Ecological Policy - Case Studies

by

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About the Author

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Introduction

This book presents a diverse array of ecological policy case studies that represent a cross section of current issues. Many of today's ecological policy issues are politically contentious, socially wrenching, and replete with scientific uncertainty. They are often described as wicked, messy policy problems (*e.g.*, reversing the decline of salmon; deciding on the proper role of wildfire on public lands; what to do, if anything, about climate change; worries about the consequences of declining biological diversity; making sense of the confusing policy choices surrounding notions of sustainability).

The theme of this book is to illustrate how various types of policy controversies can be better understood through commonsense policy analysis. Policy analysis is defined as the formal assessment of the consequences and implications of the possible options or choices for addressing a policy problem.

It is essential for the neophyte policy analyst to recognize that there are many aspects to a case study. Science, although important, is only one of the relevant aspects. In fact, science is rarely the most important factor in dissecting a policy case study. Policy analysis does not have to be analytically complicated or involve sophisticated statistical or scientific examination, but it does require rigorous thought to tease out the core points of conflict. Almost always, the key points of conflict are centered on competing values.

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Week 1 – Backgrounder

Ecological Policy Analysis

Policy Context:

We will consider a diverse set of case studies that represent a cross-section of current ecological policy issues. Before beginning our analysis of each of these complex, divisive, and timely issues, it is essential to describe some general principles about ecological policy <u>analysis</u>.

Many of today's ecological policy issues are politically contentious, socially wrenching, and replete with scientific uncertainty. They often are described as wicked, messy policy problems (*e.g.*, reversing the decline of salmon; deciding on the proper role of wildfire on public lands; what to do, if anything, about climate change; worries about the consequences of declining biological diversity; making sense of the confusing policy choices surrounding notions of sustainability).

Wicked, messy ecological policy problems share several qualities: (1) *complexity* — innumerable options and trade-offs; (2) *polarization* — clashes between competing values; (3) *winners and losers* — for each policy choice, some will clearly benefit, some will be harmed, and the consequences for others are uncertain; (4) *delayed consequences* — no immediate "fix" and the benefits, if any, of painful concessions will often not be evident for decades; (5) *decision distortion* — advocates often appeal to firmly held values and distort or hide the real policy choices and their consequences; (6) *national vs. regional conflict* — national (or international) priorities often differ substantially from those at the local or regional level; and (7) *ambiguous role for science* — science is often not pivotal in evaluating policy options, but science sometimes ends up serving inappropriately as a surrogate for debates over values and preferences.

As if they are not messy enough, ecological policy issues may become further clouded by skepticism about the independence (and credibility) of scientists and scientific information. Much of the available science is provided by government agencies, companies and corporations, and public and private organizations, as well as myriad public and private interest and advocacy groups. Each arguably has a vested interest in the outcome of the debate and typically promulgates "science" that supports its favored position.

KEY DEFINITIONS IN POLICY ANALYSIS

Policy maker: *a person who implements the process of selecting from among the various policy options.   (usually elected or appointed officials)*

_Policy analyst_*: a person who conducts a formal assessment of the consequences and implications of the possible options for addressing a policy problem. (usually government employees, but not always)*

_Policy advocate_*: a person (or organization) active, covert, or inadvertent in support of a policy or class of policies.   (usually private citizen or employee of a nongovernmental organization, but not always)*

_Scientist_*: a person who generates or interprets scientific information or "science." (almost always employees of an organization)*

_Science_*: information gathered in a rational, systematic, testable, and reproducible manner. (contrasts with faith-based information or "traditional" or "experiential" knowledge or "expert" opinion plus others)*

_Normative science_*: information that is developed, presented, or interpreted based on an assumed, usually unstated, preference for a policy or class of policy choices. (often mislabeled as "science")*

_Policy_*: a decision or plan of action for accomplishing the desired outcome.*

_Politics_*: the process of debate, negotiation, and compromise for achieving a desired policy goal.*

_Preference_*: the preferred option from among a set of policy choices or alternatives.*

_Value_*: a core belief that tends to determine or shape personal or group policy preferences.*

_Benefit_*: the "good" things resulting from implementing a policy option; includes monetary elements and intangible and nonmonetary aspects such as cultural, moral, or behavior values. (whether a "thing" is considered to be a benefit or a cost depends on the prevailing policy preference)*

_Cost_*: the "bad" things resulting from implementing a policy option; includes monetary elements as well as intangible and nonmonetary aspects such as cultural, moral, or behavior values. (whether a "thing" is considered to be a benefit or a cost depends on the prevailing policy preference)*

Policy Analysis:

Many of today's ecological policy issues are contentious, socially divisive, and full of conundrums. Many have also been around for many decades and appear to have little chance of "resolution" anytime soon. They are challenging political issues, but are typical of those that professional natural resource and environmental scientists should expect to confront. Those of you who provide or will provide information to help inform the participants involved in ecological policy debates need to be mindful of the importance of scientific information, but watch for its misuse. Further, the reality is that scientific information is just one element in complex political deliberations in a democracy.

Ecological policy analysis can become very complicated very quickly. All ecological policy problems have unique features; thus, there are exceptions to every generality, but are there lessons learned that could be broadly applied? The purpose of this week's topic is to propose a set of such lessons learned. The lessons could be labeled principles, suppositions, empiricisms, doctrines, guidelines, rules, or conventions, but they are structured axioms. Like all axioms, these are not universally true, but are applicable in most situations encountered in analyzing ecological policy issues.

> **Ecological Policy Axiom 1 — The policy and political dynamic has the features of a zero-sum game.**

Probably the most sobering reality for the uninitiated is that selecting any proposed policy choice results in winners and losers. The search for a "win-win" choice, which sounds so tantalizing to decision makers, is hopeless with even superficial policy analysis. In short, there are always winners and losers even though people running for office may try to convince the voters otherwise.

Consider the escalating competition for scarce water resources in many regions of North America (one of our case studies in this course). In areas of expanding human populations and/or expanding economic activity, the competition for water can be brutal. Any policy choice results in a set of winners and another set of losers. The winners and losers may be those in this or future generations, obvious or vague elements of society, or in near or distant regions. The benefits and costs may be monetary and nonmonetary, may be realized immediately or over many years, and are often diffused across many segments of society or concentrated on a few.

As with competition for scarce water, most policy options result in some interest groups getting what they want (or at least most of what they want), others getting little or none of what they want, and still others ending up somewhere in between. In short, the role of the policy analyst is often to *identify* for the policy maker who are the winners and who are the losers. In contrast, the role of the policy maker is to *decide* who wins and who loses.

Searching for the nonexistent, but the ever politically tantalizing win-win solution often ends up frustrating everyone. Except for the most trivial policy issues, compromise is necessary to craft a proposed policy that is democratically (*i.e.,* politically) possible. Thus, ecological policy *functionally* winds up with most of the characteristics of a classic zero-sum game. Accepting this reality encourages serious discussion about how to resolve complex ecological policy issues best. It is also something that analysts must keep in mind as they begin deconstructing a new case study.

> **Ecological Policy Axiom 2 — The distribution of benefits and costs is more important than the ratio of total benefits to total costs.**

Benefits are the consequences of a policy option or decision that are categorized as *good* outcomes. Benefits are sometimes measured solely in terms of money, but are more broadly encompassed by *all* the desirable things that are most likely to happen. Conversely, the costs are the *undesirable* outcomes that are likely to happen (often, but not always, measured in monetary terms).

Complicating ecological policy analysis is that, exclusive of money, one person's *benefits* may be another's *costs*. Preserving a wetland, for example, is a benefit for those wishing to preserve such land in its unaltered condition. Still, such a policy option costs those who wish to ditch and drain the same land to improve agricultural productivity.

To the uninitiated, it may seem that the most crucial factor in decision making is weighing the total benefits against the total costs. However, it is usually the case that the most important factor is the *perception* of who receives the benefits vs. who will bear the costs.

Weighing costs *vs*. benefits is tricky. Because costs and benefits are not merely the measurable things, but include loss of personal freedoms, religious or spiritual preferences, individual rights, etc. Benefits and costs can be categorized as either "real" or "perceived." *Real* benefits and costs are the things that analysts are keen to measure, mostly because they *can* be measured. *Perceived* benefits and costs, however, are the things that people mostly weigh in

determining their position on a particular policy issue. They are arguably *impossible* to measure with much confidence.

> **Ecological Policy Axiom 3** — **The most politically viable policy choice spreads the benefits to a broad majority with the costs limited to a narrow minority of the population.**

Democracies theoretically operate on delegated compromise validated by periodic voting. To gain sufficient political support (votes) for a proposed policy, it is prudent for the decision maker to spread the benefits across a sufficiently large number of people to garner majority support. The corollary is that those (including future generations) who bear the costs should be a minority — and the smaller, the better.

In the political dialog, the narrowly-defined minority is often labeled pejoratively as a "special interest" or some other term meant to isolate the group from the majority and weaken the force of its argument.

Consider the question of whether a particular dam should be removed to help restore native aquatic species. Almost assuredly, the policy debate is framed as a conflict between the *general* interests of society (e.g., providing reliable electricity, protecting native species, or maintaining cheap barge transportation) vs. *special* interests (e.g., greedy electric power companies, elite environmentalists, or corporate grain farmers). To market their policy preference, proponents will try to couch their choice as that of the majority (mainstream) and the opponent's position as being that of a small minority (special interest).

None of these policy advocacy tactics necessarily are wrong, immoral, or unethical, but rather reflect the nature of the democratic debate. Those involved in policy analysis or providing science to help inform policy debates, however, should be attuned to such tendencies.

> **Ecological Policy Axiom 4** — **Potential losers are usually more assertive and vocal than potential winners and are, therefore, disproportionately important in decision making.**

With many ecological policy questions, those who bear the costs, the losers, have a disproportionately more significant influence on the decision-making process. While policy analysis tends to evaluate the rationality of competing policy arguments, the political process tends to weigh the extent and depth of support for each competing policy option. Issues of

perceived fairness are important in the political process, but difficult to quantify in policy analysis.

For example, consider the possible listing (under the U.S. Endangered Species Act or the Canadian Species at Risk Act) of a fish species found only in a relatively small geographical area. Except for committed preservationists, most people see the issue as not pivotal, although they may philosophically support species preservation in general. In contrast, those whose land and livelihood will be adversely affected are likely to be aggressively hostile to the proposed listing.

> **Ecological Policy Axiom 5 — Many advocates will cloak their arguments as science to mask their personal policy preferences.**

Technocrats, as I apply the label, are individuals with scientific training who are responsible for implementing law or ecological policy. There is an understandable impulse by technocrats to insert what they *think* is or *should* be the appropriate public policy goal or option. For example, should ecological restoration be aimed at recreating the ecological condition that existed at the beginning of the Holocene, just before 1492, or at the end of last week? The answer requires making a value judgment — a policy choice which is necessarily a political judgment — and it is not a scientifically derived decision. Ecologists and other scientists should assess the feasibility and ecological consequences of achieving each possible restoration target. Selecting from among the choices, however, is a societal enterprise.

Similarly, notions of *degraded* or *damaged* ecosystems, the metaphors of *ecosystem health* or *biotic integrity*, or the relative importance ascribed to *natural* conditions vs. *altered* conditions need to be calibrated by societal values and preferences, not by those offered by scientists and technocrats. For example, one person's "damaged" ecosystem is another person's "improved" ecosystem. A "healthy" ecosystem can be either a malarial swamp or the same land converted to an intensively managed rice paddy. Neither can be seen as objectively "healthy" except through the lens of an individual's values and preferences.

Those of us who work in applied ecology must always be on guard against the incursion of normative science into our scientific language and thought. Normative science has built-in, often subtle, policy preferences and biases. Referring to an ecosystem as being "sick" or "healthy" is predicated on a value judgment that one state of that ecosystem is preferable to another. Such a diagnosis may be appropriate as personal or collective policy judgments, but should not be offered under the guise of providing policy neutral science.

Scientists should, as they often do, play an important role in ecological policy deliberations. However, their role should be carefully circumscribed even though political institutions rarely provide clear boundaries or guidance. Some players in policy deliberations, unfortunately, along with much of the public, remain ignorant as to what actually constitutes scientific information *vs.* what is a policy preference that sounds like science.

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<u>Ecological Policy Axiom 6</u> — Even with complete and accurate scientific information, most policy issues remain divisive.

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The lament that "if we just had some better science, we could resolve this policy question" is common among scientists and decision makers. Calls for more research are ubiquitous in ecological policy debates.

In most policy cases, even if we had complete scientific knowledge about all aspects of an issue, the same rancorous debate would emerge. Root policy differences are invariably over values and preferences, not science and facts.

Consider, for example, the ongoing debate over the management of U.S. public forests. Nearly every faction supports the policy goal of managing to achieve "forest health" or perhaps "ecosystem health." Many policy advocates and scientists assert that the path to achieving a healthy forest would be clear if we understood the underlying science. Thus, there are regular calls for more research, but all the science in the world will not resolve the "healthy" forest debate because, fundamentally, it is a clash of conflicting values.

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<u>Ecological Policy Axiom 7</u> — Demonizing policy advocates supporting competing policy options is often more effective than presenting rigorous analytical arguments.

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Scientists and policy analysts become frustrated when they fail to recognize that political debates are partly logical arguments, but somewhat efforts to create competing images. Negative images are often considered more effective in swaying people than positive ones.

In fractious ecological policy debates, proponents often spend more energy demonizing their opponents than sticking to rational policy analysis. My experience is that such tactics are often effective in policy debates; negative arguments move many people.

Consider salmon recovery in western North America (one of our case studies). No one has ever argued that we *ought* to eradicate salmon. The conflict is over which of the myriad competing human priorities is most important — food, electricity, water, transportation, fishing, or a host of others. To label proponents of abundant electricity, efficient farming, cheap transportation, or consumptive fishing as "enemies of salmon" is unfair in policy debates. Instead, each policy choice or priority tends to constrain others.

> **Ecological Policy Axiom 8** — **If something can be measured accurately and with confidence, it is probably not particularly relevant in decision making.**

In my experience, most scientists prefer to talk about things that they can measure with some degree of confidence. Fish population abundance, recruitment rates, optimal habitat, toxicity levels, and field surveys are within our comfort zone. We can put confidence limits on these numbers; we can duplicate the data gathering year after year; we can often forecast future conditions with some degree of confidence.

In contrast, to policy makers the most important factors cannot be quantified or at least not quantified credibly. Examples of such unquantifiable but essential factors are weighing the relative importance of electricity *vs*. the well-being of threatened species, balancing a thriving farming sector *vs*. maintaining viable populations of carnivores (*e.g*., wolves and cougars), or sustaining a high degree of personal mobility *vs*. a high level of air quality through emission regulations on automobiles.

The disconnect between what matters most to policy makers and what can be measured by scientists is a reality that scientists should recognize. That reality will not likely change in the foreseeable future. In a pluralistic society, with a wide array of values and preferences competing for dominance, the ecological policy debate is usually centered around whose values and preferences will carry the day rather than over scientific information. Scientific information, as necessary and visible in policy debates as it often is, remains but one element in policy debates and is often a minor one.

In my experience, many citizens get frustrated in ecological policy debates because the advocates of various competing choices often seem to argue over semantic nuances rather than getting on with making decisions. The precise meaning ascribed to keywords is important and is often the battleground over what policy option is ultimately selected.

The debate over definitions of keywords often ends up as a substitute for an explicit debate over the driving values and preferences. How should pivotal (and contested) words be used in science and policy, especially common but highly ambiguous and emotive words such as:

Words to Avoid Unless the Definition if Precisely Provided:

- ecosystem health
- healthy, sick
- sustainability
- degraded, improved
- biological integrity
- endangered
- at-risk
- pristine
- fragile, resilient
- disturbance
- balance, unnatural
- dominance
- alien species
- invasive species
- native species
- wild
- ecological justice
- social justice
- impaired, unhealthy
- fair, just

Definitions chosen will lead (at least in the mind of the uninformed) to a particular policy option. Thus, the debate over what might appear to be semantic nuances is a surrogate debate over values and policy preferences.

The term "biological integrity" is a case in point. It is a term included in some environmental statutes, although the meaning is ambiguous. Integrity is often defined as the status of a biotic condition relative to a pristine ecological state (unaffected by humans) or as close to a "pristine" state as can be found. Therefore, ecosystems with higher biotic integrity are closer to the pristine condition (unaltered), and those with lower biotic integrity are different (altered). So far, no policy preference has been explicitly stated, but what happens in general discussions when an ecosystem is described as having high biotic integrity? Most listeners undoubtedly *assume* that such a condition must be a good thing and that pristine ecosystems must be inherently more desirable than altered ecosystems. This leap of interpretation cannot be made unless ecosystems closer to the pristine condition are *assumed* to be preferable or more desirable. Nothing in the science or technical analysis says that high or low biotic integrity is inherently preferable.

Because specific words tend to help support one particular policy preference, participants in policy debates devote considerable energy to getting their definitions adopted.

Points to Consider in Ecological Policy Analysis:

For all ecological policy issues that we will consider, you should try to determine the position or perspective of both advocates and scientists. I have selected two different views for each policy case study. Sometimes either or both will be transparent in his policy "angle" — sometimes not. For some advocates, there will be no angle or spin, just an effort to convey information to help sell the preferred policy preference. More commonly, it will be difficult to separate subtle policy advocacy from policy neutral information — that will be one of your main challenges each week.

For each policy topic (two perspectives presented), here are some generic questions to keep in mind:

1. *What is the explicit goal of any stated policy, management strategy, or approach? Is the goal clearly stated or do you have to infer it? How will success be measured?*

2. *Who is making policy decisions (courts, Federal agencies, state agencies, Indian tribes, or some other entity)?*

3. *Are there more efficient policies for resolving the policy conflicts than those proposed by either advocate? Were these options presented or acknowledged?*

4. *Was there a convincing argument that any of the proposed options or plans would achieve the stated goal? Do the writers/advocates seem to believe that their policy options accomplish the stated goal?*

5. *How much of a role did scientific information play in evaluating alternative policy options in this particular case study? Is the issue pretty much a clash of values or do scientific questions dominate it?*

6. *Are the advocates honest about the "facts of the case," or are they spinning toward or in favor of a particular policy perspective?*

7. *Is the material under review an example of symbolic politics (talking about symbols or surrogates rather than the real issues)? Are the public and politicians being misled by scientists?*

8. *Is the Federal Government (or some other organization) really in charge of the policy issue or is it being swept along by other power centers? If the Federal Government is not in control, is anyone, and, if so, who?*

9. *How should the "best available scientific information" be determined? In the context of the policy issue being addressed, precisely what is the best available science?*

10. *How did the description of the specific policy issue being presented accommodate the 4 or 5 times more people expected in California and the Pacific Northwest by 2100? Did the two advocates explicitly address this issue? If it was omitted in presenting the information, was this done so intentionally?*

References:

Alario, Margarita, and Michael Brun. 2001. Uncertainty and controversy in the science and ethics of environmental policy making. *Theory and Science*. 2(1): 1527-1558.
http://theoryandscience.icaap.org/content/vol002.001/02alariobrun.html

Aschwanden, Christie. 2006. Is it or isn't it (just another mouse)? *High Country News*. 38(14): 12-17.
http://www.hcn.org/issues/327/16445

Baker, Susan, and Katarina Eckerberg. 2013. A policy analysis perspective on ecological restoration. *Ecology and Society*. 18(2): 17.
https://www.ecologyandsociety.org/vol18/iss2/art17/

Batie, Sandra S. 2005. The demand for economic policy analysis: is anyone listening? *Agricultural and Resource Economics Review*. 34(2): 123-130.
file:///C:/Users/User/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/34020123%20(1).pdf

Chivers, Tom. 2018. Why flawed science should concern all of us. *UnHerd online*.
https://unherd.com/2018/02/flawed-science-concern-us/

Cortner, Hanna J. 2000. Make science relevant to environmental policy. *Environmental Science and Policy*. 3: 21-30.
https://www.sciencedirect.com/science/article/pii/S1462901199000428

Crow, Deserai, and Michael Jones. 2018. Narratives as tools for influencing policy change. *Policy and Politics*. 46(2): 217-234.
https://www.ingentaconnect.com/content/tpp/pap/2018/00000046/00000002/art00003

Foster, Kenneth R., Paolo Vecchia, and Michael H. Repacholi. 2000. Risk management: science and the precautionary principle. *Science*. 288 (5468): 979-981.
http://www.gene.ch/genet/2000/May/msg00055.html

Giles, Jim. 2003. The man they love to hate. *Nature*. 423 (6937): 216–218.
https://www.nature.com/articles/423216a.pdf

Haller, Stephen F., and James Gerrie. 2007. The role of science in public policy: higher reason, or reason for hire? *Journal of Agricultural and Environmental Ethics*. 20(2): 139–165.
https://link.springer.com/article/10.1007%2Fs10806-006-9027-4

Hoope, Robert. 1999. Policy analysis, science, and politics: from 'speaking the truth to power' to 'making sense together.' *Science and Public Policy*. 26(3): 201-210.
http://www.cddc.vt.edu/tps/e-print/s&pparticle.pdf

Horton, Cristi C., Tarla Rai Peterson, Paulami Banerjee, and Markus J. Peterson. 2016. Credibility and advocacy in conservation science. *Conservation Biology*. 30(1): 23-32.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4758414/

Jamieson, Dale. 2006. An American paradox. *Climatic Change*. 77: 97-102.
http://hettingern.people.cofc.edu/Environmental_Philosophy_Sp_09/Jamieson_American_Paradox.pdf

Kok, M. T. J., and H. C. de Coninck. 2007. Widening the scope of policies to address climate change: directions for mainstreaming. *Environmental Science and Policy*. 10: 587-599.
https://www.sciencedirect.com/science/article/pii/S1462901107000792

Kotcher, John E., Teresa A. Myers, Emily K. Vraga, Neil Stenhouse, and Edward W. Maibach. 2017. Does engagement in advocacy hurt the credibility of scientists? Results from a randomized national survey experiment. *Environmental Communication*. 11 (3): 415-429.
https://www.eenews.net/assets/2017/02/27/document_gw_02.pdf

Kuntz, Marcel.   2012. The postmodern assault on science: if all truths are equal, who cares what science has to say? *EMBO Reports.* 13(10): 885-889.
file:///D:/LACKEY%20-%20FW%20620%20Articles%20-%20Winter%20-%202020/Kuntz%20(2112)%20-%20The%20postmodern%20assault%20on%20science.pdf

Lackey, Robert T. 2004. Normative science. *Fisheries*. 29(7):38-39.
http://blogs.oregonstate.edu/lackey/files/2017/07/2004c-Normative-Science-Reprint-Lackey.pdf

