GROUND UP TEAM

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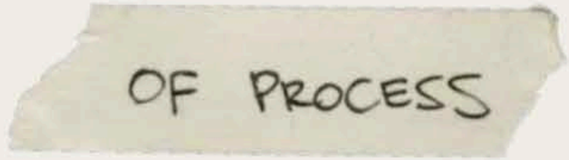

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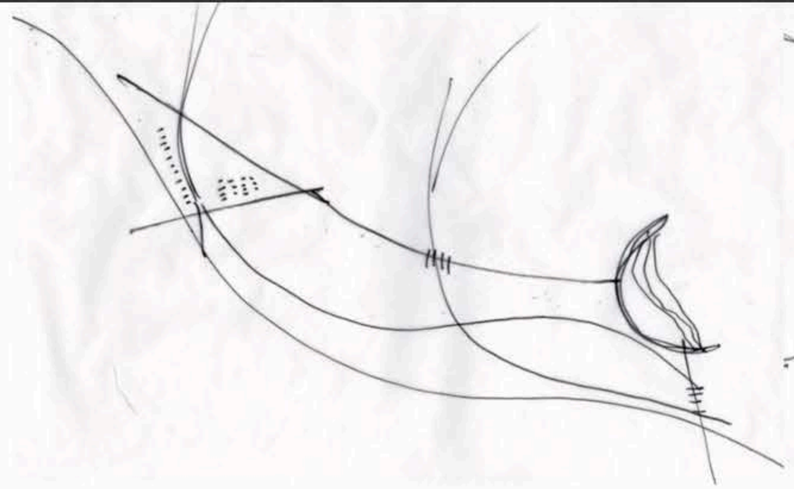
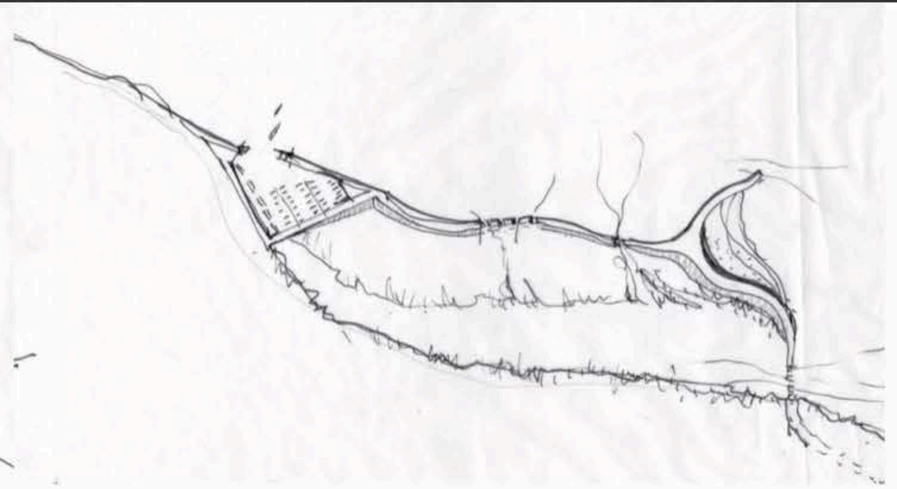
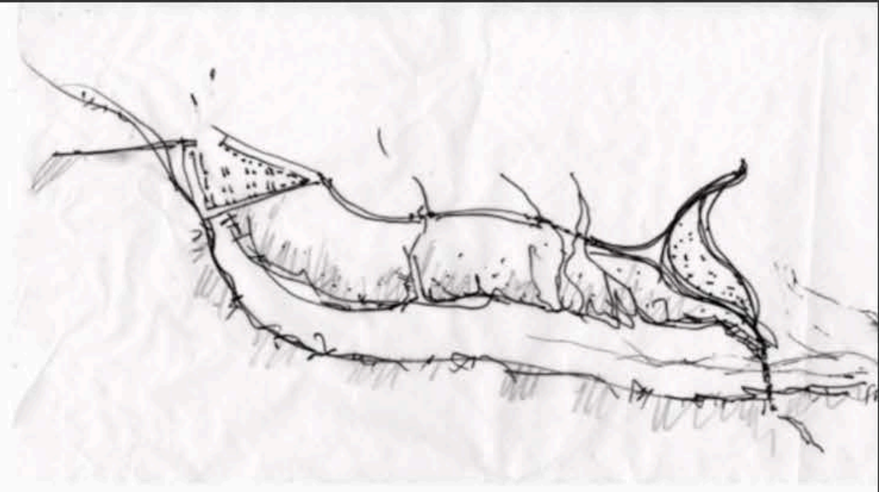






08 IN DIALOGUE

AN INTERVIEW WITH KRISTINA HILL, JOHN LARGIER, AND LAUREL LARSEN

Ground Up team members Logan Egan, Kate Lenahan, and Josh Gevertz led this conversation in 2017 as part of an effort to strengthen the ties between landscape designers and ecologists.

