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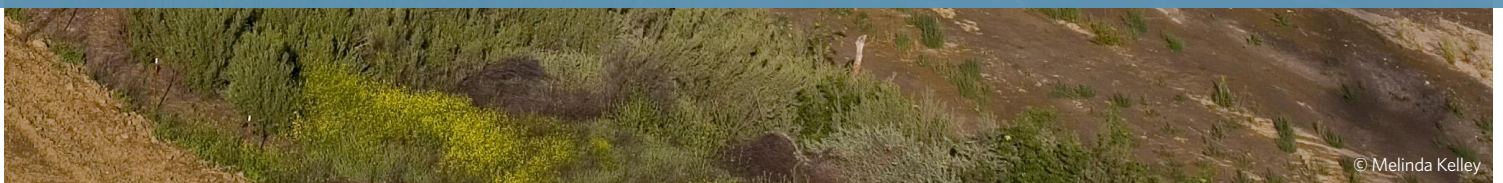
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Expanding the Role of Nature-Based Solutions in FEMA's Hazard Mitigation Assistance Programs:

LESSONS AND RECOMMENDATIONS



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Introduction



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Natural disasters and hazards are increasing in frequency and severity in the U.S., driven by climate change and other factors. Since 1980 the U.S. has experienced 332 weather- and climate-related disasters that exceeded \$1 billion in damages, and the annual frequency of these events is trending upward. A 2021 study also calculated that since 1988, flooding has caused \$73 billion in damages in the U.S. and approximately one third of that impact is due to changing precipitation patterns.

The Federal Emergency Management Agency (FEMA)—in addition to its disaster preparation, response, and recovery functions—provides billions of dollars to communities each year through its Hazard Mitigation Assistance (HMA) programs, which are designed to reduce or eliminate long-term risk to people and property. FEMA's five HMA programs are the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA), HMGP Post-Fire, and Pre-Disaster Mitigation (PDM).

In recent years, FEMA's total HMA spending has increased significantly, which is a function of the increased severity and frequency of presidentially declared disasters and congressional actions that have allocated more funds for hazard mitigation. For example, the 2018 Disaster Recovery Reform Act (DRRA) passed in Congress with overwhelming bipartisan support and formed the basis for FEMA's BRIC program; the DRRA provided a significant increase in the amount of dependable, annual funding available for hazard mitigation. The BRIC program's budget increased to from \$500 million in FY2020 to \$1 billion in FY2021 and on August 12, 2022, FEMA issued its Notice of Funding Opportunity for FY2022, announcing that funding would increase to \$2.295 billion. An historic \$3.46 billion was also committed to states, tribes, and territories through HMGP in 2021 as a result of COVID-19 pandemic Presidential Disaster Declarations, representing the largest one-time investment ever made by FEMA in the 30 year history of the HMGP.




FEMA increasingly recognizes and emphasizes the use of nature-based solutions (NBS) for building community resilience and mitigating the impacts of hazards such as flood, wildfire, drought, and more. FEMA defines NBS as “sustainable planning, design, environmental management, and engineering practices that weave natural features or processes into the built environment to build more resilient communities.” NBS, as a standalone intervention or used in combination with traditional infrastructure, can be a cost-effective approach for hazard mitigation. In addition to hazard mitigation functions, NBS provide a range of social and environmental benefits such as clean air and water, open space for recreation, habitat, and climate mitigation via carbon sequestration and storage.

FEMA has made remarkable progress on policies and resources to support NBS in a relatively short period. However, the agency has not published data or trends on the number of received subapplications or awarded projects that incorporated NBS, and anecdotally it remains challenging for most subapplicants to successfully incorporate NBS into hazard mitigation subapplications. More can be done to reduce barriers, provide technical resources for states and communities, and generally help ensure that NBS projects exist on a level playing field with traditional solutions so that subapplicants can make fully informed choices when considering the entire spectrum of options for managing natural hazard risk.

The purpose of this report is to discuss broad areas of opportunity and specific recommendations that could further facilitate — or reduce barriers to — the inclusion of NBS within FEMA hazard mitigation projects. While the recommendations are primarily aimed at expanding FEMA’s investments in NBS, it is expected that many of the ideas, if pursued, could smooth processes and improve outcomes for a range of other hazard mitigation investments that FEMA supports, not just those that involve NBS.


REPORT STRUCTURE

The report is organized according to three broad areas of opportunity:




OPPORTUNITY 1:

Update benefit-cost analysis policies, methods, and software to further reduce barriers to the use of nature-based solutions for hazard mitigation



OPPORTUNITY 2:

Increase technical and financial support provided to subapplicants, including economically disadvantaged communities and non-traditional partners



OPPORTUNITY 3:

Embed consideration of nature-based solutions into all areas of FEMA policy and practice

Each area of opportunity begins with a background discussion and is followed by a series of recommendations, which describe specific steps that could help advance each area of opportunity, along with a suggested “lead” entity for each action item. While FEMA is the suggested lead entity for most of the action items, other federal decision makers, such as Congress and the Office of Management and Budget (OMB), are included as well. It is hoped that these recommendations will also be of interest to others working in the field of hazard mitigation, such as the state offices that manage FEMA programs on behalf of the states (collectively, “state hazard mitigation agencies”).

EXPANDING THE ROLE OF NATURE-BASED SOLUTIONS IN
FEMA’S HAZARD MITIGATION ASSISTANCE PROGRAMS:
LESSONS AND RECOMMENDATIONS

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3

Report background and caveats

FEMA and The Nature Conservancy (TNC) share an interest in elevating the potential of NBS as another important mitigation strategy alongside more traditional approaches. TNC, founded in 1951, is the largest environmental conservation organization in the world, and its mission is to conserve the lands and waters on which all life depends. Since 2019, TNC's California chapter (TNC CA) has worked with FEMA Region IX under a series of Cooperating Technical Partners (CTP) grants to develop resources and provide technical support to help communities develop and advance hazard mitigation projects that incorporate NBS.¹

The recommendations in this report have different origins, including lessons learned from the CTP work, a recent series of interviews with subapplicants and state/federal hazard mitigation staff within California and beyond to elicit barriers and opportunities for NBS, and the authors' experience supporting subapplications for NBS projects and previous support to FEMA in the development of its environmental benefits policies.

These recommendations represent only a subset of possible interventions that could help to advance NBS, and while most of the recommendations are directed towards FEMA HQ and the FEMA regions, other entities will play a complementary role in the transition towards mainstreaming NBS. For example, certain federal agencies like the Office of Management and Budget can establish or modify foundational rules and guidelines to broadly reduce barriers to NBS. Other federal agencies can support FEMA's efforts to advance NBS through program alignment, partnerships, and sharing of best practices, including the U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration, U.S. Department of Agriculture (including the U.S. Forest Service), and U.S. Housing and Urban Development. As noted in several of the recommendations, state hazard mitigation agencies also play a key role in supporting subapplicants, setting overall strategy at the state level, and prioritizing specific hazard mitigation projects. Non-traditional partners and subapplicants—ranging from economically disadvantaged communities to natural resource agencies and conservation organizations like TNC—can also be important allies to help develop a pipeline of NBS hazard mitigation projects across the nation; provide support to local communities; and help FEMA, state offices, and other agencies to implement many of the recommendations presented here.

Finally, the authors recognize that FEMA and others are likely already aware of many of these ideas and may even be making progress on them internally. In such cases, every effort has been made to acknowledge current levels of progress and direction, and it is hoped that the ideas presented here can provide fresh perspective on the opportunities for expanding the role of NBS projects in FEMA's HMA portfolio.



¹ TNC has created a web page for sharing resources developed through the partnership here: <https://www.scienceforconservation.org/science-in-action/tnc-and-fema>

Table of Contents



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Opportunity 1: UPDATE BENEFIT-COST ANALYSIS POLICIES, METHODS, AND SOFTWARE TO FURTHER REDUCE BARRIERS TO THE USE OF NATURE-BASED SOLUTIONS FOR HAZARD MITIGATION... 6-10

Background 6

Recommendations 7

1. Develop additional technical resources to support the development of high-quality BCA for NBS 7
2. Continue developing pre-calculated benefits to facilitate BCA for NBS 9
3. Develop a “programmatic BCA” for common types of mitigation actions that incorporate NBS 9
4. Lower the discount rate for certain projects or mitigation actions in the FEMA BCA 10



Opportunity 2: INCREASE TECHNICAL AND FINANCIAL SUPPORT PROVIDED TO SUBAPPLICANTS, INCLUDING ECONOMICALLY DISADVANTAGED COMMUNITIES AND NON-TRADITIONAL PARTNERS . . . 11-17

Background 11

Recommendations 12

5. Continue to expand financial assistance for planning and subapplication development 12
6. Expand the number of communities eligible for reduced non-federal cost share 13
7. Continue to develop technical resources that help subapplicants prepare high-quality subapplications that include NBS 14
8. Continue to expand one-on-one technical assistance offerings to subapplicants 15
9. Proactively reach out to economically disadvantaged communities and non-traditional partners to expand the use of NBS in hazard mitigation 17



Opportunity 3: EMBED CONSIDERATION OF NATURE-BASED SOLUTIONS INTO ALL AREAS OF FEMA POLICY AND PRACTICE. 19-28

Background 19

Recommendations 19

10. Improve the transparency and speed of the subapplication process 19
11. Identify and address statutes, regulations, policies, and processes that create structural disadvantages for NBS 22
12. Update Environmental & Historic Preservation (EHP) processes and policies to reduce barriers to NBS 24
13. Support further integration of NBS into state and local hazard mitigation planning 26
14. Include consideration of natural infrastructure in damage assessments for major disasters 27

Conclusion 29

References 30-32





Opportunity 1:

UPDATE BENEFIT-COST ANALYSIS POLICIES, METHODS, AND SOFTWARE TO FURTHER REDUCE BARRIERS TO THE USE OF NATURE-BASED SOLUTIONS FOR HAZARD MITIGATION

