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## **THE IMPACT OF VOLUNTARY ENVIRONMENTAL PROTECTION INSTRUMENTS ON COMPANY ENVIRONMENTAL PERFORMANCE**

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### **Abstract**

In the last decade there has been increasing emphasis on the use of voluntary environmental protection tools such as corporate environmental reporting (CER) and environmental management systems (EMS). There has been relatively little research, however, on the impact of these tools on the actual environmental performance of companies. This paper presents the findings of a survey of 40 companies operating in Western Australia to determine the extent to which the implementation of two voluntary instruments has influenced company environmental performance. The research considered the following questions: to what extent have CER and EMS influenced the environmental performance of companies operating in Western Australia?; what are the characteristics of these influences?; how does the influence of EMS on environmental performance compare to that of CER?; and, have other external factors concurrently influenced environmental performance?

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In general, most respondents indicated that EMS had influenced environmental management practices to some extent. On the other hand, CER was seen more as a public relations exercise and had less impact on company practices compared to EMS. Other factors that influenced environmental performance included pressure from clients, senior management, the public and regulators; corporate culture; and cost savings.

## **INTRODUCTION**

Traditionally, the predominant approach to addressing the environmental problems emanating from the private sector was through "direct", or "command and control" regulation. In recent years this instrument for environmental protection has been increasingly criticised for not providing satisfactory answers to the complex environmental problems that society now faces (Dovers, 1995; Gunningham and Grabosky, 1998). A consequence of this criticism has been the growth of a range of alternative policy instruments such as: self-regulation; voluntarism; education and information; and economic instruments (Annandale *et al.*, 2000).

These alternatives to command and control regulation have been hailed as possibly significant steps forward towards the goal of "smart regulation" (Porter and van der Linde, 1995; Gunningham and Grabosky, 1998; Meadowcroft, 1998). While these so-called "new" policy instruments have been elaborately described (Welford, 1996, 1997; Braithwaite and Drahos, 2000) there is very little research evidence that points to their efficacy.

This article attempts to redress this perceived inadequacy by investigating the impact of two voluntary environmental policy instruments on the actual environmental

performance of companies. The article presents the findings of a survey of 40 companies operating in Western Australia to determine the extent to which the implementation of voluntarism has influenced company environmental performance.

The article begins with an introduction to the two instruments that were the focus of the research. It then briefly reviews the literature relating to the impact of voluntary instruments on environmental performance. It moves on to discuss research methods, and introduces the initial outcomes of the primary research. The final section presents some preliminary conclusions.

## **VOLUNTARY ENVIRONMENTAL PROTECTION INSTRUMENTS**

Various recent attempts have been made to categorise environmental protection instruments, partly in response to the rapid growth of interest in alternatives to command and control regulation.

Commentators use a range of categorisation schemes. Table 1 outlines the systems developed by a selection of recent researchers.

*[INSERT TABLE 1]*

These categorisation schemes are based on: governments' use of resources (Hood, 1986); desired ends (McDonnell and Elmore, 1987; Schneider and Ingram, 1990); degree of coercion (Doern and Phidd, 1992); and level of state presence in the provision of goods and services (Howlett and Ramesh, 1995; Gunningham and Grabosky, 1998).

Most of these categorisation schemes include a "voluntarism" component. Labatt and Maclaren (1998) consider voluntary initiatives to be further categorised according to the degree of partnership between government and industry. At one end of their continuum lies self-regulation, where there is little involvement from government in collective initiatives developed primarily by industry associations. A prominent example of this kind of activity is the chemical industry's Responsible Care programme (Gunningham and Grabosky, 1998). At the other end of Labatt and Maclaren's continuum is what they call 'voluntary challenges'. With this type of voluntary initiative, most of the responsibility for establishing the scheme lies with government. A good example of this approach is the Australian Commonwealth Government's "Greenhouse Challenge", which attempts to exhort voluntary greenhouse gas emission reductions from signatory companies (Australian Greenhouse Office, 2001).

Within this categorisation continuum can sit a number of voluntary "measures" that companies can adopt in order to achieve the goals of their initiative. These measures consist of actions such as (Brophy, Netherwood and Starkey, 1995; Annandale *et al.*, 2000):

- \* the development of company environmental policies;
- \* environmental management systems (EMS);
- \* corporate environmental reporting (CER);
- \* product certification and life cycle analysis;

- \* extended producer responsibility; and
  
- \* environmental accounting.

