Thoughts on Traditional Ecological Knowledge, Values, and Salmon Management

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Presented at PSGB Ecosystem Conference, February 10, 2009, Seattle, WA

Two Sides of the Same Fence

Our western way of thinking seems steeped in a mindset to change the landscape to suit our purposes and extract its resources. This is a conquering/subduing mindset, not a stewardship mindset. In my opinion, stewardship should be part of our thinking, for the benefit of others (not just ourselves) and future generations.

I am not against utilizing the earth we live on to meet our needs, and neither is anyone else (native people included) who derives cultural, subsistence, or economic value from our natural world. Our society's current approach (as expressed in applied policies) to environmental questions demands precise and accurate answers. Typical generic questions include the following:

- How much of some resource (such as water or timber) can be extracted before another resource (such as salmon) is impacted?
- How much can we change the land from one thing (natural) to another (urban) before we have an adverse impact on some resource (such as salmon)?

We have a tendency to want to engineer solutions to ecosystem problems (e.g., fish ladders around dams) rather than to avoid the problem altogether. We even do this in fisheries management, such as determining fishing levels (how many fish from river X can we catch before it impacts fish from river Y?). This approach to solving problems demands that we have good answers to the questions in order to make wise decisions. None of this is inherently evil, but we tend to "want our cake and eat it too." Adding more pressure on scientists or engineers charged with giving answers are policy makers who want the cake baked instantly!

The problem with wanting to see how close we can get to a natural resource before we damage it is that answers from science and engineering are limited in context and understanding; we make assumptions for both, then often ignore the assumptions when it comes time to make the policy application. The end result is that uncertainties in science almost always bear negative consequences on the natural resource, because policy decisions will almost always be applied on the side of resource extraction or impact, not conservation. It is the side of the fence from which our society views issues. It is often how we frame the questions and do the studies.

For example, consider a typical management question: "How wide should a stream riparian buffer be to protect salmon from timber harvest or urban development?" An answer is given (based on science) and a regulation is drafted. What follows? Resource extraction is guaranteed (a societal experiment is conducted); trees are cut and land is developed – right up to the regulatory distance from the stream (if it is enforced). What

about the stream's health and salmon? What if the science that informed policy makers turns out to be wrong, off a little bit, or not quite right for some streams in differing geologic, geomorphic, or hydrologic settings? If this happens, the damage will already be done because it won't be detected until the societal experiment is done or well under way. The stream's health and salmon will bear the consequences of our error. Other parts of the ecosystem that depend on the stream's health and salmon will also suffer the consequences. The timber harvest and development won't suffer. Both activities will happen per the regulation. In this example, there was no consideration for uncertainty in the "correctness" of the buffer regulation for these actions. Our society does not properly account for uncertainty when translating science into environmental policies, yet we do account for uncertainty in other applied fields of science or engineering. How often do you see airplane wings fall off or bridges collapse? Engineers add a "safety factor" in their designs because society has demanded precaution in these areas. Society's true values are shown by looking at where we are willing to add precaution and safety factors. Are we willing to add these factors to the management of natural resources?

What I described illustrates a typical best-case scenario for streams and salmon because it describes the formation of a regulation through a good faith effort based on science. Often, there isn't a good faith effort to protect salmon. The political reality characterized by "we can't ask property owners to provide all the protection needed" or "it's better than what we had before" often controls adoption of policies that do not fully protect public resources like wild salmon.

Our society typically applies policy "right up to the line" (e.g., the regulated distance from the stream in my riparian buffer example), often assuming the science is right, ignoring estimates of uncertainty (known probabilities, error bars around a mean value), and not even considering the possibility of true uncertainty (an event with an unknown probability). If science can't detect a significant difference in a hypothesized cause/effect relationship, then it often is translated into policies that assume the effect is not real. Whether there is a cause/effect relationship in the natural world, and a human's ability to detect that relationship through scientific methodology, are two very different things. The scientist's ability to detect cause/effect relationships in the natural world is a function of (a) how advanced our technology is and (b) how much effort is put into answering questions. It has nothing to do with whether a cause/effect relationship is true. A true relationship is true whether we can detect it or not. If we can't detect something that is true in the natural world, then our human understanding of how the natural world works is flawed. Policy decisions should take this into account and use common sense in order to be good stewards to future generations and preserve their ecosystem management options. Unfortunately, it is sometimes convenient to not know the truth about something in order to push a particular agenda on either side of an issue, a dishonest strategy I can't advocate.

Traditional Ecological Knowledge and Values

Traditional ecological knowledge (TEK) is science-based because it is founded on observation, possibly developed over a long period of time and communicated orally rather than in writing. It is my impression that cultures influenced by TEK also have

different ecological values. These cultures have not approached natural resource management and land use from the same perspective as westerners, and therefore the risk of errors when applying their ecological values to policy is different – they apply precaution more in favor of the fish (rather than timber harvest or development, as in the example above). They look from the other side of the fence; not "How close can I get to the stream before I impact salmon?" but "Let's not risk screwing up the stream's health, because the salmon need it". Applying the precautionary values of TEK helps to offset the risk of unanticipated consequences, allowing consequences to fall on both sides of the fence. This is a needed balance point to our current use of science and policy.

