Opinion

Reimagining watershed restoration: a call for new investment and support structures for greater resiliency and long-term impact

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Hundreds of locally based watershed initiatives have mobilized stakeholders to take voluntary action to restore the ecological conditions of North America's watersheds. Lead organizations rely on project-based grant funding, alignment with government programs, and volunteerism to incrementally restore what is ultimately a vast and complex ecosystem. Structurally, the vision and goals of these initiatives often exceed available resources and capacity. In 1999, the Bonneville Environmental Foundation began to test ways by which a funder might increase the capacity of local watershed organizations to achieve long-term watershed restoration goals through a 10-year commitment of funding and technical support. We partnered with other funders, collectively seeking solutions to increase the impact of this work. Reflecting on 13 years experience across 21 watersheds in 7 western states (USA), we have concluded that the scale of ecological change desired requires a time frame for planning, implementation, and public engagement that is inconsistent with present-day approaches. This has left us asking how can the capacity and impact of a watershed initiative be sustained over many decades—a time frame that exceeds the tenure of any individual leader, the proven life cycles of many nonprofit organizations, and the commitment of most funders? Clear themes have emerged: (1) engaging diverse stakeholders in planning, (2) orienting the work around broader goals, (3) emphasizing human well-being, and (4) developing resilient partnerships. Reimagining watershed restoration in this context, we suggest a new agenda for action and research that emphasizes a multidecadal planning horizon integrating climate change projections and changing demographics and social values.

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INTRODUCTION

Over the past several decades, hundreds of watershed restoration initiatives have promoted locally based voluntary stewardship to achieve far-reaching improvements to North America's rivers, streams, and wetlands.[1] Instead of advocating for top-down regulation or government mandates, these efforts seek to catalyze voluntary action from landowners and other stakeholders to improve water

quality, ecological function, fish and wildlife populations, and human recreation and access.[2] In some cases, initiatives are led by large conservation organizations or are aligned with government programs.[3] In other cases, small nonprofit organizations operate in relative isolation, seeking support through a mix of local contributions, volunteerism, and public and private funding. These initiatives are ambitious by any measure. Lead organizations often have limited access to resources, a high degree of uncertainty around future funding, and no regulatory authority, yet they strive to achieve meaningful change in vast and profoundly complex ecosystems with varied land ownership patterns, management regimes, and jurisdictional boundaries.[4] In many cases, the vision and goals for watershed improvement far exceed the capacity and resources of the organizations that assume responsibility for advancing work on the ground.[5] Accordingly, the effectiveness of this work varies significantly from place to place.[6] Our experience investing in and working with such watershed initiatives suggests that this locally driven movement is rarely designed, structured, and supported in a way that will address the scale of the problem and achieve long-term desired ecological outcomes.

In 1999, the Bonneville Environmental Foundation (BEF) began to test ways by which a funder or supporting institution might expand the ability of community-based organizations to define and achieve long-term and large-scale watershed restoration goals that appropriately reflect the larger ecological context and complexity of their efforts in the western United States. Many have noted that short-term, project-focused funding prevails among the myriad of agencies and foundations that support watershed restoration work.[7] While this approach has been effective at vetting, ranking, and supporting standalone restoration projects, it rarely provides the support or incentives needed to develop, implement, and sustain strategic, multidecadal restoration initiatives. To address this gap, many large regional funding programs (both public and private) have modified their approach to support local coordinating capacity, develop scientifically robust watershed assessments, and create longer-term implementation plans. In 2003, BEF also altered its approach by developing the Model Watershed Program, supporting local watershed restoration organizations through 10-year commitments of funding and support in an attempt to build organizational and technical capacity as well.

