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Barriers to biodiversity conservation in marine fishery certification

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Abstract

Two global certification and ecolabelling systems – the generic global dolphin-safe ecolabel and the global Marine Stewardship Council (MSC) ecolabel – are assessed for their present and potential contributions to improving biodiversity conservation in marine capture fisheries. The dolphin-safe ecolabel appears to have played a minor role in a reduction of dolphin mortality in tuna fisheries, but dolphin populations in the worst-affected area have not recovered, and it appears that the current level of dolphin by-catch sanctioned by present-day fishery management and the ecolabel is not effective enough to achieve population recovery. The MSC ecolabel has established a poorly expressed environmental standard that has resulted in variable interpretations by certifiers, creating an apparently systematic bias in application of the standard to the certified fisheries. Without substantial revision of both these systems, it seems unlikely that they will be able to make major contributions to marine biodiversity conservation because of barriers created by limitations in programme design, lack of robust linkages between the certification standard and biodiversity conservation outcomes, and unclear standards and their inconsistent application in the certification of fisheries.

Keywords By-catch, dolphin-safe, ecolabelling, ecological standard, Marine Stewardship Council

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Introduction

In response to the seemingly intractable problem of identifying, understanding and resolving all the issues of sustainability in marine capture fisheries (Gislason *et al.* 2000), market-based incentives (certification and ecolabelling) are often invoked as potentially important policy tools that may be able to shift industry practices towards reduced environmental impacts (Wessells *et al.* 2001; Jaffry *et al.* 2004; Hall and Mainprize 2005; Kaiser and Edwards-Jones 2005). However, many of the basic

assumptions and the real effectiveness of certification and ecolabelling programmes for improving conservation issues in marine fisheries have been repeatedly questioned (Kaiser and Edwards-Jones 2005; Jacquet and Pauly 2007). Similar initiatives are considered to contribute only dubious benefits to biodiversity conservation in forests (Ghazoul 2001), and despite the obvious theoretical potential for market-based incentives to encourage better industry practices, certification systems in general appear to have contributed in only a limited way to improved environmental outcomes (Muller 2002; Rotherham 2005; Agnew *et al.* 2006; Jacquet and Pauly 2007).

In forest management, Ghazoul (2001) proposed two main reasons why biologists do not become more involved with certification and ecolabelling to provide for better biodiversity conservation outcomes. First, they lack confidence that certification can indeed provide a useful mechanism for achieving ecologically sustainable production from forests. Second, they are faced with conceptual and practical difficulties in developing guidelines for determining and assessing biological diversity within the production context. Both these problems also apply directly to the involvement of marine ecologists with fisheries production in the context of conservation of ocean ecosystems. However, the management of fisheries has a number of additional complexities that create issues not faced by forest biologists, and these may also enhance the difficulties faced by marine ecologists in engaging with certification practice (Kaiser and Edwards-Jones 2005). These complexities include the common property context for many fish stocks (there are various forms of rights to harvest from fish stocks, but there is typically no private ownership of fish); the multi-jurisdictional nature of fish populations (many fish stocks are transboundary and migratory, including across international borders and between national waters and the open ocean); the vast scales of space and time that characterize the connectivity of most marine populations and ecosystems; and the consequent difficulties of assessing the compliance of marine fisheries with certification standards.

The characteristics of two global systems of certification and ecolabelling in marine capture fisheries are assessed here in the context of their present and potential contribution to the conservation of marine biodiversity. The two systems – the generic 'dolphin-safe' ecolabel and the Marine Stewardship Council (MSC) ecolabel – represent contrasting approaches to certification and are the only two global systems providing ecolabels for wild capture seafood that have been in operation for more than a decade. This, potentially, allows an adequate period for any major ecological benefits created by the systems to be both ecologically expressed and detected.

The generic dolphin-safe ecolabel has been propagated throughout the global canned tuna market without any specific form of global governance, and can be considered as a 'market-forces' approach to ecolabelling. The market-based incentive represented by this generic ecolabel has been used without a coherent and consistent system of standards and criteria. Some specific forms of the 'dolphin-safe' words and label are protected and used under certain conditions in some countries (such as in the USA), but the use of a generic concept indicating dolphin-safe properties of canned tuna has been available for use without any form of global management or control (Brown 2005). In direct contrast, the MSC global ecolabel is based on a single standard and a set of criteria, can only be used under licence, and is a well-managed and controlled system of ecolabelling for fishery products (May *et al.* 2003; MSC 2007).