## **IMPACT OF VOLUNTARY INSTRUMENTS ON ENVIRONMENTAL PERFORMANCE**

Possibly as a result of the fact that voluntary environmental instruments are still in the relatively early stages of development inside companies, there is very little reported research into the impacts of voluntary instruments on actual environmental performance.

There is a considerable literature reporting on the pros and cons of voluntarism, but this tends not to be based in empirical work.

On the 'pro' side, Sugiyama and Imura (1999) claim that voluntary 'pollution control agreements' implemented in Japan over the last 30 years have benefited local governments and companies. However, despite the fact that the title of their article includes the word 'proven', these authors have only evaluated Japanese voluntary agreements from a 'process' perspective. No attempt has been made to investigate whether voluntarism has led to improvements in actual environmental outcomes. Numerous other commentators focus on the perceived process improvements provided by the development of EMS and CER, without testing the impact of the instruments on actual environmental outcomes (Robinson and Clegg, 1998; Herremans *et al.*, 1999; Jorgensen, 2000; Klaver and Jonker, 2000).

There is also a contrary literature that questions the claimed benefits of voluntary environmental instruments. For example, Brophy, Netherwood and Starkey (1995) dismiss voluntarism, claiming that cost minimisation is the main driver of company interest in environmental performance, and that because environmental degradation has traditionally been cheaper than environmental protection, the voluntary approach is limited in the amount it can achieve. Newton and Harte (1997) challenge voluntarism from a different perspective, suggesting that it has been used by misguided environmental 'evangelists' to defer consideration of the need for stronger state intervention.

Segerson and Miceli (1998) are less certain about the impact of voluntarism. They develop a hypothetical economic model which suggests that the overall impact of voluntary instruments on environmental quality could be positive or negative, depending on a number of factors, including the allocation of bargaining power, the magnitude of the background threat, and the social cost of funds.

Labatt and Maclaren (1998) are also uncertain about the impact of voluntary initiatives, although they go beyond Brophy, Netherwood and Starkey (1995) by undertaking empirical research which indicates that issues other than cost minimisation drive company interest in environmental performance. Labatt and Maclaren (1998) state that the key motivating factors for industry respondents contemplating voluntary initiatives are: the threat of regulation; public image; financial considerations; and peer pressure. They conclude by indicating that considerable research is still needed to confirm the contentions of proponents or opponents of voluntary initiatives.

The intention of the research reported on in this article was to take up the challenge presented by Labatt and Maclaren.

## **A DESCRIPTION OF TWO SIGNIFICANT VOLUNTARY INSTRUMENTS**

Some of the voluntary environmental instruments listed previously are still in a development stage. It is fair to say, for example, that life cycle analysis and environmental accounting are still very much in their infancy. However, there has been a much wider application of environmental management systems and corporate environmental reporting. There are well established methodologies for implementing EMS and CERs, and they have been widely adopted by industry. They appear to be the most common voluntary instruments currently in widespread use. As a consequence, it is these two voluntary instruments that form the focus for the research reported on here. Our interest in these voluntary instruments focuses on their influence on actual environmental performance. However, before explaining our aims in more detail, a brief account of the general processes involved in establishing EMS and CERs follows.

### *Environmental Management Systems (EMS)*

EMS have developed over the course of the last 15 years to take a prominent place in the list of available voluntary environmental instruments (Sheldon, 1997; Krut and Gleckman, 1998).

EMS are described as problem-identification and problem-solving tools, based on the concept of continual improvement. There are many possible approaches to establishing an EMS, and it is not our intention to review these here. The best-known international



standard for EMS has been developed by the International Organisation for Standardisation (ISO). The key elements of its ISO 14001 series of EMS standards include: undertaking an initial environmental review; defining an environmental policy; developing an environmental action plan and defining environmental responsibilities; developing internal training courses; and auditing and review (UNEP, 2002a). In 2002, over 36,000 organisations in 112 countries had certified their EMS (ISO 2002).

### *Corporate Environmental Reporting (CER)*

CER has developed over a similar period of time, and its purpose is to communicate an organisation's environmental performance to its 'stakeholders'. In practice, CER is being implemented by larger companies along the lines of traditional annual financial reports. The key reporting elements of CER are: management policies and systems; input/output inventory of environmental impacts; financial implications of environmental actions; relationships with stakeholders; and the sustainable development agenda. Sometimes CER is combined with social and economic reporting, to provide information on a company's performance against 'triple bottom line' criteria (UNEP, 2002b). Standards for CER are less defined than for EMS, although the international multi-stakeholder initiative known as the Global Reporting Initiative (GRI) has had a considerable impact on how companies design CER ([www.globalreporting.org](http://www.globalreporting.org)).