BEF has also actively partnered with other funders, taking on roles from concept development and review to 'boots on the ground' program implementation. The aim has been to promote collective learning, address common challenges, and support effective implementation and evaluation. These programs have evolved in different ways but have been driven by the same question—how can our investments lead to greater impact? We have found that many programs have increasingly emphasized some common themes: *engagement of diverse stakeholders*; *broader goals emphasizing human well-being;* and *development of partnerships resilient to changes in funding and leadership*. Successfully addressing these has been no simple task. However, we see an opportunity to integrate these themes more effectively by reframing restoration goals and strategies to account for the long time scales (decades to centuries) of ecological and social change.[8,9]

As we contemplate a new phase of investment and learning in watershed restoration, we ask the following questions: *How can the capacity of a watershed initiative be sustained over multiple decades*—a time frame that exceeds the tenure of any individual leader, the proven life cycles of most nonprofit organizations, and the commitment of most funders; *what kinds of long-term investments and support structures are needed* to sustain collaborative initiatives and achieve large-scale progress; *what kinds of goals and strategies are appropriate* given unprecedented environmental and social change expected to occur over the coming decades? This article reviews the evolution of our thinking based on reflections from our own Model Watershed Program and our participation in other regional restoration programs. It highlights opportunities for action and applied research to support the emerging themes in this field. Our intent is to help restructure the way watershed restoration is supported and ultimately conducted so that restoration initiatives are more likely to make meaningful, long-term gains.

BEF's MODEL WATERSHED PROGRAM

In 2003, BEF designed and began testing its alternative 10-year funding approach, the Model Watershed Program, in a small but diverse set of watersheds in the Pacific Northwest (USA), with investments typically between $25,000 and $80,000 annually. We hypothesized that a long-term commitment with modest financial and technical support would promote (a) organizational stability, (b) sustained implementation of strategic actions, (c) more meaningful monitoring and evaluation, and (d) a more open relationship between grantees and

grantors to promote accountability and adaptive management.[7]

At the core of the Model Watershed Program was a formalized agreement in which BEF and local partners mutually committed to three core values: *integrating science into all aspects of planning and implementation, meaningful engagement with communities and stakeholders,* and *continual evaluation and adaptation of restoration strategies*. Rather than a top-down approach, BEF's philosophy has been to meet groups where they are and encourage a rigorous, reflective planning process. Our intent was to allow each group the flexibility to determine their own goals and strategies. Partners developed a 10-year plan that included a long-term vision, desired restoration outcomes, a set of strategies, and a monitoring framework to evaluate and report on progress. Each Model Watershed partner was expected to annually consider and report on the *overall* watershed effort—including progress toward both near-term implementation objectives and long-term ecological goals. We strived to test a longer-term and more comprehensive approach than what we saw as typical of project-based funding programs.

After 13 years, BEF has engaged in 21 watersheds across 7 western states. In 10 watersheds, we applied the Model Watershed Program described above, and in 11 watersheds, BEF collaborated with other funders to apply various aspects of the Model Watershed approach (Figure 1 and Table 1). Our on-the-ground partners have included nonprofit organizations, Native American tribes, local agencies, and others. The time and effort required for genuine reflection and adaptation has been considerable, and groups have responded with various levels of depth and commitment. Overall, we found that this approach enabled deeper, more transparent, and more candid relationships between organizations and funders.[10] It allowed both partners to adapt to an evolving understanding and changing circumstances. We also found that the sustained and flexible funding BEF offered helped groups carry out activities critical to their mission but that were difficult to fund with other more restrictive sources. Given the longer-term nature of the effort, groups were able to leverage additional funding by fulfilling match requirements or attracting multiyear funding from other private sources.

Despite important outcomes achieved through our funding approach, many challenges persist. High rates of staff turnover, difficulty integrating science into practice,[10] and inability to sustain effective monitoring frameworks continue to impede efforts to sustain restoration success. Moreover, in a subset of our partnerships, we also found that many highly functioning groups addressed only 2–8% of identified restoration needs over the course of a full decade. Challenges included regulatory constraints, private landowner participation, timing of funding, and capacity to design and install projects. While BEF's 10-year funding commitment provided advantages over short-term project-based funding, we found that 10 years was generally just enough time to construct an operational foundation and build momentum for what ultimately must be a multidecade effort.

BEF's PARTNERSHIPS WITH OTHER FUNDERS

In addition to implementing the Model Watershed Program, BEF has been invited to partner with other private funders as they endeavored to change their watershed-focused funding strategies to overcome challenges similar to those we experienced. In each of these instances, BEF worked to cultivate relationships with grantees and their partner organizations, build trust, gain an understanding of local work, and provide support specific to the needs of the funders and the on-the-ground organizations.