The generic 'dolphin-safe' ecolabel

The most productive method of catching tropical yellowfin tuna (*Thunnus albacares*) in the Eastern Tropical Pacific Ocean (ETP) is to target aggregations of dolphins or seabirds feeding on schools of tuna, and encircle the school with purse seine nets (the 'dolphin-set'). This fishing practice may also coincidentally catch and drown large numbers of the dolphins. Since the fishery began in the 1960s, more than 6 million dolphins are estimated to have been killed, but the level of dolphin by-catch has been greatly reduced since the height of the US dolphin-tuna controversy in the late 1980s and early 1990s, when dolphin by-catch exceeded 100 000 per year (SWFSC 2007). Prompted by considerable adverse publicity, the US fishing industry initially, and subsequently the Inter-American Tropical Tuna Commission (IATTC), applied fishery restrictions to reduce dolphin by-catch. The annual by-catch of dolphins in the ETP tuna fisheries through the dolphin-targeted purse seine netting has been reduced from the recent peak of about 133 000 in 1986 (Hall 1998) to <1000 in 2006 (IATTC 2007). The principal species affected are

spotted dolphin (*Stenella attenuata attenuata)*, spinner dolphin (*Stenella longirostris)* and common dolphin (*Delphinus delphis*). Despite the reduced present levels of by-catch mortality, there are no clear signs of recovery of the two *Stenella* species from the cumulative effect of the fishing-induced mortality of the previous decades (Gerrodette and Forcada 2005).

Restrictions on fishing to reduce dolphin by-catch were applied in the USA in the early 1970s and developed further by the IATTC in the early 1990s, and in 1990 the dolphin-safe concept was introduced into the US market for canned tuna. In 2001, these initiatives were supplemented with an IATTC certification procedure and an ecolabel to mark tuna products that were caught by countries and vessels that were members of the IATTC. The veracity of this ecolabel is disputed by the Earth Island Institute (EII), a non-government organization and the owner of a popular and widespread competing dolphin-safe ecolabel. The US government has also established its own ecolabel, under the Dolphin Protection Consumer Information Act, to provide support to the mandatory dolphin-safe requirements of all canned tuna products sold in the USA. EII also disputes the veracity of this label (EII 2007), and the US Consumers Union (2007) considers the US government ecolabel as a claim of only limited veracity, classifying the ecolabel as 'a partially verified general claim'.

While there is general agreement that there has been a major reduction in the by-catch of dolphins in the ETP tuna fisheries (Teisl *et al.* 2002; Brown 2005; EII 2007; SWFSC 2007), the policy driver for this reduction in by-catch is disputed, and it may not be solely, or even primarily, linked to the use of the certification or ecolabel (Gerrodette *et al.* 2003). It is claimed that canned tuna consumption peaked in 1989 and may have been reducing in the early 1990s because of the well-publicized dolphin by-catch controversy before use of the dolphin-safe label became widespread in the USA (Brown 2005; Kaiser and Edwards-Jones 2005). This suggests that the public pressure surrounding the dolphin by-catch in the ETP may well have forced tuna canners to adopt the dolphin-safe ecolabel as a means of countering reducing sales and to maintain market share independent of any links to reduced dolphin by-catch. In Australia, canned tuna is labelled with many forms of dolphin-safe ecolabel, but there are no direct links to specific procedures for verification or to specific certification systems that consumers can easily discover (Ward in press). Also, there has been rapid uptake of the dolphin-safe ecolabel in the UK, where mainly canned skipjack tuna is sold that has historically not had a dolphin by-catch problem. This confirms that, globally, the dolphin-safe ecolabel is considered by the canned tuna industry as primarily a marketing tool rather than an agent for helping to protect dolphin populations (Brown 2005).

