

Can a credit system improve management of Tuna in the Coral Triangle?

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Introduction

The crisis in the world's fisheries is seen largely as one of mis-management, where incentives for production has outweighed those for sustainability. This is no more evident than in Tuna fisheries, which has emerged as one of the most globally networked fishery commodity systems in the world (Constance and Bonanno 1996). However, production and consumption of many species of Oceanic Tuna, including yellowfin, bluefin, skipjack, bigeye and albacore, is not evenly distributed. As stocks of Bluefin Tuna in the North Pacific and Atlantic have declined more attention needs to be placed on stocks in developing regions/countries, especially those of the Western Pacific and the Coral Triangle. Multiple nations fish both juvenile and mature stocks across this extended region, making consensus on whether and how to implement effective management strategies difficult at best.

Although there appears to be adequate incentive for fishing nations to invest in sustainable management they have made very little reinvestment in management beyond often favorable concession fees (Barclay and Cartwright 2007). This has meant that despite generating enormous revenues Tuna stocks management in the Coral Triangle does not receive an equitable share in the wealth of these fish, which has translated into ongoing financial shortfalls in sustainable fisheries management (Clifton 2009). In addition, costs associated with degrading the regional ecosystem function of the Coral Triangle is also yet to be recognized. The coral Triangle is a corridor for migrating spawners and a nursing ground for juvenile Tuna that, it is believed, form the basis for the fishery centered on the high-value mature stocks in the Western Pacific (see Bailey and Sumaila 2008). Given the failure of funding from fishing concessions, opportunities exist to explore alternative financial streams that could 'incentivize' the protection of juvenile stocks in the Triangle. We propose a 'Tuna Credit' system may provide one such alternative source. And, if invested in effective stock management, it may well appeal to consumers, retailers, fishing companies and government's alike.

As part of a wider movement to payment for ecosystem services, credit systems attach economic value to either resources or pollutants to create financial incentives to preserve the environment. By linking environmental rationalities to the market they are representative of a wider trend towards ecological modernization (Mol 2002). How credits are calculated, governed and traded through green banking mechanisms depends entirely on the resource under question, making 'blue-prints' redundant. Nevertheless, there is now nearly two decades of experience in developing credit systems for ecosystem services and environmental mitigation for biodiversity, wetlands, water, forests, carbon and a variety of pollutants (Bonnie 1999; Palumbi et al. 2009; Plummer 2009).

In this short opinion piece we provide a brief review of these credit systems as a basis for a discussion on how a 'Tuna Credit' might be developed to mitigate the impacts of overfishing tuna stocks in the West Pacific by transferring payments for the conservation of Tuna stocks in the Coral Triangle. In doing so we first provide an overview of existing environmental credit systems in other resource sectors before turning to possible areas of conflict or externalities that may emerge from such a system. We then return to Tuna fisheries and outline key questions which need to be addressed to determine the viability of a Tuna Credit System in the Coral Triangle.

Review of existing credit systems

Credits are measurable units that represent a substance, function or resource subject to mitigation, conservation or management, and hold value within a market. As outlined in Table 1, we have categorized the various credit systems into emission mitigation, emission prevention and ecosystem conservation credits. Emission credits create incentives for reductions by pricing emissions higher than innovation necessary to reduce them. Emission prevention credits seek to mitigate future emissions by preventing the loss of key emission sinks, such as forests. Ecosystem conservation credits aim to compensate for species or habitats that are in threat of being lost or degraded.

The vast variety of credits available follow a similar overall framework in terms of the definition, verification, distribution and consumption. As outlined in Figure 1 these four steps involve distinct and separate sets of actors and institutions. We now turn to a brief review of the ways existing emission and ecosystem credits are defined, governed and traded.

Credit definition

The definition of a credit is determined by the (bio)physical characteristics and the technological capacity available to detect and measure the resource or emission in question. In all cases, the outcome is the definition and allocation of a tradable property right of a unit of resource or a volume of emission. All credit systems, in various ways,

also define a baseline against which ‘additional’ gains or reductions can be measured and monitored. Measurement of the credits relies on a variety of both direct and indirect methods

