RIVER VOICES

A RIVER NETWORK PUBLICATION

DISASTER PREPAREDNESS

The Road to Resiliency
January 2016 Issue

river NETWORK
connecting people · saving rivers

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MISSION, VISION, AND FOCUS

River Network empowers and unites people and communities to protect and restore rivers and other waters that sustain all life. We envision a future of clean and ample water for people and nature, where local caretakers are well-equipped, effective and courageous champions for our rivers. Our three strategies for focused investment are strong champions, clean water, and ample water.

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Cover photo credit: D.T. Stephensen

IN THIS ISSUE

Pick up a newspaper and on nearly a weekly basis you'll find a story about a disaster where water plays a lead role. From the contamination of drinking water due to lead pipes in Flint, Michigan, concern somewhere in the west about why creeks turn orange and what to do about acid mine drainage, to the massive dam failure in Brazil whose toxic mud engulfed downstream communities and cut off water supply, disasters are everywhere.

But when disaster strikes close to home, the experience is completely different. You feel it viscerally, personally, emotionally, and economically. It stops you in your tracks and rearranges your priorities. And if the disaster is related to a climatic event, you may stand back in wonder as your normally placid local stream becomes a frothy brown torrent of trees, cars, and parts of roads. With all that power moving downstream, who or what lies in harm's way?

As the articles in this issue of *River Voices* explain, we can do more to prepare for disasters and build resiliency into our ecosystems to help protect people from danger. We can also build resiliency into the social systems that we need to recover more quickly. Both investments are crucial to building a more sustainable future for people and nature. If you haven't done so already, now is the time to build your own disaster response plan, to identify who you will work with to assure your river is restored after disaster strikes, and to help engage your community in this rebuilding process.

As with all issues of *River Voices*, we hope these articles inspire you to explore further. **Thank you contributors!**

HERE ARE A FEW OTHER IMPORTANT ANNOUNCEMENTS FROM YOUR FRIENDS AT RIVER NETWORK:

- Nominate your peers for this year's **River Hero Awards**. February 5 deadline.
- Register now for **River Rally 2016**. Early bird rates through April 22. Join us this year!
- Need financial assistance to attend Rally? **Apply for a scholarship** by February 19.
- Register for **upcoming webinars** on a variety of topics.
- Please support us through your **donations** and **membership**.

Nicole Silk, President
River Network

DISASTER PREPAREDNESS AND THE ROAD TO RESILIENCY

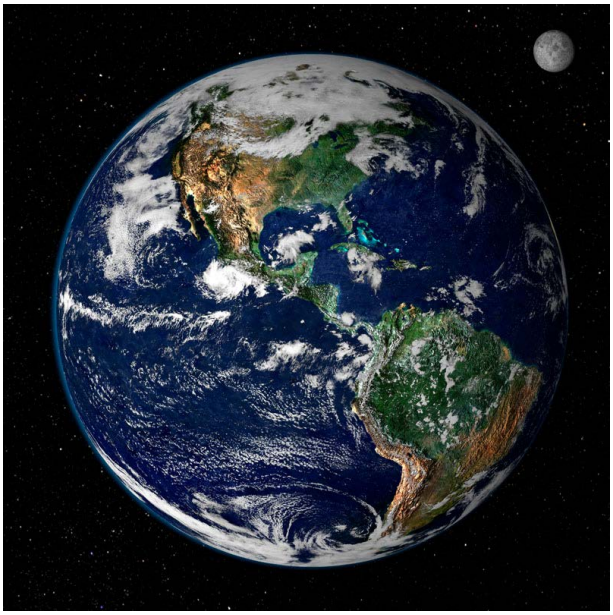
by Barb Horn, Colorado Parks and Wildlife and Nicole Silk, River Network

In North America, Europe, and many other developed countries, ample evidence suggests that water is abundant and technology will take care of our future water supply needs. Consider the water fountains in urban areas, misters in restaurants in Arizona during the summer, car washes, theme parks with water slides, sprinkler and irrigation systems to keep our lawns green and crops fed.

Of course, this is a false paradigm. The world we depend upon for our water supply actually has very little freshwater.

If you imagine the earth as a giant marble covered mostly in blue (indicating water), 97% of this blue color is salt water, and the remaining 3% is largely frozen - leaving less than 1% for plants, animals, and human use and enjoyment. Said another way, accessible freshwater is just one drop in a five-gallon bucket. This tiny amount of freshwater is continually reused through the hydrologic cycle, falling to the earth in precipitation, flowing downhill through our rivers, lakes, and groundwater, moving through plants and fueling our economy, then returning to the atmosphere through transpiration and evaporation to begin the cycle anew with a finite amount of water.

Disasters, both human or natural, bring attention to our dependence on water and the rivers that flow through our communities. With the frequency and intensity of climate related natural disasters on the rise[1], we must do more to build resilient and sustainable systems that support people and nature. And



Earth from Space. Source: **Flickr/Creative Commons by NASA** under **CC BY,** cropped.

that transformation requires agile thinking to reexamine the scientific, economic, societal principals and beliefs that underlie our existing social structures and identify new relationships and priorities for more effectively allocating limited resources.

