

Out of the Loop: Why Research Rarely Reaches Policy Makers and the Public and What Can be Done

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ABSTRACT

Most of the world's population that derives their livelihoods or part of their livelihoods from forests are out of the information loop. Exclusion of public users of natural resources from access to scientific research results is not an oversight; it is a systemic problem that has costly ramifications for conservation and development. Results of a survey of 268 researchers from 29 countries indicate that institutional incentives support the linear, top-down communication of results through peer-reviewed journal articles, which often guarantees positive performance measurement. While the largest percentage of respondents (34%) ranked scientists as the most important audience for their work, only 15 percent of respondents considered peer-reviewed journals effective in promoting conservation and/or development. Respondents perceived that local initiatives (27%) and training (16%) were likely to lead to success in conservation and development; but few scientists invest in these activities. Engagement with the media (5%), production of training and educational materials (4%) and popular publications (5%) as outlets for scientific findings was perceived as inconsequential (< 14%) in measuring scientific performance. Less than 3 percent of respondents ranked corporate actors as an important audience for their work. To ensure science is shared with those who need it, a shift in incentive structures is needed that rewards actual impact rather than only 'high-impact' journals. Widely used approaches and theoretical underpinnings from the social sciences, which underlie popular education and communication for social change, could enhance communication by linking knowledge and action in conservation biology.

Abstract in Spanish is available at <http://www.blackwell-synergy.com/loi/btp>.

Key words: communication; culture; dissemination; knowledge sharing; knowledge transfer; local knowledge systems; performance measurement.

THE GAP BETWEEN KNOWLEDGE AND ACTION in the ecological sciences is increasingly under scrutiny (van Kerkhoff & Lebel 2006). The failure of the scientific community to communicate effectively with the public may be one factor in society's general lack of comprehension of the critical links between environmental degradation and human well-being, leading to what has been referred to as a 'dysfunction in the tropical literature' on conservation and development (Pitman *et al.* 2007). Of perhaps greater significance, the limited efforts made by ecological scientists to convey the findings of their research, either to policy-makers or to local people, all too often means that key decisions related to the management of natural resources and the conservation of critical landscapes are made without the full benefit of science.

This lack of knowledge exchange between scientists and both the general public and key decision-makers stems from a deeply entrenched professional culture, reinforced by institutional incentive structures and individual reward systems in research and academia. Indeed, in many disciplines, knowledge transfer—the 'exchange, synthesis, and ethically-sound application of knowledge'—is noted to 'pose risks to an academic career' (Jacobson *et al.* 2004). This is because 'the activities that make up much of the work of knowledge transfer—outreach, building partnerships with non-academic organizations, and plain language communication—are not widely accepted as legitimate forms of scholarship' (Jacobson *et al.* 2004). Directly and inadvertently, academic and non-academic research institutions often discourage impact-oriented

research by prioritizing the number and frequency of publications in peer-reviewed journals. This emphasis has not only inhibited the communication of research findings, but on a more profound level, it has been noted to lead to the impoverishment of the scientific process itself, resulting in superficial outputs, lack of innovation and originality (Lawrence 2006), conformity and stagnation (Gendron 2008).

Lessons for tackling the problem of knowledge sharing in conservation biology can perhaps be gleaned from the health and social service sectors, which have confronted the gap in communication between knowledge generation in academia and application over the last few decades (Sullivan *et al.* 2001, Canadian Health Services Research Foundation [CHSRF] 2003, Haines *et al.* 2004, Jacobson *et al.* 2004, Proctor 2004). In the health sector, insightful critique of traditional research outputs highlighted how 60 percent of the 9.7 million deaths among children in 42 low-income countries could have been prevented through the use of effective and affordable interventions; however, knowledge transfer was deemed insufficient (Haines *et al.* 2004).

Paradoxically, in the desperate struggle to contain global environmental crises, conservation biologists are also realizing that, in spite of the considerable investments made in research (Cleary 2006) and copious publications generated, the continuing rapid rate of biodiversity loss is 'a tragedy in progress' (Bradshaw *et al.* 2008). As a result, a limited but growing number of conservation biologists are moving beyond the constraints of traditional academia and connecting with not only scientific peers, but civil society, policy makers, the mass-media, and local communities as strategic audiences (Robertson & Hull 2003, Bawa *et al.* 2004, Nadkarni

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2004, Pitman *et al.* 2007). There is now an emerging awareness that new tools for effective and timely communication of research findings are critically needed (McNie 2007). In recent years, donor fatigue (Anderson 1998), frustration on the part of communities (Sullivan *et al.* 2001), and lack of demonstrable policy change (Garrett & Islam 1998) have led to pressure on research institutions to demonstrate impact. However, information tends to stay where it is generated (Gumucio & Gray-Felder 2001, Inagaki 2007), which in the biological and ecological sciences connotes peer-reviewed journals. Increasingly, research institutes are expected to strike a balance between being relevant to a broad swath of society as well as publishing in 'high-impact' journals directed to a restricted segment of society. Calls for more discerning analysis of research dissemination (Proctor 2004), as well as confusion as to what type of outputs are currently legitimate and advantageous in science, indicate that discussion is needed regarding what products scientists generate, with whom they are shared and how.