Estimates of the present level of by-catch for dolphin populations in the ETP are considered to be well below the lower estimated boundary of net recruitment (2%), inferring that they could be considered to be within a safe level (Hall 1998), yet populations do not seem to be recovering. This suggests that the simple use of the by-catch policy of avoiding 'dolphin-sets' and related fishery practices to promote recovery of the dolphin populations does not deal effectively with conservation of the dolphin populations. Constraining levels of by-catch to within levels that can be practically achieved by the fishery is not an effective stand-alone policy tool and may be confounded by other sources of mortality. The impact of the tuna fishery (no matter how it is conducted) on dolphin populations in the ETP and elsewhere also involves many other issues of direct importance for the conservation and restoration of the dolphin populations, including the impact of chasing, and the effects of catch and release (Gerrodette *et al.* 2003; Gerrodette and Forcada 2005; Edwards 2006).

Given this situation in the ETP (where the dolphin-safe issue is most acute), it seems therefore that the major features of global dolphin-safe certification and ecolabelling are first, maintaining the awareness of consumers that dolphin by-catch is a potential issue in tuna fisheries, and second, providing a marketing tool to maintain sales and market share for canned tuna. Neither the reduction of dolphin by-catch nor the impact of the certification system that contributed in some part to this reduction can be considered to have been fully effective policy tools for conservation of these two dolphin populations. And beyond the issue of a failure of dolphin populations to recover, there are indications that the single-issue ecolabel focused on reducing the practice of 'dolphin-sets' may have displaced tuna fishing into other damaging practices, affecting other species with major conservation issues (such as turtles, sharks) (Hall and Mainprize 2005).

Both Ghazoul's propositions – scepticism about effectiveness of certification for achieving biodiversity

conservation, and difficulty in setting a standard that would in practice lead to better biodiversity outcomes – would appear to apply in the case of dolphin-safe ecolabelling. By-catch has certainly been reduced through improved fishery management responses, but irrespective of this, both the form of the standard (by-catch reduction) and the benchmark established (practically achievable dolphin by-catch levels) appear to be not sufficient to provide for effective biodiversity outcomes for the dolphin populations. While reduction of by-catch is clearly an important tool in the management of the tuna fisheries, other tools may also be needed to ensure the recovery of the dolphin populations. Also, the current benchmark of by-catch minimization may need to be reduced to lower catch levels, possibly approaching zero by-catch, and supplemented with other measures to reduce the indirect impacts of fishing if dolphin populations are to be recovered.

The MSC ecolabel

The MSC programme was established in 1996, and by the end of 2006, 22 fisheries were certified as complying with the MSC's standard for sustainable and well-managed fishery. The MSC global programme is based on the use of independent third-party certification bodies (certifiers) to assess wild capture fisheries for compliance with the MSC's sustainability standard. If a fishery is assessed as complying with the standard, it may carry the MSC ecolabel on fishery products. The programme is implemented through the voluntary submission of fisheries to an assessment by a certifier, which determines independently of the MSC if a fishery complies with the MSC standard. The MSC's primary role is to develop and maintain the standard, manage the assessment and the product chain of custody procedures, and to supervise the certification bodies to ensure they apply the assessment procedures in accordance with the MSC rules (May *et al.* 2003).

The major justification for establishment of the MSC programme was that certification and the resulting ecolabel would reward the environmental performance of a 'well-managed and sustainable' fishery, and would establish a high-quality ecological standard to be emulated by fisheries that were also seeking to acquire the MSC ecolabel (Ward and Phillips in press). Wild capture fisheries demonstrate a wide range of ecological impacts, including impacts on target stocks, on by-catch species, on habitats, and on species that are ecologically dependent on the target species (Hall and Mainprize 2005). The ecological data about such impacts are always limited and, beyond gross impacts, the ecological significance of fishery effects is typically difficult to establish. Therefore, creating changes in fisheries practices to improve biodiversity outcomes is difficult and complex irrespective of the management instruments and mechanisms involved. Securing better biodiversity conservation outcomes from fisheries through certification therefore depends critically on establishing a clear linkage between the ecological standard applied as the benchmark in fishery assessments and the specific aspects of biodiversity where improvements are being sought. The exact formulation in the standard of the biodiversity outcomes expected to be achieved is also crucial to be able to provide an appropriate incentive for correctly improving fishery practices so that they will lead to the expected biodiversity conservation outcomes.