The Pebble Mine in Bristol Bay

The proposed Pebble Mine, an extremely large open pit mine in Bristol Bay Alaska, is a good example for a modern day application of differing ecological values. One perspective considers the Bristol Bay sockeye salmon run and looks at the proposed Pebble Mine with doubt, asking "Why risk a proven 100+ year record of a naturally sustainable resource as large as Bristol Bay sockeye salmon for an unsustainable (but admittedly valuable) resource such gold and copper?" This precautionary viewpoint poses the question, "When have large-scale mining efforts such as this been successful at fully protecting watersheds and ecosystem health?" This perspective would err on the side of the fish at the expense of opportunities presented by the Pebble Mine. The advocates of the Pebble Mine certainly acknowledge the value and importance of salmon, but believe they can manage risk to sockeye salmon and their habitat through technology and mitigate any negative consequences.

Not surprisingly, each party views the same issue from a different side of the fence. But more importantly to society and ultimately the policy makers that allow or disallow the Pebble Mine's permits, the consequences of errors in judgment by either party dramatically differ. The precautionary mindset will err on the side of the fish. If the precautionary side is wrong, the fish (and many other ecosystem functions) won't be at risk but interestingly, neither are the copper and gold deposits. The deposits are still in the ground for possible future extraction. Future ecosystem management options are preserved. It is true that the current Pebble Mine proponents won't necessarily benefit economically right now, but society still preserves the option to benefit from the copper and gold deposits some time in the future, hopefully only when it is certain that mines and healthy fish populations can coexist.

What if the Pebble Mine advocates are wrong about their claims to protect the fish? The unsustainable (copper and gold) is gained at the expense of the sustainable (salmon). That's not good stewardship. The precautionary viewpoint is better for society in the long term – it preserves options for both the sustainable and unsustainable resources.

This example is largely written to compare only the dominant resources of economic value (salmon and gold/copper). Policy decisions must weigh other factors too, such as non-consumptive values related to culture, esthetics and others. Not everything (maybe nothing) should be evaluated in dollars. We need to govern as stewards for all parts of ecosystems, including its processes, people of all cultures, and other biota. Regardless of

viewpoint of where people belong in the picture (i.e., equal part of the ecosystem, not part of the ecosystem, overseers, etc.), humans have a proven historical record of changing ecosystems and so have an obligation to implement policies that preserve options for future generations and sustain healthy ecosystems.

A Local Application of TEK Concepts

In my narrow field of salmon ecology I investigate the relationship of salmon to habitat. I pay attention to what fishermen say about fish and the water. I pay attention to what people say who live on the river, its estuary, or in Puget Sound's islands – especially the long-time residents. Their opinions might not be exactly right with respect to cause/effect relationships in salmon ecology, but what they observe is credible and useful. I find these people observant. They live in the place and time of salmon or salmon habitat. They derive their living from this landscape. How well they observe makes a difference in their daily lives. The informal observations of those who fish and live in salmon ecosystems might be considered similar to TEK. These observations help form hypotheses to be tested by traditional science. It is critical that hypotheses are tested within some larger analysis framework or conceptual model to avoid drawing wrong conclusions by having an improper or narrow context. Conceptual models that link natural processes and their controls/disturbances to habitat conditions and biota (e.g., Beechie et al. 2003; Simenstad et al. 2006) are helpful in gaining an appropriate context and understanding of individual study results.

Similar to TEK, analyses that reconstruct historical landscapes (e.g., Collins et al. 2003) give us ecosystem understanding not possible from studying only the present world. The Puget Sound Partnership's video describing the "shifting baselines" of Puget Sound (www.psp.wa.gov/shiftingbaselines.php) is one "press release" example. At Skagit River System Cooperative, we rely heavily on historical reconstruction of the landscape when trying to understand past salmon ecology in an attempt to avoid having a shifted baseline viewpoint. Why be limited in context or understanding when making decisions, unless you are pushing an agenda?

Dr. David Montgomery used lessons of history (again, similar to using TEK) in his book "*King of Fish: the Thousand Year Run of Salmon*", arguing that our western way of approaching salmon problems will likely fail (again). It didn't work in Europe. It didn't work on the east coast of the United States. Why do we think it will work here? Are we better scientists? Maybe, but it has nothing to do with science. If society truly values salmon, then we will preserve and restore salmon. Society's true values reflect how we apply science to management questions – with a lack of precaution. We need to learn from more precautionary cultures and look from their side of the fence.

"We borrow salmon from future generations. If it is wrong to destroy something borrowed from a friend … is it not just as wrong to destroy salmon that we borrow from the future?" (Montgomery 2003).

References

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