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Background

FEMA requires that hazard mitigation projects be cost-effective to the federal government. Cost effectiveness is demonstrated using BCA, which compares the net present value of a project's future benefits versus its costs. A benefit-to-cost ratio (BCR) of 1.0 or above indicates that the benefits of the project outweigh the costs and is eligible for FEMA funding. A BCA is required for the vast majority of FEMA-funded hazard mitigation activities, with some exceptions.²

In recent years, FEMA has made substantial updates to its policies and supporting BCA Toolkit software to directly or indirectly facilitate projects that utilize NBS. The agency's "ecosystem services" policies established in 2013, 2016, and 2020 demonstrate this progression:

- 2013** → FEMA issued the agency's first "ecosystem services" policy, which allowed dollar values for ecosystem services to be included in a FEMA BCA and provided some pre-calculated values for ecosystem services in the BCA Toolkit.³ This first policy was restricted to acquisition and relocation/demolition projects but represented a significant step forward for FEMA and federal agencies broadly.
- 2016** → FEMA updated and expanded its 2013 ecosystem services policy to include new ecosystem types, new pre-calculated values, and new eligible mitigation actions such as Floodplain and Stream Restoration. This expansion made it easier to quantify and justify additional NBS projects in FEMA BCA.
- 2020** → FEMA issued a new policy that allowed a project to pass the BCA based on ecosystem service values alone, provided the project was an eligible risk reduction activity and met other requirements such as feasibility and effectiveness criteria. Before this policy update, projects were required to achieve a BCR of at least 0.75 using "traditional" benefits before ecosystem service benefits could be added.
- 2022** → FEMA further updated and expanded the set of ecosystem service values, including updated values for existing ecosystem types (e.g. forests), values for new ecosystem types (e.g. coral reefs), and additional guidance on how to use the values.

² For example, FEMA's 5 Percent Initiative allows up to 5 percent of HMGP funding to be allocated by the Recipient (e.g. a state) to "mitigation activities are difficult to evaluate using FEMA-approved cost-effectiveness methodologies" without a BCA, provided they meet certain other criteria.

³ FEMA used the term "environmental benefits" in the 2013 policy but then began using the term "ecosystem services" from the 2016 policy onwards. The terms are generally interchangeable.



Despite these important advances, the BCA is consistently cited—by both subapplicants and reviewers—as one of the most challenging steps in the FEMA subapplication process, and it is often the factor that will delay or derail a subapplication. In conducting a BCA, the subapplicant may encounter hurdles that exist for all project types, or ones that are specific to NBS.

Examples of BCA-related challenges include:

1. The subapplicant lacks the knowledge to conduct a BCA in general, or to use FEMA's BCA Toolkit specifically, and doesn't have the time to learn and/or resources to hire a consultant.
2. The subapplicant has some BCA knowledge or experience but is proposing NBS for which explicit FEMA BCA guidance/examples do not exist.
3. The subapplicant has some idea of how to approach the BCA for a particular type of NBS but is unable to obtain the required input data or justifications due to the specifications of the NBS and/or the difficulty, cost, or time associated with finding or generating the right data (e.g., through hydrologic & hydraulic modeling).
4. The subapplicant can show that the NBS is an eligible risk reduction activity and can achieve a BCR of 1.0 or higher based on environmental benefits alone, but encounters resistance from the state hazard mitigation agency or FEMA region because the approach is new and untested.

BENEFIT-COST ANALYSIS: EQUITY CHALLENGES

While not covered in detail in these recommendations, the use of BCA itself has been under more scrutiny in recent years. Specifically, BCA—both in general and as practiced by FEMA—has been criticized for contributing to an inequitable distribution of resources by being too narrow and overly focused on property value. FEMA received many comments on this issue in response to its *2021 Request for Information on FEMA Programs, Regulations, and Policies* and is likely well aware of the challenges that need to be addressed. One representative comment noted that:

“The FEMA Benefit Cost Analysis Tool systemically undervalues low asset-value areas, making it harder for projects benefitting those communities to demonstrate cost effectiveness. This contributes to the inequity in the impacts of disasters since the benefits of good mitigation projects are less likely to go to communities that are poorer or historically marginalized. It is more difficult to achieve cost effectiveness if projects are protecting places that are seen as not worth the cost of protecting.”

- DERRICK HIEBERT, JUNE 3, 2021

Recommendations

The following recommendations describe potential steps that FEMA and others could take to reduce BCA-related barriers to NBS. These recommendations are presented in approximate order of “easiest to hardest,” based on qualitative criteria such as technical difficulty, how quickly changes could be implemented, and political palatability.



RECOMMENDATION 1:

Develop additional technical resources to support the development of high-quality BCA for NBS

Suggested lead(s): FEMA; state hazard mitigation agencies

FEMA has developed many helpful resources and trainings to support subapplicants in the development of a BCA and other required components of a subapplication, ranging from the BCA Toolkit itself to the various job aids. However, in our discussions with FEMA, state hazard mitigation staff, and subapplicants, the BCA is still often cited as a key stumbling block for mitigation projects, especially for those that incorporate NBS. Though subapplicants could overcome many of these hurdles by spending more time studying the BCA tool or by hiring BCA consultants, not all subapplicants have access to the necessary time or resources. To help bridge this gap, FEMA could develop additional user-friendly resources that further reduce subapplicants' time and effort on the BCA. For example, FEMA could consider developing some of the following resources:



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- 1. NBS-Focused BCA factsheets** could be developed to describe the BCA methods and potential data sources for common mitigation actions that involve NBS. The factsheets could build on FEMA's Hazard Mitigation Assistance Technical Review Job Aid Series, which released technical review job aids for a number of project types in April 2022, but provide even more detail on the BCA-specific steps and data inputs for different NBS. The California Governor's Office of Emergency Services (CalOES) has also developed several factsheets to support BCAs for specific project types, which could be developed for/adapted to NBS project types at the national level.
- 2. BCA Toolkit template files** (in Excel format) could be developed for common project types, including NBS. Providing structured worksheets that prompt specific data inputs could help lower the barrier to entry for some subapplicants. The template files could have pre-loaded data from FEMA's BCA Toolkit that subapplicants would adjust for their own local contexts, including infrastructure at risk, people at risk, and return intervals.
- 3. BCA justification report templates** (in fillable Word format) could be developed for common mitigation project types, including NBS. The template files could include boilerplate language describing typical assumptions and methodologies associated with different mitigation project types, and subapplicants could simply fill in their project-specific assumptions from their BCA file.

The diversity of mitigation project types, hazard types, and local contextual factors, could make it difficult to provide resources for every combination, so it may be worth exploring whether these resources could be generated for the most common mitigation actions that incorporate NBS, like Floodplain and Stream Restoration (FSR) and hazardous fuels reduction.



RECOMMENDATION 2:

Continue developing pre-calculated benefits to facilitate BCA for NBS

Suggested lead(s): FEMA

To reduce the burden placed on subapplicants to conduct complex and time-consuming BCA, FEMA has developed “pre-calculated benefits” for certain project types. Pre-calculated benefits are unit values calculated and pre-approved by FEMA for certain kinds of benefits or certain project type/benefit combinations for use anywhere in the nation. Pre-calculated benefits can be an incredibly powerful tool for reducing the effort/cost associated with a BCA. Examples include ecosystem service values, certain post-wildfire mitigation activities, and the cost thresholds for acquisitions and elevations. Pre-calculated values save time for both subapplicants (allowing them to avoid extensive methodological justification) and for FEMA (it is easier to review pre-approved values than novel justifications), and FEMA should continue to look for opportunities to develop new pre-approved values for NBS that address hazards that are growing in prominence (e.g., extreme heat, drought, subsidence, erosion, landslide).



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RECOMMENDATION 3:

Develop a “programmatic BCA” for common types of mitigation actions that incorporate NBS

Suggested lead(s): FEMA, in consultation with OMB

To further reduce, or even eliminate, the BCA requirement for certain nature-based mitigation actions, FEMA could take the pre-calculated benefits approach one step further and conduct a “programmatic BCA” for certain classes of mitigation actions. While programmatic BCA is not a formal term defined by FEMA, it is used here to refer to the concept of conducting a detailed retrospective benefit-cost analysis of past projects to examine whether a certain project type is very likely to be cost-effective if certain criteria (e.g., cost, eligibility, design, feasibility, effectiveness) are met. Based on the findings of a programmatic BCA, certain project types or mitigation actions would automatically be declared cost effective and would not require a BCA. A programmatic BCA would be very similar to FEMA’s pre-calculated benefits approach, and perhaps analogous in some ways to the Programmatic Environmental Assessment (discussed further under Recommendation 12). For example, eligible post-wildfire actions that cost less than \$5,250 per acre on average are determined to be automatically cost-effective, and no separate BCA is required. This approach would even further reduce barriers for subapplicants, especially those representing economically disadvantaged communities who may not have the time or resources to hire outside consultants or develop their own FEMA BCA expertise. A programmatic BCA need not be limited to NBS; it could also be useful for reducing the BCA burden for traditional mitigation actions. Engagement with OMB would likely be required for such an approach.



RECOMMENDATION 4:

Lower the discount rate for certain projects or mitigation actions in the FEMA BCA

Suggested lead(s): OMB, in consultation with FEMA

Within a BCA, the discount rate determines how much weight is given to future costs and benefits, and it can have a significant impact on the types of projects that are prioritized and funded by government agencies. In 1992, the OMB mandated a real discount rate of 7% for BCA of public investments and regulatory programs in Circular A-94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs. Based on this guidance, a 7% discount rate is now used by the FEMA and other federal agencies in BCA to help prioritize a range of investments.

A relatively high discount rate like 7% rapidly diminishes the present value of future benefits and costs associated with a project, program, or policy. As OMB notes in Circular A-94, “for typical investments, with costs concentrated in early periods and benefits following in later periods, raising the discount rate tends to reduce the net present value.” All else equal, a higher discount rate can bias federal investments toward projects with more immediate returns, potentially at the expense of alternative projects—including those that incorporate NBS—with long-term benefits and resilience.