Independently verifying the credibility of the sustainability claims made, or inferred, about a fishery and its products is a central part of the market-based incentive model for certification programmes (Wessells *et al.* 2001). However, the credibility of claims made for the products are directly related to the criteria and standards applied during the fishery assessment process by the certifier. And further, sustainability standards that have ecological requirements that are unclear, not well directed, or use performance benchmarks that do not represent high-quality practices will fail to contribute to improved biodiversity conservation outcomes in fisheries, irrespective of market success of the ecolabelled products (Ward in press).

The MSC standard consists of a set of requirements known as Principles and Criteria (MSC 2007). These are organized into three Principles, each with a set of Criteria which are intended to guide the certifier about specific attributes of a fishery that must be satisfied in order for the fishery to be endorsed as passing the MSC's standard for a well-managed and sustainable fishery. Principle 1 deals with matters relating to the target species, Principle 2 deals with all other areas of ecological and environmental impact of the fishery, and Principle 3 deals with the management system that the fishery operates within (MSC 2007; May *et al.* 2003).

The Principles and Criteria are intended by the MSC to provide systematic guidance to certifiers

about the level of ecological performance that is expected to be achieved by a fishery to satisfy the MSC standard. However, because the criteria in Principle 2 are not expressed as parameters that can be measured or robustly estimated, the guidance contained in these criteria must be heavily interpreted by the certifier into a set of operational Performance Indicators, and a quantitative performance range (a benchmark) established for each indicator. The performance range is established between the 'ideal' fishery (score 100), the 'best practice' fishery (score 80, considered to be the MSC benchmark level of acceptable and unconditional performance), and the entry level (score 60, the conditional level of acceptance into the MSC programme). The weighted average of all the Performance Indicator scores awarded to a fishery must achieve 80 or more for each of the three MSC Principles or the fishery is considered to have not achieved the MSC standard of performance, and cannot be certified or permitted to carry the ecolabel. The expression of the criteria in the indicators is customized by the certifier for each fishery, and therefore each fishery is assessed under a different set of indicators and benchmarks. While this enables certifiers to adjust their assessment to suit the specific fishery situation, it effectively means that the standard is flexible and opens the possibility of inconsistent application of the criteria to different fisheries.

The criteria in Principle 2 relating to conservation issues are expressed in broad and high-level aspirational terms, and have been criticized as not likely to be achievable by any wild capture fishery (Sutton 2003). In contrast, the criteria for Principle 1 are better defined, and given the maturity of the science of single-species stock assessments, are able to be more precisely resolved into indicators and benchmarks that reflect the intent of the Principle 1 criteria.

In assessing a fishery, the performance indicators for each MSC Principle must be scored independently by a certifier. The scores awarded by certifiers for all indicators for each Principle in the 22 fisheries certified to the MSC standard up to the end of 2006 are summarized in Table 1. The scores were derived from the published final assessment reports for 19 fisheries (www.msc.org) and from unpublished reports for the three other MSC-certified fisheries.

The analysis shows that the scores awarded by the certifiers for Principle 1 and Principle 3 are highly numerically consistent with each other even though they are measures of two very different types of features in each fishery. The mean, median, standard deviation and frequency distribution of scores across all the certified fisheries for these two Principles are very similar, reflecting a reasonably mature, well-resolved and consistently applied assessment system of quantitative indicators (Table 1, Fig. 1). However, the scores for Principle 2 show a significantly different pattern, suggesting a more weakly resolved set of indicators with benchmark interpretations that differ across the fisheries. The 22 fisheries have been assessed by four certification bodies, but two certifiers have only assessed a single fishery each. The scores awarded by the two remaining certifiers are significantly different from each other, with one certifier systematically awarding higher scores for Principle 2 (Table 2, Fig. 2).

Table 1 Summary statistics for all scores in the first 22 MSC certified fisheries for each MSC Principle (P1 = Principle 1, P2 = Principle 2, P3 = Principle 3).

