

AUDITING AND CRITICAL REVIEW IN ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS) IN AGRICULTURE: IS THERE VALUE FOR SIMILAR APPROACHES IN NEW ZEALAND'S PROPOSALS FOR AUDITED SELF MANAGEMENT?

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Abstract

Farmers and other land managers around the world appreciate the need to minimise environmental impact and respond to concerns from consumers and the community regarding environmental stewardship and sustainability. In some cases, Environmental Management Systems (EMS) have been adopted by land managers to meet their own business management needs by stream-lining processes, saving resources and input costs, and obtaining marketing advantages over competitors. The international EMS standard, ISO 14001, has been employed by land managers in Australia, New Zealand, the US and Europe. Many farmers also use such systems to 'showcase' their good environmental works and effectively communicate their 'sustainability story'.

This paper outlines the 'Plan, Do, Check, Act' cycle of management, underpinned by critical reflection on progress toward environmental, social and economic goals involved in EMS. Case studies presented illustrate the benefits derived from EMS and highlight the need for robust self-reflection and auditing. Critical factors in developing a self-review process, internal audits, and if needed, external auditing are discussed. The paper concludes that adoption of an EMS approach will assist in underpinning audited self-management (ASM) which is a key recommendation made in 'A Fresh Start for Freshwater - Report of the Land and Water Forum' which was released for public consultation in New Zealand in 2010.

Introduction

Farmers need to balance their own business requirements, customer expectations for food quality and safety, and public expectations of land management when managing their enterprises. Consumers now expect (but will not always pay for) sustainable production, and are increasingly sceptical about unsubstantiated 'green' claims regarding production practices. Communities expect that public assets such as natural resources, soil and water quality and biodiversity are protected from impact from business operations – which in many areas include agriculture. It is generally acknowledged that farming intensification in New Zealand, and particularly land use change to dairy farming, is resulting in deterioration of water quality in some lakes and lowland rivers. New Zealand is also facing issues relating to water allocation (Land and Water Forum 2010). Farmers are increasingly called upon to justify not only why they should have access to public resources such as water supplies, but that when they do have access, they are making the best use of resources. Thus, the need for land managers to give 'proof' of consideration of such expectations and outcomes is growing. This has created competition between industries and within industry sectors in some cases to show that one group is more deserving of access to the resource than others. In Australia, this

has meant conflict between the cotton, horticultural, and pastoral industries for example, as they compete for scarce water allocations. Community expectations have also driven a re-evaluation of the policies guiding natural resource management (NRM), with increased calls for more rigorous regulatory structures and reporting requirements.

This plethora of demands can be met by natural resource managers (including farmers) through the use of credible management systems and comprehensive, robust monitoring and reporting. In order to provide credible evidence of sustainable practices, to monitor and promote the environmental performance outcomes achieved, farmers need to assess and understand their impacts on the environment, prioritise their management actions in response, and determine the best actions to take to deal with the impacts. As a result, the use of systematic and auditable approaches to farm management is growing worldwide. An Environmental Management System (EMS) is one such approach that is increasingly being used.

The first farm in the world to gain certification against the international Environmental Management System Standard, ISO 14001 was a cotton farm located on the outskirts of Narrabri, NSW Australia in 1997. The owner of the property (Mike Logan) had two main motivations when he undertook to implement an EMS: to differentiate his product in the market place; and to reassure community members that he was managing the farm (in particular, chemical applications and water quality), in an environmentally responsible manner. The cotton industry in Australia had been facing extreme negative community perception at the time of this development, and was struggling to minimise the potential loss of access to certain pesticides, and more particularly, water. The EMS management process had been shown to deliver a range of benefits across a range of industries – to the user, the environment and the community. Since Logan gained certification for his EMS, farmers around the world have taken up the EMS process – driven by diverse pressures, and gaining various benefits. One of the key benefits has been an enhanced ability to provide credible and robust data to ‘prove’ performance in a number of areas. However, this ‘proof’ relies on a critical assessment of performance, and is more credible when backed up by an independent assessment of the claims made regarding performance.

Similarly, in New Zealand, both the PCE report ‘Growing for Good’ (2004) and Manderson et al. (2007) highlighted that the increasing intensification of New Zealand’s agriculture came at the costs of the increased environmental degradation and input costs. Manderson et al. (2007) suggested that as a means to counter the environmental harms created, more and more farmers in the intensive industries were turning to the use of EMS, quality assurance (QA) and integrated pest management (IPM) programs - partly to ameliorate input costs and partly to reassure international markets that care was being given to environmental and food safety matters.

The PCE (2004) called for the development of appropriate indicators for both sustainable farming and the state of the environment reporting. However, Manderson et al. (2007) claimed that the inconsistent collection, analysis and collation of environmental indicators and other data hampered New Zealand’s ability to effectively participate in programs such as the OECD reporting program on agri-environmental indicators, and use of environmental whole farm plans (EWFP). The ‘Fresh Start for Freshwater’ Report of September 2010 (Land and Water Forum 2010) provided numerous recommendations to enhance the management of water allocation and of water quality in New Zealand.

In addition to the development and use of appropriate indicators, various industry sectors (see, for example, the Irrigation New Zealand report to the Ministry of Environment, 2008) and the 'Fresh Start for Freshwater' report have called for the increased use of audited self management schemes in New Zealand. Meshing such approaches with existing industry environmental policy, codes of practice, best/good management practices, strategic farm planning, integrated catchment management and catchment action plans provides a comprehensive mechanism that will assist land managers to achieve multiple scale outcomes, while simultaneously meeting individual business needs. However, a range of base considerations and ground rules must be included at the outset of the development of such an approach, in order to allow participation, understanding and ownership of all stakeholders in the development of the program.

This paper discusses the use of environmental management systems by land managers in several countries. It considers some of the factors required for successful application of management and monitoring/reporting systems, draws parallels between EMS and audited self-management, and offers some suggestions and tools for the on-going development of audited self-management approaches in New Zealand.