Since 1992, and increasingly in recent years, a number of economists, thought leaders, and agencies have used a variety of methods and assumptions to conclude that a discount rate lower than 7% would be more appropriate for public agencies, which would include those like FEMA that fund projects with long-term, intergenerational scopes and/or relate to environmental resources. Some have also questioned the assumptions behind OMB’s formulation of the 7% rate in Circular A-94.

In order to better align the discount rate with current thinking and the federal government’s resilience goals, OMB could consider the following actions:⁴

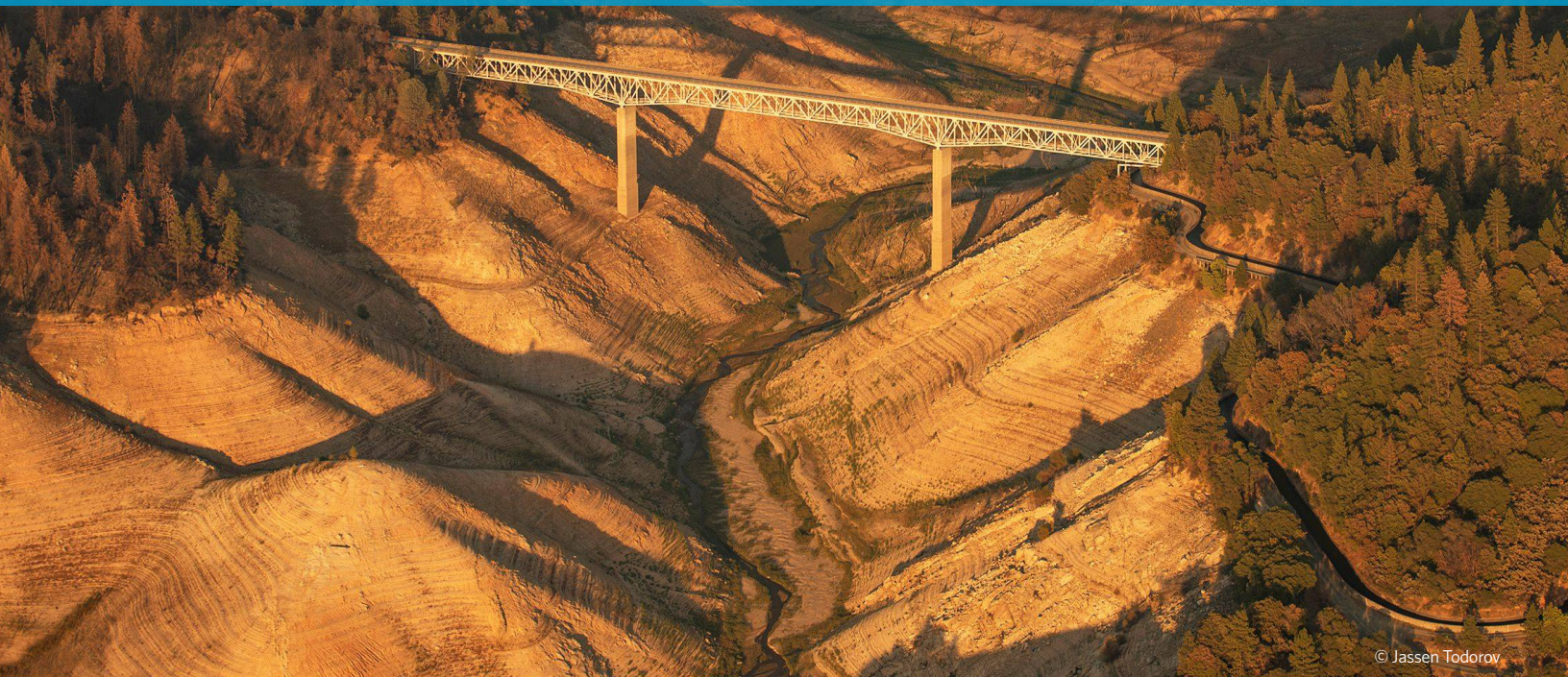
- 1. Revisit and update Circular A-94.** OMB could convene its staff along with an expert panel of economists to revisit the methods and assumptions that form the basis for the 7% discount rate specified in Circular A-94. In its review, OMB could also consider the use of a “dual” discount rate (a higher rate for short-term projects and a lower rate for projects that generate intergenerational cost/benefits—often NBS) and/or declining discount rates. Transparency, open debate, and collaboration should be encouraged during this review.
- 2. Provide more explicit guidance on the use of “other discount rates” as discussed in Circular A-94.** In the short term, given the likely time and effort required to update Circular A-94, OMB could make immediate progress by providing more clarity on the context in which an “other discount rate” (per Section 8(b)(2)) could be used by an agency and if/when such a rate could be used as the primary basis for a BCA, rather than just for sensitivity analysis. Specifically, OMB could create a discount rate exemption in Circular A-94, allowing a lower discount rate to be applied to federal investments that meet certain criteria (e.g., intergenerational costs and benefits, use of NBS), provided ample justification is given. In the case of FEMA, for example, certain kinds of hazard mitigation projects that provide long-term resilience benefits would then be eligible for a lower discount rate, and FEMA could build this function into its BCA Toolkit and associated policies.

⁴ A more detailed discussion on the discount rate, “Revisiting the OMB Discount Rate to Support Federal Agency Goals and Advance Community Resilience,” was prepared by The Nature Conservancy and Earth Economics as an appendix to another FEMA Region IX CTP deliverable, “Stress Testing the BCA Toolkit with Nature-Based Solutions: Observations and Recommendations for FEMA.” The report is not public as of the time of writing but is available upon request. The discussion includes more detail on OMB’s approach to the discount rate and reflects on recent academic thinking.



Opportunity 2:

INCREASE TECHNICAL AND FINANCIAL SUPPORT PROVIDED TO SUBAPPLICANTS, INCLUDING ECONOMICALLY DISADVANTAGED COMMUNITIES AND NON-TRADITIONAL PARTNERS



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Background

Preparing and submitting a FEMA HMA subapplication is a complex and resource-intensive endeavor that requires a significant investment from subapplicants: staff time (dozens to hundreds of hours), consultant costs, opportunity costs, or the length of time from submission through award and implementation.⁵ In addition to the standard challenges faced by all subapplicants, the relatively new and untested nature of many NBS compounds these costs by introducing additional complexity and risk to the subapplication.

FEMA provides a wide range of information, guidance, and some technical assistance to subapplicants; however, additional support specific to NBS would be welcome. The following recommendations describe the technical and financial resources that FEMA and state hazard mitigation offices could provide to subapplicants to encourage and facilitate a greater number of high-quality subapplications that leverage NBS for hazard mitigation, as well as approaches that encourage subapplications from a more diverse range of communities, agencies, and organizations.

⁵ Subapplicants can be reimbursed for pre-award costs, but only if their project is awarded funding, so there is a significant element of risk given the competitiveness of FEMA's grant programs.



RECOMMENDATION 5:

Continue to expand financial assistance for planning and subapplication development

Suggested lead(s): FEMA; state hazard mitigation agencies

One sure way to generate a greater number of high-quality subapplications and produce better mitigation outcomes is to provide additional financial resources to subapplicants at the planning and subapplication development phases of the FEMA grant cycle. FEMA's recent expansion of such grant program offerings, such as the Capability & Capacity Building (C&CB) offering through BRIC, on top of existing offerings such as Advance Assistance, is an important step. In FY2021, BRIC C&CB support was limited to a maximum \$1 million per state, and this increased to \$2 million per state in FY2022. While further analysis would be needed to determine the "right" amount of C&CB funding, \$2 million is likely to be insufficient to meet the needs and goals of many states, especially those with large populations at risk and significant exposure to hazards. If allowable through BRIC, FEMA should consider scaling the amount for each state based on a formula that accounts for factors such as population, history of hazards, previous C&CB funding requests, and/or relative population living in BRIC-defined Economically Disadvantaged Rural Communities (see next recommendation). The formula could also potentially be tied to the state's overall Social Vulnerability Index score, a measure that FEMA has adopted from the Centers for Disease Control to inform prioritization of subapplicants for BRIC 2022.^{xxii}



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RECOMMENDATION 6:

Expand the number of communities eligible for reduced non-federal cost share

Suggested lead(s): FEMA

In general, the standard federal/non-federal cost share is 75/25, meaning that FEMA will cover 75% of project costs, while the applicant/subapplicant must provide 25%. A 25% non-federal cost share is a large burden for many economically disadvantaged communities and is often a key roadblock to their participation in FEMA's HMA programs. FEMA should continue to look for ways to reduce this burden by expanding the number of communities eligible for a reduced non-federal cost share.

The BRIC program offers a clear opportunity. Within the FY2021 and now FY2022 BRIC programs, FEMA allows for the standard non-federal cost share of 25% to be reduced to 10% for sub-applicants that meet the definition of "economically disadvantaged rural community," or EDRC.⁶ Reducing this cost burden is an important step, but it may not go far enough. A recent analysis by Earth Economics and the Environmental Defense Fund indicates that, based on FEMA's criteria, only approximately 2.2 million people (0.7% of the total U.S. population) live in communities that would be designated as EDRCs. Further, the analysis found that, on average, only 6.7% of the population within these EDRCs are nonwhite, compared to a national average of 23.7% nonwhite. With the caveat of not having visibility into the process and intent behind the development of the EDRC definition, intuitively it would seem that FEMA would like to remove important financial barriers for a larger population. Also, a more representative population within the EDRCs would better support the agency's equity goals. In their analysis, Earth Economics and the Environmental Defense Fund also proposed an alternative definition, based on the Environmental Justice for All Act, referred to as an "Economically Disadvantaged Community." Under this definition, approximately 44.3 million people (13.5% of the U.S. population), of whom 25.6% are nonwhite, would be eligible for reduced non-federal cost share.

