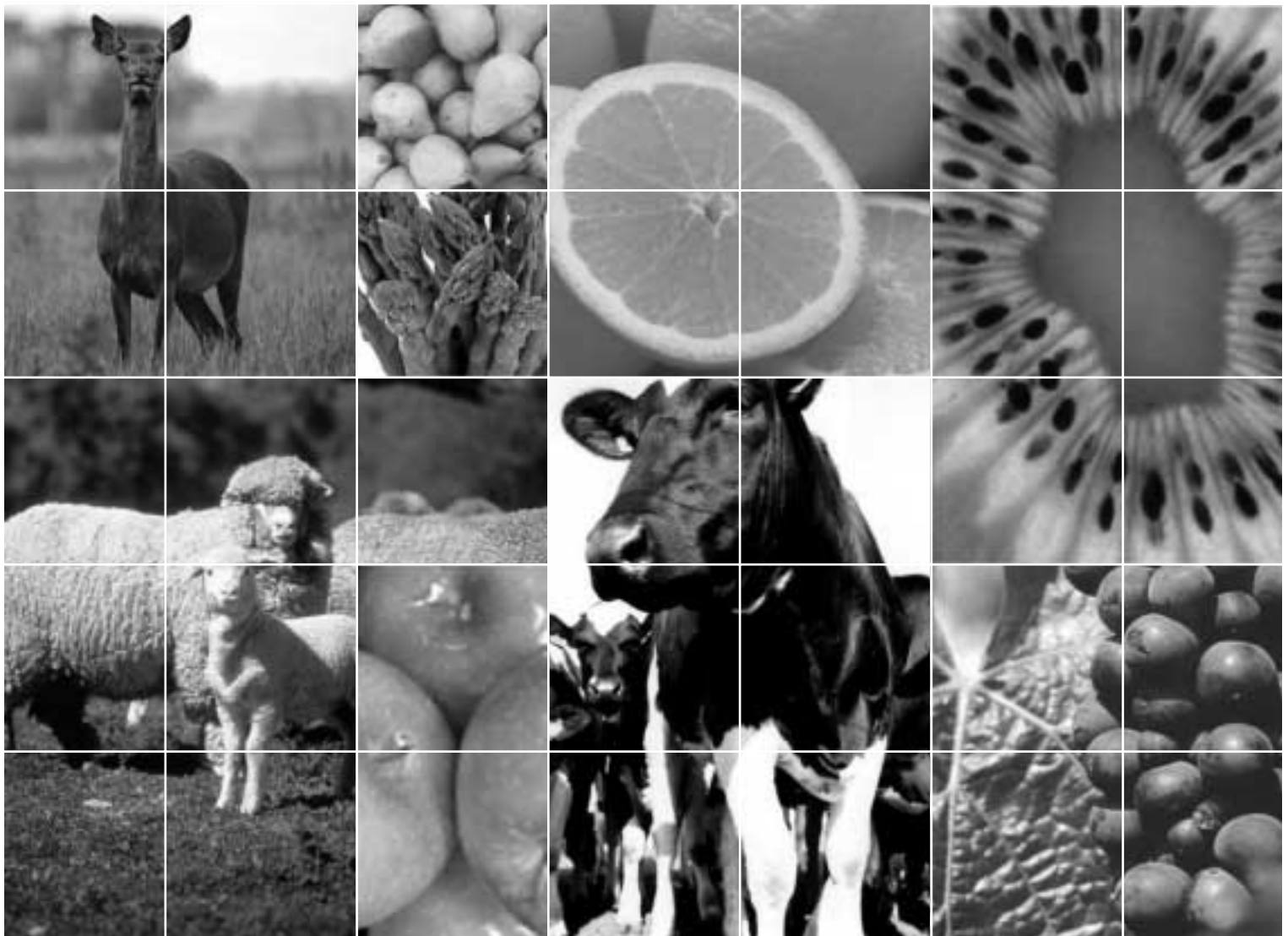


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1.0 Introduction

The Sustainable Agriculture Management Systems Network (SAMsn) has been established by a group of organisations who have a common goal in developing a template of principles that could form the basis of any agriculture or horticulture industry Sustainable Management System (SMS).

This report details the results of a literature review that has been undertaken to gain a clearer understanding of issues related to the development and operation of Sustainable Management Systems (SMS), with a specific focus on Environmental Management Systems (EMS) in the context of sustainable management.

This review was then used to inform and to complement other areas of research to assist in the identification of critical issues and possible strategies that can be used for the optimal design, development and management of future programmes in New Zealand.

The review outlines the broader issues involved with the concept of sustainability in the international and New Zealand contexts and relates these issues to the use of EMS. It also provides a general overview of the various approaches to EMS, and then relates these specifically to the agricultural sector. Various approaches exist when developing an EMS. A number of these are outlined, including formal accreditation systems; partnerships, such as between companies and government agencies; and the use of tools such as Environmental Impact Assessments (EIA) and Farm Environmental Plans to manage aspects of the environment in an informal way.