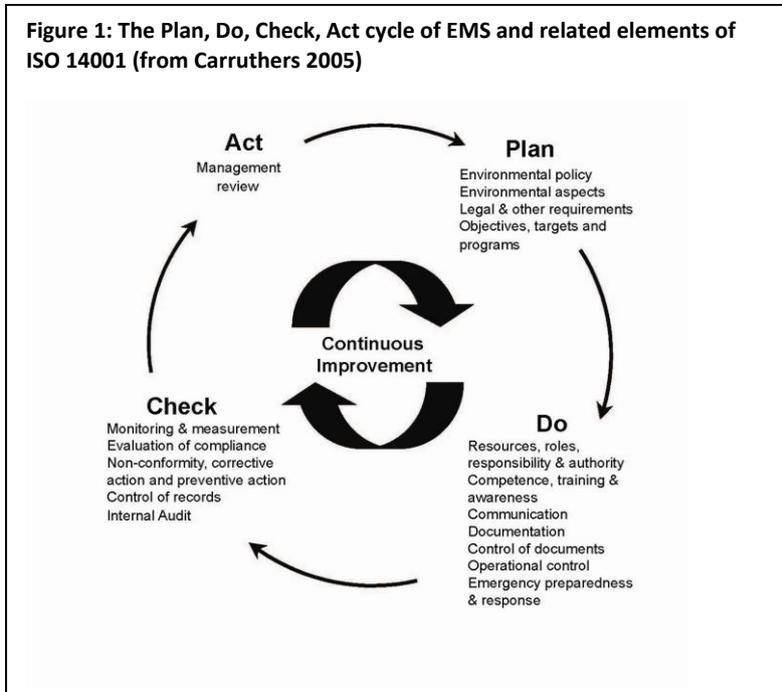
What is an Environmental Management System?

Management systems are routinely used in a range of business sectors, to improve efficiency, reduce risks, enhance compliance and improve profitability. Many modern management systems approaches are based on the concept of Total Quality Management (Powell 1995). Elements such as risk assessment, planning, communication, training, documentation, and the collection, analysis and strategic use of data, form a set of inter-related and interdependent elements (Maani and Cavana 2007) to accomplish the aim of the system (Deming 1986).

Management systems are largely about information. Sheldon and Yoxon (1999) described a system as a way of moving data around an organisation, to enable informed decisions to be made regarding management, using data that the system itself generates, thereby ensuring that business-relevant data is applied to the management process. Accordingly, as highlighted by Brunckhorst (2005, p 9), a system is "characterised by strong, usually non-linear interactions and continuous feedback". Monitoring, measuring, reporting and auditing are thus vital important components of a system, as they provide the required feedback.

Environmental Management Systems have a specific focus on the management of environmental risks and impacts created by an entity. While previously more typically used in non-primary industry sectors, the use of EMS in agriculture is growing, sometimes in combination with quality assurance and food safety programs, but at other times independently. In some cases, farmers have used the EMS process to develop whole farm plans, addressing the full gamut of business operations (including quality, food safety and occupational health and safety) through the EMS process. Ikerd (1993, p 147) noted with regard to sustainable agricultural systems that "People increase their well-being by using information and knowledge to manage or rearrange the components of systems, resources, processes, and technologies in ways that enhance the productivity or 'well-being' of those systems". EMSs therefore have an important role not only in assisting with sustainable farm management, but can also contribute to the achievement of wider societal goals (see Coglianesi 2001 and Coglianesi and Nash 2001a and 2001b for wider discussion of EMS as a public policy instrument).

EMSs, like other management systems, operate on a basic management process of ‘Plan, Do, Check, Act’. An international Standard, ISO 14001, recognised in over 170 countries codifies the specifications for an EMS. The elements of ISO 14001 and their relationship to the Plan, Do, Check, Act cycle is depicted in Figure 1. The overall management approach is based in the concept of continuous improvement.



Due to the iterative nature of the management cycle, EMSs add to the overall knowledge base of managers in a strategic and proactive way.

The OECD (2001) recognised the relationship of ISO 14001, and the related quality assurance Standard ISO 9000, to their ‘EWFP’ indicator, noting that these voluntary adoption standards are used to improve management standards, including agricultural management, internationally. However, it is recognised that “There is no rigorous international definition’ (OECD 2001, p

90) for what constitutes an EWFP plan, resulting in some countries using an ISO –based approach, and others relying on organic, IPM, or nutrient management plans as a defined basis for EWFP development.

EMSs are not BMP’s

A management system is not the same thing as a Best Management Practice (BMP), although EMSs are compatible both with many industry-developed BMPs for specific environment issues, and other ‘systems approaches’ for quality assurance, food safety, and occupational health and safety. EMSs are also different to the more conventional use of the term ‘farming systems’, which more often defined specific crop rotations and enterprise-specific actions aiming to increase production. For example, Bass (1996) discussed the relationship between ISO 14001 and the Forest Stewardship Council processes, highlighting how these two approaches could complement each other to improve forest management overall. In this case, the EMS process was recognised as a mechanism to increase uptake of industry developed performance standards. EMSs typically have a wider focus than many BMPs, covering both environmental issues and business management practices. As EMSs are developed typically following a risk assessment particular to the entity employing the EMS, the specific issues that are addressed by the EMS can differ widely, even between businesses that are in the same industry sector. Finally, use of EMS is voluntary, and the outcomes will depend on the skills and capacity of the operator.

Worldwide, there are a number of approaches employed that could be developed further into EMS. Manderson et al. (2007) suggested the Australian Property Management Plans and Whole Farm Plans, and Norwegian Environment Plans could be included in the EWFP

description. EMS-like approaches have been investigated in the US with the poultry, beef, and dairy industries (Bird and Bushman 2005), in Ontario through the Environmental Farm Plan (Schulman et al. 2000; Manderson 2007; Plummer et al. 2007), in the US with Farm*A*Syst (Schulman et al. 2000), and in the UK under the Linking Environment and Farming (LEAF) program (Schulman et al. 2000) and the UK Whole Farm Plans (Manderson et al. 2007). The OECD (2001, pp 91-120) included a range of these approaches under their EWFP indicator,

EWFPs usually include a strategic planning approach, a focus on individual properties, an emphasis on environmental issues and integrated management, which recognises other farm management and systems design issues. Use of improved management planning and application of BMPs was claimed to have been increased productivity of farms by 2.7% annually in the 1980-90's in Australia (Craik 1998). Table 1 illustrates farm management areas addressed through a range of environmental farm planning approaches in 1999 in 19 of the 29 OECD member states.

Table 1: Environmental farm management standards and issues addressed: late 1990's

No: of OECD Countries with	Farm management areas					
	Whole farm	Nutrients	Pesticides	Soil	Water	Other
compulsory standards	3	8	9	5	5	2
regulation	3	11	11	8	7	6
voluntary codes of practice	12	13	12	11	7	7
other standards	3	2	4	2	0	1

Adapted from: OECD 2001. Data is from information gained in the 1999 Agri-environmental indicators questionnaire.