In the Rogue River Basin in Oregon and the Hood Canal Watershed in Washington, BEF was funded by the Laird Norton Family Foundation to work directly with locally based watershed organizations to facilitate restoration planning processes and implement specific actions of the resulting plans.

In the Willamette River Basin in Oregon and in the Puyallup River Watershed in Washington, BEF worked with Meyer Memorial Trust and The Russell Family Foundation, respectively, to facilitate a broader, collective impact approach[11] involving many different organizations operating at different scales. In these watersheds, BEF was funded to participate in program design, implementation, and management. In the Willamette River Basin, the emphasis has been on operational efficiency and organizational capacity to increase the scale and effectiveness of restoration actions.[5] In the Puyallup Watershed, the emphasis has been on community engagement through participatory planning, community gatherings, and trainings, with broader goals and strategies than typically considered in watershed work, including a focus on urban issues (www.pwi.org).

Reflecting on these efforts, we see examples of effective partnerships performing at a higher level and achieving greater impact than would be possible with most single organizations. However, we have also observed many superficial partnerships, where watershed groups work with other entities as opportunity and convenience allow—or when such

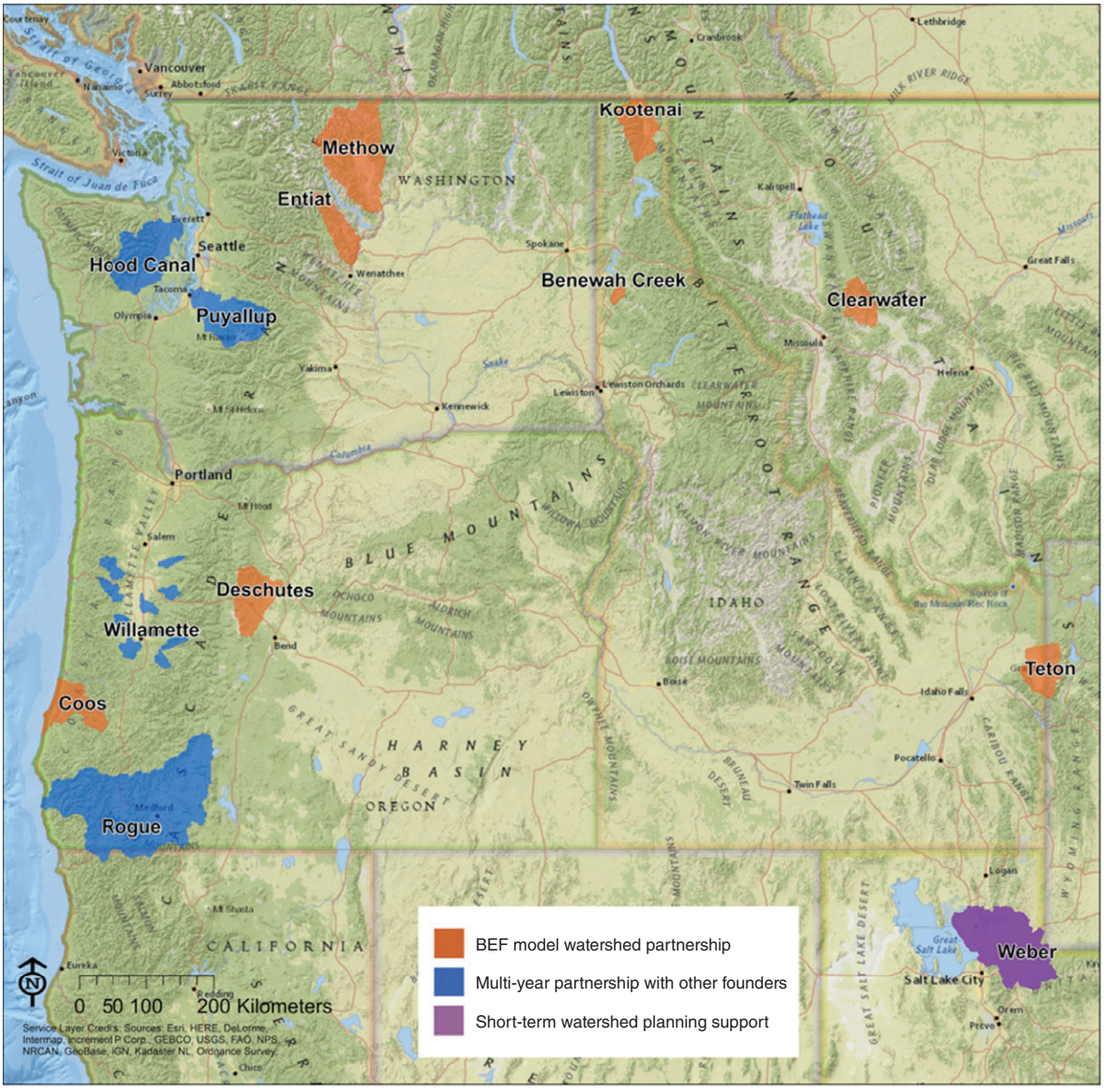

FIGURE 1 | Geographic distribution of watersheds in the western United States where BEF has partnered, contributed funding and technical support, or engaged with support from other funders.

partnerships are required by public and private funders.[12] In our experience, the project-focused funding model did not prioritize the development or sustained effectiveness of partnerships, and many groups have limited knowledge of how to build and maintain effective watershed partnerships.[13]

CENTRAL ELEMENTS OF A NEW APPROACH

Drawing from our experiences and observations over the last 13 years and a growing appreciation for the environmental and social changes predicted for coming decades,[14,15] we identified four central elements for a new agenda integrating research and action:

1. *Partnerships*—Resilient watershed-scale partnerships increasingly become the focus of financial and technical support to ensure that partners collectively have the skills and capacity over timeframes necessary to achieve and sustain desired ecological and social outcomes;

TABLE 1 | Watersheds in Which BEF Has Partnered, Contributed Funding and Technical Support, or Engaged with Support from Other Funders

Watershed	Funder	Partner Organization(s)	Start of BEF Involvement	Duration (Years)	Status
		BEF Model Watershed Projects			
Chinook River, WA	BEF	Sea Resources	2003	3	Closed
Lower Kootenai River, ID	BEF	Kootenai Tribe of Idaho	2003	7	Closed
Benewah Creek, ID	BEF	Coeur d'Alene Tribe	2005	10	Ongoing
Coos Watershed, OR	BEF	Coos Watershed Association	2007	9	Ongoing
Entiat River, WA	BEF	Entiat Watershed Planning Unit	2007	7	Ongoing
Upper Deschutes River, OR	BEF	Upper Deschutes Watershed Council	2007	9	Ongoing
Mattole River, CA	BEF	Mattole River and Range Partnership	2009	2	Closed
Upper Teton River, ID and WY	BEF	Friends of the Teton River	2009	6	Ongoing
Clearwater River, MT	BEF	Clearwater Resource Council	2010	5	Ongoing
Methow River, WA	BEF	Methow Salmon Recovery Foundation	2010	5	Ongoing
		Willamette Model Watershed Program			
Long Tom River, OR	MMT	Long Tom Watershed Council	2009	7	Ongoing
Marys River, OR	MMT	Marys River Watershed Council	2009	7	Ongoing
Luckiamute River, OR	MMT	Luckiamute Watershed Council	2009	7	Ongoing
Middle Fork Willamette River, OR	MMT	Middle Fork Willamette Watershed Council	2009	7	Ongoing
North Santiam River, OR	MMT	North Santiam Watershed Council	2009	7	Ongoing
South Santiam River, OR	MMT	South Santiam Watershed Council	2009	7	Ongoing
Calapooia River, OR	MMT	Calapooia Watershed Council	2009	7	Ongoing
		Other Watershed Engagements			
Hood Canal watershed, WA	LNFF/BEF	Hood Canal Coordinating Council	2013	3	Ongoing
Rogue River Basin, OR	LNFF	Rogue Basin Partnership	2013	3	Ongoing
Puyallup River, WA	TRFF	The Russell Family Foundation	2012	3	Ongoing[1]
Weber River, UT	Trout Unlimited—Utah	Trout Unlimited, UT Division of Wildlife Resources, UT Division of Environmental Quality, Kamas Valley and Summit Conservation District	2013	1	Ongoing[2]

BEF, Bonneville Environmental Foundation; MMT, Meyer Memorial Trust, Portland, OR; LNFF, Laird Norton Family Foundation, Seattle, WA; TRFF, The Russell Family Foundation, Gig Harbor, WA.
[1] BEF involvement ended in 2015.
[2] BEF involvement ended in 2014.

