

HISTORICAL PERSPECTIVE: WHERE WE'RE AT AFTER 20 YEARS OF DEALING WITH CWE

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I have had several people comment, with a hint of surprise, that I have been asked to give the “keynote” for this meeting. While I have wondered about why others should be surprised, I have to admit that this thought surprised me too. In fact, I can assure you that I am not calling this a keynote address because my boss, CDF Director Andrea Tuttle, is also giving a presentation. So I will defer to Andrea and others, in what is an impressive line-ups of experts, to hit the high notes that you have come to hear. What follows is an “introductory” presentation that will try to put cumulative impacts into perspective. And a logical place to start is with the laws that are the underpinning and motivation for our consideration of cumulative impacts.

The first, explicit requirement for considering cumulative impacts was given almost 30 years ago, in 1971, as part of the Council of Environmental Qualities regulations for implementing the National Environmental Policy Act of 1969 (NEPA), where cumulative impacts are defined as:

“the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”(CEQ Guidelines, 40 CFR 1508.7, issued April 23, 1971)

In California, the 1970 California Environmental Quality Act (CEQA) was amended in 1972 to include consideration of projects with effects that "are individually limited but cumulatively considerable." (California Public Resources Code Sec. 21083(b))

To implement this direction, the Office of Planning and Research developed the following definition that is included in the CEQA guidelines:

“‘Cumulative impacts’ refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.
(a) The individual impacts may be changes resulting from a single project or a number of separate projects.
(b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.” (CEQA Guidelines, Sec. 15355)

So the point is, we are supposed to determine whether project impacts accumulate over time or space to create a significant effect. And it has been left up to us to figure out how.

Now, with these definitions in mind, I want to place cumulative impacts into a larger context, starting with the big picture. But this big picture does not equate to fancy graphics, so I am going to ask you to be a little old fashioned and use your imagination.

First, I want to go back more than 20 years, because cumulative impacts are not new, and even predate life on earth. In fact, it can be argued that life exists because of cumulative effects. First from the accumulation of water and the production of a carbon rich atmosphere early in earth's history, and then through then the evolution of plants and animals that both created and adapted to increasing oxygen levels. And since the first appearance of life, countless organisms have come and gone as a result of the cumulative effects of climate change and habitat adjustments, and through the emergence of new competitors and predators.

Man has been an agent of these changes throughout our still brief appearance on the earth's stage as we learned to organize and cooperate for hunting and gathering, and, ultimately, to change our environment through cultivation, irrigation, animal husbandry, and the harvesting of forests.

And since the arrival of European immigrants, California has become a prime example of mankind's ability to change habitats, landscapes, and species composition, including:

- Elimination of the grizzly bear, which knew no threat from other animals.
- The conversion of millions of acres of perennial grasslands to annual grasses, with attendant shifts in dependant animal life.
- The conversion of millions of acres of our valleys from grasslands, forests, and swamps to croplands, towns, and cities.
- The regulation of nearly all of our major rivers, which has both drastically reduced flows in some places, like the Trinity River, and greatly increased summer flows in others, which now keeps saltwater from reaching Sacramento.
- And the cutting of most of our old growth forests.

Moving to more site-specific examples, our past activities have had major effects on the state's waterways.

Most of us may, at one time or another, have learned about the effects of hydraulic mining on downstream channel capacity, and have heard about G.K. Gilbert's pioneering cumulative impacts study (although he did not use this term), in which he concluded that the incremental effects of bay fill, rather than upstream sediment production, was the main threat to tidal flow through the Golden Gate (Gilbert 1917).

But we should also keep in mind that the gold miners impacts on our streams was more widespread than hydraulic mining. In fact, it included a nearly complete removal and turning over of the bedload in channels of streams and rivers draining the central and northern Sierra Nevada mountains, portions of the Klamath and Trinity Mountains, and in other gold producing areas. This not so subtle treatment caused complete disruption of channel habitats, along with the de-watering of entire stretches of many streams through diversion of water for both on-site and downstream mining activities. And this began only 150 years ago.