METHODS

We present results of a survey conducted by the Center for International Forestry Research and People and Plants International, designed to better understand researcher practices in knowledge sharing. The 19-question survey included multiple-choice as well as open-ended questions. Respondents were not selected randomly, but identified based on contacts with partner organizations and collaborators. There were three methods of applying the survey, listed in order of importance: (1) interviews in person and by phone; (2) an e-mail survey directed at and completed by individuals; and (3) distribution of the survey to appropriate list-servers. Most respondents were interviewed, using the survey as a tool to spur conversation. The results are discussed in light of findings from the growing body of literature, particularly from the health

sector and the importance of effective communication in the scientific process (Jacobson *et al.* 2004, Proctor 2004).

RESULTS AND DISCUSSION

Two hundred and sixty-eight respondents completed the survey. Researchers from 29 countries participated in the survey; the largest percentage of respondents was from Africa, followed by Latin America, Asia and North America. Eighty percent of respondents categorized themselves as researchers or academics, with the rest identifying themselves as managers, independents, practitioners and donors. Forty-five percent of respondents characterized themselves as interdisciplinary, with 43 percent as natural scientists and 12 percent as social scientists. Sixty-five percent of respondents had worked in conservation and/or development for > 8 yr, with 21 percent of those having > 21 yr experience.

The largest percentage of respondents (34%) ranked scientists as the most important audience for their work. This is close to three times the ranking of the next most important audience cited; 12 percent of respondents ranked policy makers, local people, and/or women and marginalized persons as the second most important audiences for their work (Fig. 1). The products that scientists produce and the audiences they communicate with reflect how their performance is appraised; scientific papers are considered the most important factor in performance assessments by 43 percent of respondents (Fig. 2). A discrepancy existed between what researchers produced vs. what they believed would influence conservation and development, and only 15 percent of respondents considered peer-reviewed journals as effective in promoting conservation and/or development. Over half of respondents perceived that joint participation by stakeholders in local initiatives (27%) and training (16%) was most likely to lead to success in conservation and development (Fig. 3).

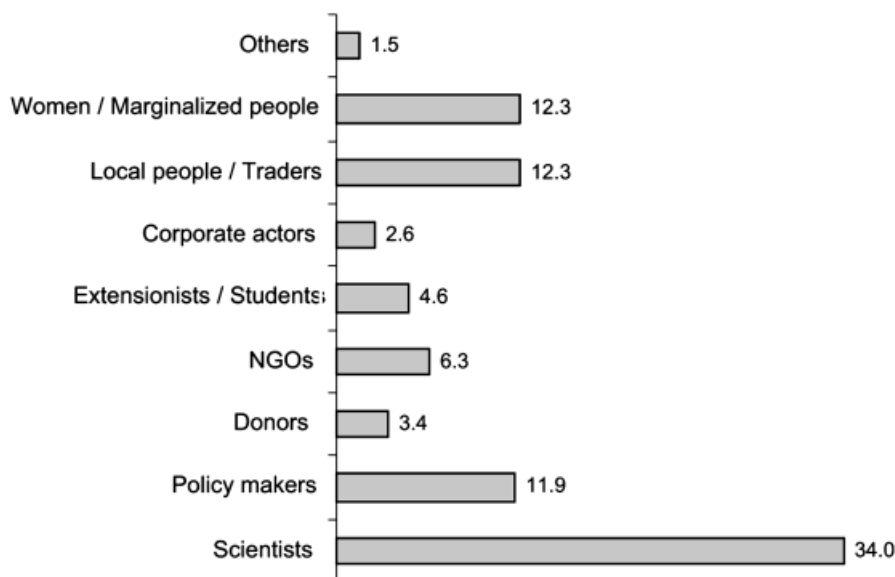


FIGURE 1. Responses to the survey question: Rank the following according to their importance as audiences for your work: (8 = most important; $N = 268$).

