



# How Good Science and Stories Can Go Hand-In-Hand

HEATHER M. LESLIE,<sup>\*†</sup> ERICA GOLDMAN,<sup>‡</sup> KAREN L. MCLEOD,<sup>§</sup> LEILA SIEVANEN,<sup>†</sup>  
HARI BALASUBRAMANIAN,<sup>\*\*†††</sup> RICHARD CUDNEY-BUENO,<sup>††</sup> AMANDA FEUERSTEIN,<sup>‡‡</sup>  
NANCY KNOWLTON,<sup>‡‡</sup> KAI LEE,<sup>††</sup> RICHARD POLLNAC,<sup>§§</sup> AND JAMEAL F. SAMHOURI<sup>\*\*\*</sup>

<sup>\*</sup>Department of Ecology and Evolutionary Biology, Brown University, Providence, RI 02912, U.S.A.

<sup>†</sup>Center for Environmental Studies, Brown University, Box 1943, Providence, RI 02912, U.S.A.

<sup>‡</sup>COMPASS, 9523 Clement Road, Silver Spring, MD 20910, U.S.A.

<sup>§</sup>COMPASS, Department of Zoology, Oregon State University, 3029 Cordley Hall, Corvallis, OR 97331-2914, U.S.A.

<sup>\*\*</sup>Conservation International, 2011 Crystal Drive, Arlington, VA 22202, U.S.A.

<sup>††</sup>The David and Lucile Packard Foundation, 300 2nd Street, Los Altos, CA 94022, U.S.A.

<sup>‡‡</sup>Smithsonian Institution, National Museum of Natural History, Washington, D.C. 20560, U.S.A.

<sup>§§</sup>Department of Marine Affairs, University of Rhode Island, Kingston, RI 02881, U.S.A.

<sup>\*\*\*</sup>National Marine Fisheries Service National Oceanic and Atmospheric Administration Conservation Biology Division, Northwest Fisheries Science Center, 2725 Montlake Boulevard E., Seattle, WA 98112, U.S.A.

<sup>†††</sup>EcoAdvisors, 1758 Henry Street, Halifax NS, B3H 3K6 Canada

## Introduction

What do you say when you have only a minute to explain to a municipal official why keeping track of the number of bird species found in a park may help make decisions about park management? Talk of significant differences among treatments or testing theory will likely meet with glazed looks. In contrast, sharing the stories of the citizen scientists who have censused the birds year after year makes the information more personal and more salient.

Stories bring conservation science to life. When one hears how Trevor Lloyd Evans, indefatigable director of bird banding at Manomet Center for Conservation Sciences, awoke before dawn every morning, rain or shine, and led his team of volunteer banders in their mist-netting surveys, as he has done every spring and fall for more than 40 years; how spring migrants arrive earlier than they used to; and how magical the day was when volunteers mist-netted a Golden-winged Warbler (*Vermivora chrysoptera*), a species not captured in over a decade, the significance of the issues, the contributions of science, and possible solutions become much clearer (Manomet Center 2012). We can explain, through Trevor's story, how assessments of ecosystem health are informed by long-term observations and deep knowledge of natural and human history in particular places.

Redford et al. (2012) discuss the need to “carefully and strategically untangle our stories from our science.” They argue that many conservation stories are not adequately grounded in data and that the new Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) will increase the visibility of conservation science and thus the scrutiny of our methods, conclusions, and motivations. We agree with Redford et al.'s concerns about the dangers of conflating stories with science and the importance of ensuring stories are grounded in robust science. They offer several reasonable suggestions for ways forward, and the need for conservation scientists to engage with the IPBES project is a particularly welcome one.

Here, however, we focus on the complementary roles stories can play, together with science, in advancing conservation science and practice. We assert that conservation interventions that recognize the synergies between science and storytelling may achieve more substantial biological and social outcomes than those that rely on only one or the other. In our work as conservation scientists, we have observed at least 3 types of synergy between stories and science: stories convey the significance of our science (communication), stories can serve as data (scholarship), and stories illustrate how scientific knowledge can illuminate policy choices (translation). We illustrate these synergies with a story from Cabo Pulmo, a national park in Mexico's Baja California Sur.