In New Zealand, the Deer Farmers' Landcare Manual and Sustainable Management Plan (SMP), and the Beef and Lamb NZ's Land and Environment Plan (LEP), have some design commonality with EMS features (Paterson et al 2009). DairyNZ's Farm Environment Action Plan (FEAP) and initiatives for Nutrient Management Plans (NMP's) also offer valuable information and planning assistance that could be enriched with EMS features to facilitate auditing and reporting. Of these three existing industry environmental programmes, Beef and Lamb NZ's level 3 LEP is the most closely aligned with EMS features (Paterson and Dewes 2011). In general, these New Zealand pastoral sector owned environmental programmes currently have a low level of uptake (Paterson and Dewes 2011).

EMS use on farms

In Australia EMS implementation on farms using the ISO 14001 Standard has been growing since 1996, when Mike Logan first began his EMS development. Projects with the Australian grains industry (initiated by NSW Department of Agriculture) and livestock industries, and a series of national conferences (see Carruthers and Tinning 1999; Carruthers 2002; PIRSA 2003; Department of Primary Industries 2005; TQA 2007) stimulated the national EMS Pilots program and EMS Pathways projects. These initiatives provided \$50 million for EMS investigation in the Australian agricultural industries. Outcomes of these government programs have been reported in a special edition of the Australian Journal of Experimental Agriculture (Vol 47 No: 3), by Thomson et al. (2006) in their evaluations of the EMS Pilot projects and by Hassall and Associates (2007a; 2007 b) in the evaluation of the Pathways program.

The most recent ISO certification figures provided by the ISO Central Secretariat in 2008, showed that worldwide, total certifications to ISO 14001 was over 188, 815 with certifications in 155 countries (ISO 2009). While it is difficult to accurately determine¹ the numbers of EMS users at any particular time or in specific industry sectors, in Australia over 1000 farmers reportedly participated in the EMS Pilots (Thomson et al. 2006) and EMS Pathways projects (Hassall and Associates 2007a). Of the 1600 registered certifications to ISO 14001 in Australia listed on the website of the Joint Accreditation Scheme for Australia and New Zealand (JAS ANZ) in February 2011, nine were agricultural EMS certifications. However, the numbers of farmers implementing an EMS are higher than those who have undertaken certification. From this author's previous work with on-farm EMS development and implementation, there is anecdotal evidence of over 100 agricultural enterprises currently using EMS, on horticulture, wine, intensive and extensive livestock, wool, cotton, grains, egg, aquaculture, mixed enterprise and organic farms. Most of these have not sought certification, but still apply the ISO 14001 process.

Internationally, ISO 14001-based EMS use on farms is also growing. Anthony (1996) worked with nine farms in Scotland to apply the pre-cursor of ISO 14001, the British Standard 7750. Riddiford (1999), Fresner (2000), Knowles and Hill (2001), and Walsdorff et al. (2003) have all discussed the use of EMSs in wineries in New Zealand, Austria and South Africa, respectively. In Martinborough New Zealand, the Palliser Estate winery was one of the earliest to undertake EMS. Pip Goodwin, Associate Winemaker and Environmental Officer from the winery, stated that "Having external quality standards to compare ourselves to is hugely beneficial. ISO, CEMARS, they all give us a benchmark for which to do better" (<http://www.palliser.co.nz/on-the-estate/sustainability/> accessed 7th Jan 2011). At the Palliser Estate, carbon emissions have decreased by 8% since measurement started in 2006, water use reduced has decreased by 58% (per tonne) since 1998, and electricity usage lowered by 18% (per tonne) over the same period. Recycling of wastewater and packaging has also been introduced. The winery has engaged with the local community to undertake various environmental initiatives. The EnviroAg/North Otago Sustainable Land Management EMS work was another early New Zealand example (Schulman et al. 2000; Carruthers 2003, 2005). More recently two Rotorua Lakes district farming communities are considering EMS as a credible mechanism for achieving and demonstrating good stewardship goals for water quality objectives in the Lake Okaro catchment (Birchal M et. al 2011) and at Lake Rerewhakaaitu (SFF Projects 2011).

Tyrolean dairy farms also operated as eco-tourism ventures (Stern 2005; Peglau and Baxter 2007), banana plantations in Costa Rica (Corbett and Kirsch (2000), flower producers in Kenya (Moomaw 2001), raspberry growers in Canada (CEC 2005) and multi-enterprise university research farms (Reith and Guidry 2003; Lopes and Ferreira 2004) have all implemented EMSs based on ISO 14001. In Sweden, Bergstrom et al. (2000) examined an approach combining quality assurance programs (using ISO 9002) and ISO 14001 in farm management.

Issues commonly addressed by participating farmers in these initiatives include management, storage and handling of chemicals, resource inputs such as water and energy, and dealing with outputs such as spray drift, leachates, plastic waste, manures and slurries. Compliance

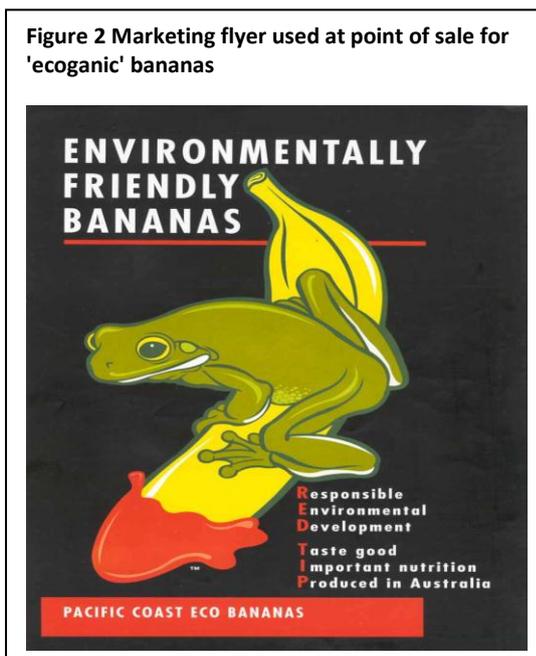
¹ Managers can use an EMS and choose not to undertake certification. If they do choose to have their system certified, there is no requirement to make this certification public. While publicly available registers of the certification status of businesses' EMSs have been developed in many countries, not all EMS users choose to be placed on the registers.

issues, training, communication, addressing off-farm impacts, particularly water quality, and biodiversity issues are also commonly addressed. Many farmers who participate in EMS find that they are better able to communicate with regulatory agencies, community members and researchers (Carruthers 2003; 2005).

