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Science FINDINGS

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INSIDE

"Science affects the way we think together."

Lewis Thomas

Going Beyond the Biophysical When Mapping National Forests

Lee Cerveny

Participants map their favorite destinations in the Mount Baker-Snoqualmie National Forest, Washington, during a human ecological mapping workshop. This process was used to identify priority destinations as part of travel management planning for the forest.

IN SUMMARY

Resource managers have long mapped biophysical forest data. Often lacking, however, is relevant social science data for understanding the variety of human needs a given landscape fulfills.

For nearly a decade, Lee Cerveny has been exploring how to provide this data on public lands around the Pacific Northwest. Cerveny is a research social scientist with the Pacific Northwest Research Station. In collaboration with several colleagues, she is using in-person mapping exercises and workshops with graphic information system software to capture social values, ecosystem benefits, and resource interactions related to some of the nation's most visited forests, including the Mount Baker-Snoqualmie National Forest. The resulting maps depict both the diversity and intensity of human-resource interactions. These participatory approaches also create opportunities to build trust and dialogue between different forest stakeholders.

Cerveny found that multiple methods of data gathering were necessary. Because demographic groups respond differently depending on the type of outreach (in-person or online), a single method of data collection can leave some key interests underrepresented. Also, collecting data various ways makes it possible and often valuable to desegregate survey responses to see which groups may not have responded.

Combining a landscape's biophysical data with points of human interaction and value can help forest planners develop sustainable strategies for managing road networks.

"Of all the paths you take in life, make sure a few of them are dirt."

–John Muir

Lee Cerveny has been trying to figure out why people visit public lands since she was a little girl. Growing up in New Hampshire on the border of the White Mountain National Forest, Cerveny saw her town's population increase 20-fold, from 3,000 to 60,000 people, each summer as people came up from the city to visit mountain resorts and freshwater lakes. She would always wonder what attracted different visitors that thronged the roads of rural New England. Decades later, now a research social scientist with the Pacific Northwest Research Station, she is still wondering the same thing, albeit with a focus on national forests on the opposite coast of her childhood.

Roads still factor into Cerveny's work. In 2005, the Forest Service passed a travel management rule to overhaul the road systems throughout the forests. The rule directed each national forest to analyze its current byways and create a plan for a sustainable future. Invariably this meant closing or converting some of the existing roads that have outlived their intended lifespan and need costly repairs.

Each road closure, however, limits public access. People come to national forests for a variety of reasons—recreation, solitude, to gather foods and forest products, and to visit places of cultural or historical importance. Others rely on forest resources for their livelihood. No matter what draws people to the forest, roads are critical for getting there. Without maintained roads, visitors can find themselves cut off from their favorite rock climbing area, tribal gathering place, or prime berry picking patch. In road maintenance, as in all other stewardship questions, decisions need to balance conservation of natural resources with the social, cultural, and economic needs of visitors.

Roads and access loom large for the Mount Baker-Snoqualmie National Forest in Washington, one of the most visited national forests in the country. Because of its proximity to the urban centers of Seattle and Vancouver, British Columbia, the forest sees more than 2 million annual visitors. To make informed decisions, the Forest Service needs to know where these 2 million visitors are going in the 1.7 million acre forest, and how they get there. This is where Cerveny comes in.

KEY FINDINGS

- Human ecological mapping (HEM) was used to identify priority forest destinations and roads in a public-engagement process used by the Mount Baker-Snoqualmie National Forest for travel management planning. Urban residents were found to value roads and destinations forest-wide, while rural residents preferred sites close to home.
- An earlier HEM exercise conducted on the Olympic Peninsula included eight in-person workshops to map special places and resource interactions across multiple jurisdictions. Results showed that most residents valued the forest for recreation; however, residents of Lake Quinault, a formerly active timber area, emphasized the forest's economic benefits.
- Another project in rural Mason County, Washington, identified where Latino forest harvesters worked and forest areas used for recreation. Participants also discussed safety issues around potential conflict with hunters and target shooters. The result was a followup meeting with law enforcement officers from multiple agencies, eventually leading to state officials investing in bright orange vests for harvesters and warning signs to increase their visibility.
- In the Browns Canyon National Monument, Colorado, community-based workshops and online mapping are being used by the Bureau of Land Management and U.S. Forest Service to inform future monument planning. Results showed that urban visitors gravitated toward developed sites near the highway while local residents were more likely to travel into the backcountry.