The final aspect of the review relates to current initiatives for the evaluation of the success of an EMS and the identification that sustainable development needs to be a key consideration when determining the success of an EMS/QA-type programme.

There is only limited reporting of examples of EMS, as more detail on these are covered in the associated reports:

- The SAMsn Initiative: Part Three – A Survey of International and New Zealand Environmental Management and Quality Assurance Programmes
- The SAMsn Initiative: Part Four – Case Studies - A Review of Selected New Zealand Environmental Management and Quality Assurance Programmes.

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2.0 Sustainability and the International Context

Environmental Management Systems (EMS) have been formulated as a response to growing concern over the sustainability of human activities on the environment. The World Commission on Environment and Development (WCED) included in 'Our Common Future' a definition of sustainable development as being development that "meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED 1987).

Common elements in most definitions of sustainable development include:

- inter-generational and intra-generational justice;
- careful treatment of resources and preservation of the production basis;
- preservation of biodiversity; and
- perpetuation of economic existence and stability (Quendler and Schuh 2002).

The Harvard Business Review in 1997, ten years after the publication of 'Our Common Future' noted, "beyond greening lies an enormous challenge - and an enormous opportunity. The challenge is to develop a sustainable global economy: an economy that the planet is capable of supporting indefinitely" (Hart quoted in Elkington 1998: 71).

In 2000 The United Nations published Global Environmental Outlook (GEO-2000) which confirmed the earlier assessments of GEO-1, that the global system of environmental policy and management is moving in the right direction but much too slowly (UNEP 1999). The gains made by better management and technology are still being outpaced by the environmental impacts of population and economic growth. UNEP recommends that action be focused on four key areas in order to respond to these issues:

- filling the knowledge gaps;
- tackling root causes;
- taking an integrated approach; and
- mobilising action.

GEO-2000 shows that there is a lack of comprehensive information on the current state of the environment (UNEP 1999). There are few tools available to determine how development in one region affects other regions. Another serious omission according to GEO-2000 is the lack of effort to find out whether new environmental policies achieve the desired outcomes.

To rectify the problems associated with the knowledge gaps, GEO-2000 suggests a number of actions. These include the development of a set of indicators to report on environmental progress, the establishment of a mechanism to bring together the compilers of global assessments of sustainable development, and research on the links between trade and the environment. Environmental thinking remains on the outside of mainstream everyday consciousness; the environment is still considered an add-on rather than an integral part of social, economic and institutional action. To provide for an integrated approach, sustainable development needs to be promoted as the central theme in policies relating to agriculture, trade, investment, research and development, and finance. The high economic and social value of environmental goods and services needs to be stressed and more research on the socio-economic causes of environmental deterioration is needed to determine the priorities and suggest solutions. Multi-agency, multi-stakeholder task forces need to be established to develop proposals for strengthening global co-ordination and governance structures to protect the global commons (UNEP 1999).

Klaver and Jonker (2000) suggest a series of prerequisites they believe would enable companies to make a positive contribution to sustainable development and prepare them to respond to the new risk society. These prerequisites include:

- improved monitoring of changes in society, and in particular changes in stakeholder actions;
- changing target areas for corporate environmental strategies by recognising social effects such as working conditions and environmental effects;
- a clearly defined goal of sustainable development issued by top management; and
- better communication to include all internal stakeholders and attempt to include shared values (Klaver and Jonker 2000).

Environmental management as it is now, focuses on control of emissions and waste, reducing the risk of calamities in individual companies and promoting the efficient use of resources (Klaver and Jonker 2000). Some companies have made considerable progress in realising elements of sustainable development, especially with respect to the reuse of waste products and materials, but Klaver and Jonker (2000) argue that progress in other areas of sustainable development has been slow and that at present EMS are lagging behind changes in society.

The current focus of EMS does not address the key social issues as recognised by sustainable development. The trend towards ISO 14000-style accreditation, with its focus on compliance, does not address the wider implications of an organisation's activities. ISO 14000 has called itself the ideological partner of 'Agenda 21' (Cascio quoted in Gleckman and Krut 1997). 'Agenda 21', an outcome of the Rio Declaration at the UN Conference on Environment and Development in 1992, contains recommendations for trans-national corporations to 'introduce policies and commitments to adopt equivalent or not less stringent standards of operation as in the country of origin', and to 'be encouraged to establish worldwide corporate policies on sustainable development'. While 'Agenda 21' includes a recommendation that organisations adopt standards for public reporting, none of these recommendations are included in ISO 14000 (Gleckman and Krut 1997).