States can also help to reduce the cost-share burden on economically disadvantaged communities during the hazard mitigation planning and subapplication processes. The Prepare California program (PrepareCA), introduced by Cal OES in 2022, may provide a good model for state support. PrepareCA leverages funds approved in California's 2021-22 State Budget and is provided specifically for communities that are classified as socially vulnerable and at high hazard risk.⁷ The program is comprised of two funding opportunities: PrepareCA Jumpstart and PrepareCA Match. The goal of PrepareCA Jumpstart is to "... fund initiatives to build capacity and resilience, augment resiliency staffing for under-resourced communities, support mitigation and recovery planning, and the scoping of future hazard mitigation activities/initiatives." Because PrepareCA Jumpstart is fully state-funded, no local cost share is required, and communities may use the funding to prepare and apply for future FEMA HMA funding. In June 2022, Cal OES announced that it had awarded nearly \$4.5 million across six applicants. PrepareCA Match provides the entire 25% non-federal cost share for qualified subapplicants that apply for FEMA HMGP funding.

Washington State Emergency Management Division (WA EMD) is also beginning to use state funds to supplement the non-federal cost share required by subapplicants. For example, in its 2021 HMGP funding announcement for Major Disaster Declaration DR-4481-WA (COVID-19 Pandemic), WA EMD committed to providing half of the 25% match requirement (i.e., 12.5% of total project costs) for awarded subapplicants—approximately \$11.8 million in total.

California and Washington may be unusual in the sense that they have greater financial resources than many other states, so any federal support FEMA can provide to state hazard mitigation offices could add significant value.

⁶ EDRCs were referred to as "Small Impoverished Communities" in the 2020 BRIC Notice of Funding Opportunity.

⁷ As identified on this map: <https://www.arcgis.com/apps/dashboards/677300969f9b4d4786d75aaa534318e6>.



RECOMMENDATION 7:

Continue to develop technical resources that help subapplicants prepare high-quality subapplications that include NBS

Suggested lead(s): FEMA

In recent years, FEMA has developed a range of technical resources that provide guidance and information for subapplicants. Resources include guidance on the different HMA programs, certain mitigation action types, specific steps in the subapplication process, and even resources solely focused on NBS (e.g., Building Community Resilience with Nature-Based Solutions).

However, based on the authors' experience and interviews with subapplicants and state reviewers, many gray areas remain when it comes to NBS. For example, subapplicants and state level reviewers alike expressed that while FEMA does provide a lot of helpful guidance, there is often a disconnect between FEMA's broadly stated support for NBS at the national level and what would actually pass a FEMA review at the regional level. Additional resources, and in some cases modifications to existing resources, with more comprehensive and explicit guidance on how to integrate NBS into FEMA subapplications, would be valuable for subapplicants. Examples of resources could include:

- 1. A taxonomy of NBS.** FEMA guidance is very clear that only eligible risk reduction projects, activities, or actions can receive hazard mitigation funding. And while FEMA does provide broad guidance for—and encouragement of—NBS, the guidance is not always specific enough for subapplicants to determine eligibility of NBS elements. Given that FEMA's guidance on mitigation project and/or action eligibility is a key limiting factor for what subapplicants will choose to pursue, and what state and FEMA regional staff will consider, more specific guidance would be helpful. As one idea, FEMA could develop an official list of all eligible NBS, structured by mitigation action or hazard type. Such a taxonomy could then form the basis for—and be tied to—additional resources that are specific to each eligible project/mitigation action, such as the resources described below.
- 2. Job aids for NBS.** Using the taxonomy described above as a guiding framework, FEMA could develop additional job aids for specific kinds of NBS project or actions, and/or job aids that map the range of nature-based actions to the hazards (e.g., flood, drought, heat, wildfire) they would most commonly mitigate. The job aids could include feasibility and effectiveness criteria, BCA guidance, and detailed case studies. These job aids could build on FEMA's Hazard Mitigation Assistance Technical Review Job Aid Series, which released technical review job aids for a number of project types in April 2022, including Acquisition, Flood Risk Reduction, Wildfire, and Post-Wildfire Soil Stabilization. Subapplicants have also expressed that FEMA materials tend to have a flood and hurricane bias, so new guidance for other hazard types such as drought, wildfire, and extreme heat would be especially welcome.
- 3. Subapplication materials.** Taking the job aids one step further, both subapplicants and state level reviewers expressed the desire to have boilerplate (or “plug-and-play”) materials for use in subapplications, organized by the type of NBS or hazard type. Materials could include sample project summaries, scopes of work, project schedules, and even BCA template files (also described under Recommendation 1). Such materials could be adapted from a combination of the strongest and clearest (anonymized) subapplications that FEMA has received in the past.
- 4. One-stop NBS shop.** During interviews, subapplicants and state reviewers shared that it was hard to find scattered NBS documents and determine what was current. FEMA should develop and maintain a one-stop NBS shop where interested subapplicants can find all NBS-related resources and trust that those are up to date. The resource could also make a note of any guidance or policies that are no longer relevant or in effect (e.g., the 2013 environmental benefits policy).

5. **NBS case studies.** FEMA could develop detailed case studies (or a database) of successful FEMA-funded NBS projects as an educational resource for subapplicants who want to develop similarly innovative projects but do not know where to start. FEMA's Mitigation Action Portfolio is a step in the right direction but is limited as a guidance resource for real subapplications. For example, many of the projects in the Mitigation Action Portfolio were not funded by FEMA, nor is it clear that they would meet FEMA's eligibility requirements. Whatever the format, sharing specific details of successful projects relevant to NBS would provide a starting place for interested subapplicants.

6. **Subapplication tool.** FEMA could also consider greater automation across all stages of the subapplication process. This could include, for example, a "project management" tool to support subapplicants through the whole subapplication process, integrating any existing resources and some of the resources described above. Under the FEMA Region IX CTP grant used to prepare this recommendations report, TNC CA and Radbridge are currently building an early prototype of such a tool, which will be pilot tested for BRIC 2022, and it may contain ideas for useful functions or features that FEMA could build into its own tool, such as project management support related to preparation of pre-applications and subapplication (including suggested tasks and schedules), a resource library, and guidance on how to meet FEMA's requirements for different mitigation actions.



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RECOMMENDATION 8:

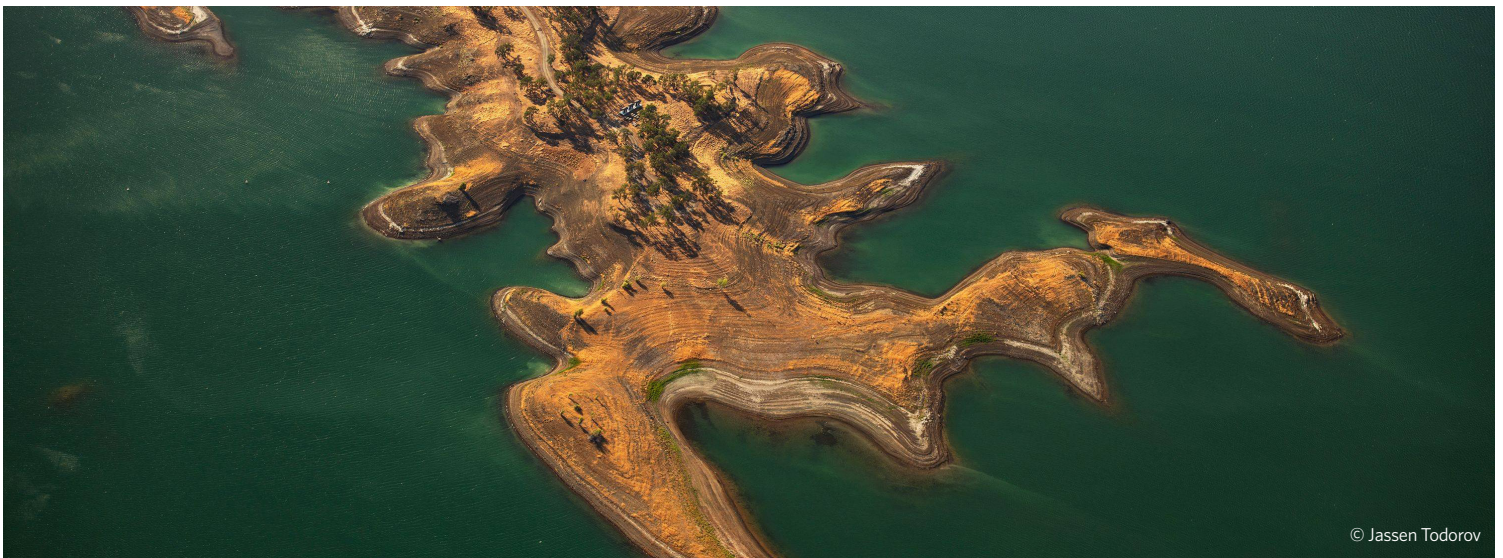
Continue to expand one-on-one technical assistance offerings to subapplicants

Suggested lead(s): FEMA; state hazard mitigation agencies

Clear policies and technical guidance are valuable, but they can only take a subapplicant so far; ultimately, there is no substitute for one-on-one assistance. During our interviews, feedback from subapplicants and state-level mitigation staff alike expressed that one-on-one assistance provided to subapplicants is perhaps the most valuable step in the subapplication process, since it provides a chance for subapplicants and mitigation staff to identify and work through issues in detail and discuss best practices specific to the subapplicant's unique context. Such assistance ultimately reduces the burden on FEMA staff in the medium and long term, because subapplicants and applicants are equipped to submit a greater proportion high-quality subapplications.