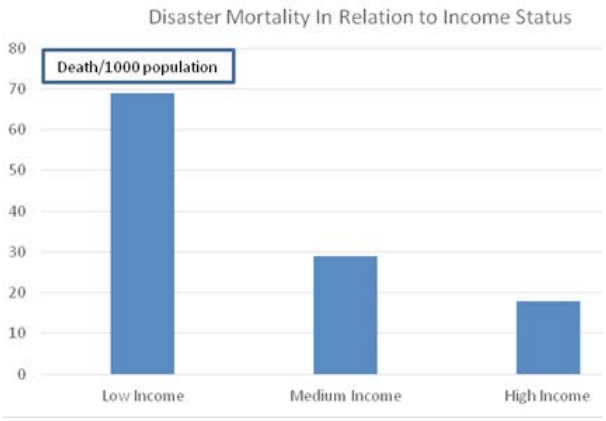
How we respond to disasters is a reflection of how we structure society and allocate resources (R.Kent 1997). And these societal systems and structures reflect the dominant paradigms or beliefs of that society. Agile thinking helps us break through those ways of operating. For example, all sectors of the community are impacted by disasters, including environment, health, safety, education, food and housing. Through agile thinking, we can find new ways to work across these sectors in a coordinated and cohesive manner. The end result can be applied to disaster planning and result in greater community readiness and resilience to disasters.

[1] According to the New England Journal of Medicine, three times as many natural disasters occurred between 2000 and 2009 as compared to between 1980 and 1989. The vast majority (80%) of these events classified as "hydrologic" (storms, storm surges and coastal flooding) and "meteorological" (storms, tropical cyclones, local storms, heat/cold waves, drought and wildfire). In comparison, geophysical disasters (earthquakes, volcanic eruptions, dry rock falls, landslides and avalanches remained fairly stable since the 1970's. N Engl J Med 2013; 369:1836-1842 November 7, 2013 DOI: 10.1056/NEJMra1109877.

A key connection illuminated by an agile lens is the connection between access to resources, resiliency and the degree of loss and suffering experienced in disaster response and recovery. Equality in this context represents more equal access to resources and decision making influence, essential ingredients to creating strong and resilient communities. Over time, strong and resilient communities require fewer resources for disaster preparation, experience fewer and shorter duration human caused disasters, and respond and recover from natural disasters more quickly. Communities lacking this equality either are already sacrifice zones (economic, environmental, safety, health, education, food deserts and housing) or have a greater chance of exposure. Inequality results in fewer prepared communities capable of disaster resiliency which creates more and more sacrifice.

We have evidence of this already. The graph on this page is one example that compares mortality rates from disasters against development status. Development status, measured by income levels, is an indicator of economic vitality and capacity that translates to the ability and capacity of a community to provide and protect itself, to expand, and grow. The mortality rate in this graph is the number of deaths per 1000 people due to a disaster. This graph shows that low income communities suffer disaster mortality rates more than two times higher than high income communities (about 70/1000 versus less than 20/1000) and medium income (30/1000). Cost and loss associated with disasters that are not absorbed in a community's response and recovery is externalized to communities with capacity.

Communities with a low income (measured by Gross Domestic Product or the monetary value of goods and services moving in, through and out of a community) tend to also have inequalities that exist in current systems - economic, education, health, safety or environmental - which perpetuates a status quo and the ability to break out of a low development rate status cycle. Such communities often have limited agility and capacity to disaster plan, respond, and recover, and suffer greater loss when disaster strikes.



Source: Centre for Research on the Epidemiology of Disasters, Belgium in World Health Organization / Environmental Health Association (EHA) Panafrican Emergency Training Centre, Addis Ababa Updated March 2002 by EHA.

River Network's October **2015 Diversity and Inclusiveness issue of River Voices** illustrated why addressing diversity and inclusiveness, equality indicators, is essential in forging a new water paradigm as environmental hazards have a disproportionate impact on minority communities, economically disadvantaged areas and people who have less political influence. River Network believes we can no longer ignore the trend of increasing disasters and our vulnerability and also retain our quality of life with abundant and clean water. We can create transformational change by focusing on the lack of attention, resources and capacity building provided for disaster preparation. The less we prepare, the more resources will be needed for response and recovery and the cost of life and property will be higher and our ability to achieve resilient communities will slip away. Changing the disaster cycle for all communities requires direct engagement with constituents within our communities, water managers and decision makers.

DEFINITIONS AND EXPLANATIONS

Disasters can be natural or human caused. They can occur suddenly and only one time or they can occur over time and more than once. Disasters as we know them can be natural or human caused, that is our first tier. Disasters can occur suddenly and only one time (tier one) or can occur over time and more than one time (tier two). These tiers can help us