Drivers for EMS

As with other industries, the drivers and motivations for EMS adoption vary with individual businesses, and range across the full spectrum of business, environmental and social issues. For many individual farmers using EMS in the early days of EMS application, one of the most fundamental drivers was that of a personal desire to improve the farm environment (Carruthers 2003; 2005). Improved sustainability management in general was seen as a potential result of EMS implementation by EMS Pathways participants, increasing farm business productivity, profitability and sustainability through efficiency gains and reduction of environmental footprints (Hassall and Associates 2007b, pp 3-4).

Marketing considerations were also initially considered important, with market access to environmentally-conscious markets such as Europe particularly significant. Maintenance of market access was a reported benefit amongst EMS Pathways participants, particularly amongst the intensive livestock industries where both environmental and animal welfare issues were seen to threaten markets (Hassall and Associates 2007b, pp 3-4). Use of EMS



was seen as a way to support the 'green' side of long-relied upon 'clean, green' marketing campaigns. For Queensland banana growers, Frank and Dianne Sciacca, the use of a food-grade red wax tip on their bananas was part of their overall approach to marketing bananas grown using their 'ecoganic' production protocol, implemented through their ISO 14001-certified EMS (see <http://www.eco-banana.com.au/story.html> for further information). Bananas are sold with the information leaflet (Figure 2) to provide information to curious customers about the distinctive looking fruit. This leaflet also serves to support the price premium gained for the fruit, as it informs customers about the growing protocol and level of auditing and validation undertaken at the Sciacca's and their partner growers farms.

For industry groups, such as the cotton industry, improved overall community perception and support for the industry was a factor, with some industry groups claiming that EMS would provide a 'right to farm'. The potential ability of EMS to demonstrate environmental stewardship and thereby change community perceptions or increase accountability was the benefit most frequently identified by the EMS Pathways participants (Hassall and Associates 2007b, pp 3-4). For example, in the EMS Pathways program, the dairy, seafood and chicken meat industries in Australia considered themselves to be under pressure to qualify for continued resource access (particularly continued access to water in the case of dairy and chicken meat) and saw EMS as one mechanism that would enable them to increase resource security and/or maintain resource access (Hassall and Associates 2007b, pp 3-4).

An increasing driver for EMS implementation is that of industries seeking to ‘self-regulate’. By promoting and creating an expectation of more stringent environmental performance outcomes (and associated reporting), some industry sectors have seen EMS as a way of avoiding imposition of increased regulatory scrutiny and compliance reporting (for example, see discussions throughout Coglianesi and Nash 2001a). The development of best management practices, codes of practice and similar guidance materials by industry groups is now being pushed further into uptake through the use of auditable management systems. For example, the Western Australian Pastoralists and Graziers Association, the seafood, egg and pork industries in Australia considered that an EMS has the potential to enable self-regulation as an alternative to the increasing imposition of regulation (Hassall and Associates 2007b, pp 3-4). Many industry groups now also publicly report the outcomes of such uptake, with industry trend data being made available. Agricultural industries have also begun to follow this trend, albeit often at a slower pace, and with many data gaps at present.

Local Government / State Agency Recognition and Integration of EMS

While EMS is essentially a non-regulatory and voluntary structure, regulatory and policy agencies can and do recognise the value of auditable EMSs in assisting achieve public policy goals (see Coglianesi and Nash 2001b for discussion on EMS as a policy instrument). Management systems can address many of the requirements recognised by the Australian Public Service Commission (APSC 2007) to tackle ‘wicked problems’ in NRM. The APSC recommended that the Australian public service utilise a range of mechanisms that are at least partially captured by the EMS process to achieve sustained behavioural change. Many of these recommendations apply equally as well to individual businesses, including farmer enterprises. The mechanisms included using holistic thinking, innovative and flexible approaches, working across boundaries, inclusion of accountability, stakeholder engagement, core skill building and taking a long term focus.

In a recent Senate Enquiry in Australia (Senate Standing Committee on Rural & Regional Affairs & Transport Reference Committee 2010), three recommendations were made that could potentially be strengthened through land managers’ application of EMS. Recommendations 1, 4 and 9 respectively called for greater engagement of regional and local expertise in the identification of priority issues for land management (p 69), encouraged stakeholder collaboration “on long-term landscape scale strategic planning and action” (p 71) and suggested the development of “a framework and generic criteria which would form the basis for an ongoing process of audit of the condition of Australia’s natural resources” (p 73). By providing monitoring data, validating recommended practices, thus providing feedback on the effectiveness of proposed strategies, users of the EMS process can inform these three recommendations. The Gippsland Natural group in Victoria (a group of beef and lamb producers) have created a very effective coalition with catchment management and agency staff, using the EMS process to collectively set targets that meet not only their own business, but also agency goals for environmental outcomes. This group uses an external auditor to assess the group EMS, and to also conduct periodic audits of the application of the EMS on individual member farms, but has chosen not to utilise full EMS certification. The group is well-positioned to undertake full certification auditing if market or other demands should alter to require this level of validation. All group members contribute to the costs of EMS development and auditing – with some of the costs of participating being off-set with premium process gained for meat supplied to ‘high-end’ restaurants or sold through local farmers markets.

NRM outcomes data generated by EMS use forms a valuable resource for agencies – if it can be tapped, and if it is credible. In Australia, Ryan et al. (2010) recognised that there is a need to increase ‘whole-systems’ thinking in all NRM approaches, from the landscape to the individual property scale. In order to achieve this, they concluded that greater connectivity between monitoring data, information and knowledge was needed. A particularly impressive example of the collection, collation and use made of such thinking and data generation is provided by the Sustainable Silicon Valley group in California. This partnership was initially developed by the Californian Environment Protection Agency, the Santa Clara Water District, the Silicon Valley Leadership Group and the Silicon Valley Environmental partnership. Forming in 2000, the group now has over 120 partners across a diverse range of industry, government, NGO and academic sectors. A regional application of EMS was used to determine regionally specific environmental target areas, providing for individual action by group members. Public reporting of progress is made through the website (<http://www.sustainablestv.org/>), and a number of metrics have been developed which allow group members (and others) to benchmark their own performance. Policy agencies are able to draw on the data generated by SSV partners to test, validate and improve policy instruments which seek to provide improved environmental outcomes for California.