Lackey, Robert T. 2006. Axioms of ecological policy. *Fisheries*. 31(6): 86-290.
http://blogs.oregonstate.edu/lackey/files/2017/07/2006f-Axioms-of-Ecological-Policy-Reprint-Lackey.pdf

Lackey, Robert T. 2007. Science, scientists, and policy advocacy. C*onservation Biology*. 21(1): 12-17.
http://blogs.oregonstate.edu/lackey/files/2017/07/2007a-Science-Scientists-and-Policy-Advocacy-Reprint-Lackey-1.pdf

Lackey, Robert T. 2016. Keep science and scientists credible: avoid stealth policy advocacy. *Bulletin of the Ecological Society of Australia.* 46(3): 14-15.
http://blogs.oregonstate.edu/lackey/files/2017/07/Keep-Science-and-Scientists-Credible.pdf

Martino, Joseph P. 2003. Science and public policy. Chapter 3. In: *Politicizing Science: The Alchemy of Policymaking*, Michael Gough, editor. Hoover Press, pp. 73-89.
http://media.hoover.org/documents/0817939326_73.pdf

Mills, Thomas J., Thomas M. Quigley, and Fred J. Everest. 2001. Science-based natural resource management decisions: what are they? *Renewable Resources Journal.* 19(2): 10-15.
https://www.fs.fed.us/pnw/pubs/journals/pnw_2001_mills001.pdf

Nelson, Michael P., and Vucetich, John A. 2009. On advocacy by environmental scientists: what, whether, why, and how. *Conservation Biology.* 23(5): 1090-1101.
http://www.aerinjacob.ca/uploads/1/0/5/5/10559030/nelson_and_vucetich_2009_cons_biol.pdf

Oreskes, Naomi. 2004. Science and public policy: what's proof got to do with it? *Environmental Science and Policy*. 7: 369-383.
https://sciencepolicy.colorado.edu/publications/special/oreskes_science_and_public_policy.pdf

Pielke, Roger A. 2004. When scientists politicize science: making sense of controversy over "The Skeptical Environmentalist." *Environmental Science and Policy*. 7: 405-417.
http://sciencepolicy.colorado.edu/admin/publication_files/resource-1621-2004.18.pdf

Rayner, Steve. 2003. Democracy in the age of assessment: reflections on the roles of expertise and democracy in public-sector decision making. *Science and Public Policy.* 30(3): 163–170.
https://cspo.org/legacy/library/090717F1GL_lib_RaynerDemocracyi.pdf

Robert, Christopher, and Richard Zeckhauser. 2011. The methodology of normative policy analysis. *Journal of Policy Analysis and Management.* 30(3): 613-643.
https://www-jstor-org.ezproxy.proxy.library.oregonstate.edu/stable/pdf/23018967.pdf?refreqid=excelsior%3A2a78b5c0c4fa7388ee9f1d039af78368

Ruggiero, Leonard F. 2010. Scientific independence and credibility in sociopolitical processes. *Journal of Wildlife Management*. 74(6): 1179-1182
https://wildlife.onlinelibrary.wiley.com/doi/abs/10.1111/j.1937-2817.2010.tb01237.x

Rosenstock, Linda, and Lore Jackson Lee. 2002. Attacks on science: the evidence-based policy. *American Journal of Public Health*. 92(1): 14-18.
http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1447376

Ryan, Clare M., and Sara M. Jensen. 2002. Scientific, institutional, and individual constraints in restoring Puget Sound rivers. IN: *Restoration of Puget Sound Rivers*. David R. Montgomery, Susan M. Bolton, Derek B. Booth, and Leslie Wall, editors. University of Washington Press.
https://rd.springer.com/chapter/10.1007%2F978-0-387-73412-5_42

Sarewitz, Daniel. 2004. How science makes environmental controversies worse. *Environmental Science and Policy*. 7: 385-403.
http://sciencepolicy.colorado.edu/publications/special/sarewitz_how_science_makes_environmental_controversies_worse.pdf

Sarewitz, Daniel. 2006. Liberating science from politics. *American Scientist*. 94(2): 104-106.
https://cspo.org/legacy/library/100526F3GU_lib_LiberatingScienc.pdf

Scharpf, Christopher. 2000. Politics, science, and the fate of the Alabama Sturgeon. *American Currents*. 23(6): 6-14.
http://www.nanfa.org/articles/pdf/alabamasturgeon.pdf

Scott, J. Michael, Janet L. Rachlow, Robert T. Lackey, Anna B. Pidgorna, Jocelyn L. Aycrigg, Gabrielle R. Feldman, Leona K. Svancara, David A. Rupp, David I. Stanish, and R. Kirk Steinhorst. 2007. Policy advocacy in science: prevalence, perspectives, and implications for conservation biologists. *Conservation Biology*. 21(1): 29-35.
http://blogs.oregonstate.edu/lackey/files/2017/07/Policy-Advocacy-in-Science-Prevalence-Perspectives-and-Implications.-.pdf

Sisk, Thomas D., Gerald Singh, Jordan Tam, Kai M. A. Chan, Sarah Klain, Megan Mach, and Rebecca Martone. 2011. Barriers and incentives to engagement in public policy and science-based advocacy. *Bulletin of the Ecological Society of America*. 92(3): 276-280.
www.jstor.org/stable/bullecosociamer.92.3.276

Steel, Brent, Peter List, Denise Lach, and Bruce Shindler. 2004. The role of scientists in the environmental policy process: a case study from the American west. *Environmental Science and Policy.* 7: 1–13.
https://www.sciencedirect.com/science/article/pii/S1462901103001400

Sullivan, Patrick J., James M. Acheson, Paul L. Angermeier, Tony Faast, Jean Flemma, Cynthia M. Jones, Eric E. Knudsen, Thomas J. Minello, David H. Secor, Robert Wunderlich, and Brooke A. Zanetell. 2006. Defining and implementing best available science for fisheries and environmental science, policy, and management. *Fisheries*. 31(9): 460-465.
https://fisheries.org/docs/policy_science.pdf

Sutherland, William J., David Spiegelhalter, and Mark A. Burgman. 2013. Twenty tips for interpreting scientific claims. *Nature*. 503 (7476): 335-337.
https://www.nature.com/news/policy-twenty-tips-for-interpreting-scientific-claims-1.14183

Trudgill, Stephen T. 2001. Psychobiogeography: meanings of nature and motivations for a democratized conservation ethic. *Journal of Biogeography.* 28: 677-698.
https://onlinelibrary.wiley.com/doi/full/10.1046/j.1365-2699.2001.00593.x

Tyler, Chris. 2013. Top 20 things scientists need to know about policy-making. *TheGuardian.com*. December 2.
https://www.theguardian.com/science/2013/dec/02/scientists-policy-governments-science

Wagner, Frederic H. 1999. Values, science, and policy: how best to serve the national parks. *The George Wright Forum*. 16(3): 52-62.
http://www.georgewright.org/163wagner.pdf

Vraga, Emily, Teresa Myers, John Kotcher, Lindsey Beall, and Ed Maibach. 2018. Scientific risk communication about controversial issues influences public perceptions of scientists' political orientations and credibility. *Royal Society of Open Science*.   5: 170505.
https://royalsocietypublishing.org/doi/pdf/10.1098/rsos.170505

Wikipedia. 2020. Normative science.
http://en.wikipedia.org/wiki/Normative_science

Wikipedia. 2020. Policy advocacy.
http://en.wikipedia.org/wiki/Policy_advocacy

Wikipedia. 2020. Policy analysis.
https://en.wikipedia.org/wiki/Policy_analysis

Wilhere, George F. 2008. The how-much-is-enough myth. *Conservation Biology*. 22(3): 514-517.
https://blogg.jagareforbundet.se/wp-content/uploads/2011/01/Wilhere-08-how-much-is-enough.pdf

Wilhere, George T. 2012. Inadvertent advocacy. *Conservation Biology*. 26(1): 39-46.
https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/j.1523-1739.2011.01805.x

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Week 2 – Backgrounder
Wildfire Policy

Policy Context:

One of the most challenging questions facing managers of public lands is developing a scientifically sound and publicly supported policy toward wildfire — one that meets society's goals for those lands and correct scientific information. The range of opinion is wide on what characteristics the desired policy should have. Some argue that wildfires, at least the naturally caused ones, ought to be allowed to burn. Conversely, others say that public lands, especially public forests, ought to be aggressively managed (including significantly reducing the number and severity of wildfires) for multiple benefits, including a steady and reasonably priced supply of wood and fiber. Between these two extremes, there are many intermediate policy perspectives.

Traditionally and over the past century, Federal and state land management agencies generally supported aggressive fire suppression programs. Some policy advocates argue that wildfire suppression only exacerbated the risks of catastrophic fire caused by intensive industrially-oriented management of public lands. Partly in response to such criticism, coupled with a variety of court challenges associated with endangered species issues, over the past several decades, agencies have generally reduced the vigor of their fire suppression programs. Many fires are now *not* aggressively fought, but instead allowed to burn unless there is a threat to life or property.   As a consequence, others argue, public forests are at even higher risk of catastrophic wildfires — and something needs to be done to reduce that risk. Prescribed burning may help, they argue, but an aggressive program to reduce fuel load through tree removal is essential if the risk is to be appreciably reduced.

Complicating any discussion of wildfire policy on public lands is the fact that such lands have extremely diverse ecological characteristics and thus have different importance to society. For example, arid interior grasslands face very different fire risks than coastal forests of the

Pacific Northwest. The legal mandates of public lands are also highly diverse. Wilderness areas have very different goals than state forests that legally must be managed to provide sustainable and predictable income to local schools through timber sales. State and Federal parks offer yet more challenges in developing fire policy. Yellowstone National Park, for example, faces very different fire policy challenges than a "forest" within the Portland or Seattle urban growth boundary.

The demographics of wildfire policy are also challenging. Some rural communities are largely dependent on a vibrant timber industry. Providing a sustainable supply of logs from public lands has long been one of the stated goals of public policy. In contrast, many from urban communities view the public forests as resources for pursuing recreational activities. The uneasy compromise is the goal of "multiple use" or the greatest good for the greatest number. Any fire policy must account for such divergent perspectives on the proper role of public forests.

Few argue that the forests and rangelands of the West (and elsewhere) continue to be threatened by catastrophic fires. Hundreds of millions of trees are killed each year by severe wildfires. Most scientists who study the issue conclude that these unnaturally extreme fires are caused by more than a century of land management that emphasized fire suppression.

Recent fire seasons in California, Oregon, Washington, and British Columbia and elsewhere have been among the worst in recent history. However, the massive coastal forest fires of the mid-1800s and the famous Pacific Northwest interior forest fires of the early 1900s are legendary in size and intensity. Annually, for the past several years, millions of acres of public and private land have burned. Hundreds of communities are annually affected by wildfires. It has become routine for tens of thousands of people to be evacuated from their homes. With more people living near forests and rangelands, it is becoming increasingly difficult to protect people and their homes from wildfire. Therefore, it is often argued, land managers must do more to address the underlying *causes* of these fires rather than just fight them after they start.

Many aspects of the scientific understanding of wildfire are broadly accepted. For example, public forests in the United States have undergone radical changes during the last century due to the suppression of fires and, in some cases, a lack of active forest and rangeland management. Frequent, low-intensity fires play an essential role in suppressing the massive, catastrophic fires by reducing the buildup of fuels. Natural, low-intensity fires burn smaller trees and undergrowth while leaving large trees generally intact. Natural fires tend to maintain natural plant succession cycles and tend to prevent the spread of nonnative plant species.

What people refer to as "fuels" have accumulated so significantly that fires no longer burn at "natural" temperatures or rates. Catastrophic wildfires can grow extremely quickly and are often difficult to control if they are not stopped immediately.

Most wildfire policy addresses efforts to reduce the buildup of fuels. Typically, such efforts get entangled in lawsuits because other policy priorities (usually associated with endangered or threatened species) are not given sufficient weight in the eyes of proponents. Depending on the policy perspective adopted, such lawsuits are an example of "democracy in action" or "needless obstructionism" that blocks the resolution of what everyone regards as a major ecological policy issue.

One factor that is often overlooked in defining the "natural" condition of a forest or grassland is the extent to which indigenous populations used fire to shape their surrounding environment. For example, long before European settlements were established in what is now the United States, large aboriginal populations were flourishing in the Mississippi Valley. In part, they actively managed (i.e., using fire) forests to maximize nut production. In many other places, indigenous populations used fire to keep forests from encroaching into grasslands. Such common land-use practices make defining the characteristics of a "natural" or "pristine" forest problematic.

Policy Analysis:

Based on the two perspectives presented this week, you should determine each of their positions on the following aspects of wildfire policy on public lands:

11. *What is the goal of current fire policy in U.S. Forests and similar landscapes? Did each author clearly state his goals, or did you have to infer them? How will policy success be measured?*

12. *Did the authors make convincing arguments that any of their proposed policy options will achieve the stated goal? Did they seem to believe what they are pitching themselves? What axioms jumped out at you?*

13. *Who is making policy decisions (i.e., courts, Federal agencies, state agencies, Indian tribes, or someone else)? Were the authors honest about assessing the reality of the situation?*

14. *Are there more efficient policies for resolving conflicts over wildfire policy? Were these options presented or acknowledged?*

15. *How much of a role did scientific information play in evaluating alternative policy options? Is the wildfire policy debate mostly a clash of values, or do scientific questions dominate?*

16. *Are they leveling about the "facts of the case," or are they spinning toward a particular policy perspective?*

17. *Was either paper an example of "symbolic politics" in that policy makers resort to using symbols rather than coming to grips with the main policy issues? Are the public and politicians being misled by scientists in wildfire policy debates?*

18. *Is the Federal Government (or other governments) really in charge of the wildfire policy issue, or is it being swept along by other power centers? If the Federal Government is not in control, is anyone, and, if so, who?*

19. *Should the development of a national wildfire policy have been handled differently? Would the divisive debates and court confrontations have been less if so?*

20. *Check on relevant background reading regarding the controversy surrounding a College of Forestry publication at Oregon State University (2006 paper under References at the end of this Backgrounder). What is your take on the debate over the policy neutrality of the OSU College of Forestry about whether and how to harvest trees after a massive wildfire? Does the College have a preferred policy option, or is it providing policy-relevant science? Did you identify any normative science?*

References:

American Forest Foundation. 2016. *Southern Wildlife at Risk: Family Forest Owners Offer a Solution*. Report, American Forest Foundation, Washington, DC, 31 pp.
https://www.forestfoundation.org/stuff/contentmgr/files/1/7947a526cb2ff17daec756b86b866549/misc/aff_southernreport_web.pdf

Balch, Jennifer K., Bethany A. Bradley, John T. Abatzoglou, R. Chelsea Nagy, Emily J. Fusco, and Adam L. Mahood. 2017. Human-started wildfires expand the fire niche across the United States. *Proceedings of the National Academy of Sciences.* 114(11): 2946-2951.
http://www.pnas.org/content/114/11/2946.short?rss=1

Brown, Hutch. 2008. American Indian fire use: policy implications of the debate. Fire Management Today. 68(1): 33-39.
https://naldc-legacy.nal.usda.gov/naldc/download.xhtml?id=17457&content=PDF

Busenberg, George. 2004. Wildfire management in the United States: the evolution of a policy failure. *Review of Policy Research.* 21(2): 145-156.
http://faculty.washington.edu/stevehar/Busenberg2004.pdf

Calkin, David E., Jack D. Cohen, Mark A. Finney, and Matthew P. Thompson. 2014. How risk management can prevent future wildfire disasters in the urban-wildland interface. *Proceedings of the National Academy of Sciences*. 111(2): 746-751.
http://doi.org/10.1073/pnas.1315088111

Chaundy, Rosalind and Tim Gray. No Date. *Forests, fires, and logging: setting the record straight. Forest Ecology Series Fact Sheet #2.* Wildlands League.
http://wildlandsleague.org/attachments/Forests,Fires,%20Logging.pdf

Cohen, Jack. 2008. The wildland-urban interface fire problem: a consequence of the fire exclusion paradigm*. Forest History Today.* 38(Fall): 20-26.
https://foresthistory.org/wp-content/uploads/2016/12/Cohen_wildland-urban-interface-fire-problem.pdf

Dombeck, Michael P., Jack E. Williams, and Christopher A. Wood. 2004. Wildfire policy and public lands: integrating scientific understanding and social concerns across landscapes. *Conservation Biology*. 18(4): 883-889.
https://www.frames.gov/catalog/20146

Donovan, Geoffrey H. and Thomas C. Brown. 2005. *Wildfire Management in the U.S. Forest Service: A Brief History.* National Hazards Observer. XXIX(6): 1-3.
http://www.fs.fed.us/pnw/pubs/journals/pnw_2005_donovan003.pdf

Ecological Society of America. 2002. *Fire Ecology*. Fact Sheet.
https://www.esa.org/esa/wp-content/uploads/2012/12/fireecology.pdf

Harden, Blaine. 2004. Salvage logging a key issue in Oregon: Bush plan to aid forests after wildfires draws criticisms. *Washington Post* (October 15).
http://www.washingtonpost.com/wp-dyn/articles/A33571-2004Oct14.html

Lueck, Dean, and Jonathan Yoder. 2016. Clearing the smoke from wildfire policy: an economic perspective. *PERC Policy Series*. No. 56: 1-39.
https://www.perc.org/wp-content/uploads/old/pdfs/PS-56-WEB%20final.pdf

McQuillan, Lawrence, Hayeon Carol Park, Adam B. Summers, and Katherine Dwyer. 2019. *California Wildfires: Key Recommendations to Prevent Future Disasters*. Independent Institute.
https://www.independent.org/pdf/briefings/2019_06_25_cagf_summer_2019.pdf

Oregon State University. 2006. Debate continues on post-wildfire logging, forest regeneration. *ScienceDaily*.
http://www.sciencedaily.com/releases/2006/08/060828074840.htm

O'Toole, Randal. 2007. The perfect firestorm: bringing Forest Service wildfire costs under control. *Policy Analysis*, No. 591.
http://www.cato.org/pubs/pas/pa591.pdf

Phillips, Anna M. 2019. The West has many wildfires, but too few prescribed burns, study finds. *Los Angeles Times*.
https://www.latimes.com/politics/la-na-pol-wildfire-mitigation-prescribed-burn-west-20190529-story.html

Pielke, Roger A. 2020. *The inconvenient facts on Australian bushfires*. Forbes.com. January 14.
https://www.forbes.com/sites/rogerpielke/2020/01/14/the-inconvenient-facts-on-australian-bushfires/#3b598f145944

Radeloff, Volker C., David P. Helmers, H. Anu Kramer, Miranda H. Mockrin, Patricia M. Alexandre, Avi Bar-Massada, Van Butsic, Todd J. Hawbaker, Sebastián Martinuzzi, Alexandra D. Syphard, and Susan I. Stewart. 2018. Rapid growth of the U.S. wildland-urban interface raises wildfire risk. *Proceedings of the National Academy of Sciences*. 115(13): 3314-3319.
https://www.pnas.org/content/115/13/3314

Shellenberger, Michael. 2019. Why Everything They Say About California Fires — Including that Climate Matters Most — Is Wrong. *Forbes.com*. November 4.
https://www.forbes.com/sites/michaelshellenberger/2019/11/04/why-everything-they-say-about-california-fires--including-that-climate-matters-most--is-wrong/#4bf6b0814cb6

Schick, Tony, and Jes Burns. 2018. Efforts to reduce wildfire fall short, buck science. *Oregon Public Broadcasting*, EarthFix, July 24.
https://www.opb.org/news/article/west-wildfire-risks-fuels-treatment-thinning-burning/

Schoennagel, Tania, Jennifer K. Balch, Hannah Brenkert-Smith, Philip E. Dennison, Brian J. Harvey, Meg A. Krawchuk, Nathan Mietkiewicz, Penelope Morgan, Max A. Moritz, Ray Rasker, Monica G. Turner, and Cathy Whitlock. 2017. Adapt to more wildfire in western North American forests as climate changes. *Proceedings of the National Academy of Sciences*. 114(18): 4582–4590.
https://www.pnas.org/content/pnas/114/18/4582.full.pdf

Society of American Foresters. 2019. *Wildland Fire Management: A Position Statement.* Society of American Foresters Web Site.
file:///C:/Users/User/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/Wildland%20Fire%20Management%20Final%20April%202019%20(1).pdf

Thompson, Matthew P., Donald G. MacGregor, Christopher J. Dunn, David E. Calkin, John Phipps. 2019. Rethinking the wildland fire management system. *Journal of Forestry*. 116(4): 382-390.
https://academic.oup.com/jof/article/116/4/382/5035163

Trail, Pepper. 2006. Of salvage logging and salvation. *High Country News*.
https://www.hcn.org/issues/337/16765

Wikipedia. 2020. *Wildfire.*
http://en.wikipedia.org/wiki/Wildfire

Wood, Jonathon. 2018. *Solving the wildfire crisis requires free-market solutions: harnessing market powers to improve wildfire management*. Property and Environment Research Center (PERC).
https://www.perc.org/2018/11/26/solving-the-wildfire-crisis-requires-free-market-solutions/

Zhang, Jianwei, Jeff Webster, Robert F. Powers, and John Mills. 2008. Reforestation after the Fountain Fire in northern California: an untold success story. *Journal of Forestry*. 106(8): 425-430.
https://www.fs.fed.us/psw/publications/zhang/psw_2008_zhang002.pdf

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Week 3 – Backgrounder
Water Policy

Policy Context:

Many rivers in western North America suffer from severe water shortages, especially for high-quality water. Our seemingly insatiable demand for freshwater, coupled with a rapidly rising regional and overall human population, shows little sign of letting up, nor do most analysts expect much change anytime soon.

Consider the Klamath Basin as a case study. In the early 1900s, California and Oregon ceded wetlands in the Klamath Basin to the Federal Government, allowing the Bureau of Reclamation to reclaim these wetlands for farming (known as the Klamath Project). Starting in 1906 and over many years, much of the Klamath wetlands were drained and then offered for World War I and II veterans as homesteads along with irrigation rights. Ownership of the land and a legal right to a specified amount of irrigation water was unchallenged through most of the past century. The Klamath Project was often offered as an example of converting "worthless" land into "productive" land, stimulating considerable economic activity and job creation in the Basin, and creating a reliable tax base.

The policy context changed toward the end of the 20th century. The U.S. Fish and Wildlife Service in 1988 listed two species of suckers under terms of the Endangered Species Act. Two populations of Coho salmon were also listed as being at-risk in 1997. In 2001, the Bureau of Reclamation announced that water would not be available from Upper Klamath Lake for irrigation to farms in the Klamath Project. Severe conflict ensued, and the on-going conflict has become widely known as the "Klamath Water War." The competing advocates for the Basin's waters continue to be locked in a fierce battle ever since.