Memon (1999) argues that the definition of sustainable development in the World Commission of Environment and Development Report (1987) is notable for its inclusiveness of global ecological concerns, particularly in terms of intergenerational equity, with the imperatives of satisfying basic human needs, primarily of the developing world's inhabitants (Memon 1999). Social concerns are implicit in this definition to the extent that they are limited to those related to the biophysical environment such as poverty, consumption patterns, population increase and environmental health. Memon (1999) argues issues of income, employment, health, education and environmental values may not have an immediate effect on the biophysical environment but are measures of well-being, and that these social and economic concerns need to be included in the definition of sustainable development (Memon 1999).

Indigenous peoples' initiatives according to Loomis (1999) are crucial to conceiving and operationalising sustainable development (Loomis 1999).

3.0 Sustainability and the New Zealand Context

New Zealand has adapted the concept of sustainable development into the related concept of sustainable management in the Resource Management Act 1991 (RMA) to promote the sustainable management of natural and physical resources. The purpose of the RMA is 'sustainable management' which is defined as: "managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—

- (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
- (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
- (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment."

One of New Zealand's strategic weaknesses is that the concept of sustainable management does not appear to be well understood (PCE 1998). This is further developed in a review of New Zealand's progress toward sustainable development undertaken by the Parliamentary Commissioner for the Environment (PCE 2002). A consequence of this lack of understanding is an inability to clearly define desirable environmental outcomes and to measure the extent to which they are achieved. The RMA is only one of a number of pieces of legislation that can, or should, contribute to this goal. Other instruments and mechanisms that will assist include economic instruments, regulation, voluntary agreements and education.

Of particular interest in New Zealand is the role of Maori and sustainability. Durie (1998) explains a holistic understanding of Maori well being where good health is related to good housing, a decent job and education. Maori approaches to development "do not recognise clear sectoral demarcations between social, cultural and economic areas" (Durie 1998: 90). Of particular importance to Maori are the natural environment, heritage and identity, human resources, land holdings and ocean resources (Durie 1998). According to customary Maori lore, people were integrally related to nature and human beings had a stewardship role in the environment.

4.0 Generic Systems for Sustainable Management

After World War II new quality concepts, which looked at managing inputs and processes, were developed to deal with increasing component failure (Morriss et al 1998). These concepts were the foundation for the development of the International Standards Organisation (ISO) series of quality management models. These models are based on the premise that if production processes can be controlled, the outcome can be consistent and of appropriate quality. Since that time a range of other models have developed which seek to facilitate the achievement of sustainable management.

4.1 International Standards Organisation (ISO)

The ISO 14001 EMS standard specifies the structure of an EMS. ISO 14001 focuses on the quality of an organisation's management process, and can therefore offer a framework that a range of organisations can adapt to meet their individual environmental needs. The organisation has to determine what it would like to achieve with regard to the environment and determine the content of its EMS accordingly (Hamner 1997).

For organisations aiming to go beyond compliance, ISO certification can be a method for identifying inefficiencies and environmental risks and can reduce operating costs. The ISO 14000-type EMS is an example of organisation - oriented standards, also called process standards. Process standards specify management processes and procedures to be followed by an organisation for the purposes of environmental management, and have the ability to be integrated with other voluntary arrangements and can therefore be used to address a wide range of environmental issues (Mech and Young 2001).

The main barrier to implementation of ISO 14001 is cost, both direct (i.e. environmental investments, audits) and indirect costs (training, time) (Grolleau 2000). Other concerns include the doubtful status of market advantage for 'environmentally sustainable' goods (Carruthers 2000).

The promotion of products originating from ISO 14001 certified farms and the group management of certain ISO 14001 requirements could potentially be solutions to some of the barriers to implementation of ISO 14001 (Riddiford 2000). The ISO 14001 certificate applies to farms and not to products so normally producers cannot advertise the ISO 14001 certificate on their products.

Carruthers argues that ISO 14001 "is a terrible name designed by a committee who has never sold an ounce of produce in a market place in their lives" (Carruthers quoted in Grolleau 2000: 85). The issue of advertising can be addressed by eco-labelling the farm product. EMS can potentially provide access to new markets, especially markets sensitive to environmental qualities (Grolleau 2000).

Grolleau (2000) also discusses group management of certain ISO 14001 requirements that enable small farms to participate without affecting farmers' autonomy. Grolleau identifies the following benefits of group accreditation:

- costs are limited - farmers who have been trained as auditors can assist with internal audits;
- control of the scheme is maintained by the group;
- bureaucracy is limited; and
- members can exchange ideas (Grolleau 2000).