Public Participation

Forest managers have long relied on maps of geological formations and vegetation types. To be sure, these are important components of any landscape or ecosystem. But, such features do not capture the diverse connections that humans have with the environment—a major challenge given the Forest Service's long-held ethic of promoting "the greatest good for the greatest number of people for the longest time." Human connections can be tangible, such as hiking, mountain biking, and foraging. Just as important, they can also be intangible, such as the spiritual reverence or cultural memories associated with a place. For a land manager, creating a picture of the forest without these connections is akin to an artist painting a scene with only half a color palette.

Cerveny has teamed up with Rebecca McLain, a research assistant professor from the Institute for Sustainable Solutions at Portland State University, for a number of human ecology mapping (HEM) projects. Definitions of HEM abound, but Cerveny says a simple one suffices: "It's a public engagement approach to bring people together to talk about places that matter to them using maps."

Lee Cerveny

Carbon River Road washout, Mount Baker-Snoqualmie National Forest. Roads are expensive to maintain. Travel management planning on national forests is done with input from the public to try to balance safe access and environmental protection while working with available funding.

Purpose of PNW Science Findings

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Forest Service

Lee Cerveny

Community members and Forest Service staff discuss maps created by the public as part of the public engagement process in travel management planning for the Mount Baker-Snoqualmie National Forest.

Gifford Pinchot National Forest

Picking huckleberries: Public lands are not only a source of recreation, but a source of income for many.

McLain says when they first started this work in 2009, mapping human connections was uncommon in the region, in part, because of the difficulty in spatially understanding and mapping people's values. She adds another reason with a laugh: "There just aren't that many social scientists in the forest!"

Recent technological advances in mapping tools have created opportunities to easily visualize these connections. Recording human-environmental connections on computerized maps allows for those connections to be integrated with other mapped information; after all, it's all just data to the computer. The combination can help land managers target limited resources efficiently and identify areas of potential conflict.

Other HEM benefits are more indirect owing to its participatory approach. Cerveny says these benefits are most pronounced when the public is engaged early, long before maintenance or land-use decisions are made. "Being involved allows people to engage in learning, build trust, and develop relationships," she says. "All those things can lead to more positive outcomes. When people have a chance to share their views about issues they find important with decisionmakers, they tend to have greater support for the process, even if they do not agree with the final decision."

Gathering social data for a forest with 2 million visitors is no small feat. Cerveny and McLain used multiple outreach methods to collect data from a variety of forest users.

They first hosted community mapping workshops. Tabletop-size maps were arrayed around the room and participants were given stickers to mark their favorite forest destinations and the routes they used to get there.

Cerveny noticed that bringing these participants together reduced tensions. "We had strong conservationist interests standing next to people who were harvesting timber," she says. "In another setting, they might be arguing with each other." But, when presented with a common problem, the groups worked together and used the maps to share their unique forest connections.

The project team also collected data through an online questionnaire sponsored by a partner, Washington Trails Association. This digital outreach allowed Cerveny and McLain to gather responses from those who were unable to attend the workshops. Many more people responded to the questionnaire than were able to attend the community workshops. However, the online participants did not give information that was as precise as that provided by workshop participants.

Differences Between Urban and Rural Visitors

Different data gathering methods reached different demographics and revealed variation in groups' destinations and activities. The workshops reached a higher percentage of rural participants than did the online questionnaire. Cerveny and her team discovered these rural forest visitors were more likely to visit locations near their homes. In contrast, the urban visitors who lived along the major highway system indicated favorite destinations spanning the entire forest.

Both urban and rural forest visitors reported a large number of camping, hiking, and relaxation destinations. Rural respondents, however, were more likely to indicate a favorite hunting or berry gathering spot. Their urban counterparts were more likely to map a place for activities such as mountain biking or backpacking.