	Median	Mean	SD	*n*
P1	90.0	89.0	8.7	472
P2	85.0	85.7	8.0	403
P3	90.0	89.6	8.5	640

The fisheries assessed in the MSC programme cover a range of sizes, jurisdictions, and global locations, including both northern and southern hemispheres, and the fisheries certified to date are assumed to be a random sample of fisheries that are

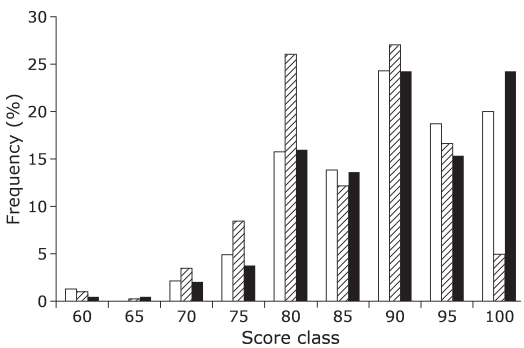

Figure 1 Frequency distribution of all scores in 22 MSC-certified fisheries; scores on MSC Principle 1 (open), MSC principle 2 (hatched) and MSC Principle 3 (black).

Table 2 Summary statistics for all scores in the MSC certified fisheries (20) assessed by the two main certifiers.

		Median	Mean	SD	*n*	*D*	*P*-value
P1	Certifier1	90	88.1	7.7	171	0.237	<0.001
	Certifier2*	90	90.3	8.7	264		
P2	Certifier1	80	84.0	6.9	143	0.269	<0.001
	Certifier2*	90	86.6	8.6	228		
P3	Certifier1	90	87.0	7.8	212	0.295	<0.001
	Certifier2*	90	91.0	8.7	366		

*Certifier 2 significantly higher scores than Certifier 1; Kolmogorov–Smirnov non-parametric distribution test values of *D* for distribution of scores within each Principle.

susceptible to MSC assessment. The patterns in distribution of scores would therefore be expected to be similar between Principles if each set of criteria and indicators were equivalently resolved and the benchmarks for performance were appropriately and consistently established and applied. The major difference in Principle 2 score distributions between the two main certifiers indicates that the poorly expressed Principle 2 criteria are interpreted differently by these two certifiers, and applied differently in the various fisheries. The flexible interpretation is explicitly accepted by the MSC programme, which requires certifiers to develop the indicators and benchmarks to represent the MSC standard in assessing each fishery. The different pattern in Principle 2 scores shown here indicates that the certifiers have interpreted and applied the criteria differently, consistent with the author's experience as MSC assessor in a number of fisheries. Both sets of interpretations have been sanctioned under the MSC rules, so this means that the MSC Principle 2 standard is flexible in its application, and therefore, to some extent, provides for assessment outcomes that depend on which certifier is conducting the assessment.

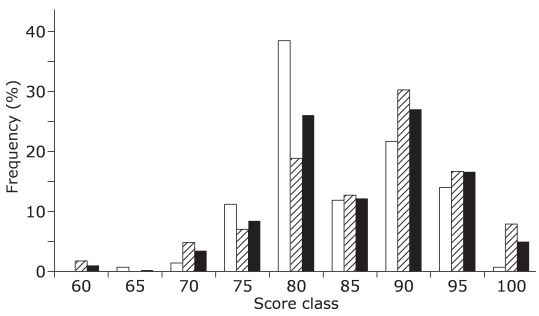

Figure 2 Frequency distribution for all Principle 2 scores in the first MSC certified fisheries (20) assessed by the two main certifiers (Certifier 1 = open; Certifier 2 = hatched), and all scores (all fisheries, all certifiers) for Principle 2 (filled).

The voluntary nature of the MSC assessment programme combined with the competition amongst certifiers to secure assessment contracts and the flexible application of the MSC Principle 2 criteria leads to what appears to be a failure of the market-based incentive model. Within any specific ecolabelling programme, the effectiveness of the market-based incentive model depends on the existence of a well-specified environmental standard that is consistently applied across all assessments. A flexible interpretation of the standard leaves the incentive model open to commercial and other sectoral pressures, and in the long term could lead to break-down of the incentive structure as consumers become more aware of the deficiencies of the assessment process and the declining credibility of the product endorsements and environmental claims. Flexible interpretation of the standard also leaves the assessment system open to claims of bias, because the certifiers may be influenced by commercial pressures, including the greater availability of data and knowledge from proponents that may have a strong motivational bias (such as environmental or fishing industry organizations).