'Science' is a contested word in landscape architecture. A cornerstone of the discipline, it plays a key role in a profession that sees itself as a hinge between people and their environment (itself an increasingly ambiguous subject). How can designers meaningfully activate the technical knowledge of specialists such as geomorphologists, hydrologists, and oceanographers? And how does this collective expertise participate in a socially and ecologically volatile world? The following content derives from a conversation, hosted by the *Ground Up* editorial staff, exploring the historic, current, and future collaborative relationship between landscape architecture and the natural sciences. Our valued contributors include: UC Berkeley's own Kristina Hill, an urban ecologist and designer; Laurel Larsen, a hydroecology and environmental restoration scientist; and John Largier, an oceanographer at UC Davis and the Bodega Marine Laboratory.

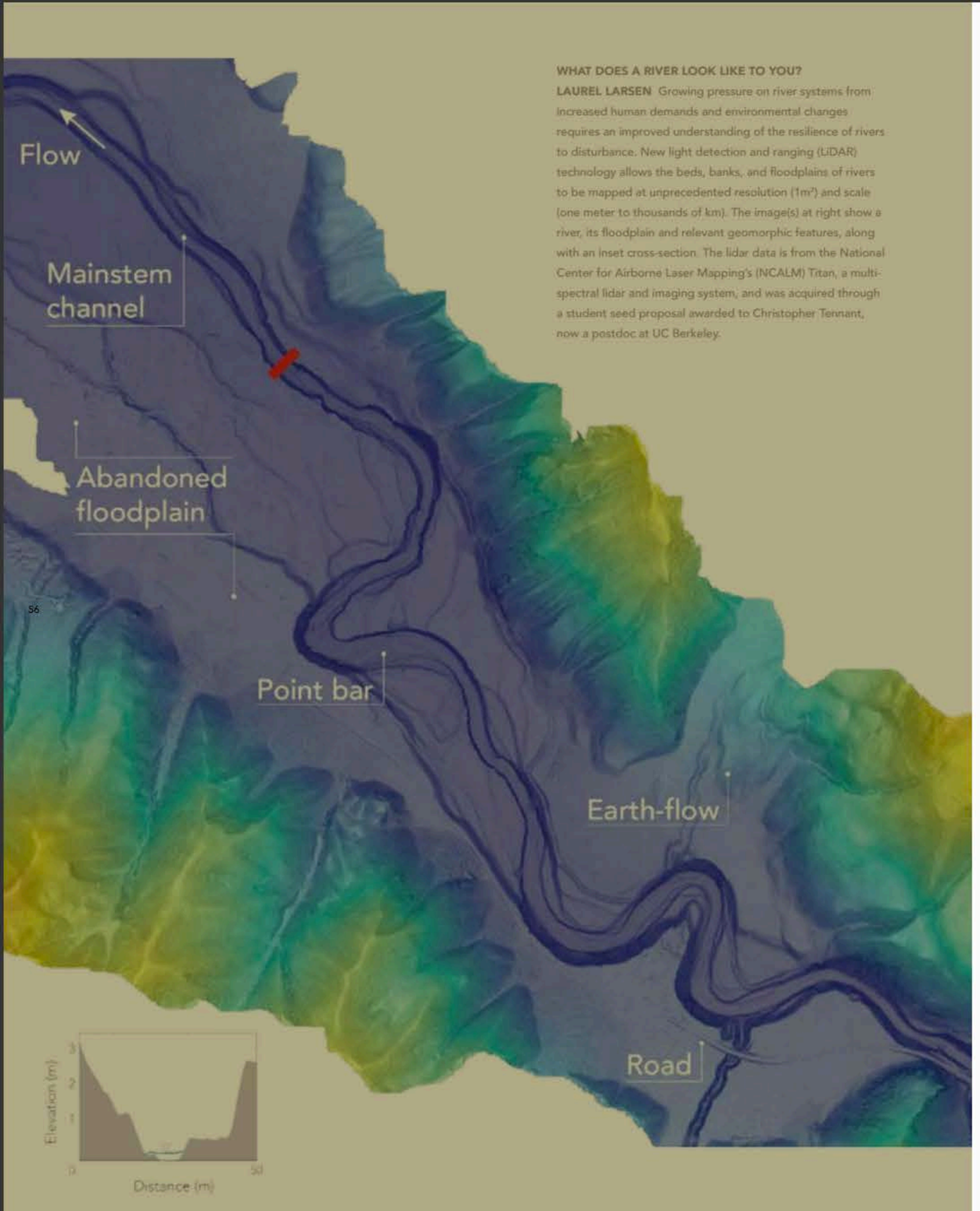
Ground Up: Kristina, from your perspective as both a scientist and an environmental designer, how do you perceive the relationship between the natural sciences and landscape architecture, both from a historical vantage and in today's society?