The potential for EMSs to form a conduit for information flows between agencies and agricultural land managers is great, however, not yet widely exploited, either as part of the SSV initiative or elsewhere. In particular, EMSs provide the capacity to gain greater accountability and allows for regular reviews of progress for agencies – both features seen as essential for progress in enhanced NRM by Ryan et al. (2010).

New Zealand, similarly to Australia is reliant on export markets for a majority of agricultural produce, and has similar community expectations of environmental stewardship. The same drivers for EMS can therefore be anticipated. The setting of targets, objectives and limits, development of processes and standards, greater engagement and collaboration of partners, reporting, data accessibility and the development and use of various instruments and incentives to encourage adoption have all previously been considered in the context of EMS use in Australian agriculture, and are all issues considered in the recommendations of the Land and Water Forum (2010) ‘A Fresh Start for Freshwater’ (hereafter referred to as LWF Report). Many of the LWF Report recommendations could be enacted or supported by EMS implementation on-farm, particularly the recommendations that call for ‘audited self-management’ (ASM).

What is Audited Self-Management (ASM)?

Voluntary measures for water management in New Zealand feature in five of the principle recommendations in the LWF Report; these measures include codes for good management practice, continuous improvement of good management practice and particularly, audited self management. The LWF Report recommendations that specifically refer to audited self management (ASM) are:

7. Regional councils should employ a range of instruments to ensure that targets and limits they set are met, including voluntary schemes, codes of good management practice (including audited self-management), regulation, and funding. They should do this in collaboration with stakeholders and iwi (p 1).
13. Audited self management should be used by industry and regulators to ensure that outcomes are being met (p 2).
15. Robust industry standards and audited self management schemes need to be recognised in the development of regulatory approaches to water quality (p 2).

Further in the LWF Report, paragraphs 103-106 (p 26) provide additional considerations for audited self-management. The report described ASM as an established audit system designed to verify adherence to Good Management Practices (GMP) requirements (paragraph 103), and saw a strong relationship between certification and marketing benefits. ASM was defined as “day-to-day resource management responsibilities to users under agreed terms, and subject to transparent audit” (paragraph 104, p 26). Curtis and Heiler (Irrigation New Zealand PowerPoint presentation, undated) interpreted the ‘agreed terms’ to be the self-management component, while the ‘transparent audit’ provided the accountability component. Regional councils could engage auditors, who would undertake compliance audits, using industry developed GMPs (or presumably catchment targets) as a basis against which to audit. Audit outcomes would then be accepted as proof of regulatory compliance by the land owner / consent holder. ASM is described in the report as a ‘key tool’ to achieve changed practices, while Memon et al. (2010) claimed that ASM represented one of ‘the most promising collaborative catchment initiatives for water users’ (p 40). However, ASM needs to rely on a range of other practices and be developed further as a concept before it will achieve all of the aspirations attributed to it in the LWF Report.

Good Management Practices (GMPs)

In the LWF Report, ASM was seen to be supported strongly by the application of GMPs, (paragraphs 93-102, pp 23-26), some of which have already been developed in some industry groups and for some issues (Paragraph 95). The development and use of GMPs is seen to be reliant upon standards and limits developed within a robust policy framework, with national agreement on sectoral GMP targets, actions and timeframes. The pace of change, need for business viability and costs/benefits were features to be considered. In addition, the need to incorporate both catchment level and site-specific objectives for water quality outcomes into GMP targets and measures was made explicit.

In Australia, a range of industry groups in the state of Queensland have developed ‘Best Management Practices’ without bearing such considerations in mind. There are no agreed standards for developing ‘BMPs’ and no clear articulation of what should have been included. Despite a stated government policy of ‘accrediting these so-called ‘farm management systems’ approaches, the lack of consistency between industry BMPs has meant in practice that such accreditation processes are not robust. Carruthers (2007) found that across the eastern states of Australia, catchment plans and targets did not clearly identify on-ground actions that could be applied on dairy farms to assist in meeting catchment based targets. Translating on-farm monitoring and outcomes achieved into higher level metrics can also prove difficult (Carruthers and Tinning 2003). In Paragraph 97, the LWF Report recognised the need for a combination of voluntary industry led measures, supported by regulatory instruments (also suggested by Gunningham 2002; 2007). Farmers using an EMS were more likely to adopt environmentally related BMPs and codes of practice (Carruthers 2005). In part, this was due to the farmers actively seeking such information, to address environmental issues identified during the risk assessment process in the EMS cycle. As a comparison, the use of EMS in the SSV group has allowed standard approaches to be used to develop region-wide targets which then guide the development of specific targets within each individual users organisation or business.

The use of EMS as a guiding process to develop GMPs could avoid some of the confusion that has arisen in Australia in BMP development. Further, GMPs can form the basis of the specification of ‘self-management’ which farmers could be expected to comply with, and provide the platform to audit against.

The LWF Report has recognised that public confidence in GMP programs, and thus ASM is important. Credible, robust and reliable monitoring of outcomes is required to achieve this credibility, and also to support proof of regulatory compliance. In addition, as has occurred with the SSV and Gippsland Natural group, public participation (sometimes through agency involvement as a de facto public presence) in the target and indicators setting, risk assessment evaluation and establishment of monitoring programs, can serve to strengthen not only credibility, but ownership of the programs and outcomes. A ‘whole-of-industry’ approach was suggested in the report to ensure that GMPs were comprehensive, that suitable investment into research and development could be supported, and that all parties would be involved in improved environmental performance. Again, the SSV and Gippsland Natural groups’ experiences suggest that the EMS process can be very useful to achieve such a collaborative approach.

Adaptive Management

A ‘transfer of technology’ approach (Kilvington and Allen 2002; Valentine et al. 2007) where there is a clearly identifiable problem, solution and monitoring, is not often appropriate to complex, environmental issues, particularly where the impacts involve the wider environment and community. Thus, there is a need for new approaches to solving the problems presented by off-farm impacts created by on-farm activities. Adaptive management (AM) is a concept developed to address such complex problems. The generally accepted management process for AM is that of ‘predict, do, learn, describe’ (Wilson et al. 2009). AM can be particularly helpful in dealing with the ‘wicked problems’ so often encountered in NRM, as it helps managers respond to uncertain environmental parameters, providing a flexible approach to dealing with issues based on the data developed through monitoring the result of actions taken. The management cycle of AM is similar to that of EMS, again with a focus on reviewing, validating and questioning outcomes achieved, so that management can be enhanced to improve outcomes.