In relation to the conservation issues in the MSC programme, this form of model failure cannot be corrected without the development and application of a more highly resolved standard for Principle 2. This would also need to include definitive quantitative criteria set at a high level of protection for the most important conservation issues so that there may be meaningful gains in conservation outcomes secured as a result of the market incentive offered by the MSC programme. An alternative approach to help correct this model deficiency would be for the programme to adopt a graded set of achievement outcomes (Kaiser and Edwards-Jones 2005), reflecting more explicitly the concept of continuous improvement, to match a graded set of performance requirements for conservation outcomes also encoded within definitive criteria.

The effectiveness of the MSC programme at achieving ecological improvements has been heavily criticized (Kaiser and Edwards-Jones 2005; Jacquet and Pauly 2007; Ponte in press). Analysis of environmental achievements by the MSC

programme found that although there have been a number of process improvements that could lead to future improvements in biodiversity conservation (Hall and Mainprize 2005; Agnew *et al.* 2006), there has been only one major ecological improvement related to the MSC certification programme (reduction in endangered seabird by-catch in the South Georgia Patagonian toothfish *Dissostichus eleginoides* fishery). This was achieved in preparation for the MSC assessment process (Agnew *et al.* 2006; Agnew in press), and although it is obviously related, it is unclear if it can be strictly attributed to the direct effects of the MSC programme. Also, it is not clear if this reduction of seabird by-catch is adequate to permit recovery of the highly depleted bird populations. As in the dolphin-safe example, a major reduction in by-catch is certainly a contributing, even if not a sufficient, response to the problem of recovery of highly depleted non-target populations. The two remaining biodiversity outcome achievements of the MSC programme identified by Agnew *et al.* (2006) – reduced sea lion by-catch in the Western Rock Lobster fishery in Western Australia and reduced New Zealand fur seal by-catch in the New Zealand hoki fishery – were either not directly related to the MSC certification or proved to be a temporary benefit respectively.

Ghazoul's propositions about barriers to the engagement of forest biologists – scepticism about effectiveness of certification for achieving biodiversity conservation, and difficulty in setting a standard that would in practice lead to better biodiversity outcomes – also apply in the case of MSC ecolabelling. Both the poor track record of ecological improvements from MSC certifications, and the flexible standard and variable interpretation by certifiers into performance indicators and benchmarks prevent the meaningful engagement of marine ecologists in the fishery certification processes of the MSC programme. The variable interpretation of the MSC standard by certifiers is also a barrier to systematic assessment of compliance of the different fisheries with the MSC standard, a key issue with fishery ecolabelling also raised by Kaiser and Edwards-Jones (2005).

Conclusions

The dolphin-safe ecolabel has not been able to provide for recovery of dolphin populations, and further fishery restrictions seem necessary to ensure dolphin conservation in the ETP. Elsewhere in the world, the ecolabel and related changes in tuna fishery practices may well have also reduced dolphin by-catch, but there is no evidence to determine if such reductions are significant enough to secure the ongoing conservation of dolphin populations and if the certification system behind the various global forms of the generic 'dolphin-safe' ecolabel have made any substantive contributions to the conservation of dolphin populations.

The interpretation and application of Principle 2 in the MSC programme is not consistent amongst certified fisheries, and appears to have a systematic bias that is related to the imprecise specification of the standard for this Principle. This infers that fisheries have been certified to different standards, and this may create the perception amongst consumers and the seafood industry of an inconsistent standard that is open to undue influence. A more consistent set of focused ecological criteria with associated explicit indicators and benchmarks that can be operationally measured in fisheries is required for the MSC in Principle 2. This would remove the flexible nature of the Principle 2 criteria, enhance both the clarity of the standard and the consistency of assessments between certifiers and fisheries, and provide for a much better interface for engagement with marine conservation biologists. Without this, it is unlikely that there can be an improvement in the capacity of the MSC programme to directly drive better biodiversity conservation outcomes from the certification of marine capture fisheries.

Neither of the certification programmes discussed here has been able to demonstrate major achievements in marine biodiversity conservation. This reaffirms earlier contentions that certification and ecolabelling in marine fisheries are primarily marketing opportunities (Kaiser and Edwards-Jones 2005; Jacquet and Pauly 2007), with little prospect for making stand-alone achievements in biodiversity conservation of either target or non-target species. Given the complexities of capture fisheries management that need to be addressed to be able to secure better biodiversity conservation outcomes (Gislason *et al.* 2000; Beddington *et al.* 2007), the scientific basis of both programmes also seems weak, and without significant improvement they seem unlikely to be able to provide for a more extensive involvement of marine conservation biologists in the future.