Kristina Hill: The field of public health, and American usage of the term, 'ecology,' were both initiated by a woman who was a contemporary of Frederick Law Olmsted, Ellen Swallow Richards. Separately but in parallel, Richards and Olmsted changed the American perception of cities and landscapes from sources of disease to places where people could expect to live healthy lives. Olmsted and other early landscape architects benefited from Richards' work, to the extent that her research provided a basis for public policy that demanded functional landscapes to support health, maintain clean water, and prevent or contain the effects of flooding.

However, Olmsted's conflation of the pastoral landscape type and the aesthetic experience of psychological restoration set the pattern for a long-standing valorization in landscape architecture of forms over processes. Succeeding generations of landscape designers have placed enormous emphasis on how landscapes look, over how they function—both in terms of supporting natural processes and in terms of the measurable social or engineering performance of built landscapes. And so the relationship between focusing on form and focusing on process has waffled back and forth over the last hundred years and longer, using the way things look to indicate whether they are healthy or not. The more landscape architecture has emphasized form over function, and concealed rather than revealed the dynamics of the larger environment, the more it has contributed to a 'dumbing down' of the American understanding of landscapes as systems.

GU: Laurel and John, does a broader cultural pattern of oscillation between form and process resonate with your professional experiences as research scientists?

In 1988, while still a student, Barbara Boardman produced a design for an artificial island in a shallow area of Boston Harbor that anticipated the contemporary focus on process-based design. Her proposal was to build a set of concrete 'pathways' in the harbor that, when viewed from above, resembled a fish skeleton. She thought it likely that sediment would accumulate on the concrete armature in a way that revealed the currents and sources of sediment in the harbor. While environmental art had enjoyed a certain recognizable formalism, as in Smithson's Spiral Jetty or Johannsen's plant forms built in concrete, Boardman insisted that it was not important whether people ever recognized the form of the fish skeleton in her island structure. By adopting an aesthetic position that allowed the ambiguities of process-driven project to co-exist with a fixed, referential form, Boardman became one of the first to propose forms that might be secondary to processes, becoming subversive palimpsests rather than commanding attention as ecosystem dynamics were revealed.



WHAT DOES A RIVER LOOK LIKE TO YOU?

LAUREL LARSEN Growing pressure on river systems from increased human demands and environmental changes requires an improved understanding of the resilience of rivers to disturbance. New light detection and ranging (LiDAR) technology allows the beds, banks, and floodplains of rivers to be mapped at unprecedented resolution (1m²) and scale (one meter to thousands of km). The image(s) at right show a river, its floodplain and relevant geomorphic features, along with an inset cross-section. The lidar data is from the National Center for Airborne Laser Mapping's (NCALM) Titan, a multi-spectral lidar and imaging system, and was acquired through a student seed proposal awarded to Christopher Tennant, now a postdoc at UC Berkeley.

Laurel Larsen: Restoration is a relatively novel concept, beginning in the 1970s. Some of the early projects I worked on were focused on restoring a particular landscape form, or a particular morphology within streams and rivers. I think that in the most recent decade or two, the focus has shifted toward processes, and trying to understand what processes constitute a healthy ecosystem.

John Largier: When I think about interactions between [the built environment] and science, the first examples that come to mind are coastal defense systems. In the Netherlands, the practical response to flooding was to build walls. The same direction was taken in the design of our coasts, which are mostly hardscape harbors and seawalls. Now, we're tending toward less maintenance, less machinery, less hard structure. Some of that is practical, and some of it is aspirational, because people want to make the system function more like it used to.