The experience of California demonstrates the effectiveness and importance of technical assistance. In recent years—in large part due to a significant increase in major disaster declarations and associated FEMA hazard mitigation funding—Cal OES has greatly expanded its capacity to provide technical assistance to subapplicants, both by increasing the number of in-house staff and retention of expert consultants. Cal OES staff noted that they use the Notice of Intent stage (i.e., pre-application) to identify subapplicants early in the process and trigger technical assistance from their staff and consultants. They also noted that since their technical assistance system was implemented, their “retention rate” for subapplicants (i.e. the proportion of subapplicants who were retained between the Notice of Intent stage and full subapplication stage) improved substantially. Cal OES can now provide immediate (i.e., within days) technical assistance to subapplicants who contact them, at no cost to the subapplicant, which can often help to put the subapplication on a solid footing and help clarify the decision to proceed (or not) early in the process. This support not only results in higher quality subapplications and prevents the state and local entities from investing substantial resources in ineligible subapplications, but also gives subapplicants in California an advantage in nationally competitive funding cycles like BRIC.

While the California example demonstrates the value of technical assistance, such technical assistance is not possible without dedicated funding. As a large and wealthy state that experiences multiple major disaster declarations each year,



California can count on a relatively large and predictable level of mitigation funding each year. However, most states (or other applicants such as federally-recognized Tribes and territories) do not have the same level of state-appropriated funding or economies of scale as California, nor do they experience as many major disaster declarations on an annual, predictable basis. As a result, many states experience a “rollercoaster” effect of having very few staff during non-disaster times but are forced to quickly ramp up their staff capacity when a major disaster does occur. Given that it can take a year or more to get new staff positions approved in some states, let alone train the staff, this process ultimately decreases the speed of response and potentially the quality of support they can provide to subapplicants.

With these considerations in mind, FEMA should explore options for providing a greater level of annual, predictable financial assistance to state hazard mitigation agencies in a way that would enable all states to provide a greater baseline level of technical assistance to subapplicants in the long-term. Mechanisms for such financial support could include increasing the allowable “management costs” allocated to states, or another type of set-aside within the FEMA budget. Another approach would be to decouple HMGP funding allocations from major disaster declarations. For example, instead of calculating a state’s funding based on the most recent disaster(s), annual state HMGP funding could be calculated based on the rolling average of the previous 3–5 years of disaster declarations. This approach would not necessarily increase total funding for states but would help to “smooth out” their allocated funding in a way that makes it more predictable.

Ideally, FEMA would provide financial resources to states, who would then work with the subapplicants directly—rather than FEMA working directly with subapplicants—since the state hazard mitigation offices best understand their local needs and priorities. FEMA could also consider adopting Housing and Urban Development’s Community Development Block Grant model for HMGP funding, which would further empower states and communities with the flexibility to focus on their highest priorities and ensure a predictable level of annual funding. Finally, once states reach their target baseline capacity, FEMA could also provide increased non-financial technical assistance to state staff through HMTAP.



RECOMMENDATION 9:

Proactively reach out to economically disadvantaged communities and non-traditional partners to expand the use of NBS in hazard mitigation

Suggested lead(s): FEMA; state hazard mitigation agencies

Land trusts, resource conservation districts, natural resource management agencies, and other non-traditional partners represent a large and relatively under-utilized community that could be leveraged by FEMA to identify and implement innovative NBS for hazard mitigation. These organizations often have a pipeline of conservation and/or restoration projects identified through detailed planning efforts, and while the projects are normally described in terms of natural resource management or conservation outcomes, many of them can generate quantifiable hazard mitigation outcomes that could be eligible for FEMA hazard mitigation funding with minor adjustments. However, given that these partners are still relatively unaware of the potential overlap between their projects and FEMA’s hazard mitigation goals, FEMA could proactively reach out to this community and continue to raise awareness about opportunities to access FEMA funding for NBS.

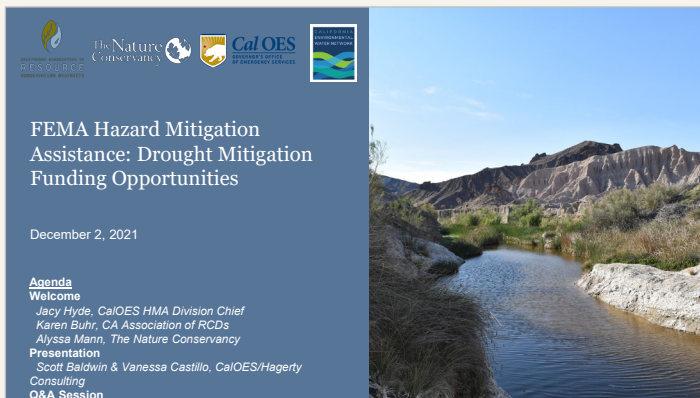
FEMA could consider awareness-raising efforts such as webinars at the regional or national level by leveraging well-connected non-profit partners such as TNC, or networks such as the Land Trust Alliance (LTA) or the National Association of Conservation Districts. Such efforts by FEMA could ultimately produce a larger number of high-quality subapplications centered around NBS for hazard mitigation. In 2021 LTA partnered with TNC to lead an informational session at their national conference on how land trusts can work with and seek FEMA funding for projects that include NBS. Also in 2021, in advance of the HMGP application process, Cal OES and TNC CA worked together to deliver webinars aimed at the conservation and natural resource communities of practice, including land trusts and resource conservation districts in California. As a result

of these webinars, several participants reached out to TNC CA and Cal OES with new hazard mitigation project ideas, some of which are currently being developed into subapplications.

FEMA should also increase—or facilitate the capacity of states to increase—proactive outreach and technical support to economically disadvantaged communities. Economically disadvantaged communities present a significant opportunity for leveraging FEMA funding to identify and implement nature-based hazard mitigation projects. Economically disadvantaged communities are often more vulnerable to the impacts of natural hazards, partly due to historical under-investment or disinvestment, and hazard mitigation investments in these communities—whether traditional or NBS—can have a high social and economic return. In addition to hazard mitigation outcomes, NBS in these communities will generate much-needed environmental, social, and economic benefits. For example, recent studies have shown that “redlined” communities have less urban canopy, which can exacerbate urban heat island impacts. Installation of trees and other green infrastructure can help to reduce heat-related illness and mortality, while also supporting other outcomes such as stormwater management, air quality, and aesthetic value. Also, some economically disadvantaged communities and many tribal communities are located in rural areas, where NBS may be relatively less costly to implement. Of course, in many cases economically disadvantaged communities lack even basic infrastructure, such as stormwater infrastructure, so in these cases an approach that integrates traditional infrastructure with NBS may be the most cost-effective means of hazard mitigation.

It should also be noted that, as discussed in other recommendations, even traditional FEMA subapplications are complex, and NBS can add a further layer of complexity that often requires upfront investments in science and design. As a result, it is primarily well-resourced communities and organizations that are able to consider and propose NBS. More financial and technical support would therefore be needed to help economically disadvantaged communities plan and prepare subapplications that involve NBS.


RECENT NBS-FOCUSED WEBINARS HOSTED BY CAL OES, TNC, AND PARTNERS



FEMA Hazard Mitigation Assistance: Drought Mitigation Funding Opportunities

December 2, 2021

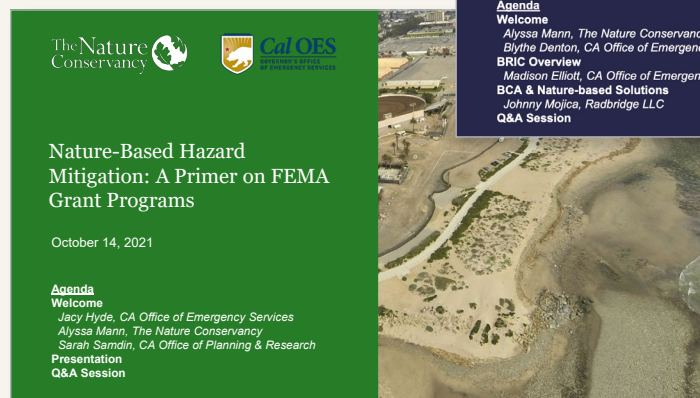
Agenda
Welcome
Jacy Hyde, CalOES HMA Division Chief
Karen Buhr, CA Association of RCDs
Alyssa Mann, The Nature Conservancy
Presentation
Scott Baldwin & Vanessa Castillo, CalOES/Hagerty Consulting
Q&A Session



FEMA BRIC: Funding Opportunities for Nature-Based Solutions

August 29, 2022

Agenda
Welcome
Alyssa Mann, The Nature Conservancy
Blythe Denton, CA Office of Emergency Services
BRIC Overview
Madison Elliott, CA Office of Emergency Services
BCA & Nature-based Solutions
Johnny Mojica, Radbridge LLC
Q&A Session



Nature-Based Hazard Mitigation: A Primer on FEMA Grant Programs

October 14, 2021

Agenda
Welcome
Jacy Hyde, CA Office of Emergency Services
Alyssa Mann, The Nature Conservancy
Sarah Samdin, CA Office of Planning & Research
Presentation
Q&A Session



Opportunity 3:

EMBED CONSIDERATION OF NATURE-BASED SOLUTIONS INTO ALL AREAS OF FEMA POLICY AND PRACTICE

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Background

While FEMA has made good progress advancing NBS, further opportunities exist to reduce barriers to the use of NBS for hazard mitigation, ranging from updating federal laws and regulations to revisiting FEMA's policies, processes, and standard practices.

Recommendations



RECOMMENDATION 10:

Improve the transparency and speed of the subapplication process

Suggested lead(s): FEMA; state hazard mitigation agencies

As previously discussed, the FEMA subapplication process is complex and requires a significant investment from subapplicants, in terms of both time and resources. Due to the nature of the process and sums of taxpayer dollars involved, many steps in this process are unavoidable and ultimately help to improve the quality and outcomes of mitigation projects or planning efforts. Also, some of the challenges are inherent and unavoidable in a process that requires engagement with two agencies (i.e., the applicants [state hazard mitigation offices] and administrator [FEMA]). However, there are likely to be opportunities to further increase the overall speed and transparency of the process, which will help to reduce the real and perceived burden on subapplicants and improve their overall experience—even if they are not awarded funding.

