Commercialising Conservation: selling out or increasing efficiency?

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Abstract

The role of biodiversity in delivering crucial ecosystem services need to fast become an area of international priority. Despite massive international efforts, the world is failing at conserving its biodiversity, with estimates of 30% of species on earth going extinct within the next 40 years (Baronsky, 2011). Part of the problem is the research implementation gap that exists in conservation science. This gap is exhibited by the fact that 94% of academic conservation research does not have a practical application (Knight, 2008). Practitioners of conservation who could put the science into practice do not read the research, and collaboration between academics and conservation practitioners is rare. This causes a communication breakdown and general inefficiency in the discipline of conservation science. Furthermore, the economic value of conservation is not effectively communicated to those with the ability to effect large scale change. However, by using the language of commerce and business efficiency, conservation scientists would be better equipped to communicate the commercial value of conservation aims. This paper investigates if commercial communication strategies such as Web 2.0, motivation theory and organizational commitment, which are currently used in the marketing discipline to improve communication and strategy implementation, can be applied to the conservation discipline. Through the analysis of literature across multiple disciplines', a series of strong and practically implementable recommendations are given to reduce the research implementation gap in conservation science and increase biodiversity.

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Crucial Conservation

It is now widely accepted that conserving nature is a global priority. This is evidenced by the many international collaborations to create and protect nature reserves in key geographical locations (Payne, 2000; Santamaría, 2012). For example, 36 countries have signed the 'Commission for the Conservation of Antarctic Marine Living Resources' [1], the World Bank is overseeing the 'Amazon Protected Areas Program' to protect 32 million hectares of the Amazon Rainforest at a total cost of $85.89 million US,[2] and 'The Convention of Biological Diversity' was signed by 150 government leaders at the Rio Summit in 1992. The latter example was considered 'one of the most significant and far-reaching environmental treaties ever to have been developed' (Santamaria, 2012; Indiana University, 2007). These conservation efforts by international and local communities are costly both fiscally and bureaucratically, and if their implementation is to continue and succeed, they require robust measurement systems to assess their efficacy.

Biodiversity and ecosystem services

The levels of biodiversity within an ecosystem are a strong indicator, and key measure of an ecosystem's health[3] and are therefore used as a measure of conservation success and failure (Rapport, 2002). Biodiversity is also generally considered to be "the backbone of multiple ecosystem services, including – erosion control, soil formation, nutrient cycling, pollination, biological control, as well as the regulation of atmospheric composition, climate, water and disturbances" (Santamaría, 2012). These tangible services are essential for the survival of our species and the global valuation of these services is US$33 trillion per year (Costanza, 1997).

Biodiversity can be broken down into three basic layers (Santamaria, 2012; (Campbell, 2003). Firstly, the existence of diverse ecosystems e.g. alpine lakes, rainforests,

1. http://www.ccamlr.org/en/organisation/about-ccamlr - accessed 28.09.2013
2. http://www.worldbank.org/projects/P114810/amazon-region-protected-areas-program-phase-ii-gef?lang=en - accessed 23.10.2013
3. http://www.cbd.int/en/health - accessed 01.10.2013

rivers, marshlands, and desert – each ecosystem contains species diversity. Secondly, there must be diversity among the species that live in an ecosystem. Thirdly, there must be genetic diversity within each of those species: the genetic reasons for preventing inbreeding within humans are well documented and these dangers apply to other species too (McCallum, 2008).

The value of ecosystem services, and the cost of losing them

The Tasmanian Devil is a poignant example of the dangers of intraspecies genetic diversity loss is. The reduction in genetic diversity has reduced their immune system and resulted in the emergence of a contagious facial cancer that has killed 95% of the wild population (Cheng, 2012; Miller et al., 2011). A costly conservation battle is being waged in Australia to prevent further biodiversity loss in this species: to breed a more diverse population in captivity, and to find out how to stop the cancer (Murchison et al., 2012; Programme, August 2012). Given the Devil is the last remaining top tier predator in the Tasmanian Bush, their plummeting population has seen the rise of pests such as wild cats, which carry a flea that is threatening the already endangered ring tailed Bandicoot (Hamede et al., 2012; Stewart, Bettiol, Kreiss, Fox, and Woods, 2008).