The researchers have published their Mount Baker-Snoqualmie findings in various journals, including in a 2017 *Journal of Environment Management* article. Among the key takeaways is the importance of using multiple methods to seek responses in any HEM project. If only one method is applied, the results would likely favor one group of respondents, leading to unbalanced input. For example, a decision based solely on an online questionnaire might ignore hunting areas popular with rural users.

Working on the Olympic Peninsula

Prior to their work with the Mount Baker-Snoqualmie National Forest, Cerveny and McLain conducted a pair of related studies on Washington's Olympic Peninsula. It was 2010 and the Olympic National Forest supervisor was eager to gain empirical data on who was visiting the forest, where they were going, and what brought them there. The team conducted eight mapping workshops over two years throughout the predominantly rural peninsula in their inaugural application of HEM.

"The study helped us to really see the value of this socio-spatial approach; we noticed intriguing differences in how people related to the forest based on where they lived," says Cerveny. "We also observed that different resource uses had unique spatial footprints, which appeared to reflect the nature of the activity and topography." For example, hiking and fishing took place in narrow bands

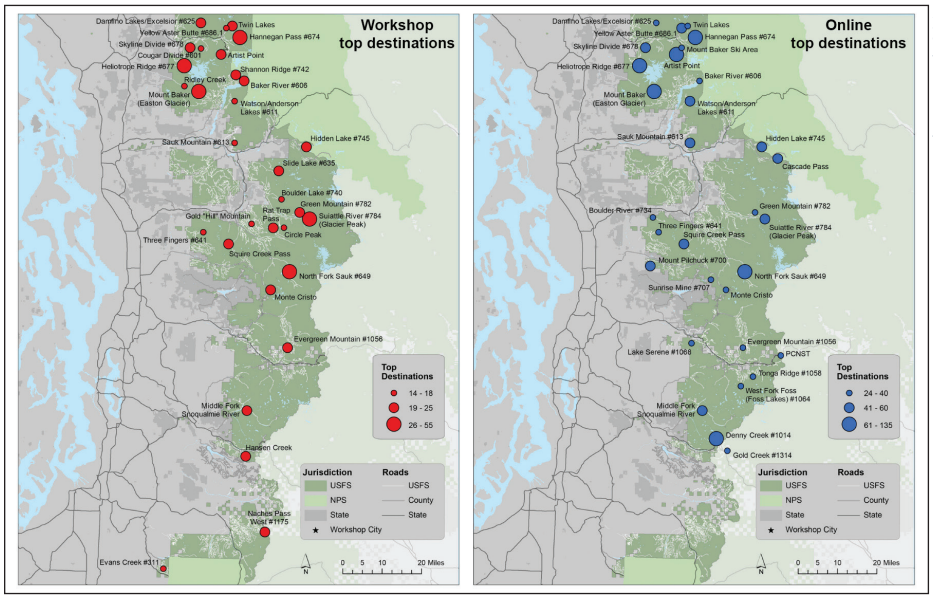
along rivers, while hunting and motorized use spanned larger areas. Economic activity, namely timber harvesting, was identified with vast areas of use.

While this project was going on, Cerveny and McLain noted that the public engagement sessions were missing certain groups to whom the Olympic Peninsula was highly important; this included American Indian tribes and the region's growing Latino population. The team took advantage of some grant funding to pursue a small project in rural Mason County where Latino residents accounted for about 15 percent of the population.

In these workshops, the Latino participants mapped locations not represented in the original study, indicating areas that were important to that population for harvesting of forest greens (salal), shellfish, and mushrooms. They also mapped places that they visited for relaxation with their families and friends.

More importantly, the mapping workshops created a dialogue between the Latino community, land managers, and law enforcement officers from multiple agencies in the area. Immediately following the workshop, state officials invested in bright orange vests and signs for Latino harvesters who were worried about their safety, in part, because of sharing the nearby forests with sizable numbers of hunters.

Indeed, in recent years the Forest Service has made a concerted effort to provide access to its various services and programs for individuals with limited English-language proficiency. Cerveny's work in Mason County, described in a 2014 *Practicing Anthropology* journal article, suggests that collaborative mapping exercises with underserved communities can contribute to this effort. In 2018, Cerveny and McLain will launch a HEM project involving Latino residents living on both sides of the Columbia Gorge near Portland and Vancouver to explore forest use patterns and special places.