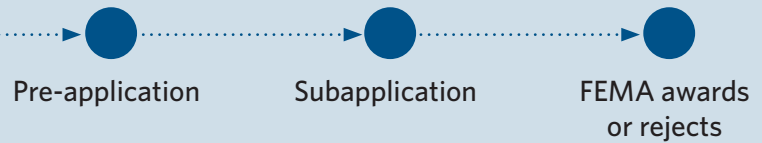
These ideas are not only relevant to NBS; it is expected that any resulting improvements to the speed and transparency of FEMA's processes will benefit all subapplications. Some of the other recommendations and ideas within this report could also contribute to improving the speed of the subapplication process. For example, greater provision of technical and financial assistance to subapplicants (discussed under Opportunity 2) would result in a higher quality of subapplications in general, reducing the back-and-forth required (e.g., RFIs), and leading to faster approval of projects. Similarly, recommendations in this report related to streamlining the BCA and Environmental & Historic Preservation (EHP) processes may also speed the subapplication process.

ENHANCING THE SUBAPPLICANT EXPERIENCE

Upfront information on level of effort



Speed and transparency of process



- 1. Provide more upfront information on the level of effort and other requirements of subapplications.** Many subapplicants have expressed that better understanding the level of effort and length of time associated with each stage of the grant process—from subapplication through award, implementation, and reporting—would help subapplicants determine whether they have the necessary resources and time to invest in the process, which would help with organizational planning and budgeting. A better understanding of the process and requirements may indicate that it is more appropriate for them to pursue other (federal, state, local) funding sources in certain instances, saving time for the subapplicants and states/FEMA regions. FEMA could provide a clear map of the process, list of steps and requirements, and level of effort (e.g. in terms of staff hours, review time for FEMA) at each step. While every subapplication is unique in terms of its proposed activities, local context, and other factors, FEMA could provide an average estimated level of effort for each step, based on a survey of past subapplicants or analysis of pre-award costs provided by subapplicants in project budgets. Example contract language would also be helpful, so that subapplicants can be prepared if they are awarded funding.
- 2. Increase the speed of the subapplication process.** Subapplicants and others have consistently expressed that the length of the subapplication process is a significant challenge, making it difficult to plan ahead. The estimated time between beginning a subapplication and receiving funds can deter subapplicants from pursuing a subapplication altogether. The speed of the process also puts NBS (and other innovative approaches) at a further disadvantage, because subapplicants (and state offices) are already hesitant about proposing “gray area” projects for several reasons (see more discussion under Recommendation 11), so a long and uncertain wait time between submission of a subapplication and award/rejection only further increases the perceived risk of engaging in the process.

Any interventions that increase the speed of the subapplication process will immediately benefit subapplicants and their communities by more quickly delivering the funding needed to implement hazard mitigation projects and reduce risk to people and property. In the medium to long term, such interventions could save taxpayer dollars by reducing communities’ exposure to hazards. In some communities, time between disasters may only be a few years, which—especially given uncertain future conditions under climate change—underscores the importance of executing HMA projects in a timely fashion.

Certain types of NBS are especially time-sensitive and may require customized subapplication pathways. For instance, in 2016 FEMA took an important step by allowing eligible actions such as reseeding of ground cover to help with slope stabilization following a wildfire. FEMA then further recognized the importance of post-wildfire actions through the creation of HMGP Post Fire as a separate HMA program. However, the timing of the required HMGP steps makes it challenging for the program achieve its intended goal of providing emergency mitigation funding to prevent debris flows and erosion, and to improve regrowth of vegetation. Specifically, to be most effective, post-wildfire actions often need to happen within months of a wildfire, and ideally in advance the next rainy season. Under the current program structure, subapplicants requesting support for post-wildfire actions, even those under the HMGP Post Fire Grant program, are currently required to follow the standard HMGP process and timeline, which can take one or more years for approval to begin work, by which time it is often too late to mitigate the immediate post-wildfire hazards. Another structural concern is that impacted communities in the immediate aftermath of wildfire do not typically have time to devote to complex hazard mitigation subapplications. Cal OES did create a fast-tracked

funding process for post-wildfire actions following the 2017 wildfire season, which helped to get funding on the ground within months for several subapplicants in Southern California, but it is unclear why that program is no longer advertised.

FEMA's access to data, understanding of key steps in the process, and ability to adjust its own policies and programs makes it best suited to implement changes that will improve the speed of the subapplication process. If it has not already done so, FEMA could undertake a targeted analysis—accounting for both qualitative and quantitative factors—to identify opportunities to increase the speed of the subapplication process. Specifically, FEMA could use the “theory of constraints” methodology to identify bottlenecks or limiting factors in the subapplication process. Once all the key limiting factors have been identified, FEMA could target and address each one in sequence, starting with the most impactful (i.e., the biggest constraints).

3. Provide more information on the status of subapplications. Subapplicants often experience long periods without any communication from FEMA after submitting subapplications. During interviews, subapplicants expressed that while they understood that long wait times were expected, they felt that the cadence of the process was sometimes counterproductive to their planning. Subapplicants shared a general sentiment of feeling “in the dark” for a large majority of the wait time; they would often wait for 6–12 months (or longer) and hear no updates on the status on their subapplication, and then receive an RFI with only a few days to respond, or simply a notice of approval/rejection with no prior signal of what was coming. Subapplicants also expressed that the process was very fast once FEMA staff were engaged in review and actively working with them.

This feedback indicates that providing more information to subapplicants on the status of their projects and better managing their expectations could lead to greater satisfaction and reduced anxiety. Specifically, FEMA could consider developing the following resources:

Visual aids such as flow charts or infographics to help subapplicants understand what happens to their subapplication once it enters the system—whether HMGP, BRIC, or other—and timelines and expectations for each step. This information would help subapplicants with organizational and project planning by allowing them to marshal resources in anticipation of funding. These resources could be made generally available on FEMA's website and/or sent to subapplicants automatically upon receipt of a subapplication, similar to the approval package and obligation report that is sent to awarded subapplicants but much simpler.

Automated updates to let subapplicants know when their subapplication has moved from one stage to the next, and to give advance notice to expect correspondence from FEMA—such as an RFI or decision—that leaves sufficient lag time to prepare. FEMA could provide these updates via automated emails, or even develop an online “subapplication tracker,” similar to services provided by many large companies, such as the U.S. Postal Service Tracking service or the “Domino's Tracker” for pizzas.

4. Provide more detailed feedback on rejected subapplications. FEMA HMA funding is limited and competitive, so not all subapplications—even high-quality ones—can be awarded. FEMA does not have a standard process across its HMA programs for providing feedback on subapplications that are not awarded. Feedback delivered in a consistent format (similar to the BRIC technical and qualitative evaluation feedback memos) would help rejected subapplicants with lingering resilience needs submit improved subapplications or project types in future funding cycles. A standard and consistent feedback mechanism would also provide consistency across FEMA regions (see Recommendation 13 for more on “regionalization”). FEMA could use data generated by this feedback process to learn about subapplication performance in the aggregate, such as why certain kinds of subapplications (e.g., those involving NBS) might be failing (and this could potentially inform the “Investment targets and metrics for NBS” discussed under Recommendation 11). FEMA could then use this information to target interventions, which may include some of the recommendations and ideas suggested elsewhere in this report, to improve the quality of subapplications and/or format of the subapplication process, ultimately leading to faster and improved mitigation outcomes for communities.



RECOMMENDATION 11:

Identify and address statutes, regulations, policies, and processes that create structural disadvantages for NBS

Suggested lead(s): FEMA, with support from the Congressional Research Service

Building on the recommendations within this report, FEMA could design and conduct a comprehensive review of how NBS are currently addressed (or not addressed) within applicable statutes and regulations, as well as FEMA's own policies and standard practices related to FEMA's HMA programs. The purpose of such a review would be to identify structural disadvantages that currently hinder communities in pursuing NBS and identify steps to resolve them, some of which have already been identified in this report and are particularly relevant to economically disadvantaged and vulnerable communities. The goal would be to ensure an even playing field between NBS and traditional HMA solutions so that subapplicants can more easily develop competitive subapplications that best suit the mitigation goals for their community.

- 1. Open space acquisition as a mitigation strategy.** FEMA's policy and guidance on project eligibility determines and constrains the kinds of projects and mitigation actions that subapplicants will propose. FEMA is very comfortable with the use of acquisition (along with relocation/demolition of structures) of specific parcels for the purposes of reducing flood risk to people and structures on those parcels and has funded thousands of such projects. However, property acquisition can also be an effective mitigation action for other hazards such as wildfire. FEMA could broaden the allowable uses of open space acquisition as a mitigation strategy, develop clearer guidance, and review its interpretation of existing law (Stafford Act) as needed.

Broaden Acquisitions. FEMA's guidance on leveraging acquisition for the purposes of flood risk reduction could be broadened to explicitly allow acquisition of parcels that do not contain structures, provided there is a hazard mitigation-related justification for such an approach. For example, acquisition of open space parcels adjacent to rivers and streams, followed by restoration and floodplain reconnection on those lands, can increase the floodwater storage potential on those lands and support reduced flood risk to downstream people and property. Such projects, when backed by hydrologic and hydraulic modeling data, should be explicitly allowed and encouraged by FEMA.

Development Projections. FEMA should encourage communities to consider future development projections in their planning, given FEMA now encourages subapplicants to consider "future conditions." The agency could consider allowing acquisition and protection of existing open space parcels as a mitigation strategy, if the subapplicant can show the parcel has high risk of future development and that the new structures would be at risk of hazards and/or increase community hazard risk.

Acquisition for Wildfire Risk Reduction. Another immediate and urgent opportunity is to explicitly allow and encourage acquisition for the purposes of wildfire risk reduction. Large private properties on the wildland-urban interface, especially when not maintained, can be a source of wildfire risk to adjacent communities. In some cases, the most effective and cost-effective long term mitigation strategy is to purchase land and conduct hazardous fuels reduction and/or management and defensible space actions. Beyond wildfire risk reduction, such projects can also generate ecosystem services and create accessible open space areas for nearby residents. One subapplicant in California did propose acquisition of open space to support their wildfire risk reduction goals following the 2017 wildfires, and FEMA Region IX counsel developed and approved model deed restriction language for the subapplicant, indicating the approach was allowed. However, ultimately the subapplicant was able to find a separate source of funding for the acquisition component of the project, because the FEMA subapplication timeline was not compatible with local needs (please refer to Recommendation 10 for more discussion regarding the speed of the subapplication process).