In New Zealand, over 70% of the indigenous forest cover has been cleared, and much land that was once tussock has been grazed bare by livestock. Without the tussock to capture water, atmospheric moisture cycling is reduced by as much as 33% (DOC, 2006), which makes land susceptible to drought. Furthermore, New Zealand's native tussock is so well suited to water capture that a 22,000 hectare plantation, called Te Papanui Catchment, supplies Dunedin with water for its population of 120,000.[4] Without this efficient ecosystem service, Dunedin would have a yearly water bill of $11 million dollars, and farms on the nearby Taieri plains would have an irrigation bill of $12 million (Conservation, 2006; Walker, 2006; Van der Ent, 2010). Similarly, a 1998 American study gave the Whangamarino Wetland, near the lower Waikato River in New Zealand's North Island, a value of $9.9 million dollars US per annum. The wetland has been a case study of drought and flood prevention and was formally protected in 1989. It has the ability to store

4.http://www.stats.govt.nz/Census/2006CensusHomePage/QuickStats/AboutAPlace/SnapShot.aspx?id=2000071 - 22.09.2013 a flood with a peak flow of 1800 cubic meters per second, nearly an Olympic swimming pool in volume (DOC, 2007).

The value of biodiversity reaches beyond agriculture, and climate stabilization, and into the areas of public health and infrastructure. Until recently, it had not been quantified that the cost to the health sector is sometimes far greater than preserving the ecosystem and the service it provides. In 2013, the Professor of Ecosystem Health from the University of South Australia, Philip Weinstein gave a speech at Otago University; he delivered three pieces of research as examples of biodiversity loss affecting human health outcomes. The first example was of the increase in Ciguatera, a common pathogen that lives on algae. When reef ecosystem fail to adapt to changing environmental conditions such as coral bleaching, increased surface temperature, or increased nutrient levels, the algae to increase in number. When fish graze on the algae, the poisonous Ciguatera pathogen bioaccumulates in the food chain, and when ingested have neurological effects that can continue for years after the infection. There are no cures, and no simple method of detecting the presence of the pathogen.

The second example was the levels of Trihalomethane (THM) in the water supplies of cities in Western Australia. Trihalomethane is a toxic by-product of disinfecting water for human consumption, and has been shown to cause a statistically significant increase in birth defects. Weinstein argued that building decontamination plants, buying chlorine, and dealing with the lifelong effects of birth deformities are far more expensive options than preserving the water catchment. This restoration could be done by planting riparian vegetation and restoring the biodiversity of plant life, which would allow the water catchment to provide its ecosystem service of filtration and remove the need for chlorine-intensive detoxification (Chisholm, 2008)[5].

The final example relates to the degradation caused by the clearing of native forest for agriculture. In parts of Australia the loss of native forest, and its deep root systems has caused the ground water levels to rise. The rising groundwater has caused the soil to become high in salt, and Australia has lost 7% of its arable land as a result (Jardine, Corkeron, & Weinstein, 2011). As biodiversity losses give rise to infectious diseases,

5. http://www.councilofsocialservices.org.nz/ai1ec_event/phil-weinstein-environmental-change-disease-and-biodiversity/?instance_id= - accessed 12.12. 2013

neurological pathogens, and teratogens(Chisholm, 2008; Jardine et al., 2011; Liu, Zhu, Fan, Qiu, & Zhao, 2011), we may see more costs associated with agricultural loss, an increased need for water remediation infrastructure, and ongoing public health risks (Chisholm, 2008; Jardine, Corkeron, and Weinstein, 2011; Liu, Zhu, Fan, Qiu, and Zhao, 2011).