Table 1. Summary of key credit trading systems

Regulation systems	Aim	Methodology	Calculation	Stakeholders	Incentive
<ul style="list-style-type: none"> Emission credits 	Promote compliance with national emissions reduction target through the polluter pays principle.	<ol style="list-style-type: none"> Cap emissions Provide allowances (credits) total credits limited to cap value Permit companies to buy credits Distribute credits between permitted Let companies trade their credits Lower cap en retire credits over time (scarcity and decrease total emission) 	<p>Direct or indirect calculation of emission volume/concentration.</p> <p>Credits embody small parts of total emission volume allowed.</p>	<ul style="list-style-type: none"> Polluting companies Banks 	Cap and trade
<ul style="list-style-type: none"> Water credits 	Funding for upstream water management activities to ensure supply of fresh water to downstream users	<ol style="list-style-type: none"> Create a framework for selection of suitable river basins Select models that can support Green Water Credit initiatives Initial quantification of benefits in a suitable river basin Facilitate trade of credits through river basin authority/ government 	Quantification of benefits from to water management projects – both quantitative (volume of water, area of watershed protection) and qualitative measures (water quality)	<ul style="list-style-type: none"> Local communities Banks Water managers 	Reward for sustainable management through funds for new projects
<ul style="list-style-type: none"> Biodiversity credits 	Prescribe economic value to biodiversity banking as a means of recognizing and managing the environment, social responsibility, business opportunities for species.	<ol style="list-style-type: none"> Identify ecosystem service providers (ESPs) Analyse ESPs: community and environmental influences, spatial and temporal scales. Strategic regional planning Find buyers and projects Create a market based on capping Monitor and adapt regulatory cap en retire credits over time (scarcity and decrease total emission). 	<p>Condition and amount of ecosystem service providers and their services translated to landscape area of ecosystem types.</p> <p>Credits are composed of projects that mitigate damage to ecosystem service providers.</p>	<ul style="list-style-type: none"> Landowners Companies that damage ecosystems by their activities/products Local communities Banks Investors in ecosystem protection 	Compensation credits/Cap and trade
<ul style="list-style-type: none"> Wetland credits 	Mitigation banking compensating for impacts to wetlands and streams.	<ol style="list-style-type: none"> Identify wetland or stream bank Determine mitigation projects Strategic regional planning Find buyers Monitor wetland banking sites and adapt mitigation management. 	Compensating for ecosystem degeneration through mitigation projects	<ul style="list-style-type: none"> Wetland managers Companies that have impact on wetlands or streams Local community 	Compensation credits

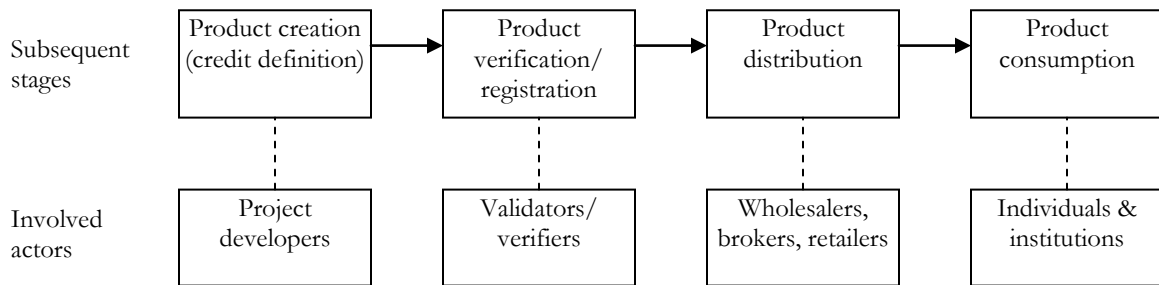


Figure 1. Schematic overview of stages of the voluntary carbon supply chain. Source: Mol (Forthcoming)

Emissions are measured based both on direct measurement and modeling. The Acid Rain Programme of the US Environmental Protection Agency was only possible after the development of the technology and institutional capacity to deal with a continuous emissions monitoring system (Cole 2002). In this case, technology provided adequate transparency and legitimacy for the trading system to operate. US policymakers were therefore able to establish emission limits and regulate companies to comply by remaining within those limits. Regulators periodically release emissions data, which can help analysts to determine the quantity and manage the equilibrium of emissions-to-cap in the market. The total allowed emission volume determined by the set cap is divided into credit units of one ton of emitted gas. These credits are then distributed (freely or auctioned) among pollutant emitting companies.

In the Kyoto mechanisms there is a clear difference in terms of defining credits given that carbon is not strictly a point-source pollutant. This has meant that instead of direct measurement from which clear emission budgets can be drawn and a transparent system of cap and trade ensues, a series of methodologies have been developed that model emissions from an ever wider set of carbon sources, or other greenhouse gases emissions transferred into carbon equivalents. Because of the wide range of methodologies within the three Kyoto mechanisms, ranging from power stations to soil sequestration, they need to be approved by the UNFCCC before they can be applied.

Biodiversity credits establish an ‘improve-or-maintain’ test for biodiversity values. Improving or maintaining biodiversity values means avoiding impacts in important areas for conservation of biodiversity values, and offsetting impacts on other areas. The offsets are measured in terms of credits using, for example, the ‘BioBanking Assessment Methodology’ (DECC 2008). Different credits exist:

1. *Ecosystem credits*, which can only be used to offset biodiversity impacts in the same ecological community, or in another community of the same formation

that has an equal or greater percentage of land cleared and the same predicted threatened species.

2. *Species credits*, which can only be used to offset biodiversity impacts on the same threatened species.

Participating developers are required to meet this ‘improve or maintain’ test based on the impact of their proposed development. Credits are created by the landowner, who establishes a biobank site and commits to enhancing and protecting biodiversity values. To be additional the credits must improve the biodiversity value of a habitat, or increase the area of habitat or population of a threatened species.

Verification

The verification and regulation of credits is spread between national and international, state and non state organizations. In regulated markets verification and regulation of credits comes under a national coordinating body, usually within or closely linked to a government department. In voluntary credit systems the verification and regulation is carried out across a wider set of organizations, including NGOs who may own standards, and third party auditors who provide verification services. The main determinant of the design of the governance arrangement and involvement of different actors depends largely on the scale at which the credit system operates.

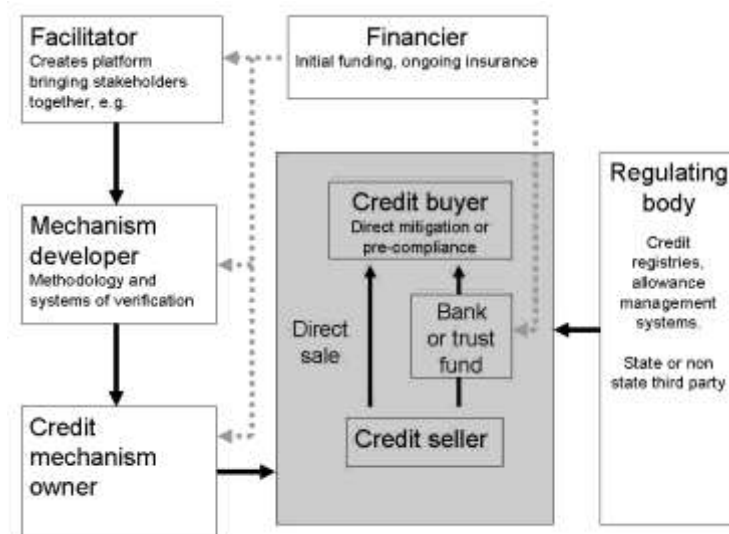


Figure 1: Schematic overview displaying all actors within a basic credit system mechanism. The arrows represent interactions. Each credit system mechanism is organized in a different way. Actors may not be present and interactions may point in different directions.

Until now biodiversity and wetland credit systems have been largely implemented at sub-national scales, across river basins or within provinces. As such, government has

played a central role in establishing and governing these credit systems. For example, Biobanking in New South Wales, Australia, is managed and audited through the Department of Environment and Climate Change (DECC). The DECC registers biobank agreements, issues biobanking statements, manages the public registers, audits biobank sites, enforces biobanking agreements, and prepares annual reports on the scheme. In addition, catchment management authorities play a facilitative role in assisting landowners to establish biobank sites.

In the case of wetland banking in the US, a two-tiered governance model is employed. At the federal level a permit programme has been legislated through the national clean water act (CWA) and administered by the US Army Corps of Engineers with oversight by the US environmental protection agency (EPA). Individual states have wetland-permitting authorities that either complement or expand upon the federal program. However, any development that fills in an area delineated as 'wetland' falls under the federal jurisdiction of the CWA. This means any developer is required to secure a federal permit from the Corps of Engineers who certify the ecological quality of these credits, in terms of their ecosystem functions, before allowing their sale.

Carbon credit governance systems span national and international scales. The UNFCCC secretariat, under the authority of the Clean Development Mechanism (CDM) Executive Board, has implemented the CDM registry for issuing CDM credits and distributing them to national registries. In addition to recording the holdings of Kyoto units, these registries 'settle' emissions trades by delivering units from the accounts of sellers to those of buyers, thus forming the backbone infrastructure for the carbon market. Each registry will operate through a link established with the International transaction log (ITL) put in place and administered by the UNFCCC secretariat. The ITL verifies registry transactions, in real time, to ensure they are consistent with rules agreed under the Kyoto Protocol. The ITL requires registries to terminate transactions they propose that are found to infringe upon the Kyoto rules. In verifying registry transactions, the ITL provides an independent check that unit holdings are being recorded accurately in registries.

Voluntary carbon markets are different again, largely because credibility, legitimacy and environmental effectiveness have emerged as key issues in the absence of the state, resulting in the emergence of third party standardization and verification of carbon credits by a diversity of verifiers (19 in 2009). Often these verifiers also establish emission-tracking and/or credit-accounting registries, but these registries are not always linked or integrated and remain stand alone.

Distribution

While some credit systems are entirely market-based, others are based on funding, or a combination of funding and market. What combination of distribution system is

chosen for depends again on scale of the credit system as well as the risk associated with the credits themselves.

In Biobanking, different interests have to meet: entrepreneurial interest, ecological interests, and regulatory interests. A traditional commodity market would have difficulties to cope with these multiple interests and the uncontrolled timelines of non-economic factors such as ecology and regulatory forces (Robertson 2009). Furthermore, whereas emission credits can be traded instantly after issuing, ecosystem or species conservation credits need starting finance to invest in ecosystem assessment and a management plan for conservation and mitigation. Given that these credits are developed in perpetuity, sufficient funding is required to implement a long-term management plan and provisions for contingencies should also be included. Funding is then entrusted to a conservatively managed non-wasting endowment fund, i.e. a fund that generates enough interest to cover management costs without depleting it.

As outlined above, carbon trade is dominated by regulatory/compliance markets, such as the EU-ETS, complemented by smaller, more fluid voluntary markets. Unlike the biocredit markets, carbon markets sell both primary and secondary credits. Primary credits are those generated directly from projects and therefore directly represent abatement. However, they are considered high risk by investors given the lead time and potential of project failure. Like the housing market, this has led to some predicting the emergence of a 'sub prime' carbon market (Chan 2009). Secondary credits represent carbon that is repackaged and re-sold any number of times. In comparison, these are high value in recognition of their much lower risk. Secondary credits now drive much of the carbon trade (>70%), but they do not represent any further abatement.

Consumption

Consumption or purchase of credits can be either to fulfill a current or future compliance or to retire credits for other reasons. In the case of biobanking, developers have three options to offset their projects: implement their own off-site projects, buy credits from a conservation bank, or on-site mitigation through 'in lieu fees'. In-lieu fee credits task agencies with the acquisition and management of habitat lands that offset future projects. If in-lieu fees are a cheaper alternative for developers to offset their projects, they can compete with mitigation banks (Fleischer and Fox 2008). The voluntary carbon market is similar in that it is not driven by a capped compliance level but rather by voluntary buyers who immediately retire their credits after purchase and by pre-compliance buyers who purchase credits either because they will become regulated or because they will trade them at a later date.

Some credit systems make use of portfolios as a means for spreading risk for buyers and as a governance measure to ensure that no one particular bio or emission credit is too heavily favored. For example, a portfolio system of biodiversity credits would

enable buyers to bundle a number of species and habitats. However, the governing body can use the system to ensure that funding flows are not limited to sites where reductions in deforestation emissions is cheapest, nor sites with greater monitoring capacities and associated lower risks of impermanence (Hare and Macey 2008).

In the case of emission schemes, funds can buy credits and retire these instead of trading them. By doing so, they lower the total pollutant emission or the damage to ecosystem services allowed by the credit system. In some cases, such a function is built into the governance system. For example, the Acid Rain Retirement Fund raises money and bids alongside polluters to remove credits from circulation, thus preventing that part of pollution from being legally emitted into the air. The system also allows third parties, i.e. not polluters, to enter the market through the Opt-in Program and receive their own acid rain allowances. This category of buyers opens the market up to environmental groups that "retire" allowances so they can't be used to cover emissions.

Key issues related to Tuna banking through a credit system

Ecosystem services banking is still developing and no comprehensive investigation on the success or failure of ecosystem and endangered species banking is available yet (Fleischer and Fox 2008). However, key issues for designing and implementing new eco-credit systems do emerge. In order to design a successful mechanism for tuna-credits or tuna-management projects, the following issues should be reflected on:

Regulatory or voluntary?

The first key choice in the establishment of a tuna credit system is whether it will be regulatory or voluntary. This choice will determine the extent of funding, political support and market integration required for any proposed system. Cost and the challenges of obtaining political will would dictate starting with a voluntary system. However, defection by the fishing nations who would bear a cost under the credit system is then more likely. A regulatory system would require oversight of a mandatory system of cap-and-trade (e.g. catch quota or days at sea limits) and, despite costing more to establish than a voluntary system, would also raise capital quickly (Neeff and Ascui 2009). Possibilities may exist for a parallel framework, as seen in the carbon markets, with a regulatory system establishing demand for a voluntary market.

Setting accurate baselines

The benefits of any credit funded environmental management scheme needs to be *additional* to a well defined baseline, i.e. a business-as-usual scenario. How to develop such baselines is a challenge already familiar to tuna fishery managers and the subject of must debate (Pauly 1995). Within a credit system there is an added set of choices, including whether the baseline is project specific or generic for an entire region, and how they can or should be periodically adjusted. Generic baselines are based on

regional, national or sectoral aggregated data, but project specific baselines require a finer level of assessment.

Measuring & monitoring

A monitoring and verification system should measure resource change relative to a set of system indicators. How the monitoring system should be developed depends for instance on: the magnitude of a stock and its rate of change, surveillance techniques available, cost to measure, and accuracy (Jennings 2009). The highly migratory nature of tuna stocks over large areas already makes the impact of management difficult to verify. It is also difficult to estimate how much time is needed before the results of new management are reflected by the targeted resource. The relatively data poor nature of Tuna fisheries in the Coral Triangle, coupled with the recent agreements on IUU, may provide an opportunity for the use of key market nodes as centers for monitoring and evaluation, as well as sites for credit trading.

Scale and leakage

Most ecosystem services are ‘delivered’ at the local scale, but their benefits are influenced by regional or global scales (Carpenter et al. 2006). As we see with migratory Tuna stocks, the benefits at various local scales have not been shared across the region. It is also important that any ‘leakage’ between localities under a credit system is avoided. For tuna, this would mean that any avoidance of Tuna overfishing within the Coral Triangle does not lead to a subsequent increase in pressure elsewhere. One option to avoid leakage is to raise the scale of accounting and crediting upwards to national or regional bodies (Neeff and Ascui 2009). Nevertheless, given the challenges of global coverage, the highly migratory nature of tuna, and the substitutability of tuna species in global markets, total avoidance may prove difficult.

Reliability of finance and start-up delays

A credit system will only be successful if incentives are provided over the long term. The lengthy lead in time to a successful credit trading system means that interim funding is often needed before credit revenues are self-sustaining (Neeff and Ascui 2009). In addition, experience in ecosystem banking shows that delays in credit approvals have also led to significant rises in cost which were not previously taken into account (Mead 2008). Risk management plans also need to be considered, covering insurance and credit reserves as a financial buffer. For example, placing a percentage of credits derived from the project/management in a self insurance buffer reserve (Garcia-Oliva and Masera 2004). Alternatively, as seen in green water banking, international donor aid and debt for nature swaps may also be utilized.

Market effects

Highly politicised allocation of credits to stakeholders can lead to market failures. Incorporating tuna credits into existing carbon trading markets is a possibility to adjust

for this. Other sectors have experience in translating tradeable units into carbon emissions and integrate these into carbon trading stocks, that may be relevant to a possible “Tuna-credit”. As more credit systems already exist, launching a new bio-conservation credit system for Tuna could have a potential impact on the existing carbon or bio-conservation credit market.

One species or more

When a decrease in consumers’ demand of one species parallels an increase in demand of another species, these species could replace each other in the market. Following consumer demand it therefore appears that management should therefore preferably focus on more than one species. But are tuna species ‘fungible’ when turned into a credit? A tuna credit system could value and manage different tuna species at the same time. This might be done through habitat or gear coefficients bringing quantities back to mean tuna equivalents, capping the total allowed tuna catch regardless of species, or mitigating for tuna caught in one area by closing more critical tuna habitat elsewhere. Alternatively, if not all tuna are equivalent, then different species credit values may be employed, allowing for differential pricing according to the economic or conservation value.

Multi-level governance framework

The complex nature of credit systems operating at a regional or global scale requires a multi-level governance framework. Within this framework oversight should be given to a central organisation, which has the responsibility to put in place sanctions for violation and procedures for conflict resolution, as well as the institutional capacity to adapt rules. Geographically nested subsidiary organizations may then provide guidance at lower levels of governance – within national government to provide checks and balances. Finally, representative bodies at the local or business level could facilitate the flow of funding from credits to fishers and communities.

A final remark

Fisheries management currently deals with both catch rates and quotas, which might be considered equivalent to emissions, and is increasingly moving towards ecosystem based management. In ecosystem and endangered species banking, habitat loss is mitigated by managing, creating or restoring habitat elsewhere. Tuna is not bound to a fixed habitat, but migrates over large distances. Critical sea habitat such as spawning areas or major migration routes, however, could in theory be protected by pelagic protected areas or temporal closures according to the mechanism used for endangered species banking. Spatial issues, such as which area or migration corridor to protect, how large a protected area should be, and how to ensure connectivity between critical habitats need to be addressed in parallel to ongoing initiatives aimed at protecting high sea areas.

References

- Bailey, M. and R. Sumaila (2008). Economics of Tuna Fisheries in the Coral Triangle. Fisheries Economics Research Unit, UBC Fisheries Centre.
- Barclay, K. and I. Cartwright (2007). "Governance of tuna industries: The key to economic viability and sustainability in the Western and Central Pacific Ocean." *Marine Policy* 31(3): 348-358.
- Bonnie, R. (1999). "Endangered species mitigation banking: promoting recovery through habitat conservation planning under the Endangered Species Act." *Science of the Total Environment* 240(1-3): 11-19.
- Carpenter, S. R., R. DeFries, T. Dietz, H. A. Mooney, S. Polasky, W. V. Reid and R. J. Scholes (2006). "Millennium Ecosystem Assessment: Research needs." *Science* 314(5797): 257-258.
- Chan, M. (2009). Subprime Carbon? Re-thinking the world's largest new derivatives market. Washington D.C., Friends of the Earth.
- Clifton, J. (2009). "Science, funding and participation: key issues for marine protected area networks and the Coral Triangle Initiative." *Environmental Conservation* 36: 91-96.
- Cole, D. (2002). *Pollution and Property: Comparing Ownership Institutions for Environmental Protection*. Cambridge, Cambridge University Press.
- Constance, D. H. and A. Bonanno (1996). *Caught in the Net: Global Tuna Industry, Environmentalists and the State* Lawrence, University Press of Kansas.
- DECC (2008). BioBanking Assessment Methodology, Department of Environment and Climate Change report 2008/385.
- Fleischer, D. and J. Fox (2008). The Pitfalls and Challenges. *Conservation and biodiversity banking: a guide to setting up and running biodiversity credit trading systems*. London, Earthscan: 43-49.
- Garcia-Oliva, F. and O. R. Masera (2004). "Assessment and measurement issues related to soil carbon sequestration in land-use, land-use change, and forestry (LULUCF) projects under the Kyoto protocol." *Climatic Change* 65(3): 347-364.
- Hare, B. and K. Macey (2008). Tropical Deforestation Emission Reduction Mechanism (TDERM): A Discussion Paper. Amsterdam, Greenpeace International.
- Jennings, S. (2009). "The role of marine protected areas in environmental management." *Ices Journal of Marine Science* 66(1): 16-21.

- Mead, D. L. (2008). History and Theory: The Origin and Evolution of Conservation Banking. *Conservation and biodiversity banking: a guide to setting up and running biodiversity credit trading systems*. London, Earthscan: 9-32.
- Mol, A. P. J. (2002). "Ecological Modernization and the Global Economy." *Global Environmental Politics* 2(2): 92-115.
- Neeff, T. and F. Ascuri (2009). "Lessons from carbon markets for designing an effective REDD architecture." *Climate Policy* 9(3): 306-315.
- Palumbi, S. R., P. A. Sandifer, J. D. Allan, M. W. Beck, D. G. Fautin, M. J. Fogarty, B. S. Halpern, L. S. Incze, J. A. Leong, E. Norse, J. J. Stachowicz and D. H. Wall (2009). "Managing for ocean biodiversity to sustain marine ecosystem services." *Frontiers in Ecology and the Environment* 7(4): 204-211.
- Pauly, D. (1995). "Anecdotes and the shifting baseline syndrome of fisheries." *TRENDS in Ecology and Evolution* 10(10): 430-430.
- Plummer, M. L. (2009). "Assessing benefit transfer for the valuation of ecosystem services." *Frontiers in Ecology and the Environment* 7(1): 38-45.
- Robertson, M. (2009). "The work of wetland credit markets: two cases in entrepreneurial wetland banking." *Wetlands Ecology and Management* 17(1): 35-51.