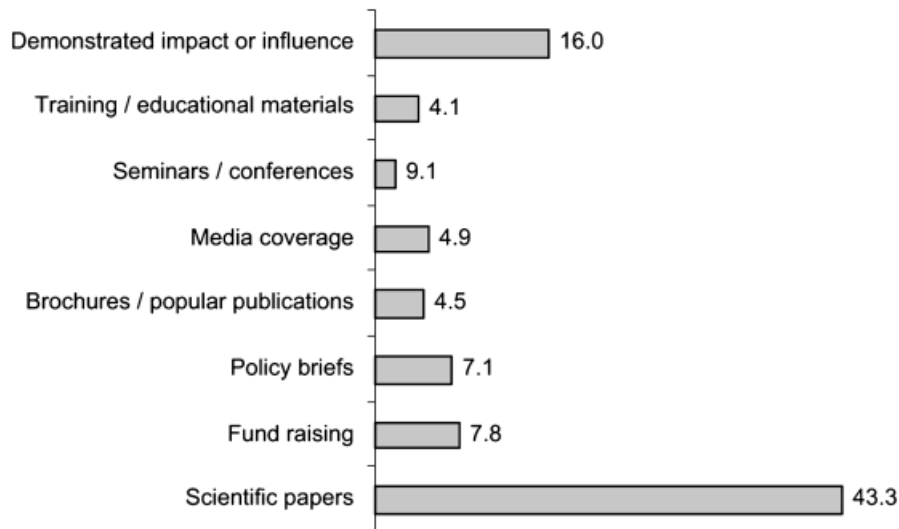


FIGURE 2. Responses to the survey question: Rank the performance indicators used by your organization to evaluate your work: (8 = most important; $N = 268$).

A relatively small percentage of researchers challenged the incentive structure (peer-reviewed publications) to engage in activities that differ from institutional preferences. The discrepancy between belief and action may be due to significant institutional disincentives to engage in production of diverse outputs or training, as these are generally deemed to be inconsequential in performance measurement systems. Journal articles remain the primary output of research as these are perceived to have greater intellectual credibility than other forms of scientific outputs. Currently, incentives to produce outputs that reach a broader swath of society through training are so low that if engaged in at all, this occurs as an after-thought once the scientific articles have been published.

Corporate actors were ranked as the least important among eight audiences, only 3 percent of respondents indicated they target corporations. Given the dominant role of financial institutions and

the private sector in deforestation and biodiversity loss, the lack of communication to such a strategic audience is a glaring oversight. Communication with civil society by scientists is similarly absent. Engagement with the media as an outlet for scientific findings is perceived by respondents as inconsequential (< 5%) in measuring scientific performance at their organizations. According to performance measurement systems, scientists are intentionally discouraged from producing materials for civil society; training materials and popular publications are each perceived as having importance values of < 5 percent.

INCLUSIVE COMMUNICATION AND RESEARCH PROCESSES PROMOTE EFFECTIVE KNOWLEDGE EXCHANGE.—In spite of theoretical advancements in communication for development, and the need to move from a top-down communication style to a more inclusive style,

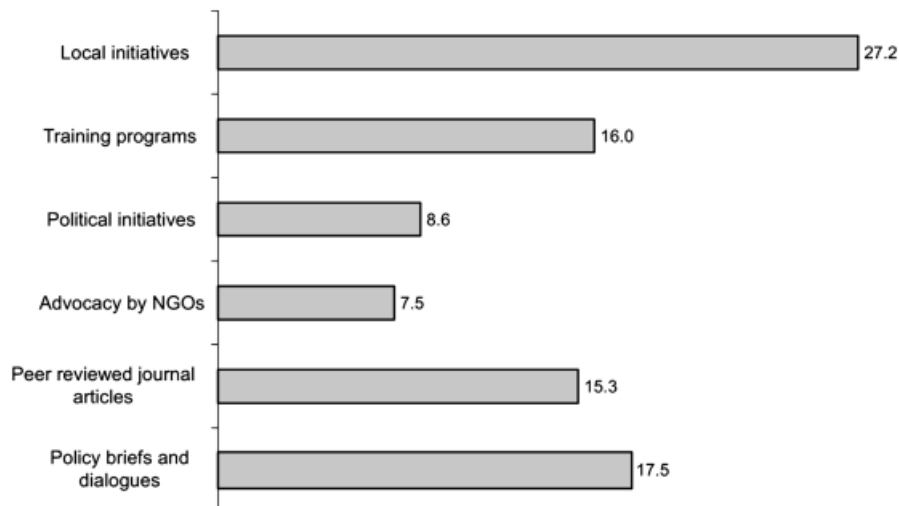


FIGURE 3. Responses to the survey question: Based on your experience, successful outcomes in conservation and/or development are most effectively catalyzed through which of the following? ($N = 268$).