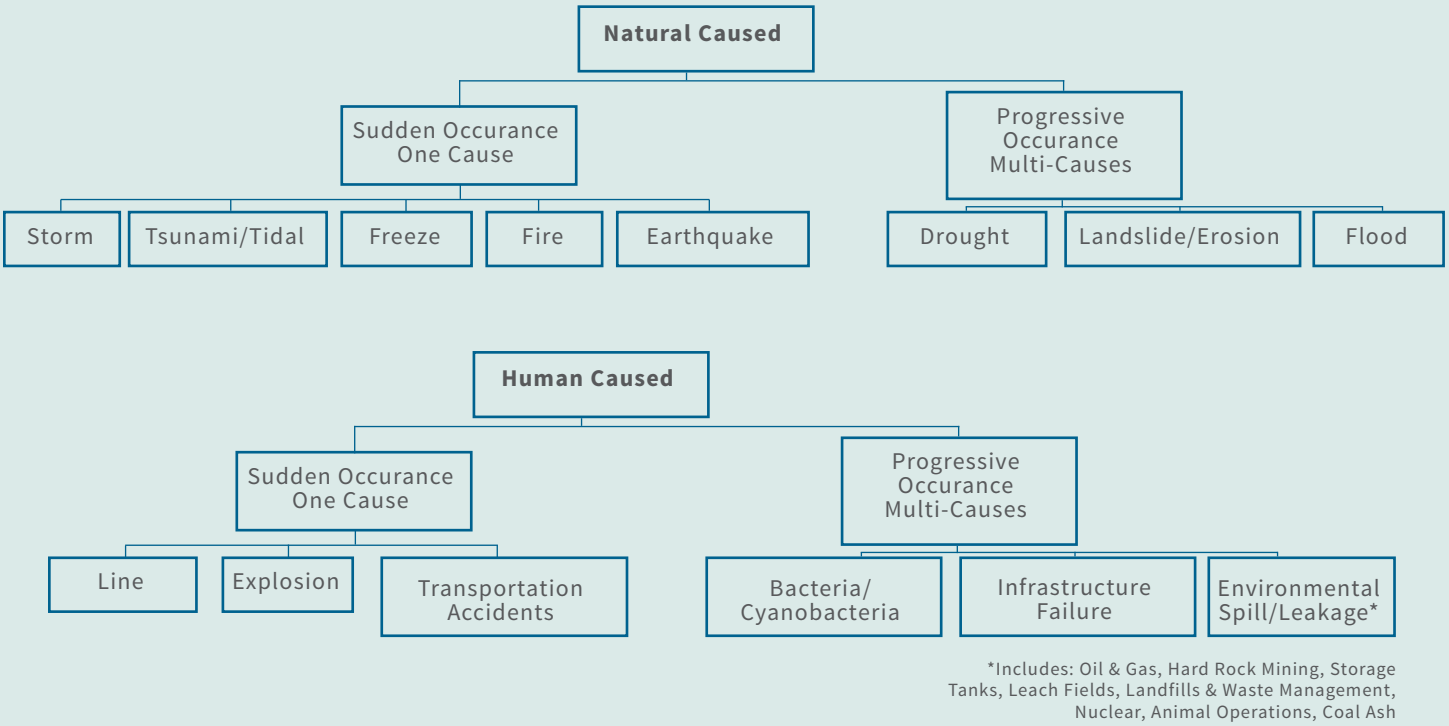


Figure 1: Natural and Human Caused Disasters. Source: Adapted from World Health Organization / Environmental Health Association (EHA) Panafrican Emergency Training Centre, Addis Ababa Updated March 2002 by EHA.

distinguish between symptoms and triggers as well as between acute and chronic disasters.

Acute events by definition are infrequent, short in duration and intense in magnitude resulting in mortality and significant losses. Often we associate acute disasters with natural geophysical events such as earthquakes, volcanoes and hurricanes. They happen infrequently and have degrees of intensity. We have warning systems to aid effective response and recovery that limit loss and provide resilience. However, we now know that natural geophysical events can be exacerbated by human activity, increasing the frequency, duration and or intensity of geophysical events (e.g., due to drilling practices). In short, when acute events become more frequent, with less recovery time between events, we cannot adequately rebound (resilience).

Chronic events by definition occur more frequently, last longer but are lower in magnitude and have less impact in scale or scope than an acute event. Second hand smoke exposure is a classic example of chronic impacts which could range from dirty windows, smelly clothes, to short term breathing issues to lung cancer and eventual death. Chronic negligence can create a disaster as well as ignoring a chronic condition that escalates into an acute condition. Once acute, the cost for all involved is significantly higher than it would have been to manage the chronic event (e.g., Gold King disaster in Colorado). We have many systems in place that adequately address chronic hazards and keep them from becoming large scale and scope disasters such as emergency planning that is funded and occurs at city, county, state and federal levels.

River Network will focus on acute disaster planning and preparation due to the higher risk and leverage toward community resilience. Focusing on acute disasters will create changes that evolve chronic planning, response and recovery as well. This is not always the case in reverse. Acute disaster planning will be applied to water-related potential hazards and disasters (listed in Figure 1) in our effort to build relationships and capacity that produces disaster community resilience and help communities do the same.

To be strategic in each potential hazardous area and focus on disaster preparation and planning

we need to have a common vocabulary and understand key choice points in the disaster cycle, how we get stuck in it and how to get out of it. Not every natural event is a disaster. A disaster occurs when our normal conditions of existence (quality of life) is disrupted causing a level of suffering that exceeds the capacity of the affected community to adjust, correct, respond and recover. Disasters have a continuum upon which they develop. The diagram below illustrates this continuum.

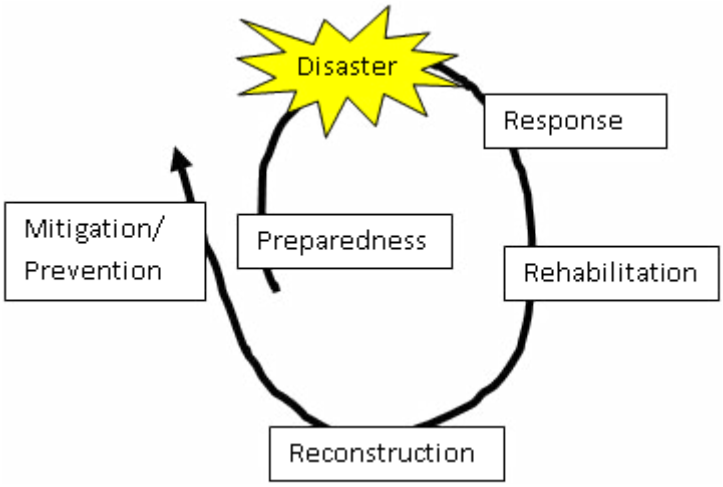


Diagram 1: Disaster Continuum adapted from World Health Organization / Environmental Health Association (EHA) Panafrican Emergency Training Centre, Addis Ababa Updated March 2002 by EHA.