The LWF Report (paragraphs 107-110; pp 27-28) suggests that GMPs be implemented using adaptive management (AM) techniques. ASM can be supported by applying an EMS process to manage, document and assess the results of management actions. Wilson et al. (2009) examined the many similarities between AM and EMS, concluding that as EMS already has audit and certification processes built in, AM could be strengthened by the EMS process to allow validation of monitoring and outcomes of management practices.

Relationship of EMS to audited self-management

Gunningham (2007) noted “Neither codes of practice nor EMSs are likely to function effectively in the public interest in the absence of adequate mechanisms ensuring accountability and transparency” (p 305). He stated “Where an enterprise self-monitors there will be a temptation to misrepresent the results, providing an overly favourable account of its environmental performance, particularly if there are regulatory or public relations benefits to be gained from so doing” (pg 305). Therefore, while the LWF Report suggests that auditing responsibility might be devolved to, for example, irrigation schemes (as self-auditors, Paragraph 105) it also recognises the need for regulators to be able to validate ASM data. Given Gunningham’s comments, a more credible course may be to engage independent auditors. To be deemed competent, such auditors need to be aware not only of standard audit practices, but also must be familiar with the industry sector, the environmental impacts likely to be created, the regulatory environment within which the industry operates, any BMPs or GMPs the industry sector employs, and any regional or local environmental or catchment action plans relevant to the location of the entity. An audit is a systematic, independent and

documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled. It is important therefore that auditors are independent of the system being audited, and should not contribute to the development of the systems being audited. Audit criteria may be set within the business (internal audit) or from outside the business (2nd or 3rd party). In the case of ASM, the regulators, industry groups, local communities, and individual land managers would conceivably work together to develop the audit criteria.

Implicit in the above approach is the need for standards. Standards provide greater certainty to the system user regarding what they are required to achieve their equity in expected actions and performance. Standards also provide certainty to auditors regarding what they are to audit and expect to find in a system, and to the community regarding elements to be deployed, and potentially outcomes to be achieved. Standards also allow consistency between different industry sectors, regional councils, the reporting requirements and audit and review procedures to be used. For example, the Green Tier approach in Wisconsin (<http://dnr.wi.gov/org/caer/cea/environmental/>) was developed in 2002/03 to allow industry representatives to engage more fully with agencies, gain recognition for their improved environmental performance, improve their awareness of environmental issues, and improve their knowledge and application of methods to address them. As a standard approach, Green Tier participants must have in place an EMS based on ISO 14001. The dairy industry in Wisconsin has been a participant in the Green Tier program, with a number of very large dairy farms becoming involved. In part, this was in response to very stringent requirements for the development of 'Comprehensive Nutrient Management Plans'. These plans were typically developed by an agency consultant, often with little farmer input, and often allowed little flexibility in approach to address nutrient management issues. In addition, these plans covered ONLY nutrient management, meaning that a range of other issues, such as water and energy use, biodiversity management, soil management, water and pollution control were not addressed. By encouraging the use of EMS, a greater range of issues could be covered, often in innovative ways. In addition, EMS use promoted greater interaction between agency staff and farmers, increased uptake of BMPs (for a range of issues), and also, through robust auditing of the EMS, provide valuable 3rd party recognition and thus enhanced credibility. A strong agency framework supported the Green Tier initiative. It was noted (Hassall and Associates 2007a, p v), that the application of such a framework had been lacking in the Australian EMS Pathways projects, where little clarity of what constituted an EMS had been provided (although it was observed that industries initially appreciated this leniency). While the EMS Pilots had quite clearly recognised that an EMS should comply with the ISO 14001 standard, and that a National Framework on EMS was available, inexplicably, the EMS Pathways projects often did not take either the Standard or the Framework into account with developing Pathways approaches. Consequently, there was no mechanism by which accreditation of the approaches could be applied, preventing, for example, the linking of incentive funding to adoption of an EMS. Hassall and Associates (2007) reported that the industry groups themselves came to recognise this shortcoming in an overly liberal approach in describing anything from a single issue BMP, self-assessment checklists, through to a comprehensive management system as an EMS.

The concept of flexibility in management systems standards is one that often creates confusion. On the one hand, ISO 14001 is a Standard, supplying the specifications for the development and implementation of an EMS. However, ISO 14001 is a process standard, meaning that it does not provide detailed performance outcomes. Because of this, ISO 14001 can be easily combined with other management systems approaches, such as quality and

occupational health and safety. For farmers, who have to address all these issues (plus a multitude of others), the flexibility offered by ISO 14001 is attractive (Carruthers 2007). Such flexibility is important when regionally specific issues need to be addressed. The need for flexibility must be recognised in the development of a suite of indicators for measuring progress towards improved environmental practices (OECD 2001, p 109), and the methods used to address issues. In some cases, such as in the Canadian and Australian pork industries, industry-specific EMS standards, based on ISO 14001, have been developed, with industry specific performance parameters developed and included in the standard. These standards have also developed guidance for auditors, covering system elements, the environmental issues that could be expected to be addressed, and in some cases, the BMP approaches that might be taken. In New Zealand, the beef and lamb, deer and dairy industries have all developed environmentally focused BMPs or GMP approaches. Combining these with elements of EMS would move towards providing the standards against which ASM could be audited, and would also provide guidance for the development of auditing governance arrangements.

The Gippsland Natural group have addressed regionally specific issues in their generic EMS development as well as tackling issues specific to individual farms. Building from the Catchment Management Plan, where regionally important issues and targets were identified, each farmer also undertook a risk assessment for their own property, to identify which of the local issues posed the highest risk to their own operations. Each farmer then set targets that helped address their own issues, and developed a suite of monitoring practices that also contributed information back to the catchment management authority. Working together on the development of common EMS elements provided time and cost savings and peer support. Group rules and audit processes were collectively developed, and the group utilises both peer and 3rd party audit to assess progress towards goals. The group customises the generic EMS to each farms needs, maintaining the flexibility desired, while also providing a cohesive and comprehensive set of monitoring data that it used to support marketing campaigns for the group products (attracting a premium price of 40 cents per kilo for meat products). In addition, the group has been able to leverage funding for research and support to enhance implementation of their on-going EMS initiatives.

Figure 3 Gate sign used by the Gippsland Natural Group's 'Enviromeat' producers



How EMS can assist to build ASM

Many of the features seen as key attributes of ASM are therefore shared with the EMS process of ISO 14001. As described in the LWF Report (paragraph 106), in order for ASM to work effectively within regulatory compliance, ASM needs to provide:

- robust and accessible data
- clearly defined roles, responsibilities, and consequences
- accessible and transparent governance
- open and regular communication between parties.