Whether allocating water for at-risk aquatic species, swimming pools, hay fields, or lawns is more important than allocating it for alternative uses is contentious.   As competition for scarce water continues and gets much more intense, how will the various policy advocates

fare relative to advocates for competing priorities such as domestic users, irrigation, manufacturing, electricity generation, ski resorts, or for any of a thousand other needs?

The on-going water war in the Klamath Basin gives us an indication of the future: farmers defying law enforcement agents; illegally opening locked valves and releasing water to irrigate their fields; streams with many dying salmon caused by low water flows and poor water quality; and lawyers from various competing interest groups dueling in court over who will get how much water. At the end of each battle, every faction being dissatisfied with the result and feeling their interest did not get a fair share of the water — and figuring out ways to be more politically influential in the next policy battle.

In many ways resolving Klamath Basin policy is like individual lives: a series of trade-offs, choices, and selections between appealing and desired alternatives. As water becomes scarcer through this century, individual and collective choices become more constrained. Some policy priorities (e.g., protecting wild salmon, recreational uses, etc.) potentially become increasingly unacceptable to more people because there is just enough water for what many people feel are essential uses (e.g., drinking water, agriculture, commercial requirements, etc.).

Scientists often end up involved in divisive issues such as the Klamath Water War. Sometimes their involvement is willing; sometimes they are assigned the task. How should scientists operate in such a polarized and divisive policy and political environment?   What are the guideposts to watch for to avoid career meltdown? What should experts do when they see science being misused? When does providing scientific information become policy advocacy?

If you are a "user of scientific information" (such as a policy analyst or decision maker) and as you consider the suite of ecological policy conflicts that surround competition for scarce water resources, you may want to consider the following generalities. Although these "lessons learned" are targeted toward the water policy issue, they are equally applicable to all ecological policy issues. Shifting from "scientist worldview" to a "policy analyst" worldview is often challenging, especially for those steeped in the important but narrow science mindset. Remember that scientific information is only one of many inputs that go into policy making – and policy analysis. It is easy for a novice analyst to get sucked into the delusion that policy issues are mainly debates over science. The following lessons learned may help.

1. Get the policy questions clear.

The formulation of water policy questions is usually value-based and likely to be an incredibly divisive exercise. Advocates will try to "frame" the policy question in a way that is favorable to their preferred policy preference. Regardless of the spin, policy analysts should agree to the fundamental questions (options) upfront and put them in writing. Which policy questions need additional research or scientific information? Be very careful of using words like *degradation, adverse, and damage,* which are value-driven and require a "political" input; scientists and policy analysts should not permit their values to influence the formulation of policy questions. Many of the disagreements among scientists, science managers, and policy analysts are fundamentally over different opinions of what the key policy questions were (or should be). Obtain clear and formal consensus on the question(s) or, at a minimum, clearly articulate the differences. Explicitly state who the client is, how the client intends to use the information produced, and who ultimately decides how the policy issue is to be resolved. Unclear (or differently interpreted) policy questions will cause continuing difficulties for scientists and policy analysts.

2. Focus science on science questions.

This seems simple, but it is not. Although it serves a very important function in water policy, science cannot and should not answer policy questions, but should provide the consequences of various alternative policy options. Do not get sidetracked into answering inappropriate questions such as: "*When will scientists tell us what to do about this difficult water policy question?*" Much of any policy debate over severe water shortages that is purportedly over the "science" involved is *really* over value-based choices, not science. Sure, the science is often open to debate. Such debate is often useful in clarifying the relevant scientific information, but not if it substitutes for debates over values and preferences. For example, a typical (and inappropriate) question often asked of scientists is*: "How much water does a certain species need to be healthy?"* Scientists can predict, at least within some error band, the likely *consequences* of various amounts of water, but scientists cannot answer whether that amount of water *should* be provided. It is deceptively easy to cross the line between "is" and "ought." Scientists and policy analysts need to work interactively, but each has a very clear role, as do decision makers.

3. Feed the client regularly.

As a policy analyst, you should provide regular updates to your client on the policy-relevant results of the science generally and any directly funded research directly relevant to the policy question or issue being considered. Involve key scientists in these briefings as needed, but prepare them well for the inevitable pressure to speculate on the significance of interim results and the policy implications. Interim briefings are a critical element of the policy assessment process, and they will require far more attention than most analysts want to devote.

Look for appropriate conclusions as quickly as possible and always bind them with confidence estimates. Often policy analysts will be content with confidence estimates such as "best current guess" or "fairly likely to be correct." For other, more critical elements of the policy analysis, a statistical confidence interval might be necessary. Not every piece of scientific information is of equal value in policy analysis. "Educated guess" is acceptable for some; "near certainty" is required for other questions. Analysts need to provide regular updates to decision makers (i.e., the client).

4. Conduct an assessment at the end — and at the beginning.

Conduct an initial evaluation to identify the critical research gaps, if any, necessary to improve the assessment. Then, update the assessment regularly throughout any on-going research effort, including formal peer review, as frequently as feasible. The scientific credibility of the assessment process will be questioned at every possible opportunity, so expect it and prepare for it. For example, in most water policy issues, priorities are set based on prevailing *opinions* among scientists regarding scientific uncertainties. Later, after preliminary policy analyses were conducted, it often becomes clear that certain scientific unknowns were critical for evaluating options, but many others are only marginally useful. Scientific research can then become much more focused on answering a few specific, assessment-driven questions. If the assessment program is to make significant progress, it is crucial to have sufficient leadership from assessors (often analysts) to forcefully shape the research direction. Otherwise, scientists will tend to include peripheral scientific issues and diffuse the available resources. Remember that the "scientific enterprise" is driven by individual priorities to obtain funding, recognition, and influence. These priorities are often in conflict with obtaining a high-quality policy analysis. In my own experience, scientists often have an inflated perception of the importance of science in policy making.

> **5. Learn to live with 80%.**

Assessment and policy analyses do not require the same degree of thoroughness or statistical confidence of scientific data, as is typical in scientific research. Scientists often tend to want near certainty before offering policy input. Policy analysts should recognize that policy makers will accept and use information with a much greater degree of uncertainty. For example, most scientists, especially in basic research, do not reach a comfort zone before reducing the likelihood of a mistaken conclusion to 1 in 20, or even 1 in a 100. No such degree of certainty exists in policy analysis for any but the simplest, most trivial policy questions. As a rule of thumb, "useful" information is that with a confidence level of 80% or greater. Always be sure to state the degree of confidence in whatever is presented to decision makers (or others).

Not every policy question requires the same degree of scientific certainty. Typically, certain scientific questions are extremely critical in assessing the consequences of certain policy options; it is these questions that require the highest degree of certainty. Other scientific questions are not nearly as essential to the policy analyst, and these can be answered with the least scientific precision.

There is a vital role for policy analysts to communicate effectively between policy makers and scientists. Policy analysts (and decision makers) must establish priorities among all potential research topics. The research manager, in turn, must be forced to realistically determine the likely research payoff from each priority. In practice, a high degree of personal skill is necessary to bridge the gaps between the various groups of players. Remaining policy neutral — both in appearance and in reality — is essential to maintain credibility amongst the policy players.

> **6. Recognize that research enterprises are more easily corrupted than individual scientists.**

In all ecological policy issues and especially those dealing with water policy, beware of political efforts to use the scientific enterprise to focus on questions that tend to support a particular political position. This is not usually a sinister endeavor, but rather a reflection of the goals of different organizations that fund research. Scientists tend to be goal-oriented, so the easiest way for an organization to influence the scientific enterprise is to focus on goals and scientific questions that show your organization's political position in the best light. Remember, for most scientists, prestige comes from the opinions of *their* peers, not the opinions of policy makers or policy analysts.

Most scientists will do good research, but they can be easily influenced by the nature of the question asked (e.g., research direction will be fundamentally determined by the nature of available funding). The research is technically sound, but tends to emphasize or support a particular policy position. For example, some organizations involved in water policy debates will tend to push "science" questions toward their policy positions (i.e., agriculture, endangered species, urban uses, tribal uses, etc.). The research enterprise may be caught between competing policy objectives (i.e., those emphasizing research on natural components vs. others emphasizing the role of human activities). Neither is scientifically wrong (or right), but the results will tend to focus discussion on different causal agents.

7. Keep the "is" and the "ought" separate.

There is an old and still vigorous debate over the role of scientists and other technocrats in ecological policy. One view is that experts have an obligation as citizens to advocate "good" policies. Another view is that scientists and technocrats should play a role analogous to physicians operating as counselors: provide information on the consequences of each policy choice, but advocate none. The "is" and "ought" separation is a problem in all assessments that attempt to link science and policy. In water policy, there was constant pressure on scientists from some in the media and government to answer questions such *as "Do you know enough now to allocate water?"* Or "*Is the proposed water policy sufficient to move forward with a decision?"* These are not questions that scientists can answer as *scientists*, but require "ought" or "should" judgments. Watch for this slippery slope.

Realistically, many scientists have political positions, publicly stated or not. Predictably, in water policy, scientists who tended to advocate policy positions were sought out by the media. Scientists who remained impartial and followed the "physician as counselor" model (providing expertise but no opinion of what *should* be done) typically were not sought by the media. However, they are usually the most highly respected among their scientific peers. In my experience, the best and most credible scientists are rarely quoted in the media.

8. Avoid hubris before the mahogany table.

The decisions concerning many water policy issues (think about the Klamath Basin) potentially cost many millions, even billions of dollars. Each political option had major winners and major losers. Some scientists, for perhaps the first time in their careers, are involved in very high-profile research. If you are a scientist, it is intoxicating to be listened to, but stick to science. Ignore the siren call to substitute personal values for scientific independence. In testimony to Congress, state legislatures, and elsewhere, stick to scientific questions and do not

under or overestimate uncertainty. It is very easy to be caught up in the importance of one's science in such impressive surroundings.

Most of us never sit with a few colleagues on one side of a massive mahogany table and answer questions from members of Congress. For most scientists, being called by a congressional committee to testify is a major professional and personal event. To some, it is relished. Others, conversely, a struck by fear. Either way, it is deceptively easy under these circumstances to step outside the role of a scientist and into the role of policy *advocate*.

Scientists who provide impartial scientific information may not generate many headlines, but they enjoy the respect of their scientific and policy maker colleagues. In contrast, those who offer policy advocacy embedded in science may generate headlines, but they run the risk of losing credibility among their colleagues.   It is a small step to move from the scientific "is" to the policy "ought" under the guise of sound science. Such behavior may cause loss of scientific credibility among colleagues that will be remembered long after Congress and the public have moved on to other issues.

> **9. *Remember that the distribution of benefits and costs is crucial in formulating policy questions.***

My experience indicates that the political process considers the distribution question to be crucial (i.e., who is causing the problem? Who will pay for its solution?). Most scientists tend not to view technical problems this way, so be sure that the policy question formally addresses this. The question of winners and losers tends to drive policy options; scientists naturally tend to be concerned with "global" effects. For example, the fact that there may be effects of water decisions on bald eagles is relevant and *purely* a scientific question; the more divisive question of whether the cause of the effect *should* be altered is not a scientific question. Science can potentially answer the cause and effect part of the question, but *not* the part of whether a person or activity causing the effect should be forced to change.

Complex public policy questions are seldom solved by rationally selecting the "best" solution, but more often by choosing the emotionally satisfying one.   In my experience, scientists tend to be intensely rational in their world view. They regard discussion based on grounds other than science as *irrational.* This does not make one type of decision making inherently better than another, merely different. After all, do any of us make our personal purchases on entirely rational grounds? Clearly, we do not; decisions are a mix of rational and irrational elements.

10. Appreciate that research and science budgets follow fear.

The scientific enterprise overall and individual scientists are not above being driven by market forces. Successful researchers, especially those operating in the American "free market approach" to deciding what research to fund, are great opportunists when seeking funding. The reality is that "good news" or "old news" does not result in financial support for research, but fear does! Researchers, especially those dependent on "soft" money, are often very effective at marketing their research priorities and frequently "hang their research on whatever (funding) hook is there." Elected officials and political appointees are most apt to respond to the latest "crisis of the day" generated, at least in part, to secure research funding.   Do not underestimate the potential for pressure from scientists who would exploit "fear of the unknown" to obtain funding for their area of research.

11. Put those resources on the table.

As with many ecological policy issues, agencies working on water issues should have their dollars (including staff time) committed *upfront* to support the assessment process. Otherwise, the scientists will tend to run free and obtain funding to research topics of low policy relevance. Further, organizations can be expected to protect their long-term turf and resist what they may view as a diversion of resources from "true science" to the "assessment" process. For example, some of the agencies purportedly spending research funds on specific water problems (such as the Klamath Basin) essentially relabeled *existing* research programs, made a few changes in design and packaging, and treated the research as supporting the "policy question of the month." This tactic is common in government, but it becomes a significant management problem when all the allocated resources are needed to answer critical research and assessment questions.

12. Help policy analysts and decision makers outgrow their science-envy.

Many science questions, such as the question of scarce water, are complex and divisive. The policy and scientific questions have been around for a long time. Even more so, the questions facing *decision makers* are also complex. Analysts and decision makers should not abrogate their roles and responsibilities. It is easy to be intimidated by articulate scientists. Worse yet, is to fall into the trap of scientists who say: *"When you policy people figure out what you want, let us know. Meanwhile, we are going to conduct the scientific research we think is important".* While the policy people retort: *"When you scientists tell us with confidence how severe the problem is, then we'll start evaluating the options."*

The scientific issues surrounding the water resources are difficult, even for the brightest scientists and analysts. Clients (policy makers) are typically schooled in political science, public policy, government, or some other discipline of social science; some were and are intimidated by science and scientists. Often there appears to be an innate willingness to defer to (perhaps "hide behind") scientists to "solve" policy problems. Avoid this. Science and scientists have important roles, but these roles make up only *part* of policy analysis.

Policy Analysis:

The are many water case studies that we *could* consider this week, but the Klamath Basin is arguably the best because it involves many competing groups (farmers, city governments, Indian tribes, State water rights, the Endangered Species Act, Treaties, "promises" provided by the Federal and State governments, and many others). Based on the two perspectives presented this week, you should determine *their* positions or opinions on the following aspects of the Klamath Basin water conflict:

21. *Who is making policy decisions (courts, Federal agencies, state agencies, Indian tribes, or another organization)? Were the two articles honest about assessing the reality of the situation?*

22. *From the perspective of each paper, what is the goal of current ecological policy in the Klamath Basin? Was it clearly stated it, or did you have to infer it? How should success be measured (according to each paper)?*

23. *Are there other policies for resolving the policy conflicts in the Basin? Were these options presented or acknowledged? If the alternatives were recognized, were they described even-handedly?*

24. *Did either author make convincing arguments that any of the proposed plans will achieve the stated goal? Did either seem to believe it? Would the average reader pick up on the embedded advocacy?*

25. *How much of a role did scientific information play in evaluating alternative policy options? Is the Klamath Basin Water War pretty much a clash of values, or do scientific questions dominate?*

26. *Are they leveling about the "facts of the case," or are they spinning toward a particular policy perspective? Is the value conflict hidden from the average reader?*

27. *Are there examples of symbolic politics that you detected? From the perspective of a policy analyst, are the public and politicians misled by* <u>scientists</u> *in this case study?*

28. *Is the Federal Government really in charge of Klamath water policy, or is it being swept along by other power centers? If the Federal Government is not in control, is anyone, and, if so, who?*

29. *In the Klamath water issue, should development and writing of the various scientific "assessments" have been handled differently? How should the "best" science be brought the attention of decision makers and the public?*

30. *How do the presented Klamath policies or policy preferences accommodate for the 4 or 5 times more people expected in the region by 2100? Did either author explicitly address this issue? If this policy driver is not covered, why not?*

Background Reading:

Boehlert, Brent B., and William K. Jaeger. 2010. Past and future water conflicts in the Upper Klamath Basin: an economic appraisal. *Water Resources Research*, *46*(10).
https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2009WR007925

1. Blankenbuehler, Paige. 2016. A new Klamath water deal emerges, but unease persists. *High Country News.* April 8.
2. https://www.hcn.org/articles/on-the-klamath-leaders-celebrate-dam-removal-but-unease-over-water-deal-persists

Coalition for the Klamath Basin. 2000. *A Conservation Vision for the Klamath Basin*. The Wilderness Society, 14 pp.
http://www.klamathbasin.info/vision1.pdf

Coldwell Banker - Holman Premier Realty. 2019. *The Tradition of Farming in Klamath County*. June 21, 2019 Blog.
https://klamathfarmandranch.com/the-tradition-of-farming-in-klamath-county/

Connick, Sarah, and Judith E. Innes. 2010. Outcomes of collaborative water policy making: applying complexity thinking to evaluation. *Journal of Environmental Planning and Management.* 46(2): 177-197.
https://escholarship.org/uc/item/03f3b4z9

Food and Agricultural Organization (United Nations). 2007. *Coping with Water Scarcity: Challenge of the Twenty-first Century*. United Nations World Water Day 2007, 29 pp.
http://www.fao.org/3/a-aq444e.pdf

Gleick, Peter H. 2006. Water and terrorism. *Water Policy*. 8: 481-503.
https://pacinst.org/wp-content/uploads/2006/08/water_and_terrorism_2006.pdf

Jaeger, William K. 2004. Conflicts over water in the Upper Klamath Basin and the potential role for market-based allocations. *Journal of Agricultural and Resource Economics*. 29(2): 167-184.
https://ageconsearch.umn.edu/record/31103/

Johnston, Barbara R. 2003. The political ecology of water: an introduction. *Capitalism Nature Socialism.* 14(3): 73-90.
https://www.tandfonline.com/doi/abs/10.1080/10455750308565535?journalCode=rcns20

Love, Cassandra. 2014. Case study: Klamath Basin. *National Geographic*.
https://www.nationalgeographic.org/article/case-study-klamath-basin/

McCarthy, James. 2001. *Crisis Profiteering: Inequalities and Excesses of the Klamath Project Bailout*. Klamath Forest Alliance, Etna, California, 16 pp.
http://www.klamathbasin.info/CrisisProfiteering.pdf

McKinney, Matthew, and John E. Thorson. 2015. Resolving water conflicts in the American West. *Water Policy.* 17(4): 679-706.
https://iwaponline.com/wp/article/17/4/679/20451/Resolving-water-conflicts-in-the-American-West?searchresult=1

Meiners, Roger E., and Lea-Rachel Kosnik. 2003. *Restoring Harmony in the Klamath Basin*. Policy Series: PS-27, PERC – Property and Environmental Research Center, Bozeman, MT.
https://www.perc.org/wp-content/uploads/old/ps27.pdf

Milner, Mary. 2015. Water law meets participatory democracy: a Klamath Basin example. *Journal of Environmental Law and Litigation.* 30: 87-141.
https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/18886/Milner.pdf;sequence=1

Mount, Jeffrey, Ellen Hanak, Caitrin Chappelle, Bonnie Colby, Richard Frank, Greg Gartrell, Brian Gray, Douglas Kenney, Jay Lund, and Peter Moyle. 2016*. Improving the Federal Response to Western Drought: Five Areas for Reform*. Public Policy Institute of California.
https://www.ppic.org/publication/improving-the-federal-response-to-western-drought-five-areas-for-reform/

Pedery, Steve. 2004. *Refuges in peril — fish, wildlife, and the Klamath water crisis.* WaterWatch/Oregon Natural Resources Council/Earthjustice/The Wilderness Society.
http://www.klamathbasincrisis.org/environmentalistswildlands/orewildklrefuges041604pdf.pdf

Reschke, E. Werner. 2018. Op-Ed: Letter in Opposition to Dam Removal Along the Klamath River. *Klamath Falls News.* July 5.
https://www.klamathfallsnews.org/news/op-ed-letter-in-opposition-to-dam-removal-along-the-klamath-river

Sabalow, Ryan, and Dale Kasler. 2018*. Can an uneasy truce hold off another water rebellion on California's northern border? *The Sacramento Bee.* May 11.
https://www.sacbee.com/news/state/california/water-and-drought/article210634429.html

Service, Robert F. 2004. As the west goes dry. *Science*. 303(5661): 1124-1127.
http://www.sciencemag.org/cgi/reprint/303/5661/1124.pdf

Smith, Anna V. 2018. How the Yurok Tribe is reclaiming the Klamath River. *High Country News.* June 2018 edition.
https://www.hcn.org/issues/50.10/tribal-affairs-how-the-yurok-tribe-is-reclaiming-the-klamath-river

Smith, Anna V. 2019. The Klamath River now has the legal rights of a person. *High Country News.* September 24 edition.
https://www.hcn.org/issues/51.18/tribal-affairs-the-klamath-river-now-has-the-legal-rights-of-a-person

Whitty, Julia. 2006. The thirteenth tipping point: twelve global disasters and one powerful antidote. *Mother Jones News*. November/December issue.
http://www.motherjones.com/environment/2006/11/thirteenth-tipping-point

Wikipedia. 2020. *Klamath Reclamation Project.*
http://en.wikipedia.org/wiki/Klamath_Reclamation_Project

Wikipedia. 2020. *Water*.
http://en.wikipedia.org/wiki/Water

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Week 4 – Backgrounder

Wolf, Cougar, and Grizzly Policy

Policy Context:

Developing a politically acceptable policy about large predatory mammals (e.g., wolves, cougars, and grizzlies) is challenging. On the one hand, much of the Oregon public supports their presence (cougars) or their reintroduction (wolves). Conversely, many residents (especially those in rural regions) are vehemently opposed in large part because of concerns about predation on livestock, pets, and wildlife (mostly deer and other important game species). Concerns about attacks on humans, especially children, is also a factor (mainly by cougars).

The third "big" predator — bears generally and grizzlies in particular — present a somewhat different policy challenge. These animals are also often at the center of conflict involving the Endangered Species Act.   Fatal bear attacks, although relatively rare, occur in a variety of settings.   Most typically, attacks include hunters, fishermen, hikers, and campers. Policy analysts must evaluate flashpoints in the conflict between competing policy priorities: assuring human safety *vs.* preserving a *species*, *subspecies*, or even protecting *individual* animals.

For several years, the Oregon Department of Fish and Wildlife (ODFW) has been developing and tweaking policies (or plans) for both wolves and cougars. As with all ecological policy issues, there is considerable debate about the scientific basis for policy analysis. A few facts are beyond dispute, however. Both wolves and cougars do prey on livestock, big game, and pets. Cougars also attack humans, although attacks are rare and typically involve children in the woods. It appears that the number of attacks is increasing. As with all ecological policy issues, there is debate over which studies constitute the best available science.