Each community has a degree of disaster vulnerability. Low vulnerability communities avoid entering the disaster cycle because they have effective disaster planning and preparation that includes agility thinking. They are in effect doing the most they can with what they have. In the event a disaster strikes, they will exit the disaster cycle with effective response, rehabilitation, mitigate and recovery without suffering great losses and with an acceptable quality of life. That is resilience. When a community with low disaster vulnerability experiences a triggering event, perhaps a flood, drought, hurricane or toxic spill for example and calls it a "hazardous condition", they respond and return to a state that equals a pre-existing state and function. They have normal response capacity or an emergency response capacity that suspends a normal response to conduct an extraordinary response to avoid disaster. Each hazardous event exposes a vulnerability that is responded to, agile thinking happens, adjustments are made and the vulnerability removed or reduced. If a low disaster vulnerability community does experience a disaster (something out of their control) they have the capacity to respond, rehabilitate, reconstruct, mitigate and recover to an acceptable quality of life. That is resilience. This includes social functions, socio-economic functions as well as environmental. These communities will exit the disaster cycle and avert a similar disaster from repeating because their response also includes post disaster agility thinking and they evolve disaster planning and preparation accordingly.

Conversely, a community with high disaster vulnerability cannot exit the disaster cycle and often spirals down so deep that it externalizes costs to low vulnerability communities, even putting them at greater risk. We have already seen how communities with existing resource and decision making inequalities have increased disaster vulnerability. At risk for them is the ability to effectively plan to avert a disaster and implement agile thinking and changes. As such, more chronic hazards evolve to acute disasters and they are unable to adequately respond, rehabilitate, reconstruct, mitigate and recover because most resources are funneled into one disaster response after another. This leaves little to no resources for the mitigation, rehabilitation, agile management needed to plan and prepare for any disaster and exit the disaster cycle. So, they stay in the disaster cycle as it repeats itself in a downward spiral keeping community resilience out of reach. Costs are externalized; for example, every year Western governments spend 100 billion dollars subsidizing power stations, contributing to global warming; 300 billion subsidizing agriculture, contributing to deforestation and overgrazing; and 50 billion subsidizing fisheries, contributing to overfishing (World Watch Institute, 1996).

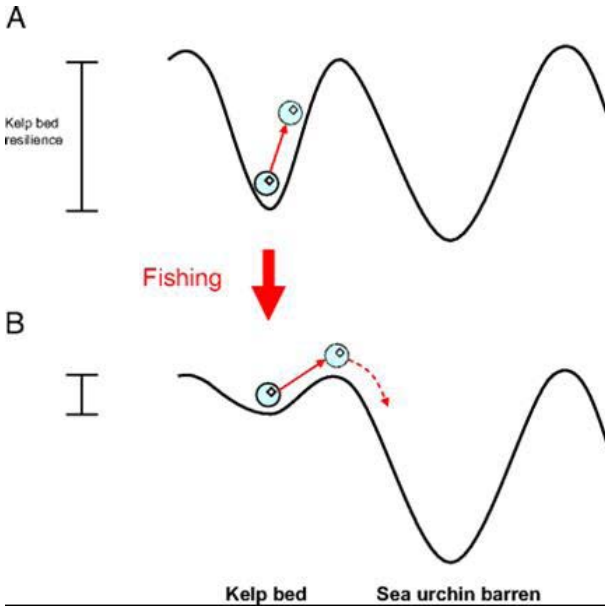
Disaster vulnerability is a function of capacity and capacity is a function of access to resources, decision making and power. It is also a function of disaster prioritization, planning and preparation. This is required to build community disaster resilience. We need a common understanding of resilience because resilience means change, it does not mean retaining status

quo. If we do not understand where change needs to occur across sectors then we will not achieve community disaster resilience.

DISASTER RESILIENCE

Resilience is simply defined as adaptability or capacity to recover, in this context from a disaster. **Resilience Alliance**, a Swedish non-profit that provides resources for community and government resilience planning, defines resilience as the ability of a system to absorb a disturbance and still retain its basic function and structure. A system in disaster context may be an environmental, economic or social system. They encourage resilient thinking which incorporates concepts of sustainability and the challenge of servicing degradation. Resilient thinking takes one out thinking the developed approaches and systems that are not resilient. It means guiding a system of adaptation in an attempt to preserve some qualities and allow others to fade away, while retaining the essence of the system.

Inherent to a resilient system is the ability to change, which can seem counter to maintaining or returning to status quo after a disaster. Resiliency requires change, necessitating adaptivity in our structures, systems and paradigms or beliefs that built inflexible systems. A systems response to a disaster causes a shift to an undesirable state, but if the system is resilient, it will return to a new norm. The new norm may not be identical to pre-disaster conditions but it is an acceptable in structure and function. This is represented in Illustration A (right column) by a large enough wave length in Kelp Bed resilience. The blue circles represent a disturbance that moves the community up the wave but not over into the next trough. Compared to Illustration B, where the first trough is not deep and a disturbance breaks down a critical set of thresholds (could be physical, economic, social, etc.) and bumps the community into a completely new normal. In that case, "new" means what was is lost, the landscape gone in structure and function and maybe even existence. A real world example of this could be islands being buried by the ocean, or deserts expanding and causing mass migrations due to climate change and exacerbated by a host of other system failures.