The Living Wine Group in New Zealand, consisting of CJ Pask, Vidals of Hawkes Bay, Martinborough Vineyards and Palliser Estate of Martinborough, was the first group of wineries in the world to receive ISO 14000 accreditation (Riddiford 2000). The group found that a joint approach to accreditation had many benefits, including reduced consultancy fees, certification and auditing costs. The group also found that there were significant savings made due to shared information, particularly of the different vineyard and winery practices. Sharing of knowledge and experience was an added bonus to the members of the group. Riddiford also notes the feeling of obligation felt by members of the group to maintain their standards, so as to not let the group down.

Gleckman and Krut (1997) are critical of the ISO 14001 approach as it moves away from the general trend of international environmental performance standard setting, based on existing best practice, to an internal method of measuring environmental conformance (Gleckman and Krut 1997). The standard is based on minimum requirements - compliance with environmental laws and regulations, prevention and continual improvement (Grolleau 2000). Therefore ISO registration only confirms that the organisation is exercising appropriate oversight and control over the environmental impacts of its operation. This means that two similar farms, both certified according to the ISO 14001 standard may have different environmental performances (Grolleau 2000).

4.2 Total Quality Management (TQM)

Total Quality Management focuses on the development of a corporate culture committed to the achievement and maintenance of quality (Gough 1994). A commitment to continual improvement is a key component of any TQM system. TQM may not guarantee better performance but can lead to greater consistency of outcomes.

The benefits of TQM include the potential to improve performance, coordination and productivity of an organisation (AS/NZ ISO 9000 1994). The other benefits of a quality management system include the ability to identify and focus on customer expectations, and the ability to achieve and maintain the quality of a product, so providing reassurance to management that the intended quality is being maintained.

The development of TQM and greater environmental awareness has led to the establishment of EMS, which are a means for organisations to voluntarily demonstrate their environmental performance.

4.3 Environmental Management Systems (EMS)

Typically an EMS involves the following steps as part of a process of continual improvement:

- establishing environmental policies;
- setting goals and targets;
- adopting plans and procedures to achieve goals and targets;
- monitoring implementation;
- instituting actions to ensure compliance; and
- reviewing progress (Castelnuovo 2000).

This process enables an organisation to identify impacts on the environment and identify any legal responsibilities the organisation has with regard to the environment. An EMS also enables an organisation to establish goals, objectives and targets and to develop a system that allows these goals, objectives and targets to be met (Roberts 1995).

The environmental policy documents an organisation's commitment to environmental management. The environmental policy is a framework for setting objectives and targets that need to be developed to deliver the commitments of the environmental policy. It is important that organisations focus on continual improvement to ensure they strive for effective environmental management rather than focusing on

specific issues such as waste reduction (Morris et al. 1998).

Important components of an EMS include a procedure for identifying and recording legal and other regulatory requirements. An environmental programme will set out these environmental objectives and targets with the designated responsibilities, and schedules for achieving these.

Management must provide the necessary resources, training and supervision to ensure the successful implementation of the EMS.

Organisations need to put in place procedures to monitor and measure key characteristics and activities that have significant environmental impact. Procedures will also have to be developed to monitor compliance and to respond to non-compliance. These procedures offer the opportunity for continual improvement. EMS must be regularly audited to determine whether the EMS conforms to the planned arrangements, with regular reviews to ensure that the environmental policy continues to be relevant.

4.4 The Natural Step (TNS)

The Natural Step programme was developed by Karl-Henrik Robert, one of Sweden's leading oncologists. (Business and Sustainable Development (BSD) website 2003). TNS is a science based, goal-oriented approach to sustainable development that encourages environmental systems thinking within corporations, governments and academic institutions. TNS is based on two principles:

1. Basic science principles:

- Matter and energy cannot be created or destroyed;
- Matter and energy tend to disperse;
- A net increase in material quality on Earth can be produced only by sun-driven processes;
- We never consume energy or matter- only its energy, purity and structure.

2. The preconditions of our lives:

- Humanity cannot tolerate continual degradation of the environment.

The concepts behind TNS signal a shift from linear to cyclic thinking. Four system conditions for sustainability were developed from the principles:

1. Substances from the Earth's crust must not systematically increase in nature.

In practical terms this means radically reducing the amount of mineral extracted from the Earth's surface.

2. Substances produced by society must not systematically increase in nature.

This means that substances must not be produced at a rate faster than they can be broken down in nature, to ensure the phasing out of all persistent and unnatural substances.

3. The physical basis for the productivity and diversity of nature must not be systematically deteriorated.

The productive surfaces of nature must not be diminished in quality or quantity, and the quantity harvested must not exceed what nature can recreate.

4. Just and efficient use of energy and other resources.

Basic human needs must be met with the most resource efficient methods possible. This means a more resource-economical lifestyle in wealthy countries.

TNS provides a framework for organisations to develop a clear understanding of the strategic importance of improving environmental performance; a clear goal and a common language for discussing it across the organisation; and the internal process characteristic of learning organisations, so progressing towards sustainability (Robert 2002).