KH: If you look back at coastal defenses, the northern Europeans didn't actually use walls or levees until after they had begun to work with people in the Mediterranean. The Mediterranean system used walls because they had a steeper, more rocky shoreline. That is part of the problem—that we've taken a vocabulary from the Mediterranean and then extended it to sandy coasts, where walls and barriers don't make any sense.

There is a wealth of literature that suggests people perceive neatness and order as positive; these formal qualities make us feel organized and in control, as with our coastal defenses. But neatness and order are not really appropriate for dynamic systems. People often find braiding in streams, or the presence of large woody debris, to indicate that the stream needs maintenance. On the coast, we used to say that 'fill' was bad, but now in New York City and other places where they are trying to add material to the nearshore environment, they call it 'shallowing.' We need to rethink our terminology to deal with existing laws and policies. We need to have a dynamic relationship between what the world looks like and what people associate with it.

GU: Landscape aesthetics—that is, the forms we typically design with, and the cultural pictures we have of healthy or functional ecosystems—have emerged out of this relationship between the natural sciences and design. But the built environment is also born of a larger framework of policy and regulation, particularly in the last several decades. How has management impacted our landscapes?

LL: Our federal agencies have adopted quite a number of scientific views of outdated thinking about how rivers work. The federal policy toward restoration essentially involves holding channels in place and designing their geometry such that they only go 'over-bank' once every two years or so, bottling the inertia in the system. That's at odds with current scientific thinking that rivers and the ecological functions they sustain are dynamic. Furthermore, managers don't always have the capacity to grapple with emergent effects of nonlinear processes, or with the synergistic effects of multiple variables in a system.

Choosing criteria such as thresholds—in the Everglades for instance, we use thresholds of phosphorous concentration and flow velocity for making water management decisions—we make a problem that might otherwise seem intractable, or incredibly location-specific, more tractable for large-scale management.

JL: One can appreciate the need for simple metrics and standards for effective regulations, but there is so much talk also about biodiversity as the ultimate metric of ecosystem success. At the foundation of biodiversity is habitat diversity, so one-size-

fits-all approaches may seem effective, but they undermine the very systems we hope to sustain. Not all systems are the same, and even the same system varies from year to year. This is especially true for many aquatic systems in California, where there are very wet years and very dry years. If so much is dumbed down to binary terms of 'good' and 'bad' measurements, you are not going to have habitat diversity in these places.

LL: [Sometimes national policy has a direct impact on where management takes place.] In the Everglades, for instance, the Endangered Species Act (ESA) has set some parameters on restoration planning in terms of restricting our ability to reintroduce historic flows and water levels into areas occupied by the Cape Sable Seaside Sparrow.

The Clean Water Act (and recently passed Clean Water Rule) has been a bigger player in my work. In the Rapanos v. United States case regarding application of the Clean Water Act, Justice Kennedy clarified that protections under the Act apply to waters that exhibit a 'significant nexus' to traditional navigable water bodies, meaning that they significantly impact the chemical, physical, or biotic integrity of those waters. This opinion caused a surge of interest among hydrologists in defining methods of assessing functional hydrologic connectivity. The Clean Water Rule used the knowledge generated by this research to clarify the type of water bodies to which the Clean Water Act applies, thereby simplifying its enforcement.

The trouble with thresholds, or very specific broad criteria [like the ESA or Clean Water Rule], is that they can stifle creativity. Thresholds are based on what we have seen already, and don't always allow for new ways of envisioning how we manage these systems to bring about desirable ecosystem function. Their utility will falter as we move into future scenarios where climate and other environmental factors are outside the realm of variability we have seen in the past, and where an entirely different regime of processes might control a system.

GU: In our current and changing climate, how do you see the work of designers and ecologists such as yourselves evolving?

KH: When I was working in Seattle between 1997 and 2006, we were trying to optimize healthy systems—healthy for people, healthy for salmon, healthy for all the species that were under the umbrella of salmon habitat. We were rethinking how cities could be shaped to produce better water quality. The goal was a kind of optimization—to find what Richard Foreman described as 'the optimal spatial configuration of landscapes to produce multiple benefits.' Around 2004 to 2006, people in the United States started taking climate change more seriously. We're past the era of optimization; when Hurricane Katrina happened in 2005 and Hurricane Sandy in 2012, everyone switched from thinking about disasters to talking about recovery and the term, resilience. As sea levels rise, the idea of optimization is out the window. We're going to lose species, we're going to lose land, we're going to see social justice issues convalesce, and we're not optimizing. It's adaptation to a permanent, irreversible change.