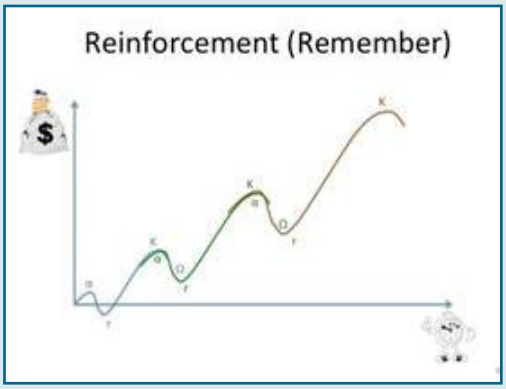


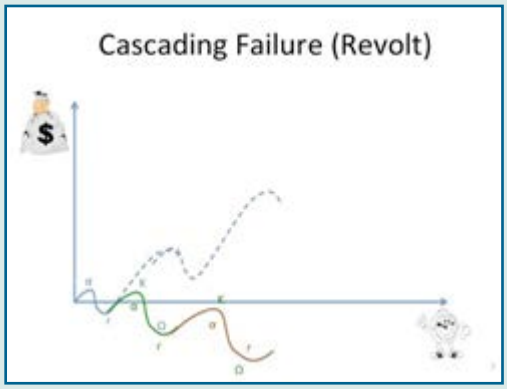
Illustrations A and B: Kelp Bed Reslience. Source: World Health Organization / Environmental Health Association (EHA) Panafrican Emergency Training Centre, Addis Ababa Updated March 2002 by EHA.

Resilience then, is the long term capacity of a system to deal with change and continue to develop and adapt, yet remain within critical thresholds and maintain an acceptable quality of life. We get there by holistic disaster management that keeps each system in its current state or better. Adaptation and agile thinking are keys to any disaster management approach. A common practice becomes standard until it breaks thresholds increasing vulnerability and opens the door for emerging and new practices. When adaptation is part of the disaster management culture, emerging and new practices are incorporated and are reinforced and remembered creating resilience. When adaptation is not part of disaster management, communities enter into a cascading spiral of destruction, never able to regain original conditions and causing a revolt (see graphs on top of next page). This is equivalent to a community staying in the disaster cycle but to the degree there is never a lasting return to an acceptable quality of life and in fact a the new norm changes what and who can even live in the community.

MOVING FROM EMERGENCY MANAGEMENT TO DISASTER MANAGEMENT

As illustrated above, you will stay stuck in the disaster cycle if all efforts and resources are





Integrating disaster resilience into disaster management is critical. Source: World Health Organization / Environmental Health Association (EHA) Panafrican Emergency Training Centre, Addis Ababa Updated March 2002 by EHA.

in response, which is what we call emergency management. You cannot break out of the disaster continuum until critical masses of resources are invested in prevention and preparedness which reduces vulnerability and increases resilience. This ability, once a community has experienced a disaster and successfully enters mitigation and prevention and exit the disaster continuum, is called post traumatic growth. Emergency management is equivalent to disaster response capacity. The more prepared for a disaster a community is, the more effective and efficient disaster response. Emergency management designed to produce a disaster resilient community will be inclusive and comprehensive consisting of adequate plans, resources and procedures to active accurate and timely information and authority, synchronizing key institutions and partnerships. This lowers vulnerability, reduces and even avoids potential losses from hazards and disasters, assures prompt and appropriate assistance to all victims when necessary and achieves rapid and durable recovery. Effective emergency management creates a response that is adequate but not all consuming and allows a community to move quickly to disaster management.

Disaster management integrates relief (recovery, rehabilitation and reconstruction) with development (risk reduction, mitigation, prevention and preparedness). Development in this context is identifying which paradigms and systems need to change, evolve, be destroyed, reinforced or rebuilt during recovery. Mitigation