\*email [beather\\_leslie@brown.edu](mailto:beather_leslie@brown.edu)

Paper submitted March 26, 2012; revised manuscript accepted December 17, 2012.

Cabo Pulmo is a community of <200 people near the end of a long bumpy road some 3 hours (yet only 60 miles) northeast of Los Cabos on the gulf coast of the Baja peninsula. The town is perched between the desert and the sea and fringed by hundreds of meters of coral reef, some of the few in the Gulf of California. Twenty years ago, Cabo Pulmo's reefs were heavily degraded due to a combination of sport fishing and small-scale commercial fishing for the ornamental trade and local restaurants (Gómez 2008). Now, 10 years after establishment of a fully protected, no-take marine reserve, Cabo Pulmo has made an amazing recovery. Total fish biomass in the reserve has increased more than 400% from the prereserve level, and abundances of sharks and other top predators resemble some of the world's most pristine marine ecosystems (Aburto-Oropeza et al. 2011).

### Stories Resonate

Field ecologist Octavio Aburto-Oropeza, who has led surveys of Cabo Pulmo's reef since the early 1990s, notes that these ecological changes "represent tons of new fish produced every year" and that "no other marine reserve in the world has shown such a fish recovery." His scientific paper on the subject received substantial scientific and media attention. But local people who have protected the area for over a decade tell the Cabo Pulmo story in a different, yet perhaps more compelling, manner. Mario Castro, one of the first stewards of the park, speaks of seeing large schools of jacks and other predatory fish swimming inside the reserve, of watching sharks return to its waters, when so few are seen elsewhere in the Cape area, and of the excitement of the tourists at seeing turtles, sharks, and one of the peninsula's few coral reefs (GCMP 2011). A video featuring Mario, along with newspaper and blog articles and a photography exhibit in Mexico City, are credited for a radical policy reversal at the highest level of the Mexican government. In 2012, President Felipe Calderón withdrew the development permit for Cabo Cortés, a \$2 billion mega tourism development that would have created the equivalent of 30,000 new hotel rooms adjacent to Cabo Pulmo (GCMP 2011; Cooper 2012).

### Stories are Data

Stories also may be primary research material, analogous to biological samples or field transects for natural scientists. Some anthropologists and other social scientists make stories the main object of study (Roe 1991, 1994). According to Roe, stories are simplifications that make policy making possible in the face of complexity. These narratives are invaluable, and like all primary data, can only be gathered through intensive research.

(See Corson [2011] for an example of how ethnography can be adapted to investigate global, rather than place-based, environmental problems and solutions.) Cabo Pulmo's recovery gains context from empirical analyses of stories told by contemporary fishermen (Sáenz-Arroyo et al. 2005) and 16th–19th century explorers (Sáenz-Arroyo et al. 2006). These stories offer a baseline view of ecological communities that characterized Baja California in the past. The use of stories as data extends beyond Mexico. For example, in Fiji, L.S. documented the stories underpinning 2 marine policies to show how ecosystem-based approaches are gaining prominence over preexisting community-based approaches (Sievanen et al. 2013). Others have shown why some stories become embedded in particular institutions, even in the face of science that supports alternative narratives (Roe 1991). This scholarship directly addresses Redford et al.'s (2012) concerns about ungrounded stories and may offer insights into how these arise and how they may be avoided in the context of the IPBES.

In the context of project evaluation, stories that people tell about improvements in ecosystem condition or changes in employment opportunities following implementation of a protected area may be mined to yield valuable data relevant to project outcomes, success, and adaptive management. The stories told by Mario and other community members include information about their perceptions of the effects of the reserve on Cabo Pulmo's ecology and economy and reveal some of the environmental narratives that conservation nongovernmental organizations, resort developers, and municipal officials are invoking to explain their positions. Buried within these stories are data on the social and ecological effects of the park and the beginnings of possible scenarios for the future. Stories of conservation success are particularly important (Balmford 2012; Fox et al. 2012) because they provide information that may be useful to effectively design similar interventions to improve ecosystem condition and human well-being elsewhere (Redford & Taber 2000; Salafsky et al. 2002).