McLain, R. et al. 2017

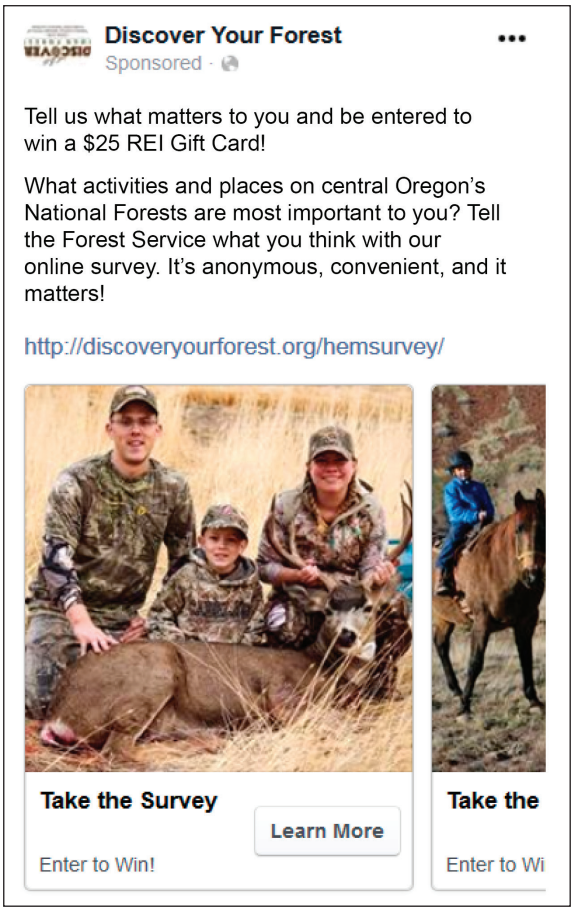
Top destinations of workshop and online survey participants in the Mount Baker-Snoqualmie human ecological mapping project. Gathering data in various ways painted a more nuanced picture of human connections to the forest.

HEM in Central Oregon

One of Cerveny's more recent projects is with the Deschutes and Ochoco National Forests, where the Forest Service collaborated with the nonprofit organization, Discover Your Forest. These forests are distinct from Mount Baker-Snoqualmie in nearly every way, including topography, climate, and proximity to large urban areas. Still, forest usage is on the rise given that central Oregon attracts about 7 million visitors annually, more than 1 million of whom visit the two forests, according to the most recent visitor use reports published by the Forest Service. Fast-growing Bend, the largest city in central Oregon, has become increasingly popular with well-off retirees and so-called amenity migrants who relocate to places with a wealth of natural amenities, including 300 days of sunshine and excellent skiing.

Discover Your Forest works to enrich the experience of forest visitors, a goal enhanced through periodic surveys to understand exactly what people are experiencing when they come to the forest. The most recent round of data collection included a significant HEM component coordinated by Cerveny and McLain. Unlike their projects in Washington state, data gathering for the Oregon forests minimized in-person, labor-intensive data collection, although an iPad-armed intern did fan out to community events and trailheads to gather survey responses.

The big push here was to greatly expand the audience reached online through a mapping application hosted by Discover Your Forest. The online app collected a year's worth of data from the public. There were publicity pushes via websites and e-newsletters, with additional responses resulting from targeted Facebook ads, a new outreach approach.



Discover Your Forest

The nonprofit group Discover Your Forest used targeted Facebook ads like this to encourage specific groups, such as sportsmen, to respond to the Oregon National Forest Survey.

"Overall, I think it's a super smart way for the Forest Service to start quantifying what recreation means and what the human experience in the forest means, in the same way, they're quantifying what a wildlife experience in the forest means," says Rika Ayotte, executive director of Discover Your Forest. "When making any sort of decision, it's hard to just tell anecdotes all day about how much people love their public lands without any hard data."

Working With the Bureau of Land Management

The scientists' unique HEM approach has recently been adapted for use in other land management agencies, including the Bureau of Land Management (BLM). In 2016, they worked with a team from the University of Colorado-Colorado Springs to capture human connections in the Browns Canyon National Monument, one of the nation's newest monuments, near Salida, Colorado. Similar to the projects in the Northwest, BLM officials recruited participants for four mapping workshops in rural communities along the Arkansas River as well as two workshops in the urban front-range corridor.