2. *Broadening goals*—Strategic planning engages diverse stakeholders to define a broad set of goals that reflect the diverse interests and values of the people in the watershed to ensure that the work is relevant and therefore supported by watershed communities and the society at large;
3. *A multidecadal planning horizon*—Multidecadal projections of ecological and social conditions are used to define realistic long-term desired outcomes and to develop practical strategies to achieve those outcomes; and
4. *Alternative outcomes and novel ecosystems*—Watershed partners increasingly think beyond

single-species recovery and the restoration of historical conditions and begin to consider the potential values provided by significantly altered but functioning ecosystems.

Partnerships

A growing body of work on the notion of 'collective impact' in philanthropy[5,11] suggests that investment in watershed restoration will have a greater impact if it is supported through broad collaborative partnerships. Where partners are aligned and focused on a common agenda, success at larger scales may become more likely. Investments in partnerships and collaboration among existing organizations and agencies, rather than individual organizations or new umbrella organizations, can increase the collective capacity and resilience of local initiatives.[12,16]

In general, members of effective partnerships develop a shared vision and sense of interdependency, receive consistent support from their leadership, enjoy real individual and institutional benefits, jointly mobilize resources, and benefit from investments in human and social capital.[13] Effective partnerships are also built from a foundation of mutually agreed-upon governance structures, like memoranda of understanding, charters, or other types of working agreements, so that decisions are made and communicated in fair and transparent ways to maintain trust, coordination, and efficient implementation.[17] For the field of watershed restoration to advance and to maximize the collective potential of local and regional partners, we see a real need to build the skills and competencies associated with partnership building and collaborative decision making.[18,19]

Broadening Goals

We also recommend that restoration goals incorporate a broader range of social and ecological values, consider alternative outcomes, and focus on human well-being.[20,21] For example, Pacific salmon and shellfish are valued for recreation and subsistence fishing. Community access to restored ecosystems supports physical and psychological health, in terms of exercise and relaxation, and reinforces cultural practices and values. Also, restored floodplains are valued for ecosystem services like flood control. Framing goals in terms of human well-being and ecosystem services might also increase the relevancy of this work among a more urbanized and increasingly diverse population.[22]

A Multidecadal Planning Horizon

Overall, we have concluded that a multidecadal planning horizon of at least 50 years will be key to reframe expectations and fully adapt to projected future ecological and social conditions. For example, we agree with the argument that climate change projections should be integrated into the process of defining watershed goals. This promotes realistic expectations for the recovery of watershed processes and populations of threatened and endangered aquatic species.[23,24] Such projections are becoming more sophisticated and more widely available. It is now possible to develop and compare a range of future scenarios accounting for factors such as climate change, population growth, development, resource extraction, invasive species interactions, and water demand and supply forecasts.[25,26] In some cases, scenarios can be scaled down to individual sub-basins. We believe watershed goals that reflect realistic future projections of ecosystem change and that resonate with a broader segment of the population are more likely to be achieved.

While shifts in societal values and culture are harder to predict, scenarios can be used to catalyze new conversations with broader audiences to tease out emerging social issues and clarify the potential benefits and costs. We anticipate that an inclusive approach that emphasizes outreach, listening, and participatory decision making will welcome more urban and more racially and culturally diverse audiences than in the past. With broader input and engagement, we expect watershed goals to gradually expand and become relevant to larger segments of society.