the former 'trickle down' and 'transfer' paradigms continue to guide and dominate the behaviors of academics (van Kerkhoff & Lebel 2006). Trickle down embodies a belief that communication is a one-way process: hierarchical with little to no input from the users of the research. Directed to scientific audiences only, the trickle down approach does not encourage or generally tolerate the practice of sharing science with civil society. Even though participation has been officially endorsed as the preferred communication strategy by numerous international organizations, including the United National Development Programme; the Food and Agricultural Organization (FAO); the United Nations Children's Fund and the World Bank, 'the modernization paradigm has persistent influence, and participatory communication is not as widely or fully practiced as commonly believed' (Fraser & Restrepo-Estrada 1998).

However, signs of movement to a more inclusive style of communication are evident in the responses and reflect theoretical advances (Figueroa *et al.* 2002, van Kerkhoff & Lebel 2006, Inagaki 2007). Twenty-five percent of respondents indicated that local people, women and/or marginalized groups are key audiences for their work, indicating a convergence of belief and behavior on the part of some researchers. Communicating with and for marginalized people reflects a movement that has been led by social scientists. For example, the Brazilian educator Paulo Freire and his colleagues (Freire *et al.* 2001) conceived of communication for social change as dialogue and participation for the purpose of empowering the voiceless and strengthening cultural identity. Understanding through dialogue underlies a cyclical model of social change that is built on relationships and mutual change (Figueroa *et al.* 2002).

In an attempt to match practice with theory, numerous institutes have recently developed guidelines for dissemination of research results and published advice for improving the impact of research through communication for development. These include the Overseas Development Institute (Hovland 2003, 2005), International Development Research Centre (Gauthier 2007), the FAO (2003) and the International Union for Conservation of Nature (Goldstein 2006), as well as organizations set up specifically to foster communication for development, such as the Communication for Social Change Consortium.

In spite of decades of research on participatory processes, the development of relevant outputs is often lacking and products are routinely inaccessible or irrelevant to communities that participated in the research. Although participatory action research was conceived to include devolution as an obligation (Fals-Borda 1986), results of our survey indicated that local people are the fourth of eight target audiences to be considered in both the design of projects and development of outputs. Commenting on the research process, one frustrated community member involved in a social science survey stated, 'We have been surveyed up to our noses. Every time somebody is new into an office they do a survey. And I [am not] going to spend another hour. Why? Because there was no [feedback]' (Sullivan *et al.* 2001).

Inclusive research processes that have clearly defined outputs from the outset and which are useful to a range of stakeholders can counter such frustration. Progressive methods of participatory action research and new principals of engagement with communities

are regularly practiced in the social sciences such as health, urban and rural planning, and feminist studies (Flicker *et al.* 2007). For example, the Center for Disease Control and Prevention in the United States posits that 'community involvement is the cornerstone of public health action' (Sullivan *et al.* 2001). As one respondent noted, 'Communication to local people is critical if we want to empower them to make use of results'.

To varying degrees, participatory processes are also present in biocultural research and development, such as sustainability science (Cash *et al.* 2003), knowledge systems (Clark & Dickson 2003), integrated natural resource management (INRM; Sayer & Campbell 2003), and adaptive collaborative management (ACM; Colfer 2008). INRM and ACM are attempts to include end users in all stages of research and to move from a scientist-dominated research focus to action research that includes social learning and adaptive processes (Shackleton *et al.* 2009). Although 'participatory' research continues to be critiqued as to the extent and meaning of participation, to varying degrees, such efforts are working to incorporate lessons learned from the social sciences.

A vital element of research is to understand who it will serve and how it will be disseminated (Gumucio & Gray-Felder 2001, FAO 2003, Hovland 2005, IUCN 2006; Ramalingam 2006). Today, the flow of information is recognized not as a linear process but as a complex, interactive, multidirectional exchange of information (Caplan 1997, Figueroa *et al.* 2002, van Kerkhoff & Lebel 2006). Results of the survey affirm findings in the health, biocultural and communication disciplines, that it is important to use a variety of dissemination methods that are closely linked to user needs, integrate various knowledge systems and stay attuned to cultural context. One respondent noted that, 'projects with passionate researchers and local champions resulted in more leverage and funding to allow multimedia dissemination at local, regional and national scales'. However, responses also indicated that strong institutional disincentives to engage with end users constituted a significant deterrent in communicating more effectively with civil society.