2. Incentives and disincentives. FEMA could develop new incentives or remove disincentives related to NBS. The BRIC program contains a good example of a targeted incentive for NBS. In the FY2022 Technical Evaluation Criteria used to score subapplications, the criterion “Incorporation of nature-based solutions” is worth 10 points of the total possible 110 points. The wording doesn’t require NBS only, but rewards subapplications that include at least some degree of NBS. Similar incentives could be built into prioritization and ranking of HMGP subapplications, though FEMA would need to work closely with state hazard mitigation offices on such an effort. A number of disincentives also hold NBS back, and most are neither explicit nor intentional. For example, state hazard mitigation staff have noted that while they want to encourage cutting-edge mitigation approaches that include NBS, they are hesitant to submit too many subapplications to their FEMA regions containing “gray area” or “untested” NBS, especially within HMGP, citing several key reasons. First, the states’ waitlisted projects expire after one year (in FEMA Region 9, at least), so if a subapplication includes NBS in a way that hasn’t been tested with FEMA, and if that subapplication is then rejected two years into the process for some unanticipated reason (e.g., an EHP issue), then the funding that was set aside for that project may be lost altogether instead of directed to a waitlisted project. FEMA also will not accept additional subapplications after the close of the application period, so, in states where the waitlisted projects expire, there is no way to spend unobligated funds. Second, states with enhanced mitigation plans are required to submit “full, complete” projects to maintain their enhanced status. There is at least a perception within the state hazard mitigation agencies that by sending too many ineligible subapplications to FEMA they could be penalized, lose their standing with the FEMA region, or even lose their enhanced status, which would significantly reduce their allocated HMGP funding following a major disaster declaration.⁸ Finally, NBS projects require substantial time investments from both the state and local entity due to their complexity and lack of precedent or guidance in the FEMA programs. FEMA has not yet produced detailed guidelines on how to develop these projects, and anecdotally has not been able or willing to provide concrete answers to project development questions, so there is a high risk of submitting projects that FEMA ultimately deems ineligible. Consequently, the state and local communities may invest substantial time and financial resources in projects that FEMA will not allow to move forward, and that time and funding could have been spent on other eligible projects. The common theme across these examples is that the stakes are very high for states, and the risk of losing funding creates a disincentive for pursuing NBS projects that may be new to FEMA and are perceived to be less of a “sure thing.” FEMA could help to address these barriers to NBS by finding ways to reduce the real and perceived risk of pursuing NBS projects. For example, just like the 5% Initiative category recognizes that certain “new” project types bring unique challenges, FEMA could allow states to tag a certain number (or percentage) of subapplications, including both NBS and other new mitigation actions, as “gray area” or “proof of concepts.” These gray area subapplications would not negatively affect the evaluation of a state’s enhanced status, and for any that are ultimately not awarded, the funding could be rolled over and used by the state for other high-priority projects. FEMA could also provide mechanisms to spend funding that is ultimately rejected due to ineligibility, and also provide eligibility guidance on NBS projects to guide states in project development.

3. Duplication of programs. FEMA’s Duplication of Programs (DOP) policy states that the agency “... will not provide assistance for activities for which it determines the more specific authority lies with another Federal agency or program,” such as the Environmental Protection Agency, Natural Resources Conservation Service, or U.S. Army Corps of Engineers. Landscape-scale projects or mitigation actions that incorporate NBS can often be more effective when their activities and/or benefit cross jurisdictional boundaries, including those of other federal agencies. Thus, the DOP policy has been cited as a potential barrier to landscape-scale investment in NBS, which can be one of the most effective use cases for NBS. FEMA could review its interpretation of the law that underpins the DOP policy (44 C.F.R. § 206.434[f]) to ensure it is not too conservative and/or provide more clarity and specific examples for how to work within the DOP policy in a way that meets FEMA’s specific hazard mitigation goals, while also leveraging cross-agency investments. FEMA could provide guidance on how to best leverage and direct FEMA funding when projects may have overlapping jurisdictions with other federal agencies. The California Governor’s Office of Planning and Research (OPR), through a FEMA Region IX CTP grant, recently published a factsheet that highlights several challenges associated with the DOP policy and calls for more clarity on how projects with DOP issues are evaluated.

⁸ For these reasons, state staff noted that BRIC was a better option for “gray area” projects.

OPR also cites the U.S. Forest Service's Master Stewardship Agreements (MSA) as one model that could potentially work around current limitations of the DOP policy. MSA could for example allow FEMA to fund "... fuels treatments and erosion control techniques on federal land in instances where no federal funding exists to mitigate hazards posed by federal land adjacent to communities."

- 4. Investment targets and metrics for NBS.** Given that FEMA has introduced a number of policies and processes to encourage NBS for hazard mitigation, it would be helpful to better understand the effect these policies are having in terms of spurring interest in these newer project concepts. Metrics could include the number of subapplications received, number of projects/actions funded, total dollars invested in NBS, and/or dollars allocated to NBS as a proportion of overall HMA funding. It would also be helpful to have explicit targets that FEMA could track progress against, for example dedicating 5% of a certain funding pot to NBS; of course, any such threshold would need to be established through careful analysis. FEMA could incorporate targets and metrics for NBS in their existing performance targets and/or reporting and tracking systems, which could be used internally at FEMA for program design and improvements or shared publicly.



RECOMMENDATION 12:

Update Environmental & Historic Preservation (EHP) processes and policies to reduce barriers to NBS

Suggested lead(s): FEMA; state hazard mitigation agencies

The purpose of FEMA's EHP review process is to ensure that mitigation projects comply with the National Environmental Policy Act (NEPA) of 1969 and the National Historic Preservation Act (NHPA) of 1966, in addition to all other applicable federal environmental and historic preservation laws, regulations, and executive orders. FEMA regional staff are responsible for leading the EHP review of most HMA subapplications and coordinating review with other agencies as needed.

Along with the BCA, the EHP process is consistently cited as one of the most daunting, complex, and resource-intensive steps in the FEMA subapplication process. Discussions with subapplicants and reviewers indicate that EHP challenges are compounded when NBS are involved due to the additional layer of (often perceived, but sometimes real) complexity and their relative "newness" as a hazard mitigation approach. For this reason, TNC recently developed an EHP Guide with specific considerations and best practices to support NBS through the EHP process. However, there are also steps that FEMA and state hazard mitigation offices can take to improve efficiency and reduce the burden on subapplicants throughout the EHP process, such as:

- 1. Increase standardization of EHP requirements across FEMA regions.** Hazard mitigation professionals with experience working in multiple FEMA regions have commented that in their experience, different regions seem to have different standards than others when it comes to EHP compliance. Referred to by one expert as "regionalization," the autonomy given to regions by FEMA Headquarters to manage unique conditions and stakeholders may inadvertently have created significant uncertainty about how requirements will be interpreted, and the level of analysis required to demonstrate compliance. Implementing practices and policies across regions to encourage consistency will facilitate the sharing of NBS best practices across regions and will build the confidence of subject matter experts working nationally that they are providing accurate guidance.
- 2. Further streamline the EHP process.** EHP review can delay the implementation of mitigation projects, or even lead to withdrawn subapplications due to non-federal cost share funding sources expiring or urgent mitigation needs requiring faster action. Though some timeline factors are beyond FEMA's control, there are steps the agency can take to streamline EHP review, without sacrificing the integrity and rigor of the process, including:

EHP pre-meeting. NBS subapplicants tend to have many questions about how EHP requirements might be interpreted, or the depth required for field studies. An upfront EHP planning meeting including the subapplicant, applicant, and FEMA would dramatically increase the quality and fit of EHP activities. This would especially help to reduce the disadvantage for projects that involve NBS (which are relatively newer project types and thus interact with EHP requirements in unique ways) by allowing the subapplicant and FEMA regional staff to identify potential issues early in the process. FEMA should look into options for building this step into the subapplication process. While a pre-meeting could place a high initial burden on busy FEMA regional staff, this activity would likely save time for all across the life of the subapplication. Also, the pre-meeting should be a required and automatic step for any subapplicants who reach a certain stage in the subapplication, so that the process does not confer an unfair advantage on well-resourced subapplicants. Recommendations for ensuring a greater proportion of economically disadvantaged communities reach the EHP review stage are described under Opportunity 2. Important issues of equity among subapplicants and potential FEMA liability in providing guidance on projects that may not be fully developed will need to be addressed.

Leveraging state environmental reviews. Before submission to FEMA, many projects have already gone through a state-level environmental review (e.g., California Environmental Quality Act review). While the specific goals and requirements of state reviews may differ from FEMA's EHP requirements, and FEMA regional staff do sometimes use information from state reviews, FEMA could develop a more systematic approach for leveraging information in state reviews to simplify and accelerate its own review. For example, it may be possible for FEMA regions to map the requirements from certain states in their regions to EHP requirements and determine that if a project meets a certain state requirement, and the state requirement is at least as strict as its EHP equivalent, then it would pass that step automatically.

3.

Support further inclusion of NBS in regional Programmatic Environmental Assessments. A Programmatic Environmental Assessment (PEA) is an approach used by FEMA in some regions to streamline the EHP process by grouping certain mitigation actions or activities together and conducting a broad and general EHP review of that class of actions/activities. If certain mitigation actions proposed by a subapplicant are consistent with those covered under the PEA, then it can circumvent the need for a detailed Environmental Assessment or other public notices, thereby speeding up the process and greatly reducing the EHP burden on both FEMA regions and the subapplicant. For example, FEMA Region X has its *Final Programmatic Environmental Assessment: Recurring Actions in Arizona, California, and Nevada* document that covers three types of vegetation management for wildfire risk reduction: mechanical or hand-clearing of vegetation, herbicidal treatments, and biological control. If a subapplicant proposes some combination of these mitigation actions in their project in a way that matches the approach described in the PEA, then FEMA would note this in its Record of Environmental Considerations and no further review would be needed. To further streamline the EHP review process for subapplications that involve NBS, FEMA could support development of expanded PEA across all of its regions that covers common mitigation actions associated with NBS. Though each region is unique in terms of NBS and environmental considerations, FEMA could share best practices across regions to help facilitate development of additional PEA.