Alternative Outcomes and Novel Ecosystems

One practice that BEF encouraged in the early stages of the Model Watershed Program was the use of pre-existing ecological conditions to define restoration goals, a practice that has been common in the field of restoration.[27,28] We now understand that this approach reinforced a common misperception that ecosystems are static, that restoration actions can outpace accelerating impacts from human development, and that change is reversible.[29] The reality is that in many cases, watershed ecosystems have been irreversibly altered and will continue to change in response to a myriad of natural and anthropogenic

impacts, such as climate change, non-native species establishment, increased human populations, and ever-growing demands on natural resources.[30,37] Efforts seeking to preserve or restore watersheds to more natural trajectories or historical conditions will undoubtedly continue to be important in many landscapes, especially where conditions have not been greatly altered, where the value of a particular landscape or species warrants a higher level of investment, or where there are legal and moral precedents (e.g., tribal treaty rights[31]). However, holding this as the primary aspiration can present significant challenges and frustrate practitioners and their constituencies. We now believe that a strict or singular focus on restoring ecosystems to historical conditions—or an emphasis on single-species conservation—will become increasingly less relevant to a society that is becoming more diverse, more urbanized, and more focused on direct public and personal benefits.[9]

In most of the watersheds where we have engaged, there is an opportunity to integrate a range of strategies, including the protection of less-impacted areas, restoration of areas where impacts can be reversed, and actions to maximize the ecological potential of areas that have been significantly altered but that can still deliver valued ecological services (e.g., so-called novel or hybrid ecosystems[32–34]).

We recognize that this shift or expansion from a singular focus on species recovery or restoration to historical conditions is controversial and challenging for those who have committed decades to this cause. However, we fear that not too far in the future, watershed efforts will cease to have the kind of public support needed because watershed proponents have been unable or unwilling to make their work sufficiently relevant to a broader and increasingly diverse population.

SUSTAINING A MULTIDECADAL EFFORT

Many funders and watershed groups have come to the realization that short-term, project-based funding is not the best tool to advance long-term ecological restoration outcomes. However, creating consistent and predictable funding programs over timescales of a decade or more is a challenge for public and private funders. Both are influenced by annual budget cycles, changes in leadership, and political cycles. Nevertheless, we have seen some funders move toward making longer-term financial investments. For example, the Oregon Watershed Enhancement Board, Meyer Memorial Trust, the Laird Norton Family Foundation, William Penn Foundation, U.S. Endowment for Forest and Communities, and The Russell Family Foundation have pledged multiyear commitments to support a diverse set of collaborative groups working in a variety of watersheds in the United States. In many of these programs, funding is dedicated to building collective capacity in addition to implementing projects of strategic relevance to funders and partners. We expect that other funders will increasingly experiment with this type of approach.

We also acknowledge that it is difficult to anticipate what types of support and capacity building will be needed to sustain restoration efforts over multiple decades. We propose that investment needs to be restructured to encourage periodic reflection and adaptation with local partners while drawing skills and capacity from a regional network of leaders and consultants to more flexibly respond to emerging needs.

Many funders find it difficult to encourage genuine reflection among grantees, which we believe is fundamental to a multidecadal approach. Funders are well-aware that grantees tend to obscure their shortcomings to make a stronger case for sustained investment. In BEF's Model Watershed Program, we have found that a commitment to partner over a longer time period has reframed our relationship with local groups, leading to open reflection on challenges and gaps in their capacity. In cases where funders are not able to facilitate this type of reflection and adaptive management, we suggest that support organizations may play a more prominent 'intermediary' role, similar to the 'backbone' organization in a collective impact effort.[35] A supporting organization in this role can facilitate annual periods of reflection to adjust assumptions and reframe the work from lessons learned. Reflection at this scale can add critical value, helping to articulate local gaps in capacity, in the context of regional trends, and opportunities to fill identified gaps.

We have also observed that flexibility is key to customizing support for local partners as their capacity and circumstances evolve. When considering how to support the capacity needs of watershed initiatives over multiple decades, we believe funders and support organizations can maximize their flexibility by relying on a network of proven consultants and experienced peers. A supporting institution need not possess the capacity and expertise to deliver the full range of needed services but could retain an array of trusted consultants for specific support as needed.

Sustaining this work over multiple decades clearly poses many challenges. However, we see great

promise experimenting with new approaches that emphasize longer-term investments and periodic reflection tied to adaptive management, and flexible, customized support services targeted at filling gaps in capacity hold the most promise.