Once an organisation has begun to understand the four systems conditions it can begin to progressively shift its activities so they are consistent with the conditions. Roberts contends that a truly sustainable business that is living within the ecological limits of the planet is going to look very different from the business of today (Robert 2002).

TNS has been implemented in a variety of sectors worldwide, from agriculture and water systems management to finance and tourism. Specific examples of organisations include Nike, Starbucks and the municipality of Whistler in British Columbia (Business and Sustainable Development website, 2003).

4.5 Eco - Labels

Eco-labels are an example of production-oriented standards, which define specific features of a final product and may also define how that product has been produced (Mech and Young 2001). When marketing eco-labelled products, food processors and distributors should have to prove that their raw materials, such as farming products, really come from environmentally friendly farming practices. EMS certification should be able to constitute a reliable means of providing this guarantee (Grolleau 2000).

In May 2002 representatives from more than 15 major organisations promoting or developing eco-labels met,

as the Greener Fields Project, to continue working towards shared principles to guide the standards behind their labels (Barham 2002). The organisations represented held a range of priorities as to the importance to be ascribed to principles, such as animal rights, environmental protection, certifiable organic practice, and social issues such as fair trade. Although the participants were discussing 'eco-labels' the topics ranged across social, environmental and ethical values and therefore could be called 'values - based labels'.

4.6 Social Standards

Social Accountability 8000 (SA8000) standard.

The Council on Economic Priorities Accreditation Agency established the Social Accountability 8000 (SA8000) Standard in 1998. SA8000 was developed as a result of rising concerns about inhumane working conditions in developing countries and defines a set of prescribed standards and an independent auditing process to protect workers' rights (Business and Sustainable Development website 2003). It has been estimated that upwards of 100 million children worldwide are in full-time labour, but under the terms of SA8000, companies must not support child labour. Discrimination, whether on the grounds of ethnicity, nationality or gender, is not permitted and neither is corporal punishment. Certified companies must pay at least equal-to-legal or industry-minimum pay and this must be sufficient to leave the employee with some discretionary income.

SA8000 explicitly includes existing international agreements, including International Labour Organisation conventions, the Universal Declaration on Human Rights and the UN Convention on the Rights of the Child. The agricultural sector is not currently addressed under SA8000.

5.0 The Role for SMS in Agriculture

The need for the agricultural industry to develop sound EMS has become increasingly apparent over the last few decades, in response to issues such as the increase of insect resistance to pesticides, eutrophication of waterways, partly caused by nitrate and phosphate leaching, soil degradation and loss of species diversity (Newbold et al. 1997).

Mech and Young (2001) identify the issue of the varying structures of farms as an aspect that is likely to affect the preferences for different EMS, as well as the ease and enthusiasm with which different EMS are adopted. Agricultural organisations can vary from family farms, corporate farms to agribusiness, all of which will have different needs with regards to desired outcomes for EMS, as well as different resources available for implementation and continued compliance. Larger organisational structures and business enterprises, such as corporate farms and agribusiness, may enjoy economies of scale and access to greater financial resources than smaller family farms. Larger enterprises may already use quality management systems and food safety protocols, which may make the implementation of EMS easier (Mech and Young 2001).

In Australia the Standing Committee on Agriculture (SCA) defines sustainable agriculture as “the use of farming practices and systems which maintain or enhance: the economic viability of agricultural production; the natural resource base; and other ecosystems which are influenced by agricultural activities” (SCA quoted in SCARM 1998).

The Committee developed five guiding principles to assess the level of sustainability achieved by the agricultural sector:

- farm productivity is sustained or enhanced over the long term;
- adverse impacts on the natural resource base of agricultural and associated ecosystems are ameliorated, minimised or avoided;
- residues resulting from the use of chemicals in agriculture are minimised;
- the net social benefit derived from agriculture is maximised; and
- farming systems are sufficiently flexible to manage risks associated with the vagaries of climate and market.

Gunningham and Sinclair (2002) identify four areas of environmental challenge facing the agricultural sector. These are:

- maintaining a clean and green image;
- maintaining food safety standards and demonstrating compliance with an ISO- accredited EMS;
- complying with the environmental requirements of supermarkets; and
- pressures from current or threatened environmental legislation (Gunningham and Sinclair 2002).

The maintenance and promotion of a clean and green image is a vital marketing tool for the agricultural industry (MfE 2001). The presence of pesticide residues, for example, could result in import bans and have a detrimental commercial impact in the future. These types of issues have led to demands for demonstrably improved environmental practices, increasing the scope for use of EMS (Gunningham and Sinclair 2002). For dairy farmers in New Zealand, the “clean green image” could be worth between \$18,000 and \$49,000 a year to each farmer (Taylor 2002).