Timber harvesting has its own history of watershed and channel impacts. Large, old growth trees required big equipment and lots of landscape preparation to move from forest to mill. Methods used by early loggers included:

- Logs suspended from high wheels on flatter landscapes and pulled by oxen or mules.
- Corduroy roads built in channel bottoms in steep terrain.
- Powerful steam donkeys that dragged logs uphill, downhill, and across slopes.
- Railroads on both flat ground and carved into sideslopes.
- And, best of all, splash dams—where logs were collected in stream bottoms, with removal of all downstream trees and other potential blockages in the channel, and the release of man-made floods from upstream dams during high flow events.

And in those days, site preparation meant burning all slash and non-merchantable trees so that logs could be jacked and rolled down the hill.

But as bad as all of this sounds, and we have all seen pictures of the desolate landscapes that these practices left behind, site disruption was primarily limited to widely spaced rail lines, stream bottom skid paths, and other main haul routes. So the channels were trashed, but adjoining slopes were generally left intact.

The entry of tractors into the woods began an entirely new phase of logging impacts. Now, it was no longer necessary to work around the constraints of existing terrain, because these highly mobile and powerful machines could move soil, skid logs, and build roads, stream crossings, and landings almost anywhere.

Unfortunately, as with many new technologies, there was not an appreciation of short and long term consequences. So it was common to:

- Find roads and landings built next to, and even in, streams and on landslides (which were often the most convenient flat spots).
- Use low order channels as skid paths.
- Build roads without drainage.
- And build stream crossings with minimal or no provision for passing winter streamflows.

The resulting massive amounts of erosion were predictable, but if the most obvious damage was limited to the timber owner's property, who else should be concerned. It turned out that downstream water users, fishermen, and recreational users of both forests and water cared a lot. And this brings us back to cumulative impacts.

What we see today is a product of what has happened before. And the current conditions of our watersheds are a reflection of their past history. In fact, considering the degree of channel modification, disturbance, and sediment production from past disturbance, the condition of many of our streams is a testament to their resiliency. In other cases, we will be faced with the effects of accumulated sediment for decades, and perhaps centuries, to come.

Now, we are charged by law to prevent both direct and cumulative impacts that would have a significant effect on beneficial uses of water, which requires us to be able to predict if these impacts will occur and determine if they will be significant. This is a question that has been before us for almost 30 years, and we still working at the answer. Hopefully, subsequent presentations will help to break this logjam.

One of the early summaries of the cumulative impacts of California forestry activities in the post-CEQA era was a report on “Assessing Cumulative Impacts of Silvicultural Activities” that was prepared by the John Muir Institute in 1979 (Coats et al, 1979). This report correctly predicted that the cumulative effects assessment requirement of CEQA should be applied to timber harvesting plans, and it proposed the following approaches to addressing cumulative impacts:

- Requiring CDF to take cumulative impacts into account when reviewing THPs.
- Requiring THP submitters to include notification of future plans.
- Consolidating multiple THPs in a single watershed into one plan.
- Developing a watershed information system to provide information about past THPs and watershed characteristics to be used for cumulative impacts analysis.

Now, 21 years later, THPs do require CDF to account for cumulative impacts, and plan submitters to identify future projects. We have several processes for submitting plans covering larger areas that include multiple THPs. And watershed information systems are beginning to appear.

Another notable early step, was the Edgebrook Conference on “Cumulative Effects of Forest Management on California Watersheds,” (Standiford and Ramacher, 1981) which was held in Berkeley in 1980, and was sponsored by Cooperative Extension and the Department of Forestry to bring together the day’s experts on cumulative impacts processes. And here we are 20 years later with the same agencies, plus others, for the same purpose.

A few years later, in 1984, I was hired to help put together a cumulative impacts study at the Caspar Creek Watershed in cooperation with the Redwood Sciences Laboratory of what was then the Pacific Southwest Forest and Range Experiment Station. This was noteworthy for me because I needed the job. But what was important for cumulative impacts research was the long-term commitment between the State of California and research personnel at the Redwood Sciences Laboratory. It took 14 years to install the study, to calibrate and treat the watersheds, and then to measure effects and recovery. Conclusions from this original study were reported in another conference (Ziemer 1998) only two years ago.