The Irrigation NZ report (2008) also recognised the importance of these features. ISO 14001 includes the first, second and fourth points as part of its' required elements, and in addition, addresses governance issues in various support documents, such as the requirements for auditor selection and accreditation.

Carruthers (2007) showed that the EMS process could be used by farmers to meet diverse business management, catchment and community outcomes. In particular, by drawing on catchment targets to assist in setting on-farm performance targets, using metrics either devised in conjunction with catchment management authorities and/or researchers, and reporting outcomes results back to catchment managers and the community, EMS users found that they could gain considerable support and validation for their actions (as shown by the Green Tier, Gippsland Natural, and EMS Pilots projects farmers). Importantly, feeding the data generated by land managers back into regional and catchment planning processes allows the overall catchment planning process to be strengthened. In some cases, targets have been challenged and changed, as a result of 'ground-truthing' supplied by farmers monitoring the range of outcomes possible as part of their EMS. Further, as shown by Carruthers and Tinning (2003), the EMS process can also guide the selection of indicators, providing more targeted management to meet agreed outcomes. Thus, EMSs can greatly assist in meeting regional or catchment water quality targets.

The EMS process includes a requirement for an internal audit and a management review to be conducted periodically. In some cases, the EMS user may also wish to gain certification for their system against the ISO 14001 Standard, in which case an external (or certification) audit is also required. An audit is a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled (Standards Australia 2004). The audit criteria may be set within the business (internal audit) or from outside the business (2nd or 3rd party). An auditor is a person with the competence to conduct an audit; and should be independent from the system (Standards Australia 2004). Auditors should also be recognised by an accredited certification body, that is, a verification of their competence, reliability and independence, and that of the certification body they represent, has been undertaken by another party (Bass 1996).

Undertaking auditing and certification allows the demonstration of continuing EMS support and implementation. Performance monitoring, environmental reporting, and compliance and conformance control have been reported to have the greatest influence on reduction of releases to air and water (Briggs 2006). Such processes reinforce the value of EMS as a tool for continual improvement. While auditing was not seen as a particularly enjoyable experience by farmers, the value of doing so was recognised. The Gippsland Natural group supported third-party auditing for the group, without the full certification auditing process being applied. The marketing group which formed around the 'red-tip eco-organic' banana production see auditing as a valuable way of maintaining production standards and credibility. Bird and Bushman (2005) also noted that farmers in their study recognised the need for credible environmental management audit procedures. The EMS process therefore, has already addressed many of the issues that would be resolved for ASM to become a practical tool in improving natural resource management, and those wishing to take the ASM concept further would do well to consider existing mechanisms that deal with the many facets of auditing and auditor recognition.

Issues that need to be resolved to build the ASM approach

Agency structure and management

The following quote from the Australian Public Service Commission (2007, p 13) regarding the management of ‘wicked problems’ highlights the difficulty that government agencies have in dealing with many NRM issues.

A traditional bureaucracy, divided into vertical silos, in which most of the authority for resolving problems rests at the top of the organisation, is not well-adapted to support the kinds of process necessary for addressing the complexity and ambiguity of wicked problems. Bureaucracies tend to be risk averse, and are intolerant of messy processes. They excel at managing issues with clear boundaries rather than ambiguous, complex issues that may require experimental and innovative approaches.

Both EMS and ASM are likely to present ‘traditionally’ structured government agencies with problems. Both approaches will be ‘messy’, need to cut across jurisdictional, regional and industry boundaries and require experimentation, changes in approach and alteration of targets on an on-going basis. Agencies would need staff who are familiar and experienced with EMS and ASM, in order to capitalise on the opportunities these approaches offer. Gunningham (2002) pointed out that lack of awareness of EMS and industry codes of practice was a barrier to their use, both from an agency and end-user perspective. Appropriate training and awareness campaigns would be required to increase the understanding of EMS and ASM, and to enhance the connectivity of these with industry GMPs. Memon et al. (2010) highlighted that while the central government in New Zealand had devolved water resource management responsibilities to local governments (i.e. regional councils), limited policy guidance or support had been given to build local capacity and commitment to address these issues. Such difficulties are also facing the adoption of ASM, and significant resourcing will be required to ensure that such a policy change can be effected efficiently.

Credibility and reliability of data

Agreement on the particular suite of metrics that would be considered comprehensive, the collection methods and reporting mechanisms to be used, and how data credibility and reliability would be maintained are issues that would need to be collectively resolved. Target issues seen as critical by catchment managers are not always regarded in the same light by farmers, who more usually have a more production-focused orientation towards the collection and use of monitoring results. As noted by the OECD (2001, p 92), while a EWFP may be developed, that presence of the plan provides no information as to whether it is implemented or about the quality of the plan. Plans need to be linked to actual outcomes, with a defined suite of indicators developed that can be used to be reported against. While many farmers in the EMS case studies found that a formal systems audit was beyond the scope of their management plans, nevertheless with assistance most farmers were able to develop a relatively simple assessment of their management systems. A group approach, as used by some group examples presented in this paper was particularly beneficial to achieve an audit of progress against targets. As many farmers had initially undertaken an EMS to demonstrate their land stewardship to others, these audits and reviews became the means to highlight good practices and outcomes, and provided a means to assess the cost-effectiveness of various practices. Farmers found it useful to draw on their peers and neighbours in some cases, to conduct assessments.

How data would be managed

The Resource Management (Measurement and Reporting of Water Takes) Regulation 2010 (Ministry for the Environment, 2010) provides an indication of the sort of specificity of

reporting and processes that may be required more generally of farmers in New Zealand if audited self-management is to be widely adopted and used. Agreed methods for the collection and reporting of data will be required, with methods developed that are within the capacity of individual landholders. The collation methods for data, to allow aggregation up to a catchment and regional scale need to be agreed, along with analysis protocol. How data are reported, used and updated are also important factors. Finally, issues regarding confidentiality and protection for those who undertake reporting voluntarily are likely to be contentious, and will take time to resolve.

Data linkages

Linking on-farm indicators to other indicator areas has been recognised as a difficult area by the OECD (2001). Making a connection between a change in one factor to outcomes in a related area (for example a nutrient management indicator linked to changes in nutrient applications) is not always straightforward, and the use of surrogate indicators may need to be considered for those areas particularly difficult or costly to monitor. The OECD suggested that it was “important to better understand the net environmental consequences of relative changes in the different farm management indicators” (p 110).