LL: Resilience and adaptation are big in my field as well. Hurricanes Katrina and Sandy highlighted the potential of extreme events to dominate geomorphic change and emphasized that the greatest threat of sea level rise is not necessarily the slow, continual encroachment of the ocean but rather storm surge events. This recognition has led to a renewed interest in studying extreme climate-related events.

KRISTINA HILL The Carbon River Road in Mt. Rainier National Park washed out in 2006 from flooding that has become more frequent as Rainier's glaciers melt and carry more sediment into the river channel, causing it to overflow—sometimes right onto the road bed itself, literally turning the Carbon River Road into the Carbon River. This is an important image because it shows the permanently closed road as a ruin that only hikers can access. When I look at this image, it reminds me that climate change will bring an aesthetic of ruins, of poignancy, of loss that some may find romantic, or sublime, or painfully sad. How will designers respond to the proliferation of ruins, of Carbon River Roads?

There has also been a notable surge in the number of papers, conferences, and focus groups (e.g., the Resilience Alliance, established in 1999) on the topic. A lot of my work centers on coastal systems, and a huge question has been the extent to which coastal marshes will be resilient in the face of sea level rise (through, for example, inland migration). We're exploring what humans can do to enhance their resilience—perform restoration, or change upstream management actions to release more sediment to coastal systems. If local loss seems inevitable, to what extent will landscapes be resilient?

GU: Kristina, as a landscape architect, how do you think social objectives figure into a dialogue around landscape resiliency?

KH: The rapid changes taking place today are not unlike Olmsted's time, when American cities were growing at an unprecedented rate, and the corrupting influences of real estate speculators and private railway companies seemed overwhelming in political life. Then, voters were concerned about chaotic streets where horses and trains competed for space, a housing crisis, flooding, air and water pollution, immigration, waste disposal, health, and food systems. The confusion of what we're living through now is immense unless you look at it through the lens of the fossil fuel industry, which has become a political entity. A very small number of people have again disrupted our politics and our economy; the former CEO of Exxon is the head of the Department of State. We might begin to see this era as the last gasp of an industry that has run everything behind the scenes for 100 years.

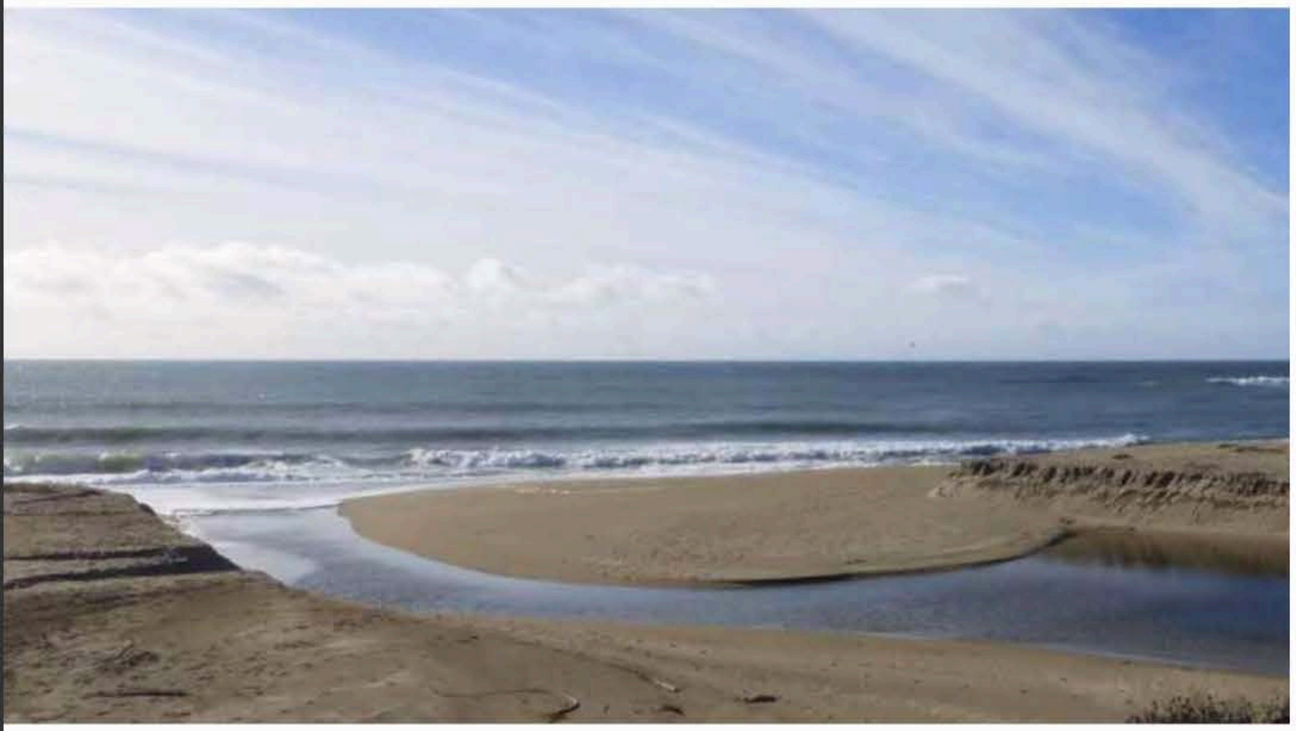
This conflict poses a new question—what is justice in the landscape? Take, for instance, Standing Rock: it's an environmental movement, an indigenous rights movement, a climate change prevention movement, and a water quality movement, but it's