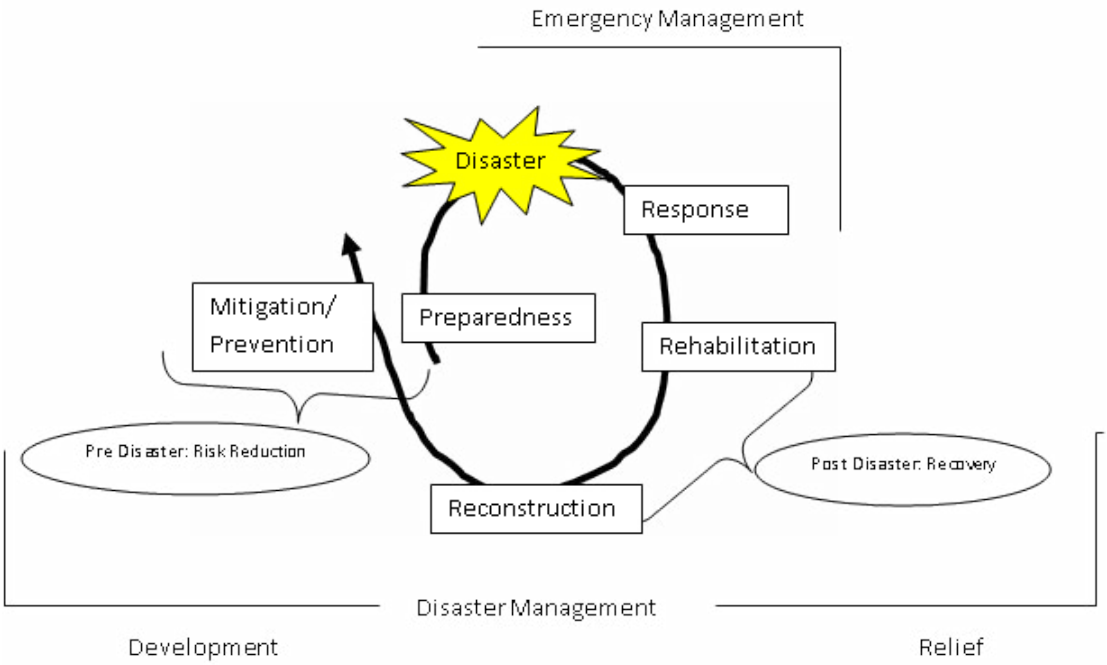
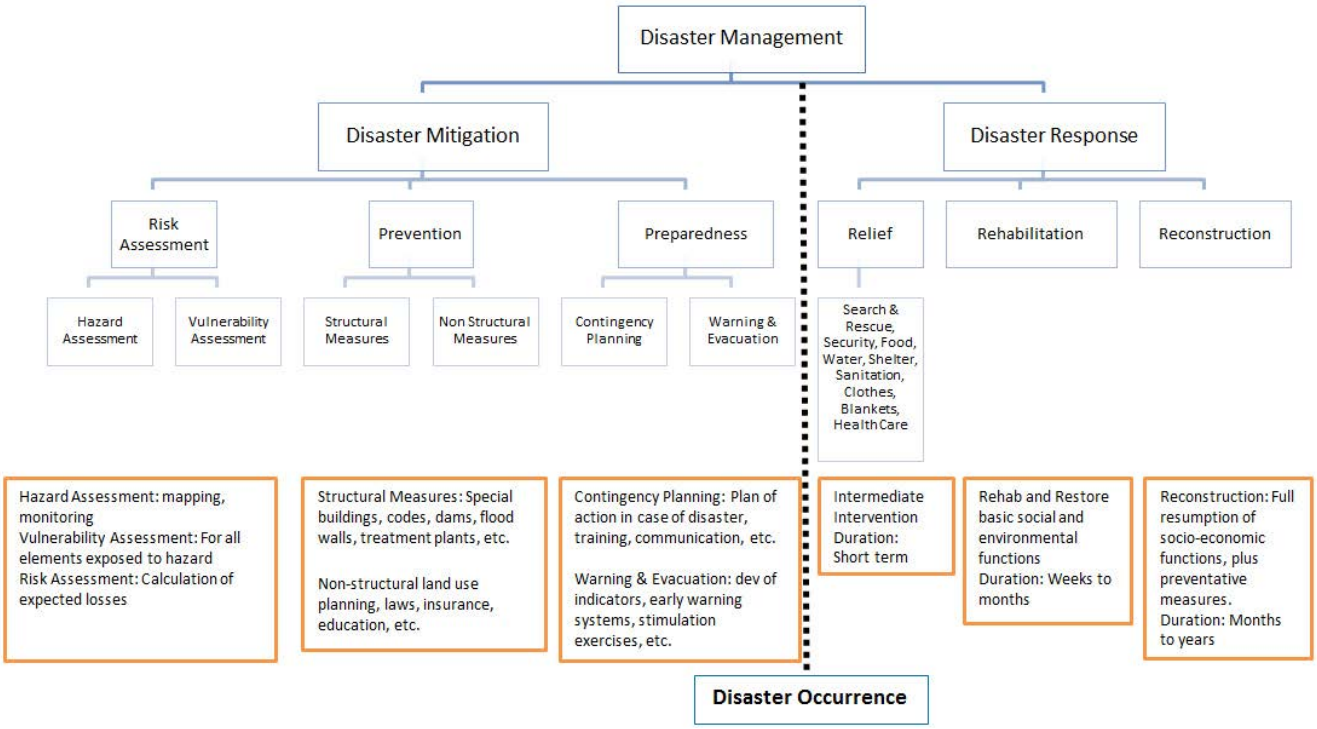


Diagram 2: Disaster Management adapted from World Health Organization / Environmental Health Association (EHA) Panaafrican Emergency Training Centre, Addis Ababa Updated March 2002 by EHA.

refers to both reducing the presence of hazards and disasters (which reduce vulnerability and risk) and also evolving preparedness (which reduces the effects of hazards or disasters), increasing response capacity. Mitigation here is a pre-disaster concept. All of this is agile thinking. This is planning to become or remain a resilient community. Resiliency does not mean return to status quo after a disaster; it means living and implementing agile thinking. Prioritizing disaster preparedness and integrating relief and development activities if disaster strikes are what allows a community to exit the disaster cycle and sustain resiliency.

Many communities focus attention and resources primarily on emergency management and assume successful relief (recovery) and development will follow. However, current paradigms have not created systems that prepare communities to avoid preventable disasters or if disaster strikes seamlessly move communities through effective emergency responses and into relief, recovery, mitigation and prevention. We see our failures in what have become sacrifice zones after recent hurricanes in the north and south, after the Gulf Oil spill and other disasters. We can also find examples of communities that did exit the disaster cycle and have rebounded and become resilient against some disasters. We advocate that a holistic disaster management resource guide and process would include these key elements:

- Disaster preparedness planning
- Vulnerability and risk assessment
- Disaster response (emergency management)
- Disaster assessment
- Rehabilitation and reconstruction
- Disaster mitigation (prevention, risk reduction, preparedness adaptation)



The figure[2] above illustrates disaster management in terms of mitigation (pre-disaster) or response (post disaster) and the leading activities associated with each area.

The orange boxes illustrate some activities you might already be involved with, but note how each activity is related to producing an overall disaster resilient community. Perhaps you can evaluate the status of your community's disaster management and vulnerability by evaluating what exists and its functionality in each of the areas. For example, many communities do not have current flood plain maps. That activity falls in hazardous assessment and drives activities in the flowing areas for effective flood prevention. After Hurricane Katrina, in the rehabilitation and restoration phase, flood walls and levees were rebuilt for hurricane level 3 storms when scientific data shows the area will be exposed to a higher frequency of category 4 and 5 storms. The current paradigm and systems involved in restoration in this example did not include agile resilient planning or recovery. Many communities are using the power and resources they have to change this paradigm and decrease their vulnerability and increase resiliency by restoring wetlands, changing how buildings are built and the way water flows through neighborhoods and changing the systems one belief at a time that in essence allowed a disaster. They are claiming their power and bringing agile thinking and equality to their neighborhoods.