INSTITUTIONAL INCENTIVE STRUCTURES CAN IMPEDE KNOWLEDGE SHARING.—Performance measurement systems, as perceived by respondents, reveal robust institutional preferences against communicating with the public; top-down communication of results will often guarantee positive evaluations. Fifty percent of respondents stated that they were not able to disseminate their results in ways that they considered most effective; 64 percent of these respondents cited organizational and/or professional disincentives as impediments. Respondents also noted lack of funds (66%) and limited time (56%) as obstacles to disseminating research results in ways they believe most effective. Numerous respondents echoed the following sentiments: 'There is no budget attached to dissemination'; 'There is not enough time for dissemination which requires several years'; and 'Why are we doing research if it is not going to be disseminated? I find this incredibly frustrating'. Respondents overwhelmingly agreed (93%) that donors should increase their emphasis on dissemination of research results.

Ensuring rigor and scientific validity of unpublished research by independent, qualified experts through the peer-review process

has crucial benefits as a means to guarantee scientific quality and is a foundation of modern science. In recent years, as political attacks on science escalate, such as in the climate change arena, arguments for defending peer review and scientific integrity have become more important (Gropp 2005). However, criticism of performance measurement systems, journal's 'impact factor' and the peer-review process is mounting (Mooney 2004, Brante 2005, Sparkes 2006, Campbell 2008). Ambiguities within the peer-review system, its perceived declining validity, a spread of conformity, a trend toward publishing positive outcomes only and the tendency to favor influential Anglo-American journals are being questioned (Mooney 2004, Brante 2005, Engber 2005, Gendron 2008).

In the current climate, it has been noted that as scientists 'fight to publish, salesmanship and pushiness pay off' (Lawrence 2006). Gendron (2008) writes, 'maximizing the quantity of journal articles has led to a huge but pointless expansion of research . . . (and) malaise that characterizes the superficial nature of academic writings'. One respondent noted, 'scientists' publications are routinely recycled, just to boost numbers'. A survey of British economists revealed

that they 'modified their research endeavors in reaction to the RAE (performance measurement system) to carry out research products which can be swiftly completed rather than thoughtful ones' (Harley & Lee 1997). In research organizations, positive feedback reinforces individual motivation to swiftly conduct research and rapidly publish papers. These actions result in positive performance evaluation at both the individual and institutional levels, with funding tied to the volume and frequency of publications, however devoid of meaning. A systemic consequence is that researchers and research institutions are rewarded for science which is out of context or 'blind science' (Morin 2003; Fig. 4). The excessive spread of performance measurement logic threatens to reduce innovation and reinforce flows of superficiality (Gendron 2008).

Indeed, due to serious shortcomings within peer-reviewed journals, some posit that lower status journals in the periphery of the field are where intellectual innovation, originality and depth may be more likely to take place (Gendron 2008). Brante (2005) suggests that while 'peer review can be important as an ideal, it cannot be trusted as a process to strengthen science'. Reductionist