being suppressed as if it's an invasion by a foreign country.

Ecological design in this context has to be allied with native people's self-determination rights. We have to find a way to adapt that protects lower-income properties and buys us time to figure out how we're going to coexist in our social and economic groups. Adaptation cannot be a white, urban, educated people's movement—and landscape architects are generally pretty white. We have to figure out how to open the boundaries of our professional box so that we can authentically partner with other people.

GU: There is potential to enrich our relationships with natural scientists as part of an expansion of professional boundaries and collaboration, both socially and scientifically. John, Laurel, have you had any professional experience working with designers, and can you see any promising future avenues for new interdisciplinary partnerships?

JL: If I interact at all with designers or planners, it usually isn't a dialogue. It's typically a concern with how their proposal will impact the natural system, with the design presented in a near-final form. It's not an iterative relationship, where there is co-production of knowledge, but that is what we need to do. Design within natural systems could be done more collaboratively from the start, drawing not only on the general principles of natural science that already are found in design, but also the specific expression of those principles in the context of place and time. Local knowledge and interpretation of the natural function of the specific environment, drawn from site-specific scientists and communities, can inform both the aesthetics and functionality of the design—revealing opportunities for nature-mimicking processes as well as nature-juxtaposing structures in the final design.



JOHN LARGIER
Earlier this winter, a large rain-induced flow scoured out an open channel in a straight line as it jetted out from under the narrow culvert-bridge under Highway-1, at the mouth of Scott Creek near Santa Cruz. In the following weeks, the channel is filling back in with the sculptured arcs of nature.

LL: One impetus for productive collaborations might come from the funding agencies. The National Science Foundation (NSF), for instance, requires investigators that receive grants to engage in broader impacts, which may include outreach and work of high societal relevance. I am currently collaborating with the Exploratorium to develop a public exhibit on marsh-sediment interactions and relevance to marsh restoration projects, funded through an NSF grant. One option on the table is to integrate the exhibit into new parkland that is being developed out of a formerly industrial area around India Basin. I can definitely see the need to collaborate with designers in projects such as these. In reviewing research proposals, however, I haven't seen any outreach that specifically targeted bringing landscape architects together with scientists, but we may need more of that kind of work.

Another impetus might be academic institutions; at Berkeley, I talk to landscape architects more than I did before. Much of this dialogue happens at the university level, in programs that are cross-cutting through disciplines. Often students drive these conversations because they have interdisciplinary interests and want to form interdisciplinary committees. For example, a former ERG student working with me, Cleo Woelfle-Erskine, conducted a dissertation focused on interactions between humans, water, and salmon in Sonoma County. His work had a huge citizen science component and involved public meetings with the watershed council and others living in the area. Much of the time, students like him are the ones who are talking.

KH: Landscape architecture has often been the face of what urban ecosystems are like, or rural park ecosystems for that matter. We need to understand what we're saying to the public, and what we want people to understand. That requires a dialogue with scientists to help us update our knowledge of what these systems are like, based on what they have learned. In return, we could help the natural science community understand what is going on in development, and the new trends that are going to have an effect on our ability to restore habitats or manage coastal systems in different ways.

I'm not working on endangered species anymore. I think humans are becoming the endangered species, at least poor humans. Even though I know that biodiversity provides us with life, health, and ecosystem services, under climate change our system is spiraling into a new biological state. We have to focus on underlying processes and work with flow regimes of all kinds as we think about changes in these systems. It's a huge challenge for landscape architecture; it's not optimization, it's reinvention. We have to live with a world that's changing fast, and to do so we have to make alliances. ■