How, to whom, and how information would be communicated

Just as there are many different levels on which data can be collected and used, so too are there many different ways in which monitoring data needs to be assessed, and communicated. Farmers involved in the EMS case studies reported that a particular feature of EMS that assisted them to manage better was the risk assessment process, which allowed them to decide on priority areas, and filter incoming information accordingly (Carruthers 2003; 2005). Incoming data needs to be tied to risk assessments, be supplied frequently enough for use with on-going management, and in an appropriate format for use. Data flowing from farms needs to feedback into practice and policy change as appropriate, at both the catchment, regional and national levels. Hassall and Associates (2007a, p v) reported that Australian agricultural industries began, following the EMS Pathways projects, to recognise a need to monitor, aggregate and report on the farming practices undertaken by their producers with sufficient rigour to provide confidence to those requiring the data. However, they noted that few areas had the systems in place to enable farmers to do this on an industry basis. Communicating must be equitable, frequent and on-going, and communication channels must be adequately resourced. The use of on-line reporting can be very effective, but only in areas where speed of uploading of data and reliability of data exchange sufficient as to not burden those providing information unduly. Many secondary industries now choose to publish their annual environmental performance data, an approach that is currently little used in agriculture.

Certification, accreditation and auditing governance

The Resource Management (Measurement and Reporting of Water Takes) Regulation 2010 offers an example of the sort of verification procedures that might be employed in an ASM approach. Verification of reporting can be applied to either equipment used for monitoring and measuring outcomes and outputs, or to those who are doing the verifying. Suitably qualified verifiers will be required, and programs associated with the management of their assessment will be needed. Due to the need to maintain independence, industry representative should not be accredited to audit their own industry sector. Cross-sectoral auditing should be encouraged where possible, particularly where there are common environmental issues of interest. For example, where irrigation and nutrient leaching is a priority issue, then dairy industry representatives could potentially audit other industries sectors where irrigation and

nutrient issues are also a high priority. Considerable development is required to build robust auditing programs, in particular in assuring that auditors are sufficiently aware of not only the Standards that they are auditing against, but also relevant industry and catchment issues. For EMS, separate bodies oversee auditor competence, and certification assessment procedures are rigorous. This does add to the cost, but enhances credibility of the programs. The recognition of assessors, definition of their required skills and processes all need to be developed. In addition, the actual assessment processes to be used would require considerable thought. For example, approaches varying from self-completion of a checklist, through to a full site visit by an independent person, seeking validation of claimed performance could be used. The approach chosen will be influenced by the degree of credibility sought, balanced against costs, time and available resources.

Programs governance

Along with the need to develop ‘rules’ to govern auditing procedures, industry groups who wish to participate in an ASM approach will also have to agree governance procedures for their own members. Issues surrounding the conditions for ‘membership’ of an ASM-based group will need to be resolved. If an industry recognition path is followed (for example, where a BMP approach is ‘endorsed’ or accredited as meeting the requirements as the ‘standard’ to be audited against), then agencies must define what is expected to be contained in the BMP, and what level of satisfaction is required to demonstrate that practices are being followed. Linkages to relevant regulations will also need to be made explicit, in order to satisfy agencies that their concerns are being addressed. Similarly, if individuals are to be recognised, then performance requirements on an individual farm basis are needed, and these will best be developed by the industry group itself. There are costs associated with either approach, and the distribution and apportionment of these costs must be resolved. Roles and responsibilities for auditing, communicating, and revoking recognition (if necessary) must be determined, along with any disciplinary measures and penalties for not following standards, or meeting required outcomes. The requirements for monitoring and reporting of outcomes need to be developed in consultation with those seeking ‘proof’ (agencies, communities, customers and possibly others), to ensure that the required information is being presented in a format best suited to the needs of all groups.

On-going review and development

As BMPs and other management practices are applied, and industry-based reporting becomes more common, the ability to benchmark performance grows. The updating of requirements (BMPs or standards), auditing and reporting must accommodate this growing knowledge base, allowing data generated by application of BMPs or similar to be incorporated back into policies and requirements/Standards. In this way, performance requirements will alter over time, becoming more stringent in some cases, but also possibly, less stringent in others. New technologies and methods, based on sound research, will need to be incorporated as they develop. This on-going review of progress is required to allow for continual improvement of both BMPs and related Standards. It is also important to validate any recommendations that have been incorporated into the BMPs, catchment targets and policies.

Provision of recognition and use of incentives

The LWF Report recognised the need to provide encouragement to individual and industry groups ‘early adopters’, in part to encourage industry leadership (Paragraph 102). The report suggested preferential compliance pathways as one mechanism to do this. In Wisconsin, the Green Tier program provided differential recognition and reward to Tier 1 participants (who either had a functionally equivalent ISO 14001 or who planned to achieve this within 12

months of joining the program) and Tier 2 participants (who already had a certified EMS). In both cases, a 3rd party audit was required within 12 months, to remain in the program. The rewards and incentives offered were proportional to the environmental outcomes achieved. In the same way, an ASM program could differentially reward farmers, perhaps through lessening of audit frequency or intensity, following a pre-determined period of reporting and meeting performance requirements. Other alternatives may include promotion of individual producers, industry-based recognition, or reduced licence fees (if appropriate). Reductions in land tax, or rates have been suggested as incentives in the past, but these are problematic if such fees form a local councils' revenue base. As many farmers seek to improve and report their environmental performance as a means to show that they are 'doing the right thing', in many cases, recognition can provide sufficient reward.

Conclusions

In order for a fully operational process of audited self-management to be applied in New Zealand agriculture to improve natural resource management, a number of issues need to be examined and resolved. The EMS process, as applied through the ISO 14001 Standard, offers a way to operationalise many existing BMPs approaches, while also addressing many of the issues surrounding auditing, certification and validation. EMSs have the potential to generate robust and credible data, which can be used to validate practices applied. EMSs are fully compatible with existing BMPs, and can also accommodate catchment, customer and community requirements. Increased integration between BMPs already developed by a range of industry groups (such as Beef and Lamb NZ, DairyNZ and the Deer Farmers) is required. The management and auditing process included in the EMS approach, supported by well-developed metrics, will assist in providing useful management information feedback to farmers, NRM managers, and regulators. This EMS approach will give detailed substance to the proposed 'Fresh Start' and the proposed new collaborative management process for New Zealand's water quality and water allocation and assist NZ in backing up clean green claims. It is suggested that further development of the proposed ASM be guided by the lessons learnt through the application of the EMS process to farms worldwide.

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