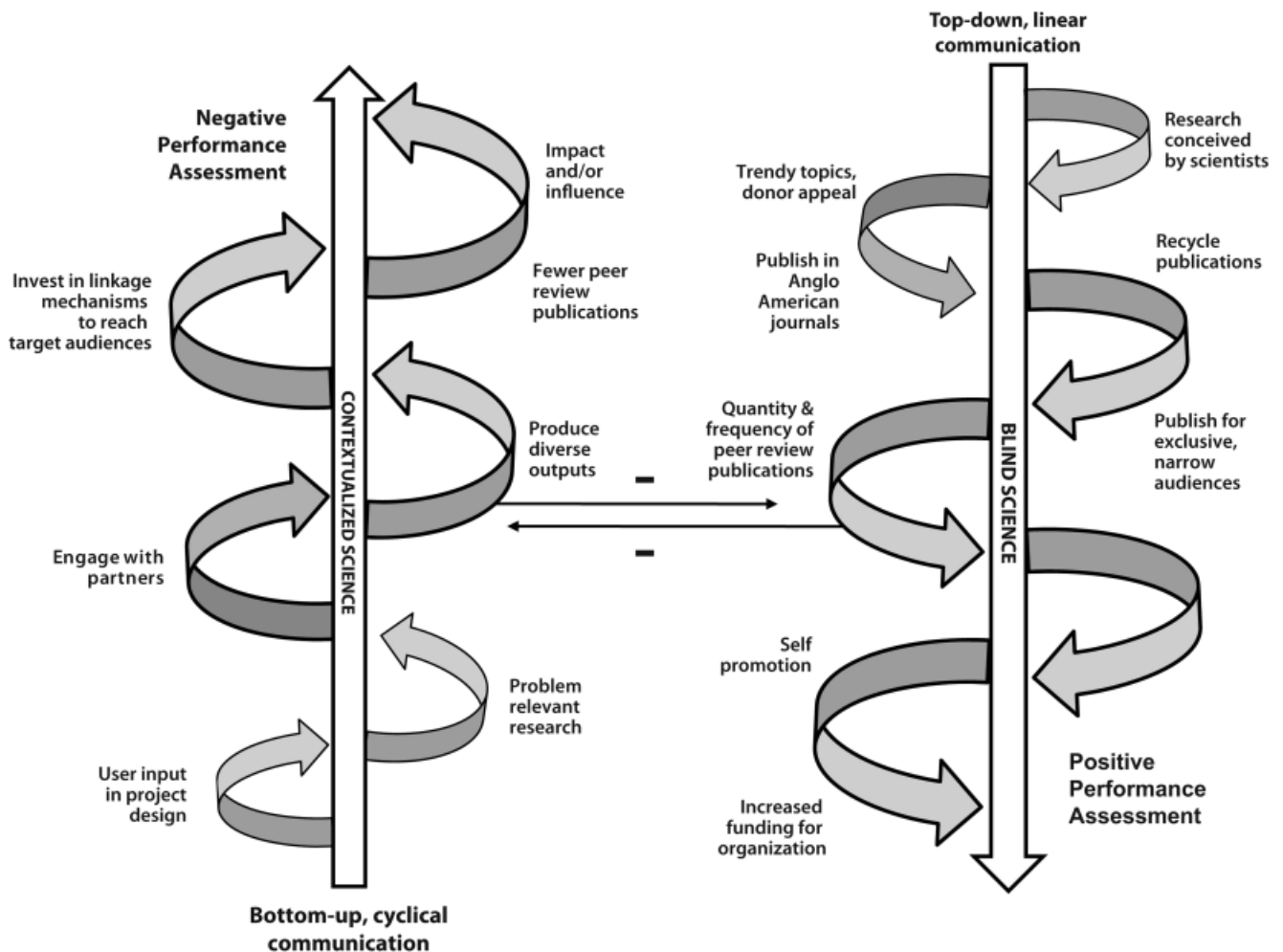


FIGURE 4. Blind science vs. contextualized science: positive feedback loops within research institutions reinforce self-promoting forms of science as opposed to impact-oriented research.

means such as the citation index and impact factor are used to measure performance in science because they are easily calculated on a computer. Founded on fear and insecurity, such performance measurement systems can be antithetical to creative instincts and diminish reflection on the nature and purpose of research. Ironically, the tools put in place to ensure scientific rigor—performance measurement systems and peer-review processes—can undermine and work against improved knowledge sharing and transfer. As Bawa *et al.* (2004) note, ‘change will only come about with a reallocation of existing resources and changes in the incentive structures within academia . . . to reward communication and action’.

To counter these queries, some universities are experimenting with performance measurement, which assesses not only the quality but the impact of research outside of academia. For example, Australia is moving toward a new system of research review that rejects widely used Institute for Scientific Information-indexed journals due to concerns that there is increasing manipulation of the indicator by journal editors (Butler 2008). Indeed, appropriation of the word ‘impact’ to designate a journal’s ranking constitutes a potential misrepresentation of what impact is. Is impact a measure of how inflated a researcher’s or journal’s identity is, or is impact effecting change?

Not only is the current state of knowledge transfer in conservation biology characterized by some as ‘dysfunctional’ (Pitman *et al.* 2007), but hiring practices may also be compromised. As access to funding is tied to rankings, there are strong incentives to move toward reductionist means of quantifying performance. This is aggravated by a trend to pull promising young national scientists out of tropical countries in which they are most needed (Luis Val & de Almeida Guimarães 2005). Recently, there has been a shift to sift out those scientists who do not ‘self-advertise’, convey a crisp ‘sense of confidence’ and ‘work their names onto author’s lists’ (Lawrence 2006). The field-worn researcher who publishes less due to time in the field engages in long-term or risk-taking research, or perseveres in focusing on whole organisms and ecosystems (Grimaldi & Engel 2007) may descend to the lower ranks or fade away. As Lawrence (2006) writes, ‘As we compare candidates, adding up their papers and calculating their impact factors, do we remember to look for . . . those rare traits of originality and creativity?’