"We had fourth- and fifth-generation ranchers show up to talk about their historic connections to this special landscape alongside raft guides and newly minted retirees from Denver," says Cerveny, who adds that the online mapping application reached hundreds more throughout Colorado.

Biophysical data will always be easier to grapple with than famously slippery human preferences. Mountains, valleys, and rivers may be fixed to the mapmaker, but to the social scientist, people's connections to these features are wildly varied depending on who is experiencing them and in what context. Cerveny's work points the way to how to illuminate and perhaps even celebrate this riotous diversity of human experience on U.S. public lands in the years to come.

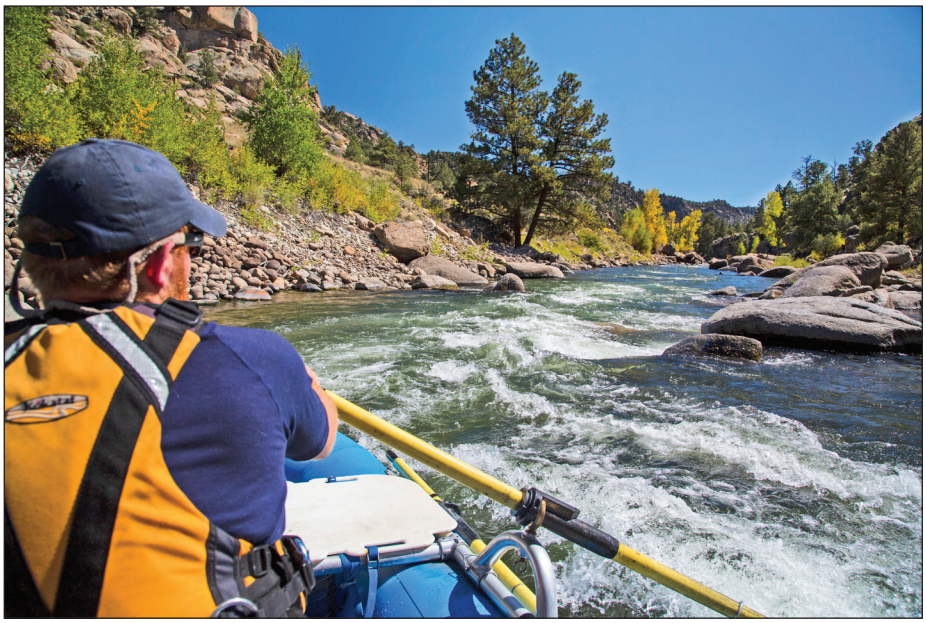
"The environment is where we all meet; we all have mutual interest; it is the one thing we all share."
–Claudia Alta "Lady Bird" Johnson.

Writer's Profile

Geoff Koch is a Portland-based science writer. He can be reached at geoffrey.a.koch@gmail.com.

LAND MANAGEMENT IMPLICATIONS

- Human ecology mapping (HEM) emphasizes direct engagement with communities and other stakeholders with strong landscape connections. Participants use maps to tell stories, describe attachments to special places, and note the benefits rendered from the forest. These gatherings create opportunities for dialogue to build trust and shared understanding.
- Once aggregated, resulting data images display sites of special importance, or "hotspots," where managers may focus attention. Resulting maps also highlight value differences among communities and other stakeholders or resource users—differences that are important to acknowledge in decisionmaking.
- Data reflecting cultural values and human-resource interactions can be integrated with biophysical data to help land managers better address critical resource problems.



Bob Wick, Bureau of Land Management

Whitewater rafting on the Arkansas River in the Browns Canyon National Monument, Colorado. Cerveny and McLain are now working with the Bureau of Land Management to use human ecology mapping to document human connections to the landscape.

For Further Reading

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Scientist Profile

LEE CERVENY is a research social scientist with the Pacific Northwest Research Station. Her research focuses on how sociospatial tools can be developed to collect information about human values, land uses, and forest benefits for use in forest planning. She has also studied homelessness and nonrecreational camping on national forests and grasslands, residential location at the urban-wildland interface, and forest collaboratives as a form of resource governance.

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