## **RESEARCH DESIGN**

The research reported on in this article had the following aims:

- \* to examine the impact of EMS and CER on the environmental performance of companies;
- \* to consider the range of other factors that may also have influenced the environmental performance of the examined; and
- \* to advance the state of knowledge in this area by making some general preliminary statements about the impact of voluntary environmental instruments on company environmental performance.

Measuring the impact of a specific 'driver' of company performance is a methodologically difficult exercise. This point has been made in relation to measuring the impact of voluntary environmental instruments (Freimann and Schwedes, 2000).

Research of the kind undertaken here can be based in either 'archival' (also known as 'objective') measurement, or in 'perceptual' measurement. Archival measurement is steeped in the idea that 'accurate' research must use 'objective' measurement techniques to prove accuracy (Starbuck and Mezias, 1996). With perceptual measurement, the point is not to assume that there are necessarily 'objective' or 'accurate' measures of performance, but rather to elicit the perceptions of senior managers.

A number of commentators argue that how managers perceive the environment is more critical to company strategy than is archival measurement of the environment (Hambrick and Snow, 1977; Miller, 1988). This idea has been extended by Hambrick and Mason (1984), who argue that organizational outcomes can be viewed as reflections of the values and cognitive bases of coalitions of top managers. It has also been

suggested that perceptual measures are more appropriate than archival measures when individuals are the unit of analysis and when research interest is focused on relatively recent events (Boyd *et al.*, 1993).

For these reasons, the research study reported on here measured the impact of voluntary environmental instruments by analysing the perceptions of senior managers.

The primary approach for the research was to sample a number of companies for maximum variation, in an attempt to study the broadest range of cases possible within the resources constraints of the research. Broad industry sector classifications were chosen as a rationale for likely differences in EMS/CER implementation and environmental performance outcomes.

The primary method of data collection was a series of interviews with company representatives responsible for the company's environmental management or reporting. Forty companies in Western Australia participated in the study. Table 2 indicates the sector focus of these companies.

*[INSERT TABLE 2]*

An interview guide was developed from the research literature, from informal discussions with industry representative, and after pilot testing.

Information extracted from the interview records was summarised in a matrix for analysis. Information contained in the matrix included;

- \* influence of EMS or CER on environmental management performance. (Here we initially asked managers whether or not the voluntary instruments had influenced their company's performance);
- \* type of influence. (If the first question was answered in the affirmative, we then asked managers to identify the main areas of impact and to provide specific examples);
- \* the significance of the impact of EMS or CER. (We asked managers to rate the impacts of EMS or CER on their company's environmental performance as either 'small', 'moderate' or 'large'); and
- \* the significance of other impacts on company environmental performance. (Managers were asked to identify other factors that might have influenced environmental performance over the same period of time that the EMS and/or CER activities were in place. We also asked them to assess the importance of these factors as influences on environmental performance improvement, by presenting us with a rating on a 0-to-10 scale [where '0' represented no influence, and '10' represented significant influence]).

## **INFLUENCE OF EMS AND CER**

Of the 40 companies interviewed, 37 used EMS similar to the ISO 14001 standard. However, not all were third party certified. Of the 40, only 23 undertook annual corporate environmental reporting. Also, 20 companies had both EMS and CER.

Clearly, respondents claim that EMS have a greater positive influence on environmental performance than CER (Table 3). However, the majority of respondents claim that both EMS and CER have a positive impact or influence on their company's environmental performance.

*[INSERT TABLE 3]*

Respondents were also asked to rate the *extent* of this influence on actual environmental performance. The results (Table 4) show that approximately 70% of respondents thought of EMS as having a moderate-to-large impact. The influence of CER appears to be smaller, with approximately 43% of respondents stating that it has a moderate-to-large influence.

*[INSERT TABLE 4]*

From these results it is clear that the influence of EMS on environmental performance is greater than CER. Only 3 of the 18 companies which used both instruments stated that CER had a greater influence on environmental performance.

## **MEASURE OF INFLUENCE**

Given this strong indication that EMS and CER appear to be having a positive impact on the actual environmental performance of companies, the research then moved to examine the nature and extent of the influence.