EFFECTIVE RESEARCH AND DISSEMINATION RECOGNIZES CULTURE AND INTEGRATES KNOWLEDGE SYSTEMS.—Although half of respondents perceived that local initiatives and training are most likely to lead to success in conservation and development, fewer (19%) respondents were active in sharing research results with local people in their recent projects. Thirty-nine percent of respondents indicated a lack of personal skills and training in dissemination as an impediment to effective dissemination of results. Strong organizational disincentives also dissuade researchers from engaging in outreach beyond the scientific community. Respondents indicated that outputs for other end users such as civil society were inconsequential in performance measurement and were afforded the least significance by organizations. Education and training materials, brochures and popular publications, and media coverage were noted to have a

combined importance value of only 14 percent in performance measurement systems.

In contrast, communication and popular education theories affirm that research and dissemination strategies that use culturally compelling methods and which account for local knowledge systems are more likely to succeed than conventional written or verbal accounts of project results (Servaes & Malikhao 2005). Innovative means of public education are burgeoning in Africa and Latin America, particularly in the health and social science sectors. Dance, puppetry, theatre, comics, radio and video are proving to be highly successful not only in raising awareness, but also in changing behaviors and improving livelihoods (Conrad 2004, Najwa 2004, Singhal 2004).

In spite of their effectiveness and considerable leverage for improving research impact, culturally compelling means of conveying research results are frequently derided as not ‘legitimate’ science. With some exceptions (Nadkarni 2004, Bletter 2006, Shanley 2006), the description of endeavors to share research with local users is uncommon in academia, with experiences generally unpublished. However, the ‘translation’ work that goes into making science accessible to a range of stakeholders is considerable and when done well, the product should not be a ‘dumbed-down’ version, but one whose rigor is enhanced through a thorough process of review by a combination of both scientists and end users. Until communication and impact are seriously integrated into performance measurement systems, it is likely that only a limited number of independently motivated scientists will engage in the time-consuming processes needed to disseminate research effectively.

Seventy-eight percent of respondents indicated that local knowledge was a component of their research and/or considered in their dissemination processes. In addition, most respondents (45%) characterized themselves as interdisciplinary, indicating a trans-disciplinary focus that is understood as fundamental to solving complex problems in contemporary society (Robertson & Hull 2003). The need to adequately address complexity in both science and culture has led to the insight that, ‘knowledge is translation and reconstruction’ (Morin 2005). Empirical and theoretical research in the social sciences indicates that attention to diverse knowledge systems and cultural context improves the research process and uptake (Sullivan *et al.* 2001, Jones & Lynch 2002, McCay 2002, Valásquez Runk 2004, Cocks & Dold 2006, Ramstad *et al.* 2007). Recent attempts to arouse interest from conservation biologists in political science (Agrawal & Ostrom 2006), psychology (Saunders *et al.* 2006), social issues (Schwartz 2006) and communication and education (Brewer 2001, 2006; Bride 2006), offer signs of growing interdisciplinary collaborations (Robertson & Hull 2003, Kainer *et al.* 2009).

In spite of theoretical understanding of the need for integration of various knowledge systems (Redford & Stearman 1993, du Toit *et al.* 2004), practical application remains lacking (Charnley *et al.* 2007). For key issues, such as land rights and deforestation, local and cultural concerns remain peripheral, permitting top-down initiatives to prevail (Colchester 1994). For example, in the case of climate change, numerous international mechanisms are criticized as having been insufficiently discussed with indigenous peoples who

may be impacted by such policy decisions (Griffiths 2007, International forum of Indigenous Peoples on Climate Change 2007, United Nations Permanent Forum on Indigenous Issues 2007, Forest Peoples Programme 2008).

CATALYZING KNOWLEDGE TRANSFER IS CRUCIAL BUT OVERLOOKED.—Survey results indicated that scientists are neither educated nor encouraged to produce a wider range of products for broader audiences. Upstream concerns such as equity at the research site and downstream concerns such as broader impact are often disregarded. This chronic problem of low researcher accountability at the study site, as well as to society, is compounded by ever shorter project funding cycles, unrealistic donor requirements, financial constraints and the chronic push to move on to the next paying project. Underlying these is a performance measurement system that provides strong disincentives for scientists to invest in dissemination activities other than a scientific article published in an English language journal.

One means that many research organizations use to share research more broadly than scientific journals is the use of partner organizations. However, most respondents (60%) rated the ability of partner organizations to accomplish dissemination of research results as limited, with 68 percent of these indicating that the amount of financial support from their own organizations in their most recent projects was < 15 percent. Only 9 percent of respondents indicated that partners do an excellent job of disseminating research. Such findings call into question the conventional model that many research and academic institutes rely upon whereby partner organizations are expected to ‘translate’ and disseminate their research. The extent to which such bridging organizations exist is one question; another is whether and how they are able to make research relevant to practice and/or national policy.