Wolves have long been listed as threatened under the U.S. Endangered Species Act and, as such, offer specific policy challenges beyond non-listed species. De-listing in some locations has taken place, however. In areas where they are listed, harming or harassing wolves is strictly forbidden except under specific and rare circumstances. Wolves were extirpated from Oregon in the middle of the last century. Still, they have reestablished in the state as a "natural" range expansion from a growing wolf population in Idaho. Wolves easily cross rivers and other obstructions in search of new and better habitat.

Cougars were nearly extirpated from Oregon in the 1960s, but are now relatively abundant (the estimated population is approximately 4,000 - 7,000 and likely growing). Even though they are now *relatively* plentiful, their nocturnal and secretive habits make their presence unnoticed to most people. In some well-populated areas, such as the Willamette Valley, they are established and appear to be prospering. Hunting with dogs (arguably the most effective way to hunt cougars) was outlawed through a voter initiative in 1994, and it seems that the cougar population has increased as a result. Non-dog hunting is permitted and occurs but is not particularly effective in harvesting cougars. Cougar sightings are regularly reported in news media, although the reliability of such sightings is often challenged. They are, for example, commonly seen around Corvallis.

The Oregon Fish and Wildlife Commission (which oversees the ODFW) would normally promulgate policies about issues such as wolf and cougar management, but the Oregon legislature has weighed in. At some level, it is the classic clash between urban and rural interests and preferences. In short, it reflects a conflict between those who benefit from various policy options and those who bear the cost of the same options.

Facts about Wolves

Wolves are highly adaptable to climate extremes. Once, wolves in North America ranged from coast to coast and from Alaska to Mexico. By the early 1900s, a vigorous program to reduce predation nearly drove wolves to extinction in the lower 48 states.

The typical wolf pack includes a breeding pair, their offspring, and non-breeding adults. By their second or third year, wolves are capable of mating. The usual litter is five or so pups. The pups are almost adult size by 7-8 months old and will begin traveling with the adults. Young wolves (a year or two old) may leave the pack searching for a mate to form a new pack. A wolf pack will live within a defined and defended territory. Territories range from several dozen to more than 1,000 square miles.

In the 1800s, when immigrants from eastern states moved westward, they depleted most populations of bison, deer, elk, and moose. These animals are typically the primary prey for wolves. Wolves also readily prey on sheep and cattle. To protect their livestock, both ranchers and State and Federal agencies began a wolf eradication campaign. As an incentive to kill wolves, bounty programs paid for each wolf's skin.

By the time the Endangered Species Act protected wolves, their distribution was severely limited in the lower 48 states. Abundant populations still reside in Canada and Alaska. Currently, gray wolves are listed as endangered in the contiguous 48 states, except in Minnesota, where they are listed as threatened. Wolves have been de-listed in some areas, and further de-listing appears likely.

Wolf recovery has been successful in many locations, especially in northern sections of the Great Lakes states and the northern Rockies (especially Yellowstone National Park). Wolves have also been reintroduced in Arizona and New Mexico. Wolf populations naturally fluctuate (as do all animal populations) with food availability, competition within and between packs, and disease.

For many people, a significant reluctance to increase the abundance of wolves is a concern for human safety. Wolf attacks on humans are sporadic and rare (but they do occur). Even in Canada and Alaska (where there are large wolf populations), attacks on humans are rare, but they do generate substantial media attention when they do occur.

In addition to safety concerns for humans, there are concerns about the safety of pets. Although compensation programs for the loss of pets to wolves have been used, compensation is usually not enough to tolerate the loss of a pet.

Many ranchers and farmers fear wolves because they prey on livestock. In response, in some locations, it is permissible to remove wolves that prey on livestock. Also, there are programs to compensate for the loss of livestock in places where wolf recovery programs are in place.

The scientific understanding of wolf biology is far from complete, but most of the policy debate appears to be over competing policy priorities. It is not that the participants in the policy debate differ significantly over issues of scientific information, but rather the relative importance of various competing priorities.

Facts about Cougars

Cougars (also commonly called mountain lions and pumas and many local or regional names) are large, generally solitary cats found in North and South America. They are found from Northern Canada to the southern Andes. As are most cats, they are secretive by nature and usually avoid people. Attacks on humans are rare, but their frequency appears to be increasing, along with substantially greater media attention.

Cougars primarily prey on deer, but they also commonly hunt rabbits, domestic cats and dogs, and mice. A diversity of other prey is also taken.

The range of cougars is now much restricted due to continual alteration (human development) of their natural habitat. Recent recovery efforts have reversed the downward trend in places such as the Pacific Northwest

At one-time cougar populations of the lower 48 states were almost extinct in most of their original range. Over the past 50 years, there has been a recovery in many locations. Even in the Willamette Valley, sightings are common (including within the city limits of Corvallis).

Cougars, like wolves, are territorial. They sometimes compete aggressively for territory, and competition is especially intense among males. Overall, however, cougars tend to be secretive, shy, and reclusive. In most cases, they avoid contact or interaction with humans. Attacks on humans by cougars are comparatively rare, but do happen. For example, a cougar recently killed (and ate) a mountain biker in a wilderness park in southern California. The frequency of attacks appears to be increasing.

Facts about Grizzlies

The grizzly is a subspecies of brown bear. Individuals are usually dark brown, but other colors (e.g., blond or black) are occasionally seen. A mature male typically weighs up to 800 pounds. Females are smaller, being roughly half the male size. When standing upright, a fully grown male may be eight feet tall. Grizzlies are highly adaptable, but typically are found in mountain forests, meadows, and wetlands. They are also found in the Arctic, temperate wetlands, and grasslands. In the United States, the animals are now found in Alaska, Washington, Idaho, Montana, and Wyoming. Also, there are substantial populations in western Canada. Historically (pre-1850s), grizzlies were found from Alaska to Mexico and from the

Pacific Ocean to the Mississippi River. Grizzlies are omnivores. In fact, they will eat almost anything (i.e., fish, insects, berries, nuts, roots, bulbs, dead animals, and almost anything humans will eat). Grizzlies have been eliminated from 98 percent of their original range. Thus, in the lower 48 States, the U.S. Fish and Wildlife Service listed them as "threatened" under the Endangered Species Act.

Given the perceived risk of bear attacks, it is perhaps not surprising that there is relatively less political pressure from advocates to reintroduce grizzlies. For example, in Oregon, after a long-term and sustained effort to eradicate the species, the last grizzly was killed in 1931.

Thus, it is presumably the *comparative* risk (vs. wolves and cougars) that there is considerable public pressure to reintroduce wolves, but much less for reintroducing grizzlies? Or is there something else involved? Cougars seem to thrive without much "protection" from humans — even if their encounters with humans (and their livestock and pets) are more common than for wolves. Is it biological practical to reintroduce grizzlies to a well-populated state like Oregon, Washington, and California? Given the risks and severity of grizzly attacks, is reintroduction politically viable?

Take California as a specific case study. There has been some political pressure for reproduction. Some studies have estimated that there is still has habitat for about 500 grizzlies in the state. In 2014, the U.S. Fish and Wildlife Service received a petition to reintroduce grizzly bears to California, but the Service rejected the request.   Later, the Center for Biological Diversity took a different advocacy tactic. It launched a petition targeting state legislature accompanied by an aggressive marketing campaign.   Although the advocacy campaign continues, It is not clear how this new advocacy approach will resonate in a state with 40 million residents.

Policy Analysis:

Based on this week's advocates, you should determine their position or perspective on the following aspects of crafting a politically acceptable policy for wolf, cougar, and grizzly populations in Oregon and the Pacific Northwest in general:

31. *What is the goal of current policy toward wolves, cougars, and grizzlies within California, Oregon, Washington (and elsewhere)? Did the advocates clearly state their policy preferences, or did you have to infer it? How will the success of the policy be measured?*

32. *Did the advocates make convincing arguments that any of the proposed policy options will achieve the stated goal? Did either seem to believe the likelihood of success of any of the policy options?*

33. *Who is making policy decisions (i.e., courts, Federal agencies, state agencies, NGOs, or someone else)? Were they honest about assessing the reality of the situation?*

34. *Are there more efficient policies for resolving the conflicts over wolf, cougar, and grizzly policy? Were these options presented or acknowledged?*

35. *How much of a role did scientific information play in evaluating alternative policy options? Is the policy debate largely a clash of values — or do scientific questions dominate?*

36. *Are the advocates level about the "facts of the case," or are they spinning toward a particular policy perspective or policy preference?*

37. *Are there examples of symbolic politics that you identified? Are the public and politicians being misled by "advocacy" scientists?*

38. *Is the state government really in charge of this policy issue, or is it being swept along by other power centers? If the State of Oregon, for example, is not in control, is anyone, and, if so, who?*

39. *Could the development of this policy have been handled differently? If so, how? How about marketing reintroduction to the public at large vs. using the Federal courts based on the Endangered Species Act?*

40. *Consider an organization such as Oregon State University's Department of Fisheries and Wildlife? Do you (and the public) assume that Department staff and students have <u>preferred</u> policy options (i.e., pro fish and wildlife vs. competing policy alternatives) or is the Department believed to be providing policy-relevant but <u>policy-neutral</u> science? In short, do you think the public sees the Department as an "honest broker"?*

Background Reading:

American Farm Bureau Federation. 2019. Endangered Species Act (ESA).   Fact Sheet posted on the AFBF website.
https://www.fb.org/files/ESA_Factsheet_2019.pdf

Castellano, Katey. 2018. Anthropomorphism in the Anthropocene: reassembling wildlife management data in Bear 71. *Environmental Humanities*. 10(1): 171-186.
https://read.dukeupress.edu/environmental-humanities/article/10/1/171/134713/Anthropomorphism-in-the-AnthropoceneReassembling

Clark, Jaime. 2016. *The Endangered Species Act Isn't Broken, but Is Its Implementation Faltering?* The Huffington Post. (Opinion Piece)
http://www.huffingtonpost.com/jamie-rappaport-clark/the-endangered-species-ac_b_8912014.html

Cronon, William. 1995. The trouble with wilderness; or, getting back to the wrong nature. Pp. 69-90. In: William Cronon, editor. *Uncommon Ground: Rethinking the Human Nature*, W. W. Norton & Co., New York, NY.
http://www.williamcronon.net/writing/Trouble_with_Wilderness_Main.html

Defenders of Wildlife. 2015. *The Truth About America's Landmark Conservation Law.* Defenders of Wildlife.
https://defenders.org/sites/default/files/publications/esa-just-the-facts.pdf

Flatt, Courtney. 2019. Proposals to restore grizzlies to Washington draws hundreds of voices. Oregon Public Broadcasting, *Northwest News Network*, October 9.
https://www.opb.org/news/article/grizzly-bears-cascades-washington-proposal-public-comment/

Glick, Daniel, Ted Wood, Leslie Dodson, and Jim Moscou (The Story Group). 2008. Still Howling Wolf (Video). *High Country News.* (October 6, 2008).
http://www.hcn.org/articles/video-still-howling-wolf

Henson, Paul, Rollie White, and Steven P. Thompson. 2018. Improving implementation of the Endangered Species Act: finding common ground through common sense. *BioScience.* 68(11): 861-872.
https://academic.oup.com/bioscience/article/68/11/861/5078556

International Wolf Center. 2020. *Home page*. (Various articles of interest).
https://wolf.org/wolf-info/basic-wolf-info/wolf-faqs/

Kettmann, Matt. 2013. Why the Endangered Species Act is broken and how to fix it. *Smithsonian Magazine*.
https://www.smithsonianmag.com/innovation/why-the-endangered-species-act-is-broken-and-how-to-fix-it-63482436/

Miller, Jeremy. 2018. *Awakening the grizzly: inside the effort to reintroduce grizzlies to California*. Pacific Standard.
https://psmag.com/magazine/how-to-bring-back-a-bear-reintroducing-grizzlies-to-california

Mountain Lion Foundation. 2020. *Home page*. (Various articles of interest).
https://www.mountainlion.org/feature.php

Neeson, Tom. 2016. Rethinking conservation in the Anthropocene. *Anthropocene Biosphere Project*. February 24.
https://inhabitingtheanthropocene.com/2016/02/17/rethinking-conservation-in-the-anthropocene/

Nie, Martin A. 2001. The sociopolitical dimensions of wolf management and restoration in the United States. *Human Ecology Review*. 8(1): 1-12.
http://www.apjh.humanecologyreview.org/pastissues/her81/81nie.pdf

Schiff, Damien M. 2014. The Endangered Species Act at 40: a tale of radicalization, politicization, bureaucratization, and senescence. *Environs: Environmental Law and Policy Journal.* 37(2): 105-131.
https://environs.law.ucdavis.edu/volumes/37/2/Articles/Schiff.pdf

Semcer, Catherine E. 2019. *Conservationists Should Support Trophy Hunting*. Property and Environment Research Center (PERC), Bozeman, Montana.
https://www.perc.org/2019/09/06/conservationists-should-support-trophy-hunting/

Simmons, Randy T. 2005. *Nature Undisturbed – The Myth behind the Endangered Species Act*. Property and Environment Research Center (PERC), Bozeman, Montana.
https://www.perc.org/2005/03/01/nature-undistur https://www.perc.org/2005/03/01/nature-undisturbed/bed/

Smith, Christina A., and Caroline A. Sime. 2007. Predator-prey workshop: policy issues related to wolves in the northern Rocky Mountains. *Transactions of the 72nd North American and Natural Resources Conference*. pp. 391-402.
https://wildlifemanagement.institute/sites/default/files/2016-09/17-Policy_Issues.pdf

Smithson, Julie Kay. 2005. *The Many Facets of the Endangered Species Act*. Property Rights Research.
https://www.biologicaldiversity.org/news/media-archive/The%20Many%20Facets%20of%20the%20Endangered%20Species%20Act.pdf

Treves, Adrian, and Jeremy Bruskotter. 2011. Gray wolf conservation at a crossroads. *Bioscience*. 61(8): 584-585.
http://bioscience.oxfordjournals.org/content/61/8/584.full

Wikipedia. 2020. *Cougar.*
http://en.wikipedia.org/wiki/Cougar

Wikipedia. 2020. *Gray wolf*.
http://en.wikipedia.org/wiki/Wolf

Wikipedia. 2020. *Grizzly bear*.
http://en.wikipedia.org/wiki/Grizzly_bear

Wood, Jonathan. 2018. *The Road to Recovery: How Restoring the Endangered Species Act's Two-step Process Can Prevent Extinction and Promote Recovery. PERC Policy Report.*
https://www.perc.org/wp-content/uploads/2018/04/endangered-species-road-to-recovery.pdf

Wuerthner, George. 2015. Anthropocene boosters and the attack on wilderness conservation. *Independent Science News. May 12*.
https://www.independentsciencenews.org/environment/anthropocene-boosters-and-the-attack-on-wilderness-conservation/

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Week 5 – Backgrounder

Wild Salmon Policy

Policy Context:

Throughout California, Oregon, Washington, Idaho, and southern British Columbia, many <u>wild</u> salmon populations (also called "stocks" or "runs") have declined, and some have been extirpated. There have been substantial efforts to restore some runs of wild salmon, but few have shown much success.

Society's failure to restore wild salmon is a policy conundrum characterized by:

1 .   **claims by a substantial majority of the population to be supportive of restoring wild salmon runs;**

2 .   **competing societal priorities which are at least partially mutually exclusive;**

3 .   **the region's rapidly growing human population and its pressure on natural resources (including salmon and their habitats);**

4 .   **entrenched policy stances in the salmon restoration debate, usually supported by established bureaucracies;**

5 .   **society's expectation that experts should be able to solve the salmon problem by using a technological scheme;**

6 .   **use of experts and scientific "facts" by political proponents to bolster their policy positions;**

7 .   **the inability of salmon scientists to avoid being placed in particular policy or political camps; and**

8. covert policy preferences buried in scientific terms or scientific imperatives rather than clearly stated value-based policy advocacy.

Even with definitive scientific knowledge — and scientific knowledge will never be complete or certain — restoring most wild salmon runs in California, Oregon, Washington, Idaho, and southern British Columbia would be a difficult and unlikely proposition. Concurrent with the substantial economic costs and social disruption required for any credible attempt at widespread restoration, there is the dubious likelihood of ultimate success (assuming that wild salmon recovery is the actual policy goal). Given the appreciable known costs and the uncertain probability of success, candid public dialog is warranted to decide whether restoration is an appropriate, much less feasible, public policy goal. Provided with a genuine assessment of the necessary economic costs and social implications required for restoration, it is debatable whether a majority of the public would opt for the pervasive measures that are necessary for restoring many runs of wild salmon.

Through the 21st century, there will likely continue to be appreciable annual variation in the size of salmon runs, accompanied by the decadal trends in run size caused by cyclic changes in climatic and oceanic conditions. Still, many, perhaps most, stocks of wild salmon in the region likely will remain at their current low levels or continue to decline despite heroic, expensive, and socially turbulent attempts at restoration. Thus, it is likely that society is chasing the illusion that wild salmon runs can be restored to significant, sustainable numbers from southern British Columbia southward without massive changes in the number and lifestyle of the human occupants, changes that society shows little willingness to consider, much less implement earnestly.

Should we restore wild salmon to California, Oregon, Washington, Idaho, and southern British Columbia? This seemingly simple public policy question is rarely discussed explicitly. Forced to answer with a yes or a no, either answer is arguably right — and wrong. Moving past such a simple, dichotomous, perfunctory choice raises troubling questions for both society and individuals.

Society never has — and never will — answer this question unequivocally, nor to the satisfaction of many interested parties. Instead, it will be answered indirectly by how we collectively respond to much smaller (but grander), narrower (but broader), more practical (but more philosophical), more immediate (but more long-term), questions such as:

- **How expensive and reliable do we want our energy to be?**

- **Where will we live, how much living space will we be permitted, and what personal choices will we have in deciding?**

- **How will the use of private and public property be prescribed?**

- **Will our food continue to be subsidized, or will it be subjected to the vagaries of a free market?**

- **Will we be able to provide high paying, family-wage jobs for this and subsequent generations?**

- **What personal freedoms or behavioral choices will we compromise or sacrifice, if any, to restore wild salmon?**

- **Are we willing to substitute hatchery-produced salmon for wild salmon, or will we demand that wild salmon runs be restored despite the challenge of restoring freshwater habitat to its unaltered state?**

- **Which individuals and groups, if any, will be granted the right to fish?**

- **What — if anything — will society control the level of the human population in general and in the Pacific Northwest in particular?**

Answers to these and other questions will determine the future of wild salmon. Salmon technocrats (professional fisheries experts who make their living filling gaps in scientific knowledge about salmon, evaluating the consequences of various salmon or management policy options, or implementing whichever policy or management decisions that society selects) can help answer these questions. Still, the salmon "problem" is predominantly an issue of *societal* choice, not scientific adjudication. Society's answer to each question is partly based on the facts produced by the scientific enterprise, but is also based on individual preference and moral judgment.

The question of whether wild salmon will continue to exist in the western United States is not a new one. The decline started in earnest with the 1849 California gold rush. By the 1850s, excessive harvest and the impacts of mining activities were decimating salmon in streams surrounding the California Central Valley. In response, by the 1870s, the Federal

government had begun a massive California hatchery program in what would eventually be an unsuccessful attempt to reverse the decline.

By the 1880s, the Columbia River salmon runs were also in real trouble. In 1894 the head of the predecessor to the National Marine Fisheries Service proclaimed to Congress that the Columbia's runs were much reduced and still declining. By 1933, the year the first main-stem dam on the Columbia River was finished, the total salmon run had already been reduced to a fifth or less of the pre-1850 level. One can argue that the most severe Columbia River salmon decline took place in the 19th century — not the 20th century — though that is not to imply that the 20th century was a favorable one for salmon.

There have been restoration successes for wild salmon, but these occur in locations where salmon spawning and rearing habitat is intact, and in good condition, migratory blockages from dams or other obstructions are not present or are minimal, and harvest is strictly controlled at levels that assure that a sufficient number of adults reach the spawning grounds. The sockeye salmon runs of the Fraser River, British Columbia, are the best-known example of recovery after decimation. In this case, the cause was a substantial 1914 rock slide that almost entirely blocked migration. Runs recovered appreciably after fish passage was improved, stringent harvest controls implemented, and other vigorous management actions were taken. The Columbia River had a similar blockage in the 1200s (and probably other times) in the Columbia Gorge, east of Portland, Oregon. After the slide was breached, naturally, salmon eventually re-established themselves in the headwater streams without the benefit of human involvement. In both cases, freshwater salmon habitat was totally, or at least mostly, intact. There are few locations in the Pacific Northwest where pristine spawning and rearing habitat is intact and accessible to salmon.

The salmon issue is full of what appear to be paradoxes. For example, no *species* of Pacific salmon (Chinook, Coho, sockeye, chum, pink, steelhead, and coastal cutthroat) is in danger of extinction; however, many runs or populations have gone extinct, and hundreds more are at risk. North American stocks that spawn in the "north" (northern British Columbia, Yukon, and Alaska) are generally doing well. Still, the vast majority of wild stocks that spawn in the "south" (southern British Columbia, Washington, Idaho, Oregon, and California) are not.

The depressed abundance of wild stocks was caused by a well-known but poorly understood combination of factors, including:

- **unfavorable ocean or climatic conditions;**

- **excessive commercial, recreational, and subsistence fishing;**

- **various farming and ranching practices;**

- **dams built for electricity generation, flood control, and irrigation, as well as many other purposes;**

- **water diversions for agricultural, municipal, or commercial requirements;**

- **hatchery production to supplement diminished runs or produce salmon for the retail market;**

- **degraded spawning and rearing habitat;**

- **predation by marine mammals, birds, and other fish species;**

- **competition, especially with exotic fish species; diseases and parasites; and**

- **many others.**

Salmon experts continue to vigorously debate what proportion of the decline in wild salmon is attributable to which factor. Many affected agencies, organizations, and entities have developed or funded the development of sophisticated assessments or computer models of salmon populations that usually end up — probably not surprisingly — supporting their organization's favored policy position.

The most strident voices include a range of affected groups such as inland barge operators, marine shipping interests, highway users, industries that are dependent on high volumes of electricity, cattlemen's and farmers' associations, logging interests, recreational, commercial, and Indian fishermen, and a spectrum of environmental advocacy organizations. In fact, no one, even the most astute salmon scientist, knows for sure the relative importance of the various factors that caused the decline of wild salmon, but we all make educated guesses.