How can you be part of making your community disaster resilience? Get familiar with the disaster cycle and the six key elements identified above. As you read the other articles in this issue of *River Voices*, look through the lens of the disaster cycle, find examples of communities practicing agile thinking, and consider what might work where you live and work. How can you take the first step in your community? The first step is bringing awareness to disaster planning. Finding gaps, old paradigms and systems that need updating can be the basis of forging new relationships and conversations that will begin disaster prioritizing across sectors and cultivate agile thinking and equal access to resources, decision making, and power. Disaster planning and prevention will always cost less than recovery and rehabilitation and save more lives and spare property.

[2] Adapted from World Health Organization / Environmental Health Association (EHA) Panafrican Emergency Training Centre, Addis Ababa Updated March 2002 by EHA

CRISIS AS AN OPPORTUNITY FOR CHANGE

by David Lillard, West Virginia Rivers Coalition

On January 9, 2014, more than 300,000 West Virginians learned their drinking water had been contaminated by a chemical leaking from a storage tank. One in six West Virginians had no access to safe water.

We can't say we were prepared for what came next, but we were ready to act. Our board had adopted a strategic plan that allowed staff to respond quickly, and we had in place a group of science and policy experts — our Water Policy Work Group. We had the historic context to the crisis that national and international media were clamoring for; and we had new — as yet untested — communications tools.

From the first moments, it was clear there was an information void. The state had no plans in place to deal with this emergency and no information on the chemical itself. Confusion reigned.

Two things, though, were clear. Politicians would try to make this a story of one bad actor—storage tank owner Freedom Industries. And there would be a rush to legislate so lawmakers could say this crisis could "never happen again."

There was an opening, and we stepped into it. Four strategies, implemented simultaneously, made the difference.

RAPID COMMUNICATIONS RESPONSE

Lesson 1: Get out in front, frame the dialogue. *Within weeks, we were quoted in nearly 70 news broadcasts and publications. Our message was clear: This was no accident; it was systemic failure. Comprehensive reform was needed.*

With national media flocking to the scene, we put out a strong statement placing the leak in the context of willful failure to regulate. We distributed an op-ed to the paper serving the state capital calling on government and West Virginians to change our relationship to water and the environment. It was syndicated nationally.

We gave hungry reporters the context they needed. They started calling — some of them from cars and airports en route to Charleston.

Admittedly, we had no formal crisis communications plan at the time. We held daily meetings on how to respond with the tools we had in place. Luckily, we had just established a Twitter account — social media was the primary way reporters looked for leads and how people got news as new information emerged by the minute.

RESEARCH

Lesson 2: Be a credible resource. *In times of crisis, people want answers. Politicians wanted to know what happened and what could be done. We helped by giving them a document that formed the framework for policy reforms.*

Shortly after a "do not use" order was issued, our executive director Angie Rosser and science advisor Evan Hansen of Downstream Strategies aggressively pursued a fact-finding mission.

They researched federal and state laws and regulations that applied to the Freedom Industries site. Only eleven days after the crisis began, "The Freedom Industries' Spill: Lessons Learned and Needed Reforms" became national news. It was an indictment of government inaction.

Our report uncovered irrefutable evidence that West Virginia had legal authority to oversee and inspect the Freedom Industries facility. It noted multiple failures by local, state, and federal agencies. The report generated an even stronger surge of media interest.

Then something remarkable happened. Instead of running from the report, committee chairs requested public presentations of the findings and recommendations. House leadership put a copy of the report was on every Delegate's desk.

Ultimately, "Lessons Learned" offered the framework for reform and systems change. It focused the dialogue on clean water and the future — not just chemical spills.

RAISING A VOICE FOR THE COMMUNITY

Lesson 3: First listen, and then organize the community for action. *As the crisis waned, the time for political action came. When the legislature held a public forum on policy reforms, hundreds of people showed up. They demanded change. And when debate began on reforms, we brought the force of community to the Capitol.*

People had to choose between washing their hands or taking a drink; they couldn't shower or wash dishes. Spontaneously, they came together at forums and meetings — first focused on helping one another, then to demand change.

Evening after evening, West Virginia Rivers and other partners attended and hosted meetings where people could be heard. For many, this was their first moment of activism. Our job was to empower and bring voice to this new movement.

We listened to them. We used our media access to share their voices, their language. Suddenly, when people watched the news or read a newspaper, they heard us sharing their concerns and their hopes.

Many of them connected with us by joining our action alert listserve and through social media. We gave them specific actions they could take to address their concerns. We saw how important it was to channel their energy and outrage into constructive action.

BUILD POLITICAL POWER

Lesson 4: Crisis provides a chance to build power. *Crisis gave us a chance to make changes. But lasting change comes only through sustained, unrelenting effort. A crisis can help build political power and broaden support, so that with each opportunity we are stronger.*

In the first days of the crisis, the health, faith, business and social justice communities came together to share information and execute a rapid response to the crisis. Groups from the environmental community were also meeting.

The two parallel efforts soon blended into a "Safe Water Roundtable" that included the traditional environmental community and dozens of diverse citizen groups and individuals — some newly formed out of the crisis.

Image credit: Rich Katz

Image credit: Rich Katz

As the legislature debated reforms, the Safe Water Roundtable kept the pressure for reform strong. We continued to serve as a technical resource to the Roundtable and lawmakers.

It worked. The most significant water protection legislation we've seen in a generation passed, unanimously.

The new law mandated protection plans for source water and stronger regulation of chemical storage tanks; it contained many of the recommendations from Lessons Learned. Working with new allies, we had helped frame the dialogue, offer a path to policy reform, and bring voice to the people.