The research implementation gap

It is thought that the communication of natural capital and ecological economics (Knight, 2008; Knight, 2006; Balmford, 2006; Salafsky, 2002) will provide further incentives for policy shifts around conservation in the decision-making of local governments and the World Bank (Balmford, 2006; Chhatre, 2005). However, several issues currently impede cohesion between conservation academics and practitioners. First, the current type of research being done in conservation science is often not reflective of the problems encountered by conservation practitioners, resulting in information that cannot be utilized at a practical level. Second, research institutions do not value conservation research that proposes a practical plan (Knight, 2006b; Whitten, 2001; Prendergast, 1999). Third, academic institutions fail to support conservation scientists in generating relevant research (Knight, 2008; Sunderland, 2009; Briggs, 2001; Prendergast, 1999; Campbell, 2005). This issue is clearly linked with complaints by practitioners that research scientists are difficult to bring on board in practical conservation projects (Briggs, 2001). These issues culminate in a trend: scientific literature seems irrelevant to practitioners, who then do not consult it (Prendergast, 1999; Fazey, 2005; Knight, 2008).

This trend places a great deal of responsibility for the research implementation gap on the shoulders of academics and academic institutions. A solution may include a change in the structure of academic institutions to include conservation practitioners. However, conservation practitioners do not often publish their findings. Therefore, this may simply result in a frustrating exercise for academics seeking to structure their research questions around the undocumented findings of conservation practitioners. Alternatively, in order to promote a balanced and long-lasting change, conservation scientists should be encouraged to engage with practitioners, and academics and the research should be formed with practical implementation in mind. However, such a large communication shift requires significant strategic research in the field of communication efficiency. This research looked to disciplines such as marketing and management, which have a financial incentive to reduce the research implementation gap within their disciplines.

WEB 2.0

Emerging communication solutions were analyzed for their efficacy, and transferability to the conservation discipline. One such strategy was the use of Web 2.0 as a research dissemination tool. Web 2.0 is content generation and information sharing that is user driven, collaborative, and interactive (O'Reilly, 2007). Some well-known examples of Web 2.0 are Facebook, Twitter, LinkedIn, Wikipedia, YouTube, Mac Forum and SoundCloud (O'Reilly, 2007).

Bernhard and Kreuter (2009) looked at distribution models used in the marketing discipline and argued that the use of Web 2.0 could be transferred from the marketing discipline to the public health sector, in order to increase the sectors' ability to disseminate research evidence to clinicians and practitioners. In 2012, a paper called 'Crowd Sourcing for Conservation' was published on the spread of the Cane Toad in Australia; it used Web 2.0 as a knowledge dissemination, and collection tool. Previously, data on the spread of the Cane Toad was gathered by sending out physical paper surveys, maps, and return envelopes; which is an expensive and unreliable method (Newell, 2012). The use of a website with an interactive Google Map of the targeted area proved to be a novel approach, which attracted three hundred respondents and significant enthusiasm and engagement from the communities. The authors considered the pilot study a success and believe Web 2.0, and in particular the Google Maps Application Programming Interfaces, to be of great potential benefit to the conservation discipline and to the engagement of communities in conservation (Newell, 2012).

Several benefits of Web 2.0 were found using data sets from internationally recognized business strategists and specialist communication companies, Association for Computing Machinery (ACM), and McKinsey and Company: The analysis of the Association for Computing Machinery data showed three elements of corporate productivity that significantly benefited from Web 2.0: collaboration/communication, knowledge management, and innovation. In the McKinsey survey the benefits of using Web 2.0 were heavily focused around the increased ease and speed of access to external and internal experts, as well as access to knowledge. The results from both surveys showed that the most effective Web 2.0 strategy for achieving these results was the use of Wikis. These results help validate the idea that Web 2.0 tools could be used to simulate the collaboration and innovation that comes with close physical proximity of practitioners from different disciplines. A case study done on a biofuel company called Aquaflow, whose chemists and engineers worked in the same building, found that because communication was easy and fast, solutions were quickly found to problems and novel approaches to innovation were seen.