A survey of over 1229 social scientists in Canada revealed that the most important determinants of knowledge use were (1) the mechanisms linking the research to users—the dissemination efforts; and (2) the adaptation of research outputs undertaken by the researchers (Landry *et al.* 2001). Notably, neither of these determinants features prominently in performance measurement systems. The researchers concluded that devising incentive schemes to compensate researchers who invest in linkage processes and adaptation of their outputs for users could increase the use of science (Landry *et al.* 2001). One respondent indicated that knowledge sharing was made possible by ‘the philosophical commitment of individuals and our organization . . . and dedicated and skilled communication staff’.

Recently, the critical importance of linkage mechanisms, boundary institutions (Caplan 1997, Cash *et al.* 2003) and ‘knowledge brokers’ (CHSRF 2003) has been highlighted, as each offers communication bridges between different organizations, projects and agencies. Brokering is defined as going beyond knowledge transfer, signifying people who act as catalysts and ‘search out knowledge, synthesize research and scan for best practices and examples from outside their organizations’ (CHSRF 2003). By linking institutes that have information with people who need it, the common cost of reinventing the wheel can be avoided. However, persons who play such a role often go undetected, as the net-

working capabilities, flexibility and linking functions remain unrecognized by performance measurement systems (CHSRF 2003). To ensure vital linking functions are nurtured within an institute, it is important to promote an institutional culture that seeks out and encourages persons who promote knowledge sharing, as well as amending performance measurement systems to recognize these skills as strategic to research dissemination and impact (Landry *et al.* 2001). Institutions need to recognize that promotion of knowledge sharing is a necessary complement to using research in evidence-based decisions (Sunderland *et al.* 2009).

The health and social service sectors may offer useful lessons for conservation ecology. In these fields, uptake pathways for humanitarian causes are clearly defined and the need for interaction and dialogue with communities widely recognized; lives are literally at stake. In environmentally related fields, there is now increasing recognition that lives are also at stake. Widely used approaches and theoretical underpinnings from the social sciences, which underlie popular education and communication for social change and development, are now making incipient inroads into the natural sciences. Embracing lessons from these disciplines could catalyze progress by linking knowledge and action in conservation ecology.

STEPS THAT MAY BE TAKEN TO PROMOTE KNOWLEDGE TRANSFER AND SHARING

Research and academic institutions

- Restructure institutional incentive structures to take into account actual ‘impact’ rather than solely ‘high impact’ journals. Create incentives to invest in dissemination and an expanded range of research products.
- Expand the use of nonacademic partnerships and channels to reach target audiences.
- Raise awareness and encourage within the organization social change agents, knowledge brokers and linkage mechanisms.
- In hiring, balance consideration of publication record with capabilities such as originality, creativity, commitment, depth of field experience and impact orientation.

Scientists and students

- Interact with stakeholders at various levels to ensure relevance of research questions and outputs at multiple scales. Identify uptake pathways as part of project design.
- Design projects to support the coproduction of knowledge to meet end users needs and aspirations (Duchelle *et al.* 2009). Integrate knowledge from the traditional, ecological and social sciences.
- Pay attention to socio-cultural context during the research process and in the content and packaging of research messages.
- Identify innovative partners and means of communication from technological to traditional (*i.e.*, theatre, music, puppetry, radio, video, web, comic design).
- Share and publish experiences regarding how research results have been ‘translated’ or used for a nonscientific audience. Masters and Doctoral students can consider describing this process in one chapter of their dissertations (Brewer 2006).

Journal editors and publishing organizations

- Challenge researchers to propose ways to evaluate the real impact of their work on the lives of their public, using a systemic evaluation process.
- Provide incentive to scientists to publish practitioner-oriented results and science of relevance to civil society.
- Publish special issues, sections and/or case studies highlighting interdisciplinary work. Break the language barrier by publishing 'mirror' papers: translations of the complete paper to the language where the research was undertaken.

Donors

- Recognize that sustainable change is a long-term process. Support longer term project time frames (4–10 yr) in which sufficient dialogue occurs at the initiation of projects.
- Expand proposal requirements to include the sharing of relevant research results in an accessible format to appropriate audiences.
- Verify that proposals designate sufficient funds for translation, printing, mailing costs and communication.
- Remember that originality often occurs at the fringes. Identify and support small but innovative, locally driven initiatives.

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