Consumers are increasingly concerned about the quality of the food that they eat. Publicity surrounding incidents such as “mad cow disease” and hormone treated beef have raised consumer awareness. Many consumers, both internationally and in New Zealand are demanding assurances about food safety and quality, and to a lesser extent animal welfare and environmental management on farms (Parminter 2002).

Closely related to increasing consumer concern is pressure from retailers to exercise a purchasing preference for sustainably harvested produce. Often this is linked to consumer demand for ‘natural’ foods which are free from pesticides and other chemical residues, but may cover a range of environmental issues. Large retailers can demand higher environmental standards from producers (Gunningham and Sinclair 2002).

A major reason for adopting EMS is often cited as the need for compliance because of the application, or threat, of government regulation. As a result, the agricultural industry has largely avoided the ‘command and control’ approach. Regulation has often been limited to point-sources discharges. However there is now a trend in New Zealand for regional councils to take a more proactive role in requiring farmers to better manage non-point source discharges to water, especially with regards to the dairy industry. Recent Fish and Game New Zealand pressure and media attention has further encouraged this. These emerging

trends provide reasons for agriculture to adopt a proactive approach to environmental problems. Such an approach will enhance farmers' capacity to shape their own destiny and better influence the direction of external policy outcomes (Gunningham and Sinclair 2002).

Traditional regulation has some advantages. For example, it carries a clear moral message and has a high credibility rating amongst the wider community because its environmental improvement targets are perceived as independently imposed and enforced (Gunningham and Sinclair 2002). However in respect to the rural sector, coercion is a particularly blunt instrument, a problem often compounded by the poor design of many regulatory regimes (Gunningham and Sinclair 2002).

Regulations are often criticised by economists as inefficient, unnecessarily intrusive and unduly expensive to administer. Some regulations may inhibit innovation and discourage people from searching for more efficient methods of resource use. They may discourage a sense of stewardship and ownership of environmental problems and solutions, and changing attitudes to environmental management.

Uniform standards provided by legislation, while cheaper to develop and administer, can be unwieldy and difficult to enforce and fail to account for variations in ecosystems. Agricultural practices that are damaging in some contexts may cause little effect in others. Enforcement problems may be exacerbated by difficulties in monitoring and identifying the source.

Economic incentives, in the form of taxes and charges, could provide the appropriate signals to encourage environmentally appropriate behaviour in some situations. There is however a general perception by recipients that these devices are simply government revenue-raising devices (Gunningham and Sinclair 2002). Subsidies, which have been used in the agricultural sector in the past, have promoted environmentally harmful practices such as the inefficient use of fertilisers. In Europe, subsidies are currently being used to encourage farmers to produce in conformance to environmental management requirements.

Traditionally agricultural environmental policy has been based on so-called 'soft options' such as information, education, support and voluntarism (Gunningham and Sinclair 2002). The fundamental role of these options has been to guide farmers to do the right thing. Environmental needs tend to require long term

management which conflicts with the needs of producers with short term economic interests.

Current environmental policies have not provided incentives for environmental stewardship or assisted producers to manage risk in an environmentally benign way (Gunningham and Sinclair 2002). Farmers, lacking awareness of the need for sustainable practices, have maintained a traditional hostility to government intrusion in their affairs. Enforcement of regulation has proved difficult and these problems are further compounded by poor regulatory design. Direct government regulation and economic instruments are unattractive to farmers, while self-regulation and voluntarism is unconvincing to external stakeholders (Gunningham and Sinclair 2002).

Mech and Young (2001) identify three trends which indicate the emerging community expectations and marketplace developments which have led to the rising prominence of EMS:

- increasing consumer concern regarding environmental quality, food safety and animal welfare issues;
- growth in supply chain driven environmental pressure, because of consumer concerns; and
- increased adoption of a diverse range of voluntary arrangements.

Issues which have been identified as inhibiting the widespread adoption of EMS by the farming sector include uncertainty about regulatory implications, lack of sound knowledge about EMS (both as a concept and implementation), concern over integration with other management systems (such as quality assurance) and a lack of time and/or expertise for farmers to develop their own EMS approach (Carruthers 2000).

6.0 Tools to Assist Agriculture

There are various tools available for use in an EMS or for organisations that do not wish to commit themselves to a formal EMS model accreditation system. Such tools include partnerships, environmental indicators, environmental impact assessment, life cycle analysis, environmental risk assessment and environmental farm plans. Such tools can be used to minimise and control an organisation's environmental impacts.

6.1 Partnerships

Gunningham and Sinclair (2002) explore the use of environmental partnerships as a means of improving environmental and commercial outcomes in the agricultural sector (Gunningham and Sinclair 2002). An environmental partnership is defined as a cooperative agreement between business and government and/or environmental organisations or commercial entities. The business voluntarily agrees to achieve certain environmental improvements in exchange for some benefit provided by the other partnership participant.