A year later, without the pressure of crisis, the legislature weakened some of our hard-won gains. We held ground on important reforms, but with the crisis in the rear-view mirror, some changes were hard to sustain.

WHEN THE NEXT CRISIS CAME

A year after the West Virginia water crisis, a train carrying Bakken crude oil exploded on the Kanawha River. This time we were prepared. With one 30-minute staff meeting, we had a schedule for press releases, action alerts, social media, and contact with our Congressional delegation.

The water crisis did not change everything, but it changed West Virginia Rivers Coalition. We have a communications template for responding to every situation; we have stronger relations with lawmakers and regulators. We have a larger activist network.

What began as a tragic pollution event sparked a new conversation about what is possible for West Virginia: a transformation of the environmental movement built from the ground up by people from all walks of life.

Now we are using the Roundtable model to build regional coalitions that are diverse and inclusive. We hope these alliances will lead to lasting change and improved quality of life in West Virginia — not just in times of crisis, but every day.

LEARN MORE

Op-ed: **Chemical Spill A Predictable Water Crisis**, Charleston Gazette.

West Virginia Water Crisis: Lessons Learned, Hope Renewed film.

Poisoned: West Virginia Water Crisis, video.

USING A WATERSHED PLANNING APPROACH FOR OIL AND GAS DISASTERS

by Emergency Response Unit for the US EPA, Region 8

Exploration and drilling in the Bakken and Niobrara Shale formations have pushed North Dakota, Wyoming and Colorado into the top 10 oil producing states. A significant percentage of the nation's oil production, thousands of miles of interstate pipeline, truck and rail transport are densely represented in the U.S. Environmental Protection Agency's Region 8 (MT, CO, SD, ND, UT and WY) and traverse not only the vast Rocky Mountains but also some of the country's largest tracts of pristine wilderness areas including major rivers and countless tributaries. More than a dozen oil refineries along with approximately 183 storage facilities, with storage capacities in excess of a million gallons of oil, dot the Region 8 landscape.

Because of the growth in the oil and gas industry, the potential for large-volume oil spills into watersheds has increased exponentially. The Oil Pollution Act of 1990 was enacted specifically to address the effects of major oil spills into the waters of the United States. This required that each region of the U.S. Environmental Protection Agency (EPA) develop strategic response plans. Region 8's original plans were developed on a jurisdictional basis over six states and 291 counties and required constant updating or they would become out-of-date.

In 2012, Region 8 developed a new approach to the strategic response plans by dividing the six states into ten watershed areas. The watershed approach is more inclusive than the jurisdictional approach and applies to all downstream users regardless of jurisdictional boundary. This approach substantially enhances partnerships with federal land management agencies (trustees), tribal authorities, state and local emergency responders, other relevant stakeholders and industry.

SIDEBAR: LESSONS LEARNED FROM THE SILVERTIP PIPELINE BREACH

At midnight on Friday, July 2, 2011, a 10-inch crude oil transmission pipeline severed by debris-laden floodwaters discharged over 1,500 barrels of sour asphaltic crude oil into the Yellowstone River upstream of Billings, Montana. The local emergency manager initiated widespread evacuations to prevent exposure to volatile constituents of the crude oil. Notifications were made to downstream water users, including the Billings Water Treatment Plant serving over 400,000 residents. Oil industry response teams in the area mobilized crews to determine the source of the discharge and initiate appropriate response actions.

The spill occurred during peak runoff on a holiday weekend in a part of the country without a robust community of clean-up contractors. As a result, the spilled crude oil was carried over 80 miles downstream and dispersed into upland vegetation long before the nearest qualified contractor arrived with spill response and clean-up resources.

In the months of shoreline clean-up that followed the spill, local elected officials, state and federal government agencies and industry leaders began to discuss and evaluate what measures could be implemented to address these vulnerabilities. Among the ideas discussed was the creation of a comprehensive geographic response plan or Sub-Area Contingency Plan for the Yellowstone watershed that included pre-planned control point locations for stopping the spread of oil downstream.

One of the positive outcomes of the Silvertip spill was the responsible party financing of a Supplementary Environmental Project (SEP). This SEP provided funding for a comprehensive training program for local

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The first step in the process of creating a comprehensive geographic response plan is to identify likely locations where oil could be spilled into flowing water. This threat assessment involves looking at transportation corridors, including pipelines, highways and railroads, where spills would be likely to originate. Once these locations are identified, the planning distance associated with a worst case discharge is determined. This planning distance helps to identify the potential impact of a spill from fixed facilities or tankers in transit and identify where control points might be the most effective. The potential impacts and control points would identify the stakeholders that need to be included in planning efforts.

The criteria for selecting control points within each of the watersheds includes finding locations that are readily accessible for the deployment of response equipment and the recovery of spilled oil at any time of year, day or night. These locations include boat ramps, fishing access points, and highway bridge crossings over rivers. Control point locations may also include head gates for irrigation ditches and canals or water intakes for municipal water plants. Once the locations have been identified, a detailed tactical plan is developed to protect critical infrastructure, including intakes, deflect oil away from sensitive environments or other resources, or to contain and recover spilled oil.

emergency responders that included basic and advanced oil spill response tactics, including the deployment of boom into a river. The SEP funds provided equipment for first responders and the development of a region-wide centralized inventory of equipment needed for oil spill response.

When the Bridger Pipeline release occurred four years later in 2015, an inventory of where to find oil boom, vacuum trucks and other needed equipment had already been developed and was available on the Viewer, which was one of the goals of the Sub-Area Contingency Plan.

The Bridger Pipeline release, although similar in volume to