We also have the recent incongruity of salmon abundance and concern about extinction. Two examples illustrate the point: First, in 1995, more *wild* Pacific salmon (summed over all regions) were harvested than in any other year in history. In such a situation, commercial fishermen typically assert that there is a salmon glut, hence the relatively low prices that they are able to command. The price paid to Alaska fishermen for wild salmon in 2001 was the lowest since 1975. Second, in 2001 the total Columbia River salmon run, which are mostly hatchery fish, has been the highest since at least 1938, the year the first Federal mainstem Columbia dam was completed.

Try to explain to the average person that salmon are at risk of extinction when fresh salmon are available at the local grocery store year-round at relatively moderate prices. There are explanations that untangle the seeming paradox of salmon abundance concurrent with concern about extinction. Most of the wild fish now come from Alaska and northern British Columbia. They are abundant, but this is due predominantly to favorable ocean conditions, spawning and rearing habitat in a relatively unaltered state, and vigorous regulations to control harvest. Also, large quantities of competitively priced "farm-raised" salmon are available year-round from many sources (*e.g.*, Washington, British Colombia, Norway, Scotland, Chile, and New Zealand).

Although there are explanations, for many members of the public, there continues to be the seeming contradiction of salmon abundance simultaneous with cries to confront risks of extinction.

The Endangered Species Act itself is no less free of paradox and intellectual intrigue. Threatened or endangered salmon are the only listed animals for which government routinely licenses large numbers of people to kill them. Further, if society's concern about the loss of salmon stocks in the Pacific Northwest is as great as many people assert, why have the fisheries management agencies not simply close fishing and hatcheries completely — until salmon runs rebound? Recreational, commercial, and Indian fishermen would scream in protest, but most people would not be affected by a ban on fishing or supplementing runs with hatchery fish. Farm-raised salmon would remain abundant and could continue to supply the retail market. Taxpayers would save hundreds of millions of dollars by closing the hatchery system and eliminating the subsidies currently required to maintain salmon runs.

Ultimately, listing wild salmon as endangered or threatened as defined by the Endangered Species Act affects everyone, not just fishermen. Efforts required to restore wild salmon run headlong into many other individual and societal priorities. Two of the most obvious and visible recent examples are the ongoing electricity shortfalls and decisions over

how to balance Columbia River electricity generation vs. salmon survival, and the contentious lawsuits over how to divide up scarce Klamath Basin water supplies between farmers, refuge managers, threatened salmon, endangered suckers, and threatened bald eagles.

Critics have described the Endangered Species Act as a naive piece of legislation searching for a credible public policy objective. Did Congress understand the implications of what it passed? Most of the discussion at the time, critics argue, involved the sorry state of bald eagles. Were the Act's policy implications for salmon comprehended by the Senators and Congressmen who voted for it? Not likely — one point upon which all agree.

Supporters of the Act, on the other hand, maintain that the Endangered Species Act is forcing society to make the necessary, though painful, decisions for the future well-being of society or, perhaps, even society's very survival. They assert that the Act may not be perfect, but it is needed now more than ever, as the salmon decline clearly illustrates. The debate often pivots on moral positions. There may be references to the economic value of salmon fishing, salmon as a Pacific Northwest cultural icon, or salmon as a "surrogate" for overall environmental quality, but the fundamental issue, from their perspective, is whether humans have a right to drive a salmon species or stock to extinction.

Even assuming that society decides that "saving" salmon is a good thing and it ought to be accomplished, there is disagreement over what the restoration objective ought to be. For example, should the target be simply to save a species — or an evolutionarily significant unit — or a stock from extinction? Such a policy objective (*e.g.*, saving a species, evolutionary unit, or stock) can be achieved with relatively low run sizes, but such runs would not be at levels that would permit sustainable fishing. Is restoration of wild salmon to levels too small to allow fishing acceptable?

A much more challenging restoration objective would be to restore wild salmon runs to historical levels seen before 1850. Almost certainly, this objective is not achievable with *wild* salmon unless human impacts are reduced to pre-1850 levels. But does society demand that salmon runs be comprised entirely of wild fish? If restoration is constrained to wild fish, it becomes much more challenging and would be especially difficult to produce enough fish to support significant fishing. If hatchery fish are used, and fishing is permitted, there will continue to be adverse effects on wild salmon, but what level of adverse effect is acceptable to society? Thus, there is no inherently *scientifically* correct approach to restoration, but rather a suite of alternatives with "best" largely being a function of which vision of the restoration objective one accepts.

But do we need to bring some annoying reality to this discussion? The human population of the Pacific Northwest is growing at an annual rate comparable to those in some third-world countries. For example, applying middle-of-the-road (from my perspective) annual growth rates of the current human population in Oregon, Washington, Idaho, and British Columbia (currently 15 million in total), there will be a population of 60-80 million people by 2100. Given such a probable human population level, you may ask whether society is being delusional about the chances of the Endangered Species Act — or anything else — doing much to save wild salmon.

Finally, in western North America, we now expend considerable public and private resources in a desperate attempt to save salmon stocks that are down to a few individuals. Have we reached a point where society will soon conclude that sufficient resources have already been spent in an abortive bid to save *all* wild salmon stocks? Or, are we at the stage of recognizing that society wishes to maintain salmon in the Pacific Northwest, but prefers to do it using hatcheries and other technological fixes that may be costly and not certain to succeed, but avoid the major social dislocation of restoring *wild* fish? Or, will society accept the creation of *salmon refuges*, analogous to national parks, that preserve runs of a few stocks in a fully wild state? Or, will society demand that protection and restoration of wild salmon trump all other societal priorities, regardless of individual and collective costs?

These are troublesome questions. These questions force us to accept that we cannot have it all. These questions expose our personal battles between emotion and intellect. These questions force us to acknowledge mutually exclusive policy alternatives. Most importantly, these questions are ones that few of us relish.

Should wild salmon be restored to the Pacific Northwest? Salmon technocrats contribute to the answer, but their role should be confined to the crucial role of assessing the probability of success of various policy options. Rather, the answer to the question, with input from salmon technocrats, must come from *society* through its political institutions. It is delusional to think that society will ever answer the question unequivocally, or to the satisfaction of many interested parties. Rather, individuals, society, and our institutions answer the question indirectly by making personal choices, allocating tax expenditures, and setting bureaucratic priorities on issues in which the fate of wild salmon is only a small, often trivial, component. Thus, society and its political institutions may appear to be unable to act on the salmon restoration issue. Still, they *are* making decisions daily on the importance of maintaining or restoring wild salmon compared to competing societal priorities, although they may not be consciously aware that they are doing so.

Policy Analysis:

Based on the two perspectives presented for this week, you should determine their two positions or perspectives on the following aspects of wild salmon policy:

1. *What is the precise or implied goal of a particular proposed recovery plan (or approach to recovery)? Does an advocate state it, or do you have to infer it? How will success be measured? Is the primary de facto goal to keep the various technocrats employed?*

2. *Who is actually making policy decisions (i.e., courts, Federal agencies, state agencies, Indian tribes)? Is a particular pitch being honest and accurate about assessing the reality of the situation?*

3. *Are there more efficient policies for achieving salmon recovery? Where these options presented fairly by either perspective? If they are not presented, why not?*

4. *Did the advocate make a convincing argument that the proposed recovery plan would actually achieve the stated goal? Did the advocate actually seem to believe it?*

5. *How much of a role did scientific information play in evaluating the alternative policy options as presented? Is the salmon policy issue pretty much a clash of values, or is it dominated by scientific questions? Is there an example of "advocacy masquerading as science?"*

6. *Are the advocates leveling about the "facts of the case" or are they spinning toward a particular policy perspective or implied policy preference?*

7. *Did either pitch offer examples of "symbolic politics"? Are the public and politicians being misled regarding how likely salmon recovery is given current policies?*

8. *Is NOAA-Fisheries (or any organization) really in charge of salmon policy, or is it being swept along by other power centers? If they (NOAA-Fisheries) are not in control, is anyone and, if so, who?*

9. *Did the advocates make credible cases that the public would support what really needs to be done to have significant, sustainable runs of wild salmon through this century?*

10. *How do the advocates of the proposed salmon recovery plans accommodate for the 4 or 5 times more people expected in California, Oregon, Washington, Idaho, and British Columbia by 2100? Were they explicit in addressing this issue? Is it even possible to have salmon recovery in human population centers (urban areas)? If they did not cover this point, why not?*

Background Reading:

Aspelund, Lindsey Ray. 2016. *How Will Salmon Survive a Flooded Future?* Wild Salmon Center, Portland, OR.
https://www.wildsalmoncenter.org/2016/10/17/salmon-floods-learning/

Barker, Rocky. 2019. Northwest salmon still struggle to survive. Can we save them – and at what price? *The Idaho Statesman*. April 25.
https://www.idahostatesman.com/news/local/environment/article160364954.html

Beamer, Eric. 2009. Thoughts on Traditional Ecological Knowledge, Values, and Salmon Management. *Puget Sound Georgia Basin Ecosystem Conference*, Seattle, Washington.
http://skagitcoop.org/wp-content/uploads/Beamer2009-thoughts-on-traditional-ecological-knowledge.pdf

Blumm, Michael C., Erica J. Thorson, and Joshua D. Smith. 2006. Practiced at the art of deception: the failure of Columbia Basin salmon recovery under the Endangered Species Act. *Environmental Law*. 36: 709-810.
https://law.lclark.edu/live/files/258-363blumm

Buchal, James L. 1998. *The Great Salmon Hoax*. Iconoclast Publishing Company, Aurora, Oregon, 384 pp.
http://www.buchal.com/tgsh/chap7/Table%20of%20Contents.htm

Conca, James. 2016. Will removing large dams on the Snake River help salmon? Forbes.com. November 29.
https://www.forbes.com/sites/jamesconca/2016/11/29/will-removing-large-dams-on-the-snake-river-help-salmon/#561dc793155b

Doremus, Holly. 2001. Adaptive management, the Endangered Species Act, and the institutional challenge of "New Age" environmental protection. *Washburn Law Journal*. 41: 50-89.
https://contentdm.washburnlaw.edu/digital/collection/wlj/id/5232

Hall, Troy E. and Dave D. White. 2008. Representing recovery: science and local control in the framing of U.S. Pacific Northwest salmon policy. *Human Ecology Review*. 15(1): 32-45.
http://ajph.humanecologyreview.org/pastissues/her151/hallandwhite.pdf

Independent Scientific Advisory Board. 2007. *Human Population Impacts on Columbia River Basin Fish and Wildlife*. Northwest Power and Conservation Council, ISAB Human Population Report (ISAB 2007-3), 73 pp.
https://www.nwcouncil.org/sites/default/files/isab2007_3.pdf

Irvine, James R. 2009. The successful completion of scientific public policy: lessons learned while developing Canada's Wild Salmon Policy. *Environmental Science and Policy.* 12(2): 140-148.
http://www.sciencedirect.com/science/article/pii/S146290110800110X

Johnson, Miles. 2019. *A New Deal for Orcas, Salmon, and the Pacific Northwest*. Columbia Riverkeeper, March 29, 2019, Hood River, OR.
https://www.columbiariverkeeper.org/news/2019/3/new-deal-orcas-salmon-and-pacific-northwest.

Katz, Jacob, Peter B. Moyle, Rebecca M. Quiñones, Joshua Israel, and Sabra Purdy. 2013. Impending extinction of salmon, steelhead, and trout (*Salmonidae*) in California*. Environmental Biology of Fishes*. 96: 1169-1186.
https://watershed.ucdavis.edu/files/biblio/Katz_et_al._2013%20salmonids%20in%20CA.pdf

Lackey, Robert T., Denise H. Lach, and Sally L. Duncan. Editors. 2006. *Salmon 2100: The Future of Wild Pacific Salmon*. American Fisheries Society, Bethesda, Maryland, 629 pp.
http://blogs.oregonstate.edu/lackey/files/2017/07/2006i-Salmon-2100-Project-Introduction-Reprint-Lackey.pdf

Lackey, Robert T., Denise H. Lach, and Sally L. Duncan. 2006. Policy options to reverse the decline of wild Pacific salmon. *Fisheries*. 31(7): 344-351.
http://blogs.oregonstate.edu/lackey/files/2017/07/2006g-Policy-Options-to-Reverse-Decline-Reprint-Lackey-Lach-and-Duncan.pdf

Lackey, Robert T. 2009. Salmon Decline in Western North America: Historical Context. In: *Encyclopedia of Earth*. Eds. Cutler J. Cleveland (Washington, DC, Environmental Information Coalition, National Council for Science and the Environment).
http://blogs.oregonstate.edu/lackey/files/2017/08/2009b-Encyclopedia-of-Earth-Salmon-History-Reprint-Lackey.pdf

Lackey, Robert T. 2009. Salmon in Western North America: Assessing the Future. In: *Encyclopedia of Earth*. Eds. Cutler J. Cleveland (Washington, DC, Environmental Information Coalition, National Council for Science and the Environment).
http://blogs.oregonstate.edu/lackey/files/2017/08/2009c-Encyclopedia-of-Earth-Salmon-Future-Reprint-Lackey.pdf

Landry, Clay J. 2003. *The Wrong Way to Restore Salmon*. PERC (Property and Environment Research Center), Bozeman, MT.
https://www.perc.org/2003/06/01/the-wrong-way-to-restore-salmon/

Lichatowich, James R. 2018. *Wild Pacific Salmon: A Threatened Legacy*. Bemis Printing, St. Helens, OR, 59 pp.
https://www.worldsalmonforum.org/wp-content/uploads/2018/11/Pac-Sal-Legacy-Combined-cover-and-doc-2018.pdf

Meyers Resources, Inc. 2019. *Tribal Circumstances and Impacts from the Lower Snake River Project on the Nez Perce, Yakama, Umatilla, Warm Springs, and Shoshone Bannock Tribes—Executive Summary.* Columbia River Inter-Tribal Fish Commission. 22 pages.
https://www.critfc.org/wp-content/uploads/2014/11/circum_exec.pdf

Michael Jr, John H. 1999. The future of Washington salmon: extinction is not an option but may be the preferred alternative*. Northwest Science.* 73(3): 235-239.
https://research.libraries.wsu.edu/xmlui/bitstream/handle/2376/1153/v73%20p235%20Michael%20Jr.PDF?sequence=1

Pollon, Christopher. 2019. Will B.C.'s wild salmon strategy be a boon or bust? *The Narwhal*.
https://thenarwhal.ca/will-b-c-s-wild-salmon-strategy-be-a-boon-or-bust/

Rahr, Guido. 2020. Why protect salmon. *Wild Salmon Center.* Portland, OR.
https://www.wildsalmoncenter.org/why-protect-salmon/

Service, Robert F. 2018. Pacific Northwest salmon are in big genetic trouble. *Science Magazine*.
https://www.sciencemag.org/news/2018/01/pacific-northwest-salmon-are-big-genetic-trouble

Simpson, R. David. 2019. Saving salmon and saving money. *PERC-Reports*. 38(2): 34-39.
https://www.perc.org/2019/12/06/saving-salmon-and-saving-money/

Wikipedia. 2020. *Salmon*.
http://en.wikipedia.org/wiki/Salmon

Wikipedia. 2020. *Salmon conservation.*
https://en.wikipedia.org/wiki/Salmon_conservation

Zhang, Sarah. 2019. The feeding frenzy that got sea lions into deep trouble. *The Atlantic*. January 31.
https://www.theatlantic.com/science/archive/2019/01/killing-sea-lions-save-salmon/581740/

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Week 6 – Backgrounder

Genetic Engineering Policy

Policy Context:

The debate over developing a rational public policy concerning use of genetic engineering (genetic modification) is mired in vitriolic arguments involving an amorphous mix of values, preferences, and scientific information. Many proponents of using the technology argue that it has been demonstrated to be low risk and is essential to providing sufficient high quality food to meet human needs, especially in developing countries. Others, however, argue that resorting to genetic engineering is unnecessary (along with being dangerous) because people should not be forced to eat food produced by unproven technology.

Some oppose genetic engineering because the technology may have unforeseen ecological consequences, and some consequences may be irreversible. Specifically, opponents usually identify concerns that genetically engineered agricultural crops might cross-pollinate with other varieties of similar crops (both wild and domestic) and transmit genetically altered genes to future generations. Once these "bad" genes are in the gene pool, they would not likely be removed through natural reproduction. Others argue that appropriate controls eliminate or significantly reduce these risks. Given the negligible risk, they argue, the technology ought to be used. Further, they claim these risks are not much different than those arising from conventional breeding programs.

Opponents to genetic engineering sometimes argue that there is no way to ensure that genetically modified organisms remain under control in the real world even though it is theoretically possible to do so. To them, the application of genetic engineering outside of laboratory conditions carries unknown (and unacceptable) risks. Until these risks are known, they argue, there ought to be a moratorium on using genetically modified organisms.

Proponents of using genetic engineering techniques (especially for food plants) tout the benefits that the technology would likely have. In very harsh agricultural conditions, for example, genetically modified local crops might prosper where the local varieties do not. Genetically altered rice, often offered up as a documented success story, contains elevated levels of vitamin A. If such varieties of rice were planted widely, they could reduce the prevalence of vitamin A deficiency, a disease that causes blindness and death to hundreds of thousands of people annually. In summary, they (the GMO proponents) conclude that the demonstrated and limitless potential benefits far exceed the recognized and potential risks. Therefore, efforts to develop and use genetically engineered agricultural products ought to continue.

Proponents also assert that genetic engineering or genetic modification is not significantly different from the modifications that plant breeders have done for many centuries and continue to do. Well accepted and age-old animal husbandry and crop breeding techniques are essentially a type of genetic engineering except that artificial selection is used instead of gene modification.

One of the principal but intangible concerns about genetic engineering as technology is fear of the unknown. Some new technologies were widely embraced initially only to find later that there were unanticipated risks. Often there is considerable hype over new technology; only later does a balance develop between the likely benefits vs. the potential risks. So-called "miracle" chemicals such as DDT proved to be very useful in their intended use (i.e., killing mosquitos), but later it became apparent that there were some largely unanticipated consequences. DDT tended to accumulate in fish tissue and weakened the egg shells of fish-eating birds such as eagles, pelicans, and ospreys. It is (and was) extremely effective in malaria control programs, especially in Africa, southeast Asia, and South America. When DDT was effectively (but not legally) banned in international aid programs, the number of deaths from malaria went up. As unpleasant as these tradeoffs are, they are at the core of policy debates. Thus, the DDT case study is sometimes encapsulated as a policy choice between saving birds in North America vs. saving humans in Africa and southeast Asia. There is no "right" answer to such questions.

Even though the scientifically documented risks of using genetically engineered organisms have *not* been shown to be great, at least as assessed by most scientists, the concerns remain. All scientists who have looked at the issue conclude that there are a number of ways in which genetically engineered organisms *could* potentially adversely impact the environment (and human health for that matter). Thus, the skeptics' argument is mostly governed by a highly risk-averse approach to policy making. In their view, the possibility of

adverse consequences of the widespread use of genetically engineered products is sufficient to preclude their use. Thus the policy debate is less over the scientific issues, but rather of the degree of risk society ought to accept to achieve the benefits of genetic engineering.

GMOs have now been around for many years, as has the technology. For example, in 1994, the first genetically engineered commercial food (a tomato) was introduced in the United States. This new and genetically engineered tomato had a much longer shipping life than conventional tomatoes and had no additional risks compared to regular tomatoes. Since 1994, more than 50 other genetically engineered foods have been approved for market in the U.S. (the U.S. Food and Drug Administration determined them to be as safe as their regular or non-engineered counterparts).

Perhaps ¾ of all processed foods sold in U.S. grocery stores may contain ingredients from genetically engineered plants. Examples are bread, cookies, cereals, pizzas, hot dogs, and soft drinks. Ingredients used extensively in processed foods are soybean oil, cottonseed oil, and corn syrup. Soybeans, cotton, and corn are the dominant genetically engineered crops in the U.S. These plants, through use of genetic engineering, are now able to repel pests and/or tolerate herbicides used to kill competing weeds. Some crops (potatoes, squash, and papaya), have been engineered to resist species-specific diseases. Despite these various examples of "improvements" though use of GMOs, many people remain opposed.