Environmental partnerships offer a middle ground between traditional regulation and voluntary approaches to environmental management. Regulation can stifle an organisation's attempts to develop innovative approaches to environmental management. (Gunningham and Sinclair 2002).

A partnership approach can derive commercial benefits by providing opportunities for greater on-farm productivity. Another potential benefit is that an environmental partnership may provide farmers with greater environmental credibility and so assist in promoting their position in a range of governmental policy areas. Environmental partnerships, more broadly, can combine industry flexibility and ownership with the increased credibility provided by an external partner when that party is not a regulatory agency (Gunningham and Sinclair 2002). The challenge is to identify the right balance of voluntary and formal approaches to environmental management (Mech and Young 2001).

The diverse and disparate nature of environmental partnerships in agriculture has made comparative analysis difficult with only a small number of environmental partnerships used in agriculture, and limited evaluation undertaken to identify factors for success (Gunningham and Sinclair 2002).

However Gunningham and Sinclair (2002) have identified some key factors that are conducive to the

development of successful environmental partnerships. These include:

- a coincidence between public and private profit;
- the prospect of mutual gain for all partners;
- companies which trade off their public image; and
- disparities in power along the supply chain (Gunningham and Sinclair 2002).

Partnerships have the greatest chance of success if they are accompanied by an increase in profit for the industry partner. The private sector is profit driven and it is only rational to invest in environmental initiatives if the anticipated benefits outweigh the costs (Gunningham and Sinclair 2002). Where short-term costs are involved to provide for anticipated long-term benefits the partnership is only likely to occur with some external incentive, such as government support.

Success also occurs where there are motivating factors encouraging partnerships to succeed. These include where one partner wishes to compete in green markets, which provides a strong incentive to make environmental partnership work. Companies which trade on their high public profile are motivated by pressures to maintain and enhance their corporate image.

All parties must be satisfied that there will be a sharing of responsibilities, benefits, profits and gains in a partnership. The exception to this rule occurs where there are disparities in power along the supply chain. Large commercial enterprises with power to influence the market may use this power to influence suppliers and buyers. If the pressure is coercive then it is not really a partnership, but in some cases supply chain partners can play a positive role as a mentor.

6.2 Indicators

Several environmental indicators are already used by farmers e.g. to determine soil fertility. There are a number of different indicators being used which may identify a need for a change in practices or the introduction of new practices e.g. improved energy efficiency, or a fresh look at agricultural practices triggered by a decline in biodiversity.

6.3 Assessment of Environmental Effects (AEE) or Environmental Impact Assessment (EIA)

Environmental impact assessments (EIA) are required to be carried out before development consent is granted for specific projects considered likely to have significant environmental effects. EIA are conducted in the

European Union, United States and New Zealand. The application of EIA to agricultural activities could have significant environmental benefits (Newbold et al. 1997).

6.4 Life Cycle Analysis

Life cycle analysis (LCA) "is an analytical environmental management tool used to assess the environmental loading of a product, process or activity over its entire life cycle, i.e. from raw material to final waste disposal" (VITO quoted in Newbold et al. 1997: 24). LCA has yet to be specifically applied to an agricultural system as the focus for study. However concepts of life cycle thinking may not be unfamiliar to the farmer, in areas such as energy and nutrient budgeting. LCA often fails as a technique on more specific day-to-day issues due to its broad approach. LCA could be complemented with a smaller more flexible tool such as environmental risk assessment (ERA).

- water quality
- irrigation management
- use of chemicals
- disposal of effluent
- protection of significant indigenous habitats
- control of pests which affect farm production
- nutrient and fertiliser management.

Blasckhe and Ngapo identify the relationship between financial planning and environmental planning, referring specifically to Property Management Planning in Australia, which has an integrated approach to the whole farm operation.

6.5 Environmental Risk Assessment (ERA)

Risk is defined as "a combination of the probability, or frequency or occurrence of a defined hazard and the magnitude of the consequences of the occurrence" (DOE quoted in Newbold et al. 1997: 24). Risk is influenced by perceptions of stakeholders and also uncertainties in knowledge. ERA often focus on the potential impacts on human health. In ERA many of the secondary impacts such as eutrophication and greenhouse gas emission can occur or cause harm off-site, thus determining impacts can be difficult. The complexities of human biology can present problems of a similar nature, such as the assessment of long-term risks to human health of exposure to hazardous substances.