### Stories Illuminate Future Options

Judith Castro, the daughter of one of the first protectors of Cabo Pulmo, sat with H.L. and L.S. for over an hour, telling the story of how her father switched from fishing to dive tourism after seeing the marine ecosystem become depleted in the early 1980s. She talked proudly of the recovery of Cabo Pulmo's reefs and of how what had begun as a community-sponsored reserve eventually became a national park. She spoke of the community's desire to develop sustainably and to maintain the character of their community and the marine environment that surrounds them. "We want to show what the future can be," Judith told us.

Stories can illustrate likely consequences of different policy decisions, inspire action, and aid in comprehension of the choices facing decision makers. Conservation science can inform these stories, which may in turn contribute to the development of scenarios and other analytical tools used to inform future environmental policy and action (Peterson et al. 2003). Scenarios form the core of some of the most successful examples of collaborative and policy-relevant conservation science, including the Millennium Ecosystem Assessment and reports from the Intergovernmental Panel on Climate Change. A key lesson of past assessment efforts is that scientists need to interact more closely and responsively with decision makers and investigate the social, economic, and institutional consequences of specific policies under consideration by decision makers so that assessments, such as the ones IPBES will undertake, will be just and effective (Perrings et al. 2011).

### Scientists as Storytellers

The stories of Octavio, Mario, and Judith bring the richness of Cabo Pulmo's reefs alive and illustrate how science and stories can complement one another. Good conservation stories are verifiable and supported by robust and, ideally, peer-reviewed, science. As scientists, we are part of these stories and often in the best position to tell them (Baron 2010a). Stories represent an opportunity for scientists to connect their work to the wider world, if they have the patience and creativity to write narratives that include tension (Franklin 1994; Olson 2009) and put people front and center (Kristof 2009). Although these are not trivial tasks, the many science writers who report on conservation offer excellent models for how to do this. We can partner with these professionals, and tell more and better stories that are grounded in our science. We also can learn to tell these stories ourselves. Organizations such as COMPASS train established and fledgling researchers in effective communication with decision makers, journalists, and local communities (Baron 2010b; Smith et al. 2013). These are the same constituencies who are guiding and contributing to the IPBES and should be among the target audiences of every engaged conservation scientist.

We believe there are benefits to connecting conservation science and stories, in terms of evaluating and achieving conservation effects and disseminating those outcomes to other practitioners and the public. But conservation scientists will only know this is true if they engage in these activities more frequently and with greater intent and then systematically analyze the effects. To our knowledge, this has not yet occurred. Unsubstantiated conservation stories are a danger and could damage the credibility of conservation science or distract policy makers from the magnitude of conservation challenges, but

we believe conservation science and practice would be enriched by more efforts to thoughtfully connect science and stories.

### Acknowledgments

We acknowledge the hospitality and support of the Helen R. Whiteley Center at University of Washington's Friday Harbor Laboratories, where we first began our conversations on the topic. We also thank O. Aburto, J. Castro, and many others associated with Cabo Pulmo who graciously shared their stories with us (H.L. and L.S.). We thank the editor and two anonymous reviewers for their comments on an earlier version of this manuscript. The workshop was facilitated by COMPASS and funding was provided by The David and Lucile Packard Foundation through grants to J. Lubchenco, S. Levin, and H.L.