### *Environmental Management Systems*

Table 3 and Table 4 clearly show that respondents think that EMS are having a positive impact on company environmental performance. Further questioning help to clarify the nature of these benefits. The greatest benefit appears to arise from the establishment of EMS themselves.

EMS were claimed by 61% of respondents to:

- \* provide a systematic framework for tracking issues;
- \* provide focus and discipline; and
- \* provide better documentation and an overall 'driver' for change.

While some respondents claimed that their company paid serious attention to environmental performance prior to the establishment of EMS, there was a clear theme that the implementation of EMS has led to improved performance.

There appeared to be a positive relationship between EMS and improved environmental awareness. Implementing EMS was claimed by 35% of respondents to improve the environmental awareness of either employees, senior management, or contractors. Improved awareness has been achieved through:

- \* changes to staff job descriptions,
- \* education of staff by way of induction programmes;

- \* management of contract agreements, and,
- \* focussing the responsibility of senior staff.

None of the above relates directly to improved environmental performance. In fact, there was a recognition that increased awareness, in itself, does not necessarily lead to improved performance. The implication, though, seems to be that the process reforms outlined above are a necessary precondition.

Many examples were given of EMS having a direct positive impact on operational performance. Examples were provided by 43% of respondents as to how implementation of EMS had led to specific environmental improvements.

Table 5 presents a summary of these stated positive impacts, by industry sector.

*[INSERT TABLE 5]*

Examples clearly vary depending on industry sector, but commonly focus on pollution control, production efficiency improvements, and increasing resource input efficiencies for energy and water.

Respondents also pointed to other 'ancillary' benefits of EMS, such as:

- \* assisting in the assessment of risk, and therefore management to reduce risk (16% of respondents);
- \* cost savings in relation to resource inputs and waste outputs (13% of respondents);

- \* integration with health and safety provisions where efficiencies could be obtained by coordinating ISO processes (13% of respondents); and
- \* improved compliance with regulatory conditions (13% of respondents).

Continual improvement is an important aspect of EMS and respondents were asked about their company's ability to achieve 'continuous environmental improvement'. The following summarises the most important findings:

- \* 17% of respondents stated it was too early in the cycle of EMS establishment to determine levels of continuous improvement;
- \* 40% of respondents stated that auditing was an important technique for achieving continuous improvement. There was a positive correlation between a company being certified through ISO 14001, and the perception that this led to continuous improvement; and
- \* approximately 40% stated that the early stages of EMS implementation led to performance improvements and that these levels of performance improvement were sometimes difficult to maintain over the longer term.

The survey showed that there was a correlation between effectiveness of EMS and the structure of a company's operations. For example, in the resources sector where a company might have a number of mine sites, the effectiveness of EMS was considered to be variable across sites. It is possible that the same concept would apply to companies with numerous manufacturing plants, although this conclusion could not be



drawn directly from the survey responses, It was the opinion of some respondents that centrally-driven EMS are less effective than EMS that are implemented by a business site, unit, or profit centre.

### *Corporate Environmental Reporting*

Although the influence of CER on company environmental performance was considered by respondents to be smaller than for EMS, a number of examples of environmental improvements driven by CER were given.

Three main areas were highlighted by the survey:

- \* 35% of respondents stated that CER improved monitoring and data collection, and led to a more organised approach to environmental reporting through the use of key performance indicators or other reporting tools;
- \* 35% of respondents claimed that CER provided a good internal management tool and, as a consequence, improved management of environmental performance; and
- \* 35% of respondents also claimed that public reporting enabled a focus on critical environmental issues through public accountability and transparency.

Other, less important benefits of CER were reported. For example, 12% of respondents described CER as both providing an "additional impetus for changing things" and, "improving communication".

## **OTHER FACTORS THAT INFLUENCE ENVIRONMENTAL PERFORMANCE**

There are many factors that can influence the environmental performance of companies, and there is a large literature dealing with this issue (Hunt and Auster, 1990; Roome, 1992; Hass, 1996; Annandale, 2000). EMS and CER are clearly only one driver of improved performance. The research took the opportunity to ask respondents about other factors that influence environmental performance, and where EMS and CER fit in terms of the overall significance of their influence. Table 6 presents the outcomes of this question. Scores are mean averages, scaled from 0 to 10, where 10 is the most important influence.

*[INSERT TABLE 6]*

What is especially interesting about Table 6 is that EMS and CER rank relatively low in the list of influences. Of the sixteen "influences on company environmental performance", EMS and CER rank only twelfth and thirteenth respectively. These results are aligned with other recent research, which has tended to rank stakeholder pressure, regulatory pressure, and organisational culture as significant influences on company performance (Henriques and Sadorsky, 1996; Annandale, 2000).