6.6 Environmental Farm Plans

Environmental Farm Plans are a planning tool that is available for farmers to assist with establishing the impacts of activities. They range from simple riparian management plans to comprehensive environmental programmes that address all soil and water issues, as well as biodiversity. In New Zealand, Environmental Farm Plans are being used by regional councils as a method to achieve good environmental outcomes in a non-regulatory way (Blaschke and Ngapo 2002). They identify a set of core criteria which should require attention in environmental farm plans. These include:

- soils and Land Use Capability (LUC) assessment
- soils management
- control of runoff
- stream margin protection

7.0 Measuring Success

A key consideration as to the effectiveness of EMS-type programme is evaluating the impact/performance of the implementation of the programme.

To determine the success of an EMS it is necessary to develop some criteria or indicators to measure success. Sustainability is a key criteria for success as it implies the ability to maintain operations over the long term in a way that enables the needs of future generations to be met.

Where an EMS is ISO 14000, an organisation is required to carry out an audit to determine whether the EMS conforms to requirements and has been properly implemented (Tibor 1996). ISO 14000 also requires some procedure for periodically evaluating compliance with environmental legislation and regulations. Using information gathered during the audit, the auditor evaluates whether specified environmental activities, conditions and management systems conform to the audit criteria. In the case of ISO 14000 it means checking that the structures of the system are in place; it does not require checking the actual performance of the system.

The Natural Step provides the four system conditions for sustainability which can be used to map the success of an organisation as it strives for sustainability.

Another method for determining the sustainability of an organisation is Triple Bottom Line Reporting, involving economic, social and environmental reporting.

Triple Bottom Line Reporting (TBL) focuses on the economic prosperity, environmental quality and social justice of an organisation. Traditionally a company's bottom line referred to its profit figure used as the earnings figure in the earnings per share statement (Elkington 1998). In most countries, companies have an obligation to give an account of their financial performance. The financial position is demonstrated through a number of key indicators including a profit loss account, balance sheet and statement of total and recognised losses and gains. When it comes to wider economic sustainability there is a lack of generally accepted indicators.

The social agenda for business stems back to controversies regarding slavery, child labour and working conditions (Elkington 1998). If the wider political, social and ethical issues are ignored the backlash will inevitably undermine progress in the environmental area. Environmentally sustainable human capital requires "investments in education, health and nutrition" (Serageldin quoted in Elkington

1998: 85). Social accounting aims to assess the impact of an organisation or company on people both inside and outside. Issues often covered include community relations, product safety, training and education initiatives, sponsorship, charitable donations of money and time, and employment of disadvantaged groups (Elkington 1998).

Emerging social indicators include the Human Development Indicator (HDI) and the Index of Sustainable Economic Welfare (ISEW). The latter adjusts normal measures of welfare by subtracting the costs of unemployment and automobile accidents, for example. Social auditing usually covers the non-financial impacts of a company. Environmental audits are often seen as a form of social audit. The purpose of social auditing is for an organisation to assess its performance in relation to society's requirements and expectations (Elkington 1998).

The environmental bottom line involves examining how an organisation manages natural capital. Natural capital can be thought of as coming in two main forms: 'critical natural capital', which is essential to the maintenance of life and ecosystem integrity, and 'renewable, replaceable, or substitutable natural capital' (Elkington 1998). A company's ecological bottom line will vary in relation to the activities and numbers of economic factors within the ecosystem they operate in. Organisations may be held accountable for their actions by regulators, environmentalists or media campaigns.

The large number of potential issues and the expanding range of environmental risks are reflected in the potential indicators. Environmental risks can have financial indicators, including trends in legal compliance; provisions for fines, insurance, and other legally related costs; and landscaping remediation, decommissioning and abandonment costs (Elkington 1998). There is also a need to measure environmental impacts such as life cycle impacts of products, resource usage at production sites, waste generation; consumption of critical capital and performance against best practice standards. At the company level these indicators can be dealt with via the use of an EMS.

8.0 Conclusion

The literature suggests there are a wide range of options available to organisations interested in implementing environmental management systems. It is possible for an organisation to use one type of EMS or a combination of approaches and this can be in a formal or informal manner. The organisation needs to develop a clear environmental policy which includes the aim of sustainable management. Sustainable management needs to consider social goals alongside economic and environmental goals. Social goals include justice and equity and there is also the opportunity to consider traditional Maori environmental management within or alongside EMS. Reporting, such as Triple Bottom Line, can provide a valuable mechanism for determining the strengths and weaknesses of the EMS. Environmental reports in general can provide credibility for EMS by allowing public scrutiny.

Government tools such as subsidies, regulations and education can aid farmers to manage the environment and assist to foster innovative thinking and stewardship of the environment. Partnerships between the government and farmers and other agribusiness ventures can also help address environmental issues.

The agricultural sector also faces many environmental challenges, which include:

- maintaining a clean and green image;
- maintaining food safety standards;
- demonstrating compliance with regulations; and
- complying with requirements of other members of the supply chain.

To be successful, members of the agricultural sector need to embrace the concept of sustainable management of the environment and recognise the role that EMS can play to assist this management.

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