Correcting these weaknesses seems readily achievable. Improvements needed include much more specific formulations of the standard being applied, specific linkages between criteria and intended conservation outcomes, more quantitative benchmarks related to the criteria, stronger numeric systems for scoring and verification of fishery performance in relation to the standard, and a stronger engagement with marine conservation ecologists. Two critical problems with the dolphin-safe system are the undefined linkage between the current levels of by-catch in the fishery and the conservation of the dolphin populations, and the lack of a coherent compliance verification system for all types of the generic dolphin-safe ecolabel. The key issue in the MSC programme is the weakly defined ecological standard established in Principle 2, which has been interpreted in different ways by the certifiers, exposing the assessment process and ecolabel award to intense commercial pressures. Both sets of issues require better engagement with governments and regional fishery management organizations to provide for appropriate forms of partnerships to address and resolve these weaknesses.

Consumer apathy in relation to seafood issues has been considered to be a key problem preventing better conservation outcomes being achieved through the application of ecolabels (Kaiser and Edwards-Jones 2005), although others (Gulbrandsen 2006) consider that certification has been driven mainly by environmental organizations not by consumers. Irrespective of this, even if there is a high level of scientific data and expertise backing an ecolabel, consumers may still not respond because the ecolabel is not directly relevant to their interests. In the modern market for seafood, there is a 'profusion of self-serving ecolabels' (Jacquet and Pauly 2007), and where there is no clear linkage of the ecolabel to the issues of concern, consumers may not respond strongly to any claims an ecolabel may make. The two programmes considered here contribute to the raising of awareness about the issues, and they may provide a platform for the development of better regulatory standards, but they do little to contribute directly to improved marine biodiversity conservation in capture fisheries, and may therefore not be seen by consumers as relevant to their interests. Ecolabels more narrowly focused on specific biodiversity issues where improvements can be measured may be of much more interest to consumers, and reduce the problem of consumer apathy as an issue in the effectiveness of certification and ecolabelling of marine fisheries.

Certification systems promote and maintain awareness of the issues, and this currently seems to be their main short-term role in marine fisheries, but there are other policy tools in fishery management that could be applied to achieve conservation of marine species and communities as well as provide for more effective fisheries management (Hall and Mainprize 2005; Beddington *et al.* 2007). The need for a range of these latter policy tools is perhaps greater now than ever before as it seems increasingly evident that certification systems are not bringing about substantive increases in the conservation of marine biodiversity in marine fisheries. On this basis, there seems little prospect that marine conservation ecologists will find significant incentives to engage more effectively with, and provide better support for the improvement of, contemporary certification systems in marine capture fisheries.

References

Agnew, D. Case study 1: toothfish—an MSC certified fishery. In: *Seafood Ecolabelling, Principles and Practice* (eds T. Ward and B. Phillips). Wiley-Blackwell, Oxford (in press).

Agnew, D., Grieve, C., Orr, P., Parkes, G. and Barker, N. (2006) *Environmental Benefits Resulting from Certification against MSC's Principles & Criteria for Sustainable Fishing*. Marine Stewardship Council, London, 134 pp.

Beddington, J.R., Agnew, D.J. and Clark, C.W. (2007) Current problems in the management of marine fisheries. *Science* **316**, 1713–1716.

Brown, J. (2005) An account of the dolphin-safe tuna issue in the UK. *Marine Policy* **29**, 39–46.

Edwards, E.F. (2006) Duration of unassisted swimming activity for spotted dolphin (*Stenella attenuata*) calves: implications for mother-calf separation during tuna purse-seine sets. *Fishery Bulletin* **104**, 125–135.

EII (2007). Available at: http://www.earthisland.org/dolphinSafeTuna (accessed October 2007).

Gerrodette, T. and Forcada, J. (2005) Non-recovery of two spotted and spinner dolphin populations in the eastern tropical Pacific Ocean. *Marine Ecology Progress Series* **291**, 1–21.

Gerrodette, T., Dayton, P.K. and Ragen, T.J. (2003) Thinking like a lobbyist. *Conservation Magazine* **4**, 1–2.