Policy Analysis:

Based on the two perspectives being considered this week, you should determine their positions or opinions on the following aspects of crafting a rational public policy for using the technology of genetic engineering (i.e., genetic modification):

41. *What is the goal of the current U.S. policy toward genetic engineering?   Did the authors clearly state their positions, or did you have to infer them? How will the success of their individual policy preferences be measured? In other words, what would "success" mean from their perspectives?*

42. *Did either author make a convincing argument that any proposed policy options will achieve the stated goal?*

43. *Who is making policy decisions regarding genetic engineering (courts, Federal agencies, state agencies, NGOs, or someone else)?   Was either author being honest about assessing the reality of the political situation or policy context?*

44. *Are there more efficient policies for resolving the policy conflicts over genetic engineering? Were these options presented or acknowledged by either author?*

45. *How much of a role did/does scientific information play in evaluating alternative policy options for genetically modified organisms? Is the policy debate largely a clash of values and preferences, or is it dominated by scientific questions?*

46. *Did the authors level about the "facts of the case," or were they "spinning" toward a particular and desired policy perspective? Did either use any normative science to bolster their cases?*

47. *Did either propose using "symbolic politics" in proposing their policy preferences? Are the public and/or politicians being misled by scientists according to either? How much delusional reality is there associated with policy debates over genetic engineering?*

48. *To what extent are NGOs influencing policy analysis and/or policy making? Which are the most influential NGOs, and why are they so influential?*

49. *Should the development of this public policy be or have been handled differently? If so, how?*

Background Reading:

American Farm Bureau. 2020. Biotech grassroots toolkit (Retrieved from the web site)
https://www.fb.org/files/GrassrootsToolKit-AllBenefitsIncluded.pdf

Ben-Shahar, Omri. 2018. *The environmentalist case in favor of GMO food*. Forbes Online.
https://www.forbes.com/sites/omribenshahar/2018/02/26/the-environmentalist-case-in-favor-of-gmo-food/#32d5a5e237de

Carpenter, Janet E. 2010. Peer-reviewed surveys indicate positive impact of commercialized GM crops. *Nature Biotechnology* 28**:** 319–321.
http://fundacion-antama.org/wp-content/uploads/2010/04/20100422-Nature-Biotechnology.pdf

Dang, Etana. 2020. Designer babies, superhumans, and the ethics of genetic engineering.
https://medium.com/@etana.dang/designer-babies-superhumans-and-the-ethics-of-genetic-engineering-f47073909d41

Dobert, Ray. 2015. Think GMOs aren't regulated? Think again. *Forbes Online*.
https://www.forbes.com/sites/gmoanswers/2015/12/21/how-are-gmos-regulated/#d8cbdc362553

Epstein, Ron. 1999. *Ethical Dangers of Genetic Engineering*. Institute for World Religions.
http://www.greens.org/s-r/20/20-01.html

Freedman, David. 2013. The truth about genetically modified food. *Scientific American*.
https://www.scientificamerican.com/article/the-truth-about-genetically-modified-food/

Gilbert, Natasha. 2013. Case studies: a hard look at GM crops. *Nature*. 497(7447): 24-26.
https://www.nature.com/news/polopoly_fs/1.12907!/menu/main/topColumns/topLeftColumn/pdf/497024a.pdf

Greenpeace. 2020. Stop genetic junk.
https://www.greenpeace.org/archive-india/en/What-We-Do/Sustainable-Agriculture/GE-campaign/

Mason, Matthew. 2020. *Future of agriculture: facts about GM crops and biotech*.
EnvironmentalScience.org
https://www.environmentalscience.org/future-agriculture-biotechnology

Nesbit, Rebecca. 2017. The future of GMO Food. *Scientific American.*
https://blogs.scientificamerican.com/observations/the-future-of-gmo-food/

Pickrell, John. 2006. *Introduction: GM organisms.* New Scientist.com*.
http://www.newscientist.com/channel/life/gm-food/dn9921

Regis, Ed. 2019. *Golden rice could save children: until now, governments have barred it*.
Washington Post op-ed.
https://www.washingtonpost.com/opinions/2019/11/11/golden-rice-long-an-anti-gmo-target-may-finally-get-chance-help-children/

Rifkin, Jeremy. 2004. The biotech century: playing ecological roulette with Mother Nature's
designs. *E-Magazine.com*.
https://emagazine.com/the-biotech-century/

Savage, Steve. 2020. Biotechnology could save our favorite banana: will anti-GMO activists
stand in the way? *The Genetic Literacy Project.*
https://geneticliteracyproject.org/2020/02/07/viewpoint-biotechnology-could-save-our-favorite-banana-will-anti-gmo-activists-stand-in-the-way/

Scientific American. 2013. Labels for GMO foods are a bad idea: mandatory labels for
genetically modified foods are a bad idea. *Scientific American*.
https://www.scientificamerican.com/article/labels-for-gmo-foods-are-a-bad-idea/

Siegel, Kate, and Suzanne Verity. 2020. *What You Need to Know About GMOs*. WebMD website.
https://www.webmd.com/food-recipes/features/truth-about-gmos#1

Union of Concerned Scientists. 2012. Failure to yield evaluating the performance of genetically engineered crops.
https://www.ucsusa.org/resources/failure-yield-evaluating-performance-genetically-engineered-crops

Wikipedia. 2020. *Genetic Engineering*.
http://en.wikipedia.org/wiki/Genetic_engineering

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Week 7 – Backgrounder

Owl *vs.* Logging Policy

Policy Context:

National forests were created to attain public benefits, but what are those benefits — and who should receive them? To some, publicly-owned forests should be managed to achieve the goals and aspirations of local (usually rural) residents, which typically means that consumptive, economic uses (especially timber harvest, grazing, and mining) are encouraged. To others, the forests ought to preserve the nation's biotic heritage and be managed more like wilderness areas or national parks with little or no commercial enterprise and strictly limited recreational activity. Various visions of multiple use populate the vast middle policy ground, often captured in the progressive era mantra, "the greatest good for the greatest number."

Vigorous policy debate and lack of a clear public consensus about the appropriate role of public forests is more than a century old.   Most recently, the conflict over what should be the proper policy or goal for public forests percolated to the surface through the unlikely narrow issue of the future viability of the northern spotted owl. In the early 1980s, environmental advocacy groups began using the declining populations of spotted owls as a vehicle or legal surrogate to try to force change in public policy relative to national forests in the Pacific Northwest. In 1986, the U.S. Fish and Wildlife Service was legally petitioned to list the owl as an endangered species. The petitioners (and the opponents), felt that a successful ESA listing potentially would drastically curtail commercial uses of the forests, especially logging. In June 1990, the northern spotted owl was ruled in Federal court to be a threatened species. For years, a protracted series of contentious legal proceedings followed this listing.

From the perspective of the environmentalists and their political allies pushing spotted owl litigation, protecting the spotted owl and its habitat was more important than the cost that would be borne by specific elements of society. They readily acknowledged that many relatively high paying jobs (mostly rural) would be lost and many Pacific Northwest timber companies would be adversely affected, but timber jobs and companies, they argue, will vanish no matter what because wood can be produced more cheaply in the southeastern US, Canada, Russia, Brazil, and elsewhere.

Conversely, others maintained that the benefits of saving the spotted owl were negligible compared to the harm that would be done to individuals, communities, and especially small, locally owned mills and logging companies. Further, they argued, reduced logging in the Pacific Northwest would harm all Americans and be particularly devastating to rural communities in the Pacific Northwest. After all, they argued, the public forests were primarily a primary source of timber for small, independent PNW lumber mills. Also, after logging, the land was reforested and managed in a sustainable manner so the timber supply would continue to be sustainable for the foreseeable future. Existing forests, they and their political allies argued, provided ample opportunities for outdoor experiences, forest recreation, and other multiple use activities.

In response to declining harvest levels and an apparent worsening status of the northern spotted owl, several Federal agencies developed in 1994 the "Northwest Forest Plan." There were two explicit goals that were tasked to the developers of the Plan:

(1) implement a sustainable timber harvest program that would provide a predictable supply of timber to mills, especially in rural communities decimated by prior mill closures; and

(2) reverse the apparent decline in northern spotted owl numbers which is protected under the Endangered Species Act.

How well were the two goals met? According to a recent review of the Northwest Forest Plan conducted by the US Forest Service:

(1) Federal timber offered for sale in the area covered by the Northwest Forest Plan was lower than expected and ultimately averaged only 54 percent of the goal; and

(2) Spotted owl populations declined about 7.5% per year across their northern range and 2% per year across their southern range.

So why was the Plan not successful in meeting its publicly-stated two goals? As is typical in these policy case studies, the answer depends on who you ask. As always, it is easy to get lost in the scientific details and debates about the spotted owl controversy, but the broader policy debate continues: *what is the appropriate public policy goal for national forests?*

Policy Analysis:

Based on two perspectives (required readings) considered this week, you should determine their policy positions or opinions regarding how national (and state or provincial) forests *ought* to be managed (including specific issues such as spotted owls and timber harvest).

50. *What has been the role of scientists and technocrats in the logging/owl policy debate? Did the two authors clearly state their positions, or did you have to infer them? Are some scientists using their position as "scientists" to pitch their personal or their employer's policy preferences?*

51. *Did either author make a convincing argument that his position was the best one? Did the authors seem to believe these positions, or were they primarily making rhetorical arguments? What were the marketing tactics used?*

52. *Relative to scientific information regarding the logging/spotted owl issue, how important is it for society ultimately to choose the preferred policy? Policy-wise, who were the winners and losers?*

53. *Are there other (or better) ways to inform decision makers about the "science" than the authors propose? Were any of these different ways presented or acknowledged?*

54. *Is the spotted owls/logging debate largely a clash of values and preferences, or is it dominated by scientific questions?*

55. *Are the authors leveling about the "facts of the case," or are they pushing toward a particular and desired policy perspective?   Did either use any normative science to make their cases about spotted owls or timber harvest?*

56. *Is either author playing into the hands of those practicing symbolic politics? Are the public and politicians being misled by scientists or other experts in the spotted owl/logging issue? Is this an example of "scientizing" a policy issue? If so, why?*

57. *Compared to Federal, state, and local governments, to what extent are NGOs influencing policy analysis and/or policy making regarding spotted owls/logging? Which are the most influential NGOs, and why are they so powerful? What about the role of the courts? How is ESA playing in this case study?*

58. *Should the development of ecological policy (and the role of science and scientists) be handled differently from the logging/timber issue? If so, how?*

59. *What is your take on the debate over the policy neutrality of "scientists" who work on this issue? From your reading concerning the policy issue being considered this week, do the scientists have a de facto preferred policy option, or do they generally provide policy-relevant but policy-neutral science?*

Background Reading:

Anderson, Terry. 2017. Why protecting the habitat of the Northern Spotted Owl sparks forest fires. *Newsweek*.
https://www.newsweek.com/why-protecting-northern-spotted-owl-sparks-forest-fires-689546

Andre, Claire, and Manual Velasquez. 2015. *The Spotted Owl Controversy*. Markkula Center for Applied Ethics, Santa Clara University.
https://www.scu.edu/environmental-ethics/resources/ethics-and-the-environment-the-spotted-owl/

Davis, Raymond J., Ohmann, Janet L., Kennedy, Robert E., Cohen, Warren B., Gregory, Matthew J., Yang, Zhiqiang, Roberts, Heather M., Gray, Andrew N., Spies, Thomas A. 2015. *Northwest Forest Plan – the first 20 years (1994-2013): status and trends of late-successional and old-growth forests.* General Technical Report PNW-GTR-911. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 112 p.
https://www.fs.fed.us/pnw/pubs/pnw_gtr911.pdf

Duvernay, Adam. 2020. The Oregon timber worker's truth. *The Register-Guard*. February 23.
https://www.registerguard.com/news/20200223/oregon-timber-workers-truth

Gilman, Sarah. 2016. Evidence of absence: northern spotted owl still vanishing from Northwest. *The Cornell Lab, All About Birds*.
https://www.allaboutbirds.org/news/evidence-of-absence-northern-spotted-owls-are-still-vanishing-from-the-northwest/

Martino, Joseph P. 2003. Science and public policy. <u>Chapter 3</u> in: *Politicizing Science: The Alchemy of Policymaking*, Michael Gough, editor, Hoover Press.
http://media.hoover.org/documents/0817939326_73.pdf

Phalan, Benjamin T., Joseph M. Northrup, Zhiqiang Yang, Robert L. Deale, Josée S. Rousseau, Thomas A. Spies, and Matthew G. Betts. 2020.   Impacts of the Northwest Forest Plan on forest composition and bird populations. Proceedings of the National Academy of Sciences. 106(8): 3322-3327.
https://www.pnas.org/content/pnas/116/8/3322.full.pdf

Schwartz, Peter. 2000. *In Moral Defense of Forestry*. Speech, California Forestry Association, Napa, California, The Ayn Rand Institute, Irvine, California.
http://hv.greenspun.com/bboard/q-and-a-fetch-msg.tcl?msg_id=003Q55

Shaver Zack. 2016. Logging, Owls, and Unlikely Alliances around Environmental Ethics on the West Coast. Evergreen State College.
https://sites.evergreen.edu/ccc/mineralstimber/owls-loggers-and-resistance-on-the-west-coast/

Thomas, Jack W., Jerry E. Franklin, John Gordon, and K. Norman Johnson. 2006. The Northwest Forest Plan: origins, components, implementation experience, and suggestions for change. *Conservation Biology*. 20(2): 277-287.
https://conbio.onlinelibrary.wiley.com/doi/pdf/10.1111/j.1523-1739.2006.00385.x#accessDenialLayout

U.S. Fish and Wildlife Service. 2020. *Barred Owl Threat: Encroaching Competitor Adds to Spotted Owl's Struggle.*
https://www.fws.gov/oregonfwo/articles.cfm?id=149489615

Vellend, Mark, Lander Baeten, Isla H. Myers-Smith, Sarah C. Elmendorf, Robin Beauséjour, Carissa D. Brown, Pieter De Frenne, Kris Verheyen, and Sonja Wipf. 2013. Global meta-analysis reveals no net change in local-scale plant biodiversity over time. *Proceedings of the National Academy of Sciences.* 110(48): 19456-19459.
https://www.pnas.org/content/pnas/110/48/19456.full.pdf

Weidensaul, Scott. 2018. Old-growth is great, but here's why we need new-growth forests too. *Living Bird Magazine.*
https://www.allaboutbirds.org/news/old-growth-is-great-but-heres-why-we-need-new-growth-forests-too/

Welch, Craig. 2009. The spotted owl's new nemesis: a battle between environmentalists and loggers. *Smithsonian Magazine*.
https://www.smithsonianmag.com/science-nature/the-spotted-owls-new-nemesis-131610387/

Wikipedia. 2020. *Northern Spotted Owl*.
http://en.wikipedia.org/wiki/Northern_Spotted_Owl

Wikipedia. 2020. *Northwest Forest Plan.*
https://en.wikipedia.org/wiki/Northwest_Forest_Plan

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Week 8 – Policy Backgrounder

Climate Change Policy

Policy Context:

To date, most of the public debate over climate change policy revolves around "facts" and "science." The implied assumption is if we all agreed on the facts of the case (*i.e.*, the science about climate change), the appropriate policy choice would be clear.

Although there is considerable debate among scientists over specifics, overall, an increasing body of scientific study supports the assertion that the Earth is warming due at least *in part* to human activities. The global average surface temperature has increased over the 20th century by about 0.6°C. There is relatively little scientific debate over this estimate, but there is considerable debate over the *cause* of the increase. The global average surface temperature and the sea surface temperature have increased since 1861.

As with all climate data, the historical record shows a great deal of variability. Most of the warming occurred during the 20th century. The most significant warming occurred during two periods: 1910-45 and 1976-2006. Worldwide, the 2010s was the warmest decade and 2014 the warmest year in the instrumental record. In a longer-term context, the increase in temperature in the 20th century is likely to have been the largest of any century during the past 10 centuries. These observations, of course, imply nothing about the cause, an issue of central importance in policy analysis.

There are a few other reasonably widely stated, if not universally accepted, conclusions. On average, between 1950 and 1993, night-time daily minimum air temperatures over land increased by about 0.2°C per decade. This change is about twice the increase in daytime daily maximum air temperatures (0.1°C per decade). As a result of this increase, the fire season has lengthened the freeze-free season in many mid- and high latitude regions. The rise in sea

surface temperature over this period is about half that of the mean land surface air temperature. Temperatures have risen during the past four decades in the lowest 8 km of the atmosphere. Since the late 1950s (the period of adequate observations from weather balloons), the overall global temperature increases in the lowest 8 km of the atmosphere and surface temperature have been similar at 0.1°C per decade.

Snow cover and the extent of ice cover have decreased recently (last several decades). It is very likely to have decreased by about 10% since the late 1960s. Over the 20th century, it is also likely that there has been a reduction of about two weeks in the annual duration of lake and river ice cover in the mid- and high latitudes of the Northern Hemisphere. Overall, there has been a general retreat of mountain glaciers in non-polar regions.

Changes in sea levels are also of great relevance in policy analysis because of the likely effects on coastal and island communities. Over the past 100 years, the sea level has risen, probably at the rate of 1-3 mm/yr. A common prediction is that by 2100 there will be a sea level rise of 11 to 88 cm (4-34 inches). Sea level rise has not been, nor is it expected to be globally uniform. Some regions are predicted to have a sea level rise more than the global average, but others may see decreased sea level.

Climate has been and is, of course, always changing. It has varied significantly over human history, and there is no reason to expect current times to be different. The Earth is still emerging from the Little Ice Age (~1250 to ~1850 AD), and some scientists conclude that significant rises in global temperature are a predictable consequence. Thus, they argue that the current level of global warming is both real and natural. On balance, however, most analysts have concluded that recent changes in climate are due, at least in some part, to human activities.

Reducing greenhouse gas emissions is at the center of most public discussions about climate change policy and is the most direct way theoretically to reduce warming, many policy advocates argue. Such policies would have to address the emissions of both (1) major developed countries (US, UK, Japan, Germany, France, Canada, etc.) along with (2) the major "emerging" emission contributors (China, India, Brazil, Russia, etc.). Thus, it is easy to see why such policy discussions tend to go nowhere.   As emerging countries develop economically and move toward higher living standards already enjoyed elsewhere, they tend to be reluctant to restrain their energy use.

Another approach is to focus on "mitigating" or "adapting" to changing climate. Climates have always changed naturally, and they will continue to do so, so adaptation has

always taken place to some degree. Adapting to climate change would focus on dealing with impacts that cannot be avoided or those for which the costs of avoiding are too great (from society's perspective).

Adaptation efforts can lessen the adverse (from a human perspective) *consequences* of future climate change even if a change in climate does take place. Complicating an adaptation-oriented policy is the conundrum that many of the anticipated changes in climate will fall on those nations least able (or willing) to cope financially. Steep reductions in emissions (although very unlikely to happen politically) could eventually *stabilize* atmospheric greenhouse gas levels, but the levels would almost assuredly be much higher than today's levels. With these higher levels (even with stringent emission controls) will come rises in temperatures (and likely sea level), changes in precipitation (may be increases or decreases, depending on location), and more extreme weather (beyond the typical cyclic fluctuations). Therefore, many policy analysts argue, some elements of adaptation must be part of any climate change policy.

Climate change (whether natural or human-induced) affects a broad array of the Earth's ecosystems with corresponding effects on health, agriculture, fishing, water supplies, and many other elements vital to human well-being. Further complicating policy development, some regions will likely be better off (from a human perspective) with a warmer climate (especially more northern areas). Agriculture in Canada, Ukraine, Georgia, and Russia, for example, might be improved, but agriculture in Australia might be much worse off.

From a policy perspective, adapting in the past to the ecological impacts happened by necessity as the climate changed. Most of the adaptations were by individuals or local institutions. The current policy debate is different in that climate is predicted to change, and therefore, adaptation is less a response to demonstrated climate change than to anticipated climate change. Also, mitigation may be on a much broader scale than was the case in the past.

As we have seen in other policy case studies, from a policy perspective, the distribution of costs and benefits is arguably the most important factor in settling on a specific policy choice. Those regions most vulnerable to human-caused climate change are usually the ones least responsible for it. The "benefits" of climate change adaptation programs are categorized as "good" outcomes. Benefits are sometimes measured solely in terms of money. Still, they are more broadly encompassed by all the desirable things that are most likely to happen if a specific policy option is adopted. Conversely, the "costs" are the undesirable outcomes that are likely to happen (often, but not always, measured in monetary terms). As with all ecological policy issues, the critical factor is the perception of who receives the benefits vs. who will bear the costs.

Policy Analysis:

Based on two perspectives presented this week, you should determine their positions or opinions about how climate change should be addressed.

60. *What has been the role of scientists and technocrats in debates over climate policy? Did the authors clearly state their positions on scientists' appropriate role in climate policy debates, or did you have to infer them?*

61. *Did the authors make convincing arguments that their positions are the best ones? Did they seem to believe it themselves? What about a scientist with strong personal policy preferences (and there seem to many of them in the climate science/policy arena)?*

62. *Relative to scientific information and scientists, how important are they in climate policy? Were the authors honest about assessing the reality of the political situation?*

63. *Are there other (or better) ways to inform decision makers than they proposed? Were these ways presented or acknowledged by the authors?*

64. *How much of a role did/does scientific information play in evaluating alternative policy options regarding climate change generally? Is the policy debate largely a clash of values and preferences, or is it dominated by scientific questions?*

65. *Are the authors leveling about the "facts of the case," or are they subtly favoring a desired policy perspective? Did either use any normative science to make their case about climate change? Think about "Climategate" and those scientists in "marketing" their personal policy message.*

66. *Did either author practice or recommend symbolic politics? Are the public and politicians being misled by scientists in the climate change debate? How much delusional reality is there?*

67. *Compared to Federal, state, and local governments, to what extent are NGOs influencing policy analysis and/or policy making? Which are the most influential NGOs, and why are they so influential? What role do lawsuits play as an advocacy tool?*

68. *One tactic that policy advocates have used frequently in the climate debate is to attack the credibility of "opposing" scientists by using their funding source to cast doubt on the independence of their science. For example, scientists who receive research funding from industries such as oil or solar companies will be attacked as being "in the pocket" of special interest groups. Conversely, those scientists accepting money from advocacy groups such as the Pew Foundation or the Greenpeace are similarly attacked. Given these tactics, what should scientists do? Did either author offer a recommendation?*

69. *What is your take on the debate over the policy neutrality of "scientists" who work on climate change? Do the scientists involved have de facto preferred policy options, or do they generally provide policy-relevant but policy-neutral science? What about the various ecological advocacy NGOs (i.e., Sierra Club, Western Forests, National Wildlife Federation, Rural Landowners Association, Union of Concerned Scientists, etc.). Think about what policy analysts should learn from Climategate?*

Background Reading:

Birger, Jon. 2007. *The great corn gold rush*. CNNMoney, March 30.
http://money.cnn.com/2007/03/29/magazines/fortune/corn_gold_rush.fortune/index.htm

Easterbrook, Gregg. 2007. Global warming: who loses – and who wins? *The Atlantic Monthly*, April, pp. 52-64.
https://www.theatlantic.com/magazine/archive/2007/04/global-warming-who-loses-and-who-wins/305698/

Easterbrook, Gregg. 2007. Some convenient truths. *The Atlantic Monthly*. September.
https://www.theatlantic.com/magazine/archive/2007/04/global-warming-who-loses-and-who-wins/305698/

Energy Information Administration. 2019. *Energy and the Environment Exchanged*.
http://www.eia.doe.gov/oiaf/1605/ggccebro/chapter1.html

Epstein, Alex. 2015. *'97% of Climate Scientists Agree' Is 100% Wrong*. Forbes Online.
https://www.forbes.com/sites/alexepstein/2015/01/06/97-of-climate-scientists-agree-is-100-wrong/#213b2a393f9f

Hales, Steven D. 2019. The futility of guilt-based advocacy. *Quillette* (November, 23, 2019).
https://quillette.com/2019/11/23/the-futility-of-guilt-based-advocacy/

Intergovernmental Panel on Climate Change. 2020. *Climate Change [to be finalized in 2021]: The Physical Science Basis – Summary for Policymakers*.
https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/

Lynch, Michael. 2016. Climate Change Advocacy, the good, the bad, the dumb. *Forbes Online.*
https://www.forbes.com/sites/michaellynch/2016/07/19/climate-change-advocacy-the-good-the-bad-the-dumb/#3fbfb3a030cb

Michaels, Patrick J. 2003. Science or political science? An assessment of the US National Assessment of the Potential Consequences of Climate Variability and Change. Chapter 7 in: *Politicizing Science: The Alchemy of Policymaking*, Michael Gough, editor, Hoover Press.
http://media.hoover.org/documents/0817939326_171.pdf

Nelson, Barry, Monty Schmitt, Robert Wilkinson, Ronnie Cohen, and Noushin Ketabi. 2007. *In Hot Water: Water Management Strategies to Weather the Effects of Global Warming.* Report. Natural Resources Defense Council, 90 pp.
http://www.nrdc.org/globalWarming/hotwater/contents.asp

Pew Center on Global Climate Change. 2019. *Climate Change 101: Overview*.
https://www.pewtrusts.org/-/media/legacy/uploadedfiles/wwwpewtrustsorg/reports/global_warming/climate101full121406065519pdf.pdf

Scientific Expert Group on Climate Change (SEG). 2007. *Confronting Climate change: Avoiding the Unmanageable and Managing the Unavoidable*. Rosina M. Bierbaum, John P. Holdren, Michael C. McCracken, Richard H. Moss, and Peter H. Raven, editors. Report prepared for the United Nations Commission on Sustainable Development, Sigma Xi, Research Triangle Park, NC, and the United Nations Foundation, Washington, DC, 144 pp.
http://www.globalproblems-globalsolutions-files.org/unf_website/PDF/climate%20_change_avoid_unmanagable_manage_unavoidable.pdf

Shellenberger, Michael. 2019. *Why Apocalyptic Claims About Climate Change Are Wrong*. Forbes Online.
https://www.forbes.com/sites/michaelshellenberger/2019/11/25/why-everything-they-say-about-climate-change-is-wrong/#2f747c0312d6

Shellenberger, Michael. 2020. *On Behalf of Environmentalists, I Apologize for the Climate Scare*. Quillette. June 30.
https://quillette.com/2020/06/30/on-behalf-of-environmentalists-i-apologize-for-the-climate-scare/

Steffen, Alex. 2008. Attention Environmentalists: Keep Your SUV. Forget Organics. Go Nuclear. Screw the Spotted Owl. *Wired Magazine*.
http://www.wired.com/science/planetearth/magazine/16-06/ff_heresies_intro

Taylor, James. 2015. Top 10 global warming lies that may shock you. *Forbes Online* (February 9, 2015).
https://www.forbes.com/sites/jamestaylor/2015/02/09/top-10-global-warming-lies-that-may-shock-you/#6ec3a3cf53a5

Union of Concerned Scientists. 2020. Global Warming 101.
http://www.ucsusa.org/global_warming/science/Fingerprints.html

Wikipedia. 2020. *Climate Change*.
http://en.wikipedia.org/Wiki/Climate_change

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Week 9 – Backgrounder

Whaling and Marine Mammal Policy

Policy Context:

Developing publicly supported, biologically sound, policies regarding marine mammals (generally) and whales (specifically) are among the most challenging aspects of natural resource management. Many people view mammals very differently from fish and shellfish, and therefore there are often drastically different and mutually exclusive competing policy goals. In "fisheries" management, the term "fish" generally includes fin-fish, shellfish, and marine mammals.