The literature on voluntary instruments for environmental management exhorts companies to take on these tools for environmental, and business, benefits. While our practitioners who recorded a positive response to the influence of EMS and CER on environmental performance support this exhortation, they have identified other factors

that exert a greater influence. In other words, our empirical research indicates that EMS and CER are not as significant as the literature implies they should be. In particular, managers expressed almost unanimous disappointment related to the perceived lack of influence of CER on environmental performance. In addition, the high ranking given to "pressure from parent company", and "pressure from clients" suggests that supply chain pressure might have considerably more influence on corporate environmental performance than EMS or CER.

## **CONCLUSIONS**

The research reported on in this article set out to investigate the impact that voluntary environmental instruments might be having on the actual environmental performance of companies. The point was made that the literature surrounding this area has to date focused on perceived process improvements inside companies, but has not examined the impact of such instruments on environmental outcomes.

This is the first empirical study to examine the impact the EMS and CER might be having on the actual environmental performance of companies. We found that the influence of these voluntary instruments was not as strong in practice as the existing literature suggests it should be.

Focused on a detailed survey of 40 Western Australian companies, the research showed that EMS are perceived as having a more significant impact on environmental performance than CER, but both rank low on the list of 'drivers' that influence environmental performance. Nonetheless, they are both perceived by senior managers to have an overwhelmingly positive impact on outcomes. Direct positive impact on

operational activities included improvements to: management of spills; recycling programmes; energy efficiency; noise and dust abatement; and the development of environmentally friendly products and processes.

Analysis of the survey results points to some significant differences between how the impacts of EMS and CER implementation are perceived by respondents. With regard to the extent of influence, EMS were perceived to have had greater impact on environmental performance than has CER.

Managers did perceive some notable differences in the way that EMS and CER operate in practice. It appears that respondents think of CER primarily as a tool for maintaining social conscience, or 'doing the right thing'. CER enables this to happen by initiating and ordering a 'flow of information'. EMS, on the other hand, are thought of more as 'systems that coordinate change'. Therefore, EMS are viewed as seeking company cultural change through internal process reform, whereas CER has an external focus which attempts to influence the way companies are viewed by stakeholders.

The influence of other voluntary approaches, especially pressure from parent companies and clients, was considered to be greater than from EMS or CER. In addition, public pressure, economics, and corporate culture were important motivations for improving company environmental performance. The research shows that while voluntary mechanisms have an important role to play in guiding and influencing company environmental management, the influence of other internal and external factors should not be ignored.

## REFERENCES

- Annandale D. 2000. Mining company approaches to environmental approvals regulation: A survey of senior environment managers in Canadian firms. *Resources Policy* **26**(1): 51-59.
- Annandale D, Altham J, Dingle P, Phillimore J, Morkel A. 2000. Developments in the environmental regulation of firms. *International Journal of Management* **17**(1): 35-44.
- Australian Greenhouse Office. 2001. *The Challenge*, Issue 20, Winter.
- Boyd BK, Dess GG, Rasheed, AMA. 1993. Divergence between archival and perceptual measures of the environment: Causes and consequences. *Academy of Management Review* **18**(2): 204-226.
- Braithwaite J, Drahos P. 2000. *Global Business Regulation*. Cambridge University Press: Cambridge, UK.
- Brophy M, Netherwood A, Starkey R. 1995. The voluntary approach: An effective means of achieving sustainable development? *Eco-Management and Auditing* **2**: 127-132.
- Doern GB, Phidd R. 1992. *Canadian Public Policy: Ideas, Structure, Process*. Nelson: Canada, Toronto.
- Dovers S. 1995. Information, sustainability and policy. *Australian Journal of Environmental Management* **2**: 142-156.