The work at Caspar Creek is just one example of the many research efforts, in small and larger watersheds, that have studied both basic processes and integrated downstream effects, with a focus on cumulative impacts. So we have been working on the why and how of cumulative impacts for more than 20 years, with many conferences and projects directed at this question.

In the meantime, the law has required that cumulative impacts be analyzed with whatever tools

are available, and waiting for studies to find the ultimate answer has been no excuse for not conducting these assessments. I can related some of CDF's experience with this. At first, CDF argued that cumulative impacts were taken care of by on-site mitigations required by the Forest Practice Rules. We lost that round in court. Then we were going to address cumulative impacts through administrative procedures to satisfy the paper trail requirement in the record of decision. This didn't work either.

So the Board of Forestry began a long process of deciding how requirements for cumulative impacts assessment could be included in the Forest Practice Rules, and this led to explicit Rule requirements for:

- identifying an assessment area,
- information about past and future projects,
- identifying beneficial uses, and
- determining the impacts of past projects.

This information is then used to determine if the proposed timber operations could cause or add to significant, adverse cumulative impacts. Guidelines about factors to be considered were provided in the Rules, but no analysis method was specified because the Board felt that the available assessment techniques were not adequate.

These rules were adopted in 1991, twelve years after the John Muir Institute Report indicated that they were needed. In most cases, they have withstood the test of legal challenge, which has generally been fought on procedural grounds, but the controversy about their technical adequacy continues.

I am not as familiar with the U.S. Forest Service experience, but know that they too went through an analogous process of trying to determine what was required under the National Environmental Policy Act, and have also been struggling to develop adequate assessment methods.

So, in the 31 years since NEPA became law and the 30 years that the state passed CEQA, we have figured out when cumulative impacts assessments are required, and have established procedures for review with a paperwork trail to satisfy legal requirements in the record of decision. But we are still searching for analysis methods to measure and predict cumulative impacts. This doesn't mean that we haven't tried.

At CDF, I helped to develop guidelines (CDF 1994) that lead Foresters through an inventory of site conditions and the impacts of past projects using qualitative judgements to arrive at a conclusion about current impacts and about the potential for proposed activities to cause significant impacts. This was designed with small landowners and limited analysis resources in mind, and has been used sporadically by foresters preparing THPs. One of the main complaints about this approach is that it is too subjective.

The U.S. Forest Service settled on using an equivalent road area (ERA) index that is based on the type and age of site disturbance across a watershed assessment area (USDA Forest Service 1988). This has been applied throughout National Forests in California for assessing the

cumulative impacts of timber harvest projects, with some modification at the individual Forest level. It provides a very objective result, so it is criticized as not being accurate.

And there are other cumulative impacts assessment procedures of varying degree of complexity. But all have suffered from the difficulty of getting adequate information about current hillslope and channel conditions over a watershed scale that can be quantitatively evaluated to predict future impacts of proposed forest management activities.

Now, we are turning to an expanded form of cumulative impacts assessment called watershed analysis, but are still trying to decide what information to collect and how to use it. In effect, we are trying to make up for lack of insight by collecting more information that we aren't really sure what to do with. In fact, in CDF's sustained yield plan program, I have had the experience of nearly drowning in information while searching for the analysis. And if I have one thing to add to this conference, it is that we must bridge the gap between information and conclusions.

For the rest of today, we are going to be immersed in the relevancy, science, framework, integration, and state-of-knowledge of cumulative impacts assessment. Then tomorrow we will find out how landowners and agencies are meeting the challenge of conducting these assessments. I am looking forward to it.

Finally, I would like to observe that cumulative impacts assessment is not about saving the world from itself, because change is inevitable. Instead, it is about choices concerning how we will affect the world that we and our children will live in—about its diversity of plants and animals, and its ability to sustain the types of lifestyles that we both have and want.

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