Collectively, dolphins, porpoises, and whales (collectively called cetaceans) present very challenging problems to policy makers, natural resource managers, and policy analysts.

The benefits humans gain from a fishery are diverse and are enumerated in several ways. Most commonly, benefits are computed as *commodity* output — the weight or number of fish produced. Benefits are also widely measured as wholesale or retail economic *value* of the commodity output. Such benefits are easily calculated for *commercial* fisheries because the products are usually sold, but for sport or *recreational* fisheries, the quality of the fishing experience is paramount, so measures of catch in weight, number, or economic value only partially measure the benefits provided to fishermen or to society. Measurements of the indirect economic value of recreational fishing that include the quality of the fishing *experience*, however, remain controversial. Even in commercial or subsistence fisheries, substantial benefits may be associated with *cultural* or *religious* aspects. Although such benefits are difficult to measure, they may be very important to the advocates and to society overall.

Beyond the direct benefits derived from harvested fish or the fishing experience, benefits are also derived by individuals and society from merely *knowing* that a natural resource exists (often called *existence* value). For marine mammals, especially, society and individuals receive intangible benefits from preserving species, especially those in danger of extinction. Such benefits are often significant, but, like the benefits from recreational fishing, they are also exceedingly difficult to quantify in economic terms. The whale fishery is an example for which the value of leaving the animals unharvested currently may be of greater benefit (primarily intangible) in most societies than the economic value of the harvested animals.

Whether measurable or not, fisheries management is increasingly guided by ecological benefits mandated in treaties, environmental laws, and government trade policies. For example, the *Convention on Biological Diversity* obligates signatory nations to preserve their biological diversity to the maximum possible extent. Many countries also have laws to protect species at risk of extinction, and these laws may be important constraints on the scope, type, and intensity of fishing that will be permitted.

In practice, the over-arching management policy goal for managing a nation's fisheries is often expressed in general terms such as:

> *"To ensure the attainment and continued satisfaction of human needs for present and future generations in an environmentally non-degrading, technically appropriate, economically viable, and socially acceptable manner, and such that land, water, plant, animal, and genetic resources are maintained."*

The challenge for the fisheries manager is to translate such a general policy goal into a practical, effective program to maximize benefits of specific fisheries to society.

Marine mammals, however, offer unique challenges to the policy analyst and the fisheries manager. From a human perspective, marine mammals are relatively intelligent, large, often visible, and look and act more like humans (at least compared to fin- and shellfish). Not surprisingly, in the political world, they are often treated differently than other target species.

Worldwide, probably the largest threat to most marine mammals (especially dolphins, porpoises, and small whales) is accidental entanglement in fishing gear. Entanglement causes the death of several hundred thousand individuals annually. Commercial harvesting historically contributed to major declines in marine mammal populations. Nowadays, however, fishing or hunting pressure is much less. Except for subsistence purposes, few nations currently allow hunting or fishing for marine mammals.   Japan, Norway, and many indigenous groups regularly

harvest whales.   Whales are vulnerable to ship traffic. In fact, shipping lanes are very high risk areas (from a marine mammal perspective).

Policy direction for marine mammals changed dramatically in the United States in the early 1970s. With the passage of the Marine Mammal Protection Act (1972) and the Endangered Species Act (1973), marine mammals were given a more dominant place in formulated public policy regarding marine and coastal fisheries management.

Many of the threats to marine mammals are not easily addressed by the Marine Mammal Protection Act and the Endangered Species Act — and this gap in part stimulated the rise of what is typically labeled as "ecosystem management." (see the Policy Backgrounder for Marine Protected Areas and Ecosystem Management).   The notion behind various formulations of ecosystem management (for marine mammals) was to consider all important components and processes in an ecosystem, evaluate of the major threats, then implement tactics to manage those threats.

By-catch can also be an issue with whales and other marine mammals. By-catch is what is captured incidental to catching the desired species or the desired size of a species. There are many nuanced definitions of by-catch, but in its simplest form, it is what is caught that is not desired to be caught.

In some areas, dolphins, porpoises, and whales (cetaceans) can be seriously affected by entanglement, direct capture by hooks, or being scooped up in trawls. By-catch is often contentious, especially when at-risk species are caught (i.e., cetaceans, sea turtles, and sea birds). Marine mammals, of course, do not have gills, and they may drown while trapped underwater. The by-catch issue has been one of the drivers of the growing practice of packaging products with labels such as "Dolphin Friendly." There is considerable debate over what such labels actually mean or should mean.

Policy Analysis:

Based on this policy backgrounder, the two assigned articles, and other material you have read, you should carefully evaluate the various policy positions and perspectives. Marine mammals generally, and whales specifically, present some formidable challenges to policy analysts and managers. Here are key questions to consider as you analyze what individual authors are proposing:

70. *What is the appropriate role of scientists, science, policy analysts, and politicians in*

deciding whale and marine mammal policy, mainly because this policy case study is heavily inculcated with moral and ethical positions? Did the authors clearly state their positions, or did you have to infer them?

71. *Did they make convincing arguments that their position on "how to make a difference" was the best one? Did either or both seem to believe it?*

72. *Relative to scientific information and scientists and whale policy, how important are they to politicians? Were the authors honest about assessing the reality of the political context?*

73. *Are there other (or better) ways to inform decision makers than the authors proposed? Were these alternative approaches presented or acknowledged?*

74. *How much of a role did/does scientific information play in evaluating alternative policy options in the authors' experience? Is the policy debate largely a clash of values and preferences or is it dominated by scientific and technical questions? Is whale policy (or management) much different from other fisheries management policy and management questions?*

75. *Are the authors leveling about the policy context, or are they spinning toward a desired policy perspective? Did either use any normative science to make their case?*

76. *Are the public and politicians being misled by scientists and/or policy analysts? How much delusional reality is there in either proposed role for scientists and policy analysts in whale management?*

77. *Compared to Federal, state, and local governments, to what extent are NGOs influencing policy analysis and/or politicians relative to whale management? Which are the most influential NGOs, and why are they so influential?*

78. *Could the development of whale and marine mammal policy (and the role of science, scientists, and policy analysts generally) be handled differently than it is now? If so, how?*

79. *What is your take or opinion on the debate over the policy neutrality of "scientists" who work for agencies such as the U.S. National Marine Fisheries Service or their counterpart agencies from other national governments? Are they playing the science straight or are*

they subtly pitching their own (or their employer's) policy preferences?

Background Reading:

Alexander, Kristina. 2013. *The International Whaling Convention (IWC) and Legal Issues Related to Aboriginal Rights*. Congressional Research Service.
https://fas.org/sgp/crs/row/R40571.pdf

Butler-Stroud, Christopher. 2016. What drives Japanese whaling policy? *Frontiers in Marine Science.*
https://www.frontiersin.org/articles/10.3389/fmars.2016.00102/full

Cawthorn, Martin. 1999. *The changing face of New Zealand's Whaling Policy*. From: "Whaling and Anti-Whaling Movement."
http://luna.pos.to/whale/gen_nz.html

Eligon, John. 2019. A native tribe wants to resume whaling: whale defenders are divided. *The New York Times.* November 15, 2019.
https://www.nytimes.com/2019/11/14/us/whale-hunting-native-americans.html

Humane Society. 2020. *Save whales not whaling: whaling and the International Whaling Commission.*
http://www.humanesociety.org/sites/default/files/archive/assets/pdfs/SWNW_IWCFctsht.pdf

International Whaling Commission. 2020. General web site.
https://iwc.int/home

Lackey, Robert T. 2005. Fisheries: history, science, and management. pp. 121-129. In: Water Encyclopedia: Surface and Agricultural Water, Jay H. Lehr and Jack Keeley, editors, John Wiley and Sons, Inc., Publishers, New York, 781 pp.
http://blogs.oregonstate.edu/lackey/files/2017/07/4.-Fisheries-History-Science-and-Management.pdf

Lackey, Robert T. 2006. Axioms of ecological policy. *Fisheries.* 31: 286-290.
http://blogs.oregonstate.edu/lackey/files/2017/07/2006f-Axioms-of-Ecological-Policy-Reprint-Lackey.pdf

Lies, Elaine. 2019. *Explainer: what's behind Japan's support of whaling?* Reuters.
https://www.reuters.com/article/us-japan-whaling-defiance-explainer-idUSKCN1TP015

Mackenzie, William. 2020. 10 good reasons to not kill whales (as if you needed them). Retrieved from *Greenpeace International* web site.
https://www.greenpeace.org/international/story/18358/10-reasons-to-not-kill-whales/

O'Dwyer, Shaun. 2015. Japanese activists fight against the tide to save whales and dolphins. *The Japan Times*. Pp1-3.
https://www.japantimes.co.jp/community/2015/03/16/voices/japanese-activists-fight-tide-save-whales-dolphins/#.XmMeyahKg2w

Sasaki, Megumi. 2019. *Untangling the Myth Behind the Whaling Controversy: A Directors Take.* Japan Forward.
https://featured.japan-forward.com/whalingtoday/2019/12/12/untangling-the-myth-behind-the-whaling-controversy-a-directors-take/

Wallace, Jacob. 2019. Who's still hunting whales for the first time in 17 years. *Newsweek*.
https://www.newsweek.com/whaling-iceland-ban-1449517

Wikipedia. 2020. *International Whaling Commission.*
https://en.wikipedia.org/wiki/International_Whaling_Commission

Wikipedia. 2020. *Marine Mammals*.
http://en.wikipedia.org/wiki/Marine_mammals

Wikipedia. 2020. *Marine Mammal Protection Act*.
http://en.wikipedia.org/wiki/Marine_Mammal_Protection_Act

Wikipedia. 2020. *Whaling*.
http://en.wikipedia.org/wiki/Whaling

Wikipedia. 2020. Whaling in the United States.
https://en.wikipedia.org/wiki/Whaling_in_the_United_States

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Week 10 – Backgrounder

Marine Protected Areas Policy

Policy Context:

There are many definitions used to describe what is meant by the term *marine protected area*. Still, most definitions describe an area of the ocean reserved through law, policy, or regulation by a governmental organization to provide protection to part or all the natural or cultural resources of the specified area. Common examples of marine protected areas are national parks and wildlife refuges. The term "marine protected area" is increasingly being used to describe such protected areas.

There has been increasing realization that human pressures on ocean resources are challenging the sustainability of these resources. As a result, interest in marine protected areas has increased because such areas may provide a useful management tool to sustain ocean productivity.

There are many ways to classify marine protected areas. One classification scheme is:

- **Policy goal** – Is the primary goal of the marine reserve to preserve cultural or natural resources?

- **Degree of protection** – Will people be allowed to use the area? Will fishing be allowed, for example? Will shipping be allowed to use the MPA? What about wind farms, oil extraction equipment, or tidal power operations?

- **Time frame of the protection** – Is the marine protected area expected to be short- or long-term?

- **Seasonal frame of the protection** – Will the marine protected area be protected throughout the year, or will there be changes, depending on the season?

- **Scope of the protection** – Will the entire ecosystem be protected or just components of the ecosystem?

The focus or goal of a marine protected area may be very different. Examples of other goals are:

- **Natural resources** – the primary goal is to protect biological communities, their habitats, ecosystems structure and processes, and ecosystem services. Examples of such marine protected areas are national wildlife refuges, national marine sanctuaries, national parks, and many state marine protected areas.

- **Cultural resources** – the primary goal is to protect marine cultural or historical resources such as archaeological sites, shipwrecks, or other unusual underwater features. Often such sites reflect important events in maritime history or cultural connections to the sea (usually fishing).

- **Biological harvest** – the primary goal is to support the continued but sustainable harvest of fish, wildlife, shellfish, plants, etc. Commonly, the marine protected area provides a spawning or nursery ground with biological harvest coming from outside the marine protected area.

The notion of protecting specific sections of the marine environment is an old idea, but one that gained currency as an offshoot of the growing popularity of a concept loosely described under the mantle of "ecosystem management."   Beginning in the 1980s, a widespread view emerged that managing fisheries should be broadened in scope to include the entire ecosystem, hence the rise of *ecosystem management*.   A precise, universally accepted definition of ecosystem management has yet to emerge. Still, ecosystem management is broadly defined as the application of ecological, economic, and social information, options, and constraints to achieve desired social benefits within a defined geographic area and for a specified period.

Part of the appeal of ecosystem management is that it may better balance the suite of benefits (*e.g.*, food fish, recreational fish, preserving endangered species, and preserving ecosystems) that society values. To date, ecosystem management has been most commonly implemented in public forests in North America. Efforts are now underway to apply the same concept to large lakes and open ocean ecosystems.

Ecosystem management (and its several variant names, ecosystem-based management being the most common) is proposed as the modern and preferred way of managing natural resources and marine ecosystems. It is often pitched in policy debates as a bold concept, one that departs significantly from prior management approaches.

When implemented, ecosystem-based management will, at least according to its advocates, protect the environment, maintain healthy ecosystems, permit sustainable development, preserve biodiversity, and save scarce tax dollars. A cynic might be tempted to add to the list: alleviate trade imbalances, reduce urban crime, and pay off national debts. Is ecosystem-based management a revolutionary concept and a sea change in public choice as its champions maintain, or are the critics right who assert that it and the associated jargon are closer to cold fusion than cold fact?

Whether ecosystem-based management is "hot tub science applied to New Age management" — or "a paradigm shift to save our rapidly disappearing biological heritage" — scientists and managers are increasingly involved in the debate. Why should scientists and other technical people care about ecosystem-based management as a concept or follow the spirited debates over its exact meaning? There are at least three reasons.

First, the concept has been embraced widely by politicians and appointed officials. Many policy advocacy groups, especially the environmental non-governmental organizations, are actively advocating adoptions of ecosystem-based management principles. At least in much of the political arena, the debate is concluded whether ecosystem-based management is a good idea; it *will* be implemented, or at least attempted, in word if not in deed.

Second, it might just be a bold new concept and a very different — and better — way of managing ecosystems. Beyond the rhetoric, there may be some technical substance. Ideas do have consequences — especially those that are put into practice on a wide scale.

Third, society needs to move beyond the debates over rhetoric and focus directly on policy issues and the role science could and should play. There are many interesting and challenging research opportunities relative to ecosystem-based management, but what are the *critical* research needs and management approaches that *will* make a *difference* in ecosystem-based management?

Ecosystem-based management is offered as a management approach to help solve complex ecological and social problems. Examples of current issues are (1) the U.S. Pacific Northwest forest/salmon/spotted owl impasse, (2) the purported massive decline in marine biological diversity; and (3) ecosystem "degradation" caused by "poor" ocean, urban, industrial, transportation, agricultural, ranching, and mining policies and practices. Of course, there is a widespread notion that applying ecosystem-based management to marine resources will reverse the apparent decline in key marine fish stocks. Some critics may charge that ecosystem-based management is the triumph of the politics of "process" over the politics of "substance," but the public choice problems are real and substantive.

Ecosystem-based management problems typically possess several general characteristics:

(1) fundamental public and private values and priorities are in dispute, resulting in partially or wholly mutually exclusive decision alternatives;

(2) there is substantial and intense political pressure to make rapid and significant changes in public policy;

(3) public and private stakes are high, with substantial costs and substantial risks of adverse effects (some also irreversible ecologically) to some groups regardless of which option is selected;

(4) the technical facts and scientific interpretations, ecological and sociological, are highly uncertain;

(5) the "ecosystem" and "policy problems" are meshed in a large framework such that policy decisions will have effects outside the scope of the problem.

Solving these kinds of problems in a democracy has been likened to asking a pack of four hungry wolves and a sheep to apply democratic principles to deciding what to eat for lunch. Given public choice problems with these characteristics, no wonder discussions of ecosystem-based management tend to focus on *process* and not *substance.*

This backgrounder is organized the fundamental concepts of ecosystem-based management around seven *pillars.* Just as physical pillars do not completely define a building, neither do intellectual pillars completely define ecosystem-based management. Nevertheless, these pillars to provide the essential underpinnings of "ecosystem-based management," the circumstances under which it might be successfully applied, and its relationship to public and private choice. The seven pillars are neither procedures nor blueprints for ecosystem-based management but are principles upon which ecosystem-based management should be based.

Definitions

As does any good policy analysis, articulating a clear *definition* for ecosystem-based management seems a good place to start. The diversity of definitions provides some indication of the current amorphous nature of the concept. Typical of definitions of ecosystem-based management are:

> ***1.*** *"A strategy or plan to manage ecosystems to provide for all associated organisms, as opposed to a strategy or plan for managing individual species."*
>
> ***2****. "The careful and skillful use of ecological, economic, social, and managerial principles in managing ecosystems to produce, restore, or sustain ecosystem integrity and desired conditions, uses, products, values, and services over the long term."*
>
> ***3.*** *"To restore and maintain the health, sustainability, and biological diversity of ecosystems while supporting sustainable economies and communities."*

These definitions have an unmistakable similarity to traditional definitions of fisheries management, wildlife management, and forest management. In fact, they are strikingly similar to the much-maligned definition of multiple use management. For example, a typical definition of fisheries management is the "practice of analyzing, making, and implementing decisions to maintain or alter the structure, dynamics, and interaction of habitat, aquatic biota, and man to achieve human goals and objectives through the aquatic resource". But in the definitions of ecosystem-based management, there are some new words — *ecosystem and community sustainability, ecosystem health, ecosystem integrity, biological diversity, social values, social principles.*

Values and Priorities

What does society want from marine ecosystems?   There are two fundamentally different world views. The first is *biocentric* and considers maintenance of ecological health or integrity as the goal. All other aspects, including man's use (tangible or intangible), are of secondary consideration. The other view is *anthropocentric* in that benefits (tangible or intangible, short- or long-term) are accruable to man. Indeed, the ecological systems can be adversely affected, and care should be taken not to deplete resources for short-term benefit. Still, sustainable benefits are possible from ecosystems with careful management.   Neither view is necessarily right or wrong, but they are fundamentally different views and must be evaluated like any other moral or religious position.

The basic idea behind any management paradigm is anthropocentric; it is to maximize benefits by applying a mix of decisions within defined constraints. Benefits may be tangible or intangible and may be achieved by maintaining a desired ecological condition. Potential benefits from ecosystems may be commodity yields (lumber, fish, wildlife), ecological services (pollution abatement, biological diversity), intangibles (preservation of endangered species, wilderness, vistas), precautionary investments (deferring use to preserve future options), and maintaining a desired ecological status (old-growth forests, unaltered rangelands).   The management challenge is to figure out what the *goal* or *goal set* is and then design a strategy for implementing a *mix* of decisions to reach the goal. A key challenge to successful management is accurately determining the system's capacity to achieve that goal — an important challenge that scientists can help meet.

The first and foremost management challenge, figuring out precisely the goal, is complicated by the evolving nature of society's values and priorities. It is difficult to be concerned with an endangered toad or a threatened snail when your family's immediate problem is surviving the winter. And it is difficult to understand the passion for industrial development when your primary concern is whether you will take a vacation this winter or wait until summer. Our individual and collective goals and values differ with our circumstances and change over time.

The other management challenge involves evaluating and selecting the mix of decisions that seem likely to achieve the identified goal — a goal that must be continually considered to be sure that it reflects society's values and priorities. This is no easy task under the best of circumstances, but it becomes impossible unless the analyst *assumes* a matrix of societal goals. The most efficient way to implement policy may be through a series of "experimental" decisions from which we can "learn" how the ecosystem (ecological and human elements)

responds to various decisions. A modification of an old maxim may be most appropriate here: "the best way to implement ecosystem management may be to learn from past mistakes and systematically make some new but different ones."

The important central role of values and priorities has long been recognized in management.   Management paradigms, whether they be multiple use, multiple resource use, maximum equilibrium yield, scientific management, watershed management, natural resources management, maximum sustained yield, or ecosystem management, are based on values and priorities.   Each paradigm has either formally — or informally, accepted a set of values and priorities, or used a process to derive values and priorities. Ecosystem-based management is no different in this regard.

The first pillar of ecosystem-based management is:

Ecosystem management reflects a stage in the continuing evolution of social values and priorities; it is neither a beginning nor an end.

Boundaries

A practical technical requirement with any management paradigm is to *bound* the system of concern.   Because no useable definition of an ecosystem has been developed that works within public decision-making, other approaches are used to define the "system" of concern. Historically, this was accomplished by focusing on one or more species of concern over a defined geographic area. We manage flyways for migratory waterfowl, for example. The geographic limits of the flyway become the operational boundaries for the management analysis. Or we manage the game fish populations in a certain lake. The lake and its watershed then become the unit of concern. In all cases, the "problem" of concern will define the boundary.