### Literature Cited

- Aburto-Oropeza, O., B. Erisman, G. R. Galland, I. Mascarenas-Osorio, E. Sala, and E. Ezcurra. 2011. Large recovery of fish biomass in a no-take marine reserve. *PLoS ONE* 6:DOI:10.1371/journal.pone.0023601.
- Balmford, A. 2012. *Wild hope: on the front lines of conservation success*. University of Chicago Press, Chicago.
- Baron, N. 2010a. *Escape from the ivory tower: a guide to making your science matter*. Island Press, Washington, D.C.
- Baron, N. 2010b. Stand up for science. *Nature* 468:1032-1033.
- Cooper, C. 2012. Cabo Pulmo saved! The Ocean Foundation. Washington, D.C. Available from <http://www.oceanfdn.org/blog/?p=611> (accessed November 2012).
- Corson, C. 2011. From rhetoric to practice: how high-profile politics impeded community consultation in Madagascar's new protected areas. *Society & Natural Resources* 25:336-351.
- Fox, H. E., et al. 2012. Reexamining the science of marine protected areas: linking knowledge to action. *Conservation Letters* 5:1-10.
- Franklin, J. 1994. *Writing for story*. Plume, New York.
- Gómez, A. E. 2008. *Turismo y sustentabilidad en Cabo Pulmo, Baja California Sur*. San Diego State University, Universidad Autónoma de Baja California Sur, Consejo Nacional de Ciencia y Tecnología, San Diego, CA.
- GCMP (Gulf of California Marine Program). 2011. *World heritage biosphere reserve*. Film. Scripps Institution of Oceanography, La Jolla, California. Available from <https://vimeo.com/40660113> (accessed February 2013).
- Kristof, N. D. 2009. *Nicholas Kristof's advice for saving the world*. Outside, Santa Fe, New Mexico. Available from <http://www.outsideonline.com/outdoor-adventure/Nicholas-Kristof-s-Advice-for-Saving-the-World.html> (accessed February 2013).
- Manomet Center. 2012. *Landbird program*. Manomet Center for Conservation Sciences, Manomet, Massachusetts. Available from <http://www.manomet.org/landbird> (accessed November 2012).
- Olson, R. 2009. *Don't be such a scientist: talking substance in an age of style*. Island Press, Washington, D.C.
- Perrings, C., A. Duraiappah, A. Larigauderie, and H. Mooney. 2011. The biodiversity and ecosystem services science-policy interface. *Science* 331:1139-1140.
- Peterson, G. D., G. S. Cumming, and S. R. Carpenter. 2003. Scenario planning: a tool for conservation in an uncertain world. *Conservation Biology* 17:358-366.

- Redford, K. H., C. Groves, R. A. Medellín, and J. G. Robinson. 2012. Conservation stories, conservation science, and the role of the Intergovernmental Platform on Biodiversity and Ecosystem Services. *Conservation Biology* 26:757–759.
- Redford, K. H., and A. Taber. 2000. Writing the wrongs: developing a safe-fail culture in conservation. *Conservation Biology* 14:1567–1568.
- Roe, E. 1991. Development narratives, or making the best of blueprint development. *World Development* 19:287–300.
- Roe, E. 1994. Narrative policy analysis: theory and practice. Duke University Press, Durham, North Carolina.
- Sáenz-Arroyo, A., C. M. Roberts, J. Torre, M. Cariño-Olvera, and R. R. Enríquez-Andrade. 2005. Rapidly shifting environmental baselines among fishers of the Gulf of California. *Proceedings of the Royal Society B: Biological Sciences* 272:1957–1962.
- Sáenz-Arroyo, A., C. M. Roberts, J. Torre, M. Cariño-Olvera, and J. P. Hawkins. 2006. The value of evidence about past abundance: marine fauna of the Gulf of California through the eyes of 16th to 19th century travelers. *Fish and Fisheries* 7:128–146.
- Salafsky, N., R. Margoluis, K. H. Redford, and J. G. Robinson. 2002. Improving the practice of conservation: a conceptual framework and research agenda for conservation science. *Conservation Biology* 16:1469–1479.
- Sievanen, L. S., R. L. Gruby, and L. M. Campbell. 2013. Fixing marine governance in Fiji? The new scalar narrative of ecosystem-based management. *Global Environmental Change* 23:206–216.
- Smith, B., N. Baron, C. English, H. Galindo, E. Goldman, K. McLeod, M. Miner, and E. Neeley. 2013. COMPASS: Navigating the rules of scientific engagement. *PLoS Biol* 11:e1001552.