Ghazoul, J. (2001) Barriers to biodiversity conservation in forest certification. *Conservation Biology* **15**, 315–317.

Gislason, H., Sinclair, M., Sainsbury, K. and O'Boyle, R. (2000) Symposium overview: incorporating ecosystem

objectives within fisheries management. *ICES Journal of Marine Science* **57**, 468–475.

Gulbrandsen, L.H. (2006) Creating markets for eco-labelling: are consumers insignificant? *International Journal of Consumer Studies* **30**, 477–489.

Hall, M.A. (1998) An ecological view of the tuna-dolphin problem: impacts and trade-offs. *Reviews in Fish Biology and Fisheries* **8**, 1–34.

Hall, S.J. and Mainprize, B.M. (2005) Managing by-catch and discards: how much progress are we making and how can we do better? *Fish and Fisheries* **6**, 134–155.

IATTC (2007). Available at: http://www.iattc.org/DolphinSafeENG.htm (accessed October 2007).

Jacquet, J.L. and Pauly, D. (2007) The rise of seafood awareness campaigns in an era of collapsing fisheries. *Marine Policy* **31**, 308–313.

Jaffry, S., Pickering, H., Ghulam, Y., Whitmarsh, D. and Wattage, P. (2004) Consumer choices for quality and sustainability labelled seafood products in the UK. *Food Policy* **29**, 215–228.

Kaiser, M.J. and Edwards-Jones, G. (2005) The role of ecolabeling in fisheries management and conservation. *Conservation Biology* **20**, 392–398.

May, B., Leadbitter, D., Sutton, M. and Weber, M. (2003) The Marine Stewardship Council (MSC) background, rationale and challenges. In: *Eco-labelling in Fisheries What is It All About?* (eds B. Phillips, T. Ward and C. Chaffee). Blackwell Science, Oxford, pp. 14–33.

MSC (Marine Stewardship Council) (2007). Available at: http://www.msc.org/html/content_463.htm (accessed October 2007).

Muller, E. (2002) *Environmental Labelling, Innovation and the Toolbox of Environmental Policy, Lessons Learned from the German Blue Angel Program*. Federation of German Consumer Organisations, Berlin, Germany. 38 pp. Available at: publications, http://www.blauer-engel.de/englisch/navigation/body_blauer_engel.htm.

Ponte, S. The Marine Stewardship Council and developing countries. In: *Seafood Ecolabelling, Principles and Practice* (eds T. Ward and B. Phillips). Wiley-Blackwell, Oxford (in press).

Rotherham, T. (2005) *The Trade and Environmental Effects of Ecolabels: Assessment and Response*. UNEP, Geneva, Switzerland. Available at: http://www.unep.ch/etb/publications/Ecolabelpap141005f.pdf.

Sutton, D. (2003) An unsatisfactory encounter with the MSC—a conservation perspective. In: *Eco-labelling in Fisheries What is It All About?* (eds B. Phillips, T. Ward and C. Chaffee). Blackwell Science, Oxford, pp. 114–119.

SWFSC (Southwest Fisheries Science Center) (2007). Available at: http://swfsc.noaa.gov/textblock.aspx?Division=PRD&ParentMenuId=248&id=1408 (accessed October 2007).

Teisl, M.F., Roe, B. and Hicks, R.L. (2002) Can eco-labels tune a market? Evidence from dolphin-safe labeling. *Journal of Environmental Economics and Management* **43**, 339–359.

US Consumers Union (2007). Available at: http://www.ecolabels.org/label.cfm?LabelID=98&mode=text (accessed October 2007).

Ward, T. Measuring the success of seafood ecolabelling. In: *Seafood Ecolabelling, Principles and Practice* (eds T. Ward and B. Phillips). Wiley-Blackwell, Oxford (in press).

Ward, T. and Phillips, B. Anecdotes and lessons of a decade. In: *Seafood Ecolabelling, Principles and Practice* (eds T. Ward and B. Phillips). Wiley-Blackwell, Oxford (in press).

Wessells, C.R., Cochrane, K., Deere, C., Wallis, P. and Willmann, R. (2001) *Product Certification and Ecolabelling for Fisheries Sustainability*. FAO Fisheries Technical Paper 422, FAO, Rome.