OPPORTUNITIES FOR FURTHER EXPLORATION

In the Pacific Northwest, we have already started to see funders and watershed organizations incorporating the central elements of the new approach described here, despite the reality that change is difficult. In many watersheds, decades of inertia have been embedded in complex bureaucratic structures that distribute funding and regulate restoration activities in highly prescribed ways.[3,12] Yet even in our experience, complex bureaucracies have begun shifting to incorporate support for partnership capacity, asking practitioners for on-the-ground needs over longer timeframes, and broadening restoration goals. Some encouraging examples from our experience demonstrate emerging opportunities for action and applied research:

- The Oregon Watershed Enhancement Board (www.oregon.gov/OWEB) has begun to move funding from individual projects to high-performing partnerships. They have included modest investments in building the capacity of emerging partnerships. Applied research in this type of program can help us understand whether collaborative governance structures can result in efficiencies and increased capacity rather than create new layers of bureaucracy. It could also help us assess the growth and development of partnerships and how to boost their productivity and performance.
- The Hood Canal Coordinating Council (hccc.wa.gov) in Washington has recently adopted indicators of human well-being into the Hood Canal Integrated Watershed Plan (www.ourhoodcanal.org). They argue for linkages between healthy ecological systems and healthy human communities and have begun to collect human well-being data to monitor change in conjunction with ecological indicators. Applied research in this context could help us understand what communication strategies invite broader participation and ownership.
- The Upper Columbia Salmon Recovery Board (http://www.ucsrb.org/), the central salmon recovery institution in north central Washington, has recently expanded its scope linking forest restoration, biodiversity conservation, and human well-being. They are also developing tools to integrate climate change into the design of restoration strategies and projects. Applied research could help us understand the nuances of integrating emerging climate information into a planning framework and how to communicate uncertainties and risk to the public, restoration practitioners, and policymakers.
- The Russell Family Foundation, with a long-term investment in a single watershed in Washington, has invested in a participatory approach that seeks to engage more racially and culturally diverse partners. They are reframing restoration goals and targeting strategies to address inequities in environmental health and human well-being. This approach requires significant investment in community engagement, planning, and equity training. It can be challenging, even confusing, for partners who specialize in ecological restoration and single-species recovery, but equity and environmental justice concerns are becoming increasingly prominent in discussions about climate change, environmental stewardship, and conservation funding.
- Seattle's 'Equity and Environment Initiative' (www.seattle.gov/environment/about-ose/equity-and-environment) has achieved significant visibility and political support. More applied research could help us understand what types of support local watershed groups need to understand and build from these broader social movements.

Funders and supporting institutions are well positioned to help reveal opportunities and facilitate the next generation of best practices that can be tested, communicated, and applied broadly across the field.

CONCLUSION

Watershed restoration remains a grand experiment, with the long-term results of countless projects across thousands of river systems worldwide not yet evident.[36] While there is uncertainty, it is clear that community-based watershed initiatives will continue to play a key role in achieving outcomes that benefit ecosystems and society.[5] Over the past 13 years, we have partnered with funders and community-based watershed groups across the Pacific Northwest,

which has provided us a unique vantage point from which to compare alternative approaches to fund and support watershed restoration initiatives in diverse contexts.[10]

By reimagining the future of watershed restoration, we anticipate the need to develop stronger, more resilient, and integrated networks of organizations that can sustain and scale up strategic watershed stewardship efforts over multiple decades, create effective strategies that respond to mounting environmental pressures, and define a broader range of goals that are relevant to the values of a changing society. To support the growth of productive partnerships and to develop the organizational capacity for partners to be successful, funders will have to think creatively about how to provide critical support services customized to local needs. Although we have observed that the field of watershed restoration in many ways continues to operate on outmoded assumptions and ideas that have not kept pace with social and ecological change, we also appreciate that there is a great deal of experimentation, innovation, and learning occurring at present. The hundreds of funders and thousands of community-based watershed groups pursuing the vision of healthy watersheds offer great promise that local solutions will continue to play a vital role in stewarding watersheds.

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