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RECOMMENDATION 13:

Support further integration of NBS into state and local hazard mitigation planning

Suggested lead(s): FEMA; state hazard mitigation agencies

The hazard mitigation planning process guides state and local priorities for hazard mitigation and presents an important opportunity for increasing investments in NBS in the long term. For example, a project's chances of being developed into a complete subapplication and awarded FEMA hazard mitigation funding are greatly improved if the specific project has been identified in the relevant Local Hazard Mitigation Plan (LHMP) or is at least consistent with the goals and priorities of the LHMP and relevant State Hazard Mitigation Plan (SHMP). FEMA has encouraged the use of NBS in many areas of its HMA programs and could potentially encourage more NBS in subapplications by facilitating the inclusion of NBS within state and local hazard mitigation plans.

This is underscored by the findings of a study published by the Environmental Law Institute (ELI) in 2021. In the study, ELI reviewed 103 LHMP from across the country to better understand the extent to which NBS were incorporated. ELI found that 63 of the 103 LHMP reviewed included reference to some sort of "nature-based action." The plans varied widely in their incorporation of NBS, and only five of the plans included more than 10 nature-based mitigation actions. Among other conclusions, ELI noted that there remained opportunities for LHMP to more systematically include "... specific and targeted nature-based hazard mitigation actions." Results were similarly mixed in ELI's review of SHMP, which found that while 38 of 50 SHMP had goals or objectives broadly related to natural systems protection, only 14 had goals specifically focused on natural infrastructure or NBS.



FEMA could support further integration of NBS into state and local hazard mitigation planning in the following ways:

- 1. Provide additional guidance and resources.** FEMA could update its 2013 guide, Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials, with specific guidance related to NBS, or develop other resources to help state and local partners systematically incorporate NBS into hazard mitigation planning. Resources could include examples of nature-based mitigation actions or goals (ideally linked to the taxonomy of NBS such as the one discussed under [Opportunity #2](#)) and case studies of other communities that have successfully used NBS for hazard mitigation.
- 2. Develop incentives.** FEMA could develop incentives to encourage greater integration of NBS into state and local hazard mitigation plans. For example, FEMA could require or encourage states to consider NBS in the development of Enhanced State Mitigation Plans. This would not necessarily require a change to the Code of Federal Regulations (specifically 44 CFR 201.5), but could simply provide a greater emphasis on NBS as one element of what constitutes a "comprehensive" mitigation program (44 CFR 201.5 [b][4]), along with other considerations such as equity and future conditions like climate change. FEMA could even broaden its definition of "natural hazard" to include climate change, similar to an approach the State of California's legislature is currently considering in Assembly Bill (AB)-2442 California Disaster Assistance Act: climate change, which could further incentivize NBS in hazard mitigation planning as an effective approach for both addressing some of the root causes of climate change itself (via carbon sequestration and storage) and mitigating the hazards that are exacerbated by a changing climate (e.g., flood, drought, wildfire, etc.).



RECOMMENDATION 14:

Include consideration of natural infrastructure in damage assessments for major disasters

Suggested lead(s): FEMA, in consultation with Congress

To date, most of FEMA's work and success related to NBS has been within its HMA programs, which is understandable given the clear overlap between NBS and hazard mitigation outcomes. Recommendations 1-14 have been focused on FEMA's HMA programs, but there may also be opportunities for FEMA to expand consideration of natural infrastructure within its Public Assistance (PA) program in a way that advances the agency's mission. These opportunities are discussed below.

1. As an immediate step, FEMA could increase its emphasis on NBS within Section 406 PA Hazard Mitigation, where possible and appropriate. For example:

FEMA could revisit its guidance under "Eligibility Considerations by Facility" to ensure consistency with other policies the agency has introduced to encourage NBS across its HMA programs. Specifically, FEMA could consider adding natural infrastructure as an "eligible facility" under Category G (Parks, Recreational, Others), in Section IX (Eligibility Considerations by Facility), Chapter 8 (Permanent Work Eligibility) of the Public Assistance Program and Policy Guide (PAPPG). Currently, the PAPPG states that "unimproved natural features are ineligible." However, this guidance is inconsistent with FEMA HMA programs, as well as the Infrastructure Investment and Jobs Act, passed by Congress in 2021, both of which recognize nature, natural infrastructure, and NBS as real infrastructure capable of providing hazard mitigation services and other benefits. Further, damage to natural areas as a result of wildfire, drought, and other hazards can entail significant costs to local communities, both as a result of their immediate restoration (repair) costs and ongoing loss of function.

FEMA could update the list of "Cost-Effective Public Assistance Hazard Mitigation Measures" in Appendix J of the PAPPG to include additional measures that leverage NBS. FEMA has already included one direct reference to NBS in Appendix J, in the "Drainage Structures" section: "The Applicant should consider using green infrastructure techniques such as bioswales, bioretention, rain gardens and similar techniques that may be used in public drainage systems." Greater detail could be added here, and similar references (and incentives) could be developed within other existing and new hazard mitigation measures.

2. Another related opportunity, building on the theme of recognizing natural infrastructure as "real" infrastructure, is consideration of natural infrastructure within damage assessments for major disasters. FEMA recognizes the economic value of natural infrastructure—such as forests and wetlands—within its BCA Toolkit, yet damages to natural infrastructure are not counted when tallying the costs of a major disaster. Wildfires in particular can result in massive damages to forests and other natural infrastructure. Considering these damages in the damage assessments of major disasters would provide at least two benefits. First, it would help FEMA more accurately count the costs associated with disasters. Second, the cost of a disaster determines the PA assistance and therefore HMGP assistance that states can receive following a disaster. This is important because even if a forest is not infrastructure in the traditional sense, some agency or entity still ultimately needs to pay to repair or restore it to replace its lost function. PA funding could initially help to "repair" natural infrastructure, and then additional HMGP funding could support additional hazard mitigation investments within the state, including NBS.

To begin, FEMA could start with a scoping study with the goal of developing a proposed methodology for incorporating the damages associated with natural infrastructure into damage assessments. For example, one valuation approach could be to use the “replacement cost” of the damaged natural infrastructure, such as the cost of restoring a forest following a catastrophic wildfire. Another approach could be to value the “lost ecosystem service benefits” as a result of the disaster, using FEMA’s pre-calculated ecosystem service values from the BCA Toolkit as a proxy for the impacted ecosystem(s). An example of this method can be found in an analysis by Earth Economics of damages to ecosystems resulting from the 2013 Rim Fire in California, which was not officially included in the damage assessment, but was included in the package submitted by then-Governor Jerry Brown to FEMA that helped inform the President’s decision to declare a major disaster. FEMA recently issued a new set of pre-calculated ecosystem service values for use in its BCA Toolkit, which includes pre-calculated values for a range of existing and new land cover categories, including an updated value of \$12,589/acre/year for forest ecosystems. Thus, the cost of damages to a forest as a result of a wildfire could be represented by the (discounted) present value of ecosystem services lost while the forest recovers from the wildfire (i.e. \$12,589/acre/year * number of acres impacted * number of years).

FEMA could then develop retrospective analyses and/or case studies of previous disasters, to understand the implications of different methodologies. Pending the results of such a scoping study, FEMA could then develop a new policy and guidance on how to incorporate natural infrastructure and ecosystem services into damage assessments, or if required FEMA could work with Congress to update the Stafford Act to enable such an approach.

These ideas would be another way to embed consideration of the real economic value generated by nature into FEMA’s decision-making processes.



Conclusion



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In recent years, FEMA has made important progress in its support for the use of NBS for hazard mitigation, ranging from policy and program updates to the creation of technical resources. This is important, as there is a clear long-term shift towards increased use of NBS, spurred by local desire for NBS and the multiple benefits they provide and the need for flexible and effective solutions for adapting to future conditions such as climate change, and supported by the continued maturation of NBS-related concepts in the fields of design, engineering, and economics.

To help FEMA build on existing momentum and stay ahead of new opportunities, this report presents a wide range of opportunities and recommendations to speed adoption of NBS and shift the narrative around NBS from novel and risky to familiar and widely understood. Adoption of some or all of these recommendations will ultimately result in a greater number of cost-effective NBS projects that support equitable hazard mitigation outcomes, reduce risk to communities, save taxpayer dollars, and generate a range of desirable environmental and social benefits.

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COMMON TERMS & ACRONYMS

BCA	Benefit-Cost Analysis
BCR	Benefit-Cost Ratio
BRIC	Building Resilient Infrastructure and Communities
C&CB	Capability- and Capacity-Building
Cal OES	California Governor's Office of Emergency Services
CTP	Cooperating Technical Partners
DOP	Duplication of Programs
DRRA	Disaster Recovery Reform Act
EDRC	Economically Disadvantaged Rural Community
EHP	Environmental & Historic Preservation
ELI	Environmental Law Institute
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance
FSR	Floodplain and Stream Restoration
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
LHMP	Local Hazard Mitigation Plan
LTA	Land Trust Alliance
MSA	Master Stewardship Agreement
NBS	Nature-Based Solution(s)
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
OMB	Office of Management and Budget
OPR	California Governor's Office of Planning and Research
PA	Public Assistance
PAPPG	Public Assistance Program and Policy Guide
PDM	Pre-Disaster Mitigation
PEA	Programmatic Environmental Assessment
SHMP	State Hazard Mitigation Plan
TNC	The Nature Conservancy
TNC CA	The Nature Conservancy, California
WA EMD	Washington State Emergency Management Division



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