- Freimann J, Schwedes R. 2000. EMAS experiences in German companies: A survey on empirical studies. *Eco-Management and Auditing* **7**: 99-105.
- Gunningham N, Grabosky P. 1998. *Smart Regulation: Designing Environmental Policy*. Oxford University Press: Oxford.
- Hambrick DC, Snow CC. 1977. A contextual model of strategic decision-making in organizations. *Academy of Management Proceedings*: 108-112.
- Hambrick DC, Mason PA. 1984. Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review* **9**: 193-206.
- Hass JL. 1996. Environmental ('green') management typologies: An evaluation operationalization and empirical development. *Business Strategy and the Environment* **5**: 59-68.
- Henriques I, Sadorsky P. 1996. The determinants of an environmentally responsive firm: An empirical approach. *Journal of Environmental Economics and Management* **30**: 381-395.
- Herremans I, Welsh C, Kane D, Bott R. 1999. How an environmental report can help a company 'learn' about its own environmental performance. *Eco-Management and Auditing* **6**: 158-169.
- Hood C. 1986. *The Tools of Government*. Chatham House, Chatham.
- Howlett M, Rameesh M. 1995. Policy Instruments. In *Studying Public Policy: Policy Cycles and Subsystems*. Oxford University Press: Ontario.

Hunt CB, Auster ER. 1990. Proactive environmental management: Avoiding the toxic trap *Sloan Management Review* **31**(2): 7-19.

International Organisation for Standardisation (ISO) 2002. ISO 9000 and ISO 14000 certifications reach record levels in 2001. Ref: 830, July 19 2002. URL: [www.iso.ch/iso/en/ISOOnline.frontpage](http://www.iso.ch/iso/en/ISOOnline.frontpage). Accessed September 30, 2002.

Jorgensen T. 2000. Environmental management systems and organizational change. *Eco-Management and Auditing* **7**: 60-66.

Klaver J, Jonker J. 2000. Changing corporate environmental management: Development of new management systems. *Eco-Management and Auditing* **7**: 91-97.

Krut R, Gleckman H. 1998. ISO 14001: *A Missed Opportunity for Sustainable Global Industrial Development*. Earthscan: London.

Labatt S, Maclaren V. 1998. Voluntary corporate environmental initiatives: A typology and preliminary investigation. *Environment and Planning C: Government and Policy* **16**: 191-209.

Marshall C, Rossman G. 1989. *Designing Qualitative Research*. Sage Publications: Thousand Oaks, California.

McDonnell L, Elmore R. 1987. *Alternative Policy Instruments*. Centre for Policy Research in Education: Santa Monica.

Meadowcroft J. 1998. Cooperative Management Regimes: A Way Forward? In *Cooperative Environmental Governance: Public-Private Agreements as a Policy Strategy*, Glasbergen P (ed.). Kluwer Academic Publishers: Dordrecht; 21-42.

- Miller D. 1988. Relating Porter's business strategies to environment and structure. *Academy of Management Journal* **31**: 280-308.
- Newton T, Harte G. 1997. Green business: Technician kitsch? *Journal of Management Studies* **34**(1): 75-98.
- Porter M, van der Linde C. 1995. Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives* **9**(4): 97-118.
- Robinson D, Clegg A. 1998. Environmental leadership and competitive advantage through environmental management system standards. *Eco-Management and Auditing* **5**: 6-14.
- Roome N, 1992. Developing environmental management strategies. *Business Strategy and the Environment* **1**(1): 35-44.
- Schneider A, Ingram H. (1990). Behavioural assumptions of policy tools *Journal of Politics* **52**(2): 510-529.
- Segerson K, Miceli T. 1998. Voluntary environmental agreements: Good or bad news for environmental protection? *Journal of Environmental Economics and Management* **36**: 109-130.
- Sheldon C. (Ed.) 1997. *ISO 14001 and Beyond: Environmental Management Systems in the Real World*. Greenleaf Publishing: Sheffield.
- Starbuck WH, Mezias JM. 1996. Opening Pandora's box: Studying the accuracy of managers' perceptions. *Journal of Organizational Behavior* **17**: 99-117.



Sugiyama R, Imura H. 1999. Voluntary approaches in Japan: Proven record of pollution control agreements and new industrial initiatives for the protection of the global environment. *Eco-Management and Auditing* **6**: 128-134.

UNEP. 2002a. Production and Consumption Unit: Environmental Management Tools: Environmental Management System. URL: [www.uneptie.org/pc/pc/tools/ems.htm](http://www.uneptie.org/pc/pc/tools/ems.htm). Accessed September 30, 2002.

UNEP. 2002b. Production and Consumption Unit: Environmental Management Tools: Corporate Reporting. URL: [www.uneptie.org/pc/pc/tools/reporting.htm](http://www.uneptie.org/pc/pc/tools/reporting.htm). Accessed September 30, 2002.

Welford R. 1996. *Corporate Environmental Management: Systems and Strategies*. Earthscan: London.

Welford R. 1997. *Corporate Environmental Management 2: Culture and Organizations*. Earthscan: London.