Another option is to bound the system by what is relevant to elements of the public, such as a community or interest group. For example, management goals might focus on providing diverse hunting options to society. However, no matter how boundaries are defined in ecosystem-based management, they end up largely being geographically based — a *place* of concern. Again, the nature of the problem or the beneficiaries of concern will define the boundaries.

Within the place of concern the goal then becomes managing for maximum social benefits within ecological and societal constraints. And because management optima vary by the scale of consideration, it is essential to define the boundary of concern clearly. For example, a set of decisions to maximize benefits in managing a 1,000-hectare watershed *within* the Columbia River watershed may well be very different than decisions for the same smaller watershed that were designed to maximize benefits over the *entire* Columbia River watershed. The definition of the management problem should define the scale to be used in the analysis. The same problems analyzed at different scales will likely lead to very different management strategies.

There is a natural tendency to gloss over decisions about boundaries because deciding on boundaries defines the management problem explicitly. In a pluralistic society, with varied and strongly held positions, conflict is intensified when perceptive individuals and groups immediately see how their position may be weakened by a certain choice of boundaries. However, not to define boundaries will lead to management strategies that lack intellectual rigor, or will result in debates over technical issues when the debates are clashes over values and priorities.

The second pillar of ecosystem-based management is:

Ecosystem management is place-based and the boundaries of the place of concern must be clearly and formally defined.

Health

The terms ecological *health* and ecological *integrity* are widely used in scientific and political lexicon. Politicians and many political advocates widely argue for managing ecosystems to achieve a "healthy" state or to maintain ecological "integrity." By implication, their opponents are relegated to managing for "sick" ecosystems.

Scientists often speak and write about monitoring the health of ecosystems, or perhaps the integrity of the ecosystem. There is usually the assumption that there is an *intrinsic* state of health or integrity and other, lesser states of health or integrity for any given ecosystem. Some scientists explicitly advocate". . . that maintaining ecosystem integrity should take precedence over any other management goal".

Much of the public seems to accept that there must be a technically defined healthy state similar to their individual human health. After all, people know how they feel when they are sick, and so, by extension, ecosystem sickness must be a similar condition, which should be avoided. "Health" is a powerful metaphor in the world of competing policy alternatives.

For example, society may wish to manage a watershed to maximize opportunities for viewing the greatest possible diversity of birds, for the greatest sustained yield of timber, or for the greatest sustained yield of agricultural products. Achieving each goal would almost assuredly result in ecosystems that were very different, but equally "healthy."

The debate is over defining the "desired" state of the ecosystem, and secondarily, managing the ecosystem to achieve the desired state. Phrased another way: What kind of garden does society want? There is no intrinsic definition of health without a benchmark of the desired condition. In ecosystem-based management, scientists should avoid value-based terms such as "degradation, sick, destroy, safe, exploitation, collapse, and crisis" unless they are accompanied with an explicit definition of what the desired condition of the ecosystem is as defined by society. The word "society," as used here, includes only humans.

In philosophical terms, the problem with "health" is how one links "is" and "ought." For example, an ecosystem has certain characteristics — these are facts on which all analysts who study the ecosystem should agree. Features such as species diversity, productivity, and carbon cycling are examples. If the same definitions and the same methods are used, all analysts should come to the same answer within the range of system and analytical variability. The "ought" must involve human judgment — it cannot be determined by scientific or technical analysis. The concept of "health" has a compelling appeal, but it has no operational meaning unless it is defined in terms of the *desired* state of the ecosystem.

The third pillar of ecosystem-based management is:

Ecosystem management should maintain ecosystems in the appropriate condition to achieve desired social benefits; the desired social benefits are defined by society, not scientists.

Stability

Stability, resilience, fragility, and *adaptability* are interesting and challenging concepts in ecology. These are some of the characteristics of ecosystems that allow society to realize benefits for society, but these same characteristics constrain options for society and the ecosystem manager. Stability and the related concepts are tough to describe clearly because of the variations in definition for all the terms associated with this topic. Care must be taken to be sure that differences in opinion are not due to differences in definition.

There is a widespread, if sometimes latent, view that ecosystems are best that have not been altered by man.   Further, it just seems obvious that such "healthy" ecosystems *must* be more stable than the altered, less "healthy" ones, just as the Romantic School held that nature realized its greatest perfection when not affected by man. This view is the classic "balance of nature" view. Pristine is good; altered is bad — perhaps necessary for food, lodging, or transport, but still not as desirable as pristine.   However, few seem to be willing to return to the "natural" human mortality rates of at least 50% from birth to age five.

Moreover, this is not how nature works. There is no "natural" state in nature; it is a relative concept. The only thing natural is change, sometimes somewhat predictable, frequently random, or at least unpredictable. It would be nice if it were otherwise, but it is not. The concept of dynamic equilibrium might place bounds on ecosystem change in an intellectual attempt to describe better stability. Still, the intuitive appeal of the idea of stability is not easily fulfilled. Some ecologists cling to traditional concepts of stability and equilibrium with a near missionary zeal.

Ecosystems are resilient, although not without limits. A crucial role of science in ecosystem-based management is identifying the limitations or constraints that bound the options to achieve various societal benefits. The trick in management is to balance the ability of ecosystems to respond to stress (including use or modification) in desirable ways, but without altering the ecosystem beyond its ability to provide those benefits. We want shelter, food, personal mobility, energy, etc., but we do not want the systems to collapse that are producing those benefits.

The fourth pillar of ecosystem-based management is:

Ecosystem-based management can take advantage of the ability of ecosystems to respond to a variety of stressors, natural and man-made, but there is a limit in the ability of all ecosystems to accommodate stressors and maintain a desired state.

Biodiversity

The level of *biological diversity* in an ecosystem is an essential piece of scientific information, and this knowledge can be useful in understanding the *potential* of an ecosystem to provide certain types of social benefits. Some proponents argue that ecosystem-based management is a response to today's deepening biodiversity crisis. This assertion may be true *politically*, but biological diversity is purely a technical piece of information. What people value about biotic resources, whether biological diversity or something else, is not a technical question.

An argument often made is that biological diversity is necessary to maintain ecosystem stability. This argument contains an element of truth, but there is only the most general linkage between biological diversity and ecosystem stability.   Like any other attribute of ecosystems, the value of biological diversity to society must be based on society's preferences. That is not to say that biological diversity (and many other characteristics of ecosystems) is not important; it is.   As a characteristic of ecosystems, biological diversity operates as an *ecological constraint*, not as a *benefit — unless there is an explicit societal preference*. Many people's values clash over biological diversity, but that is a human preference issue; the ecological role and function of biological diversity is purely a technical question.

It is possible, even likely, that society may value elements of biological diversity as social benefits in and of themselves, but this is a public choice, not a scientific one. For example, public choice may dictate that no naturally occurring species go extinct due to human action. This is certainly a legitimate social benefit, but not a scientific one. Biological diversity may or may not have intrinsic worth to society.

There are other fundamental public choice issues involved with biological diversity: Do you consider all species, exotic or otherwise, as part of the fauna and flora for the purposes of assessing biological diversity? Is not every species an exotic? What scale do you use to

measure diversity? By some measures, diversity has increased; by others, it has decreased. The choice of the scale used and whether you include exotic species will answer whether biological diversity is increasing or decreasing.

If the public expresses a social preference for biodiversity, then do our management options include increasing biological diversity beyond what would naturally occur? Should we reintroduce extirpated species (or introduce exotic species) to increase diversity?   Should we use the tools of genetic engineering to double or triple biological diversity?   Producing agricultural crops with high-performance seeds is not natural, so why not use tools like genetic engineering to increase biological diversity if it is a social benefit?

The fifth pillar of ecosystem-based management is:

Ecosystem-based management may or may not result in an emphasis on biological diversity as a desired social benefit.

Sustainability

Sustainability and a host of related concepts are essential elements of nearly all management paradigms. There is a considerable literature on defining exactly what these concepts mean and whether the concepts, however defined, are really relevant to changing social priorities and technology. There is always considerable debate over whether various societal benefits (including ecosystem "harvests" or outputs) are sustainable, but historically the basic goal has almost always been to produce sustainable outputs of something, tangible or intangible. Sustainable, *tangible* outputs (fish, deer, visitor days, drinking water, lumber) are much easier to identify and measure than are the more *intangible* benefit yields (ecosystem integrity, biodiversity, endangered species) typical in ecosystem-based management. However, whether "yields" of benefits are described and measured in trees, fish, deer, visitor days, diversity of recreational opportunity, or maintenance of "wilderness areas that no one visits," all are realized *benefits* accruable to man. Benefits are produced within constraints and ecosystems, like all systems, have constraints.

Much more tenuous is the analytical basis for sustainable development — a term often used interchangeably, but inappropriately, with sustainability. The goal of sustainable development typically offered is ". . . to meet the needs of the present without compromising the ability of future generations to meet their own needs," or in economic terms as exemplified in the 1993 Presidential Executive Order on sustainability,". . . economic growth that will

benefit present and future generations without detrimentally affecting the resources or biological systems of the planet." The concept of sustainable development masks some fundamental policy conflicts that mere word-smithing will not alleviate. If one assumes existing social values and priorities, increasing human population, and constant technology, then we cannot *develop* in perpetuity. By necessity, we must assume that either values and priorities will change and/or technology will change; otherwise, sustainable development is an oxymoron.   There are precise definitions of "develop" that have been offered to counter the logical inconsistencies in the concept of sustainable development; however, at least in the way sustainable development is typically used in public and political rhetoric, the inconsistencies remain. More defensible is the concept of environmental sustainability, which, although logically consistent, leads inevitably to painful choices for society. Natural resource management has a long history of failures, in part due to the use of management "magic." There has been a willingness to promise management success when simple logic leads to the opposite conclusion.

Selecting *what* is to sustain is a societal choice that should be expected to change over time. Do we measure the sustainability of commodity yields as surrogates for total societal benefit? Do we measure the sustainability of the ecosystem in some defined state? Over what time frames do we measure sustainability? A generation? Over 50 years? Over 100 years? A millennium? What is the scale of sustainability?   A small watershed? An ecoregion?   The entire nation? How is sustainability to be measured when societal values and priorities change? In short, sustainability often raises more questions than it answers.

Further complicating the concept of sustainability is the apparent chaotic characteristic of ecosystems.   Sustainability is often based, at least tacitly, on a mostly homeostatic view of nature. That view is that there is a particular natural condition of an ecosystem or perhaps a trajectory of change. But there is no natural state of any ecosystem, only conditions from a wide array of possibilities, known and unknown. The term "balance of nature" has passed out of common usage in ecology, and this reflects the acceptance, albeit reluctant, of the essentially chaotic nature of ecosystems.

The sixth pillar of ecosystem-based management is:

The term sustainability, if used at all in ecosystem management, should be clearly defined — specifically, the time frame of concern, the benefits and costs of concern, and the relative priority of the benefits and costs.

Scientific Information

Some level of ecological understanding and *information* specific to the ecosystem of concern is essential to effective ecosystem-based management. The question is how much understanding and information is needed.   After all, it is the ecological characteristics of ecosystems that largely constrain various management options to produce societal benefits.

Other types of information are also important; for example, knowing how individuals and groups might respond to various decision options. Tax incentives may be an especially important tool in ecosystem-based management, so a solid understanding of how people will respond to modifications in tax law is essential. Erroneous predictions of individual and group response to regulations, policies, or other regulatory tactics are all too common in policy analysis.

Scientific information is by its nature uncertain — sometimes highly uncertain. Often scientific information and predictions based on scientific information can become the lightning rod for debate over various management options. Debate over values and priorities is important and should be encouraged in the public and policy arena; this is not, however, the most appropriate arena to debate scientific information. It is essential to isolate the two types of debates.

Part of the responsibility for the confusion over "providing information" vs. "advocating policy" rests with scientists. Many ecologists have a strong tendency to support "environmentalist" worldviews and positions. This policy bias is understandable in part due to self-selection in all professions (environmentally-oriented individuals are more likely to select ecologically oriented fields than are more materially oriented individuals). The same self-selection takes place in business management (business-oriented individuals are prone to select an MBA program rather than a Master of Science program in conservation biology). Individuals in any profession naturally tend to be advocates for what is important in that profession. It is easy to understand the difficulty that many ecologists have in deleting from their scientific vocabularies such value-laden and emotionally charged words as "sick, "healthy," and "degraded." Language is not neutral, and we should be very careful when speaking as *scientists. Scientists should also avoid unspoken assumptions that reflect value-laden or emotionally based opinions.*

The seventh pillar of ecosystem-based management is:

Scientific information is important for effective ecosystem-based management, but is only one element in a decision-making process that is fundamentally one of public or private choice.

Conclusion

Where do these pillars leave you, the analyst? The seven pillars of ecosystem-based management collectively define and bound the concept of ecosystem-based management. Whether the concept turns out to be useful will depend on how well its application reflects a collective societal vision. Whether it is possible to develop a collective societal vision in a diverse, multicultural, polarized society such as ours is a major, and yet to be answered, question. The democratization of science, policy, and choice is not a smooth process, nor will it ever be efficient.

At least in North America, the ideas behind ecosystem-based management represent a predictable response to evolving values and priorities. Those values and priorities will continue to evolve, although the direction and degree of their evolution are ambiguous and largely unpredictable.   Without major social jolts such as war, economic collapse, the return of plagues, or natural disasters, the movement of social preferences toward the values and priorities of the affluent will probably continue.   Such values and priorities operate in the seemingly paradoxical world of intensive use and alteration of nearly all ecosystems, while at the same time, high value is given to the non-consumptive elements of ecosystems such as pristineness. We may want the benefits and affluence of a "developed" economy, but we do not want its factories, foundries, and freeways in our back yard.

There are other directions for ecosystem-based management that are less clear, but potentially much more significant. At a recent conference, a statement was made that illustrates such a possible path:

"It is time to change our [society's] charter with individuals. We have massive and critical problems with our ecosystems that cry out for immediate action because we have subordinated the collective good of society to the will of individuals. Personal freedom must be weighed against the harm it has caused to the whole of society and more importantly, to our ecosystems."

A response to the statement was equally instructive:

"Society and freedom are at greatest risk from those with the noblest of agendas."

Ecosystem-based management will continue to be place-based. Ecosystem-based management problems need to be bounded to make them tractable. A practical implementation problem is that much of the "place" is owned by individuals, not by society in the form of "public lands." By being place-based, the application of ecosystem-based management will become a lightning rod for debates over individual vs. societal "rights." How does society balance the rights of individuals not to have their property taken without compensation against the right of society, collectively, to prosper? Or perhaps the concept of owning ecosystems (places) must yield to other "rights" for the greater collective good?

At a superficial level the role of scientific information will continue to become more prominent in ecosystem-based management. However, most of the important decisions are choices among competing and often mutually exclusive values. The role of scientific information is important, but it does not substitute for choices among values.

Ecosystem health, ecosystem integrity, biodiversity, and sustainability have evolved from scientific terms to terms used in debates over values. Unless these terms are precisely defined and clearly separated from values and priorities, their value in science is severely diminished. There are major differences in the concepts of sustainability, sustainable development, and developments that are sustainable, but the differences are not easy to explain and understand in the world of sound bite politics.   I recommend that they be dropped from use in scientific discourse and that more precise, nonvalue-laden terms are used. Scientists need to be involved throughout the process of ecosystem-based management, but in a clearly defined, interactive role where the values and priorities of the public are implemented, not those of scientists.

The definition of ecosystem-based management is:

The application of ecological and social information, options, and constraints to achieve desired social benefits within a defined geographic area and over a specified period.

In conclusion, ecosystem-based management is not a revolutionary concept nor an oxymoron, but rather an evolutionary change from existing, well-established paradigms. What is revolutionary is the fact that the issues have moved from the hallways of obscure bureaucracies and remote academic outposts to the political landscape.   For better or worse, ideas do make a difference.

Policy Analysis:

The issue of deciding the proper role of marine protected areas highlights some challenging policy choices.   Also, notions of ecosystem-based management are vague and tend to sink into platitudes. Based on the material you have read, you should assess the policy positions and perspectives presented. Specifically, keep in mind the following questions as you evaluate what you read:

80. *What is the appropriate role of scientists, science, policy analysts, and politicians in deciding the appropriate role of marine protected areas (or ecosystem management) in public policy? Did the authors clearly state their positions, or did you have to infer them?*

81. *Regarding marine protected areas (or ecosystem management), did the authors make convincing arguments that their individual position on "how to make a difference" was the best one? Did either or both seem to believe it?*

82. *Relative to scientific information and scientists, how important are they to politicians when they decide about the appropriate role of marine protected areas? Were the authors honest about assessing the reality of the political context?*

83. *Are there other (or better) ways to inform decision makers than the authors propose? Were these alternative approaches presented or acknowledged?*

84. *How much of a role did/does scientific information play in evaluating alternative policy options for marine protected areas (or ecosystem management)?   Is the policy debate largely a clash of values and preferences, or is it dominated by scientific and technical questions?*

85. *Are they leveling about the pros and cons of marine protected areas, or are they spinning toward a desired policy perspective? Did either use any normative science to make his case? Is ecosystem management something new, or merely an evolution of traditional natural resource management?*

86. *Regarding marine protected areas, are the public and politicians misled by scientists and/or policy analysts? How much delusional reality is there in either article regarding a proposed role for scientists and policy analysts?*

87. *Compared to Federal, state, and local governments, to what extent are NGOs influencing decisions regarding marine protected areas (or ecosystem management)? Which are the most influential NGOs, and why are they so significant?*

88. *Should the development of marine protected areas (and the role of science, scientists, and policy analysts) be handled differently than it is now? If so, how?*

89. *Regarding marine protected areas and setting policy, what is your take or opinion on the debate over the policy neutrality of "scientists" who work for agencies such as the National Oceanic and Atmospheric Administration, Oregon Department of Fish and Wildlife, the U.S. Forest Service, or Oregon State University?*

Background Reading:

Cooney, Margaret. 2019. How Marine Protected Areas Help Fisheries and Ocean Ecosystems. *Center for American Progress*.
https://www.americanprogress.org/issues/green/reports/2019/06/03/470585/marine-protected-areas-help-fisheries-ocean-ecosystems/

Fabricius, Christo, Carl Folke, Georgina Cundill, Lisen Schultz. 2007. Powerless spectators, coping actors, and adaptive co-managers: a synthesis of the role of communities in ecosystem management. *Ecology and Society*. 12(1): (on-line).
http://www.ecologyandsociety.org/vol12/iss1/art29/

Food and Agriculture Organization (United Nations). 2007. *Marine Protected Areas as a Tool for Fisheries Management (MPAs).*
http://www.fao.org/fishery/mpas/en

Hilborn Ray. 2016. Policy: marine biodiversity needs more than protection. *Nature*. 535(7611): 224–226.
https://www.nature.com/news/policy-marine-biodiversity-needs-more-than-protection-1.20229

Gray, Noella J., and Campbell, Lisa M. 2009. Science, policy advocacy, and marine protected areas. *Conservation Biology*. 23: 460-468.
https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/j.1523-1739.2008.01093.x

Grorud-Colvert, Kirsten, and Jane Lubchenco. 2017.   Do ocean preserves actually work? *The Conversation*.
https://theconversation.com/momentum-grows-for-ocean-preserves-how-well-do-they-work-65625?xid=PS_smithsonian

Jones, P. J. S.   2007. Point-of-view: arguments for conventional fisheries management and against no-take marine protected areas: only half the story? *Reviews in Fish Biology and Fisheries*. 17: 31-43.
https://discovery.ucl.ac.uk/id/eprint/11103/1/11103.pdf

International Union for the Conservation of Nature (IUCN).   2018.   *Applying IUCN's Global Conservation Standards to Marine Protected Areas (MPA): Delivering effective conservation action through MPAs to secure ocean health and sustainable development.* Version 1.0. Gland, Switzerland. 4pp.
https://www.iucn.org/sites/dev/files/content/documents/applying_mpa_global_standards_final_version_050418.pdf

Lackey, Robert T. 1998. Ecosystem management: in search of the elusive paradigm. *Human Ecology Review*. 4(2): 107-113.
http://blogs.oregonstate.edu/lackey/files/2017/07/35.-Search-for-the-Elusive-Ecosystem-Management-Paradigm.pdf

Lackey, Robert T. 2005. Fisheries: history, science, and management. pp. 121-129. In: Water Encyclopedia: Surface and Agricultural Water, Jay H. Lehr and Jack Keeley, editors, John Wiley and Sons, Inc., Publishers, New York, 781 pp.
http://blogs.oregonstate.edu/lackey/files/2017/07/4.-Fisheries-History-Science-and-Management.pdf

Lackey, Robert T. 2006. Axioms of ecological policy. *Fisheries.* 31: 286-290.
http://blogs.oregonstate.edu/lackey/files/2017/07/2006f-Axioms-of-Ecological-Policy-Reprint-Lackey.pdf

Larkin, P. A. 1996. Concepts and issues in marine ecosystem management. *Reviews in Fish Biology and Fisheries*. 6(2): 139-164.
https://www.zoology.ubc.ca/~consort/pdfs/Larkin1996-concepts.pdf

Marine Ecosystems and Management. 2020.   Web Site, Published by the University of Washington.
https://meam.openchannels.org/

Mora, Camilo and Peter F. Sale. 2011. Ongoing global biodiversity loss and the need to move beyond protected areas: a review of the technical and practical shortcomings of protected areas on land and sea. *Marine Ecology Progress Series*. 434: 251–266.
https://www.int-res.com/articles/theme/m434p251.pdf

Morgan, James. 2016. Effects of Marine Protected Areas. *World Wildlife Magazine (Fall, 2016)*.
https://www.worldwildlife.org/magazine/issues/fall-2016/articles/effects-of-marine-protected-areas

National Resource Council. 2001. *Marine Protected Areas: Tools for Sustaining Ocean Ecosystems*.
https://dnr.maryland.gov/fisheries/Documents/NRC%202001%20Marine%20Protected%20Areas.pdf

Pinto, Andrea. 2020. These protected marine spots around the world are giving hope to Planet Earth. *Condé Nast Traveller*.
https://www.cntraveller.in/story/protected-marine-spots-around-world-giving-hope-planet-earth/

Wikipedia. 2020. *Ecosystem-Based Management*.
http://en.wikipedia.org/wiki/Ecosystem-based_management

Wikipedia. 2020. *Marine Protected Areas*.
http://en.wikipedia.org/wiki/Marine_Protected_Area

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