These are exciting results, as the global mission to prevent biodiversity loss will require not only interdisciplinary collaboration, but international collaboration too.

The problems and benefits of web 2.0

The authors of 'Crowd Sourcing for Conservation' encountered significant resistance from government conservation managers, which limited the publicity of the ‘Toad Tracker’ website and the project as a whole (Newall, 2012). The major issue for the government conservation managers seemed to be the idea of data ownership, as it was felt that this project created a 'privately run database', which was inappropriate for a government-funded research project. The authors insisted that the intention was purely to illustrate the possibilities of Web 2.0 technologies in the field of conservation.

Gathering data using Web 2.0 is an area where citizen scientists could aid academic research. The variables of weather and animal behaviour can considerably slow down university-based research of biological systems. Access to verified data sets could be a draw-card for studying Ecology, Botany or Zoology in New Zealand or Brazil, as they are both biodiversity hotspots (Norman Myers, February 2000). Furthermore, by providing postgraduate students with practitioner devised data sets, academic research would include the practical aspect of conservation. The use of students to further conservation science is being described as a 'unique opportunity' to engage postgraduate students, so that they may 'meaningfully contribute' to the problem of the research implementation gap (Courter, 2012). The research implementation gap could be reduced if universities were more flexible and encouraged postgraduate students to choose a practitioner as a co-supervisor or member of their research committee. Furthermore, this would instill ethics of collaboration into conservation scientists early in their academic career, and long-lasting habits of collaborative research will be formed (Courter, 2012).

Strategy implementation, organisational commitment, and motivation theory

The implementation of any strategy, once decided upon, is difficult and costly. It was found that even Fortune 500 companies generally saw less than 60% return on input (Steele, 2005) and the top executives in Europe agree that 90% of the effort to effect strategic change lies in the implementation of strategy, and not the generation of it (Smith, 2009). When two of the key factors affecting successful implementation are at the level of motivation and organizational commitment among employees, they are worthy of investigation (Alexander, 2007; Smith, 2009).

Commitment is defined as “the force that binds an individual to a course of action that is of relevance to a particular target” (John P. Meyer*, 2001). As the role of organizational commitment in strategy management has become more important to a variety of fields, its definition has become more segmented (Janet Parish, 2008). It is now defined as having three separate forms:

1) Affective commitment	Attachment to the organisation
2) Normative commitment	Obligation to remain in the organisation
3) Continuance commitment	The perceived cost of leaving the organisation

Figure 1

(John P. Meyer*, 2001).

Motivation is divided into four concepts under expectancy theory (V. H. Vroom, 1966)

1) Force	'The compulsion of an individual to behave in a certain way'
2) Valence	'The preference for consequent reward', 'whether the incentive is desirable to the individual.'
3) Expectancy	'The perceived likelihood that the individual's behaviour will result in the intended outcome'
4) Instrumentality	'The perception that the intended outcome will lead to the intended reward', or 'whether if the individual has successfully completed a task, the incentive will actually be delivered'

Figure 2

(V. H. W. a. m. Vroom, 1964).

The major findings in this area that relate to the reduction of the research implementation gap in conservation science were in relation to a task being of sufficient value. For example, when an employee is given a detailed task they tend to exhibit increased effort; also, when given a more difficult task, an employee will try harder (Smith, 2009). This finding directly relates to reduction of the research implementation gap as often practitioners are faced with 'wicked' problems, which are hugely complex ecosystem-related conservation problems. Practitioners often find that academics choose to research obvious or irrelevant topics, which aside from frustrating practitioners, might actually result in a lower level of motivation from the academics (Knight et al., 2008). Particularly if the academic cannot see that his or her research will have an impact on his or her chosen field, as the knowledge that one an integral part of something worthwhile and important generates strong affective commitment (John P. Meyer, 2001).

Conclusions

The research implementation gap could be reduced if Web 2.0 strategies were widely utilized. Furthermore, reducing the research implementation gap in conservation science will increase motivation and organisational commitment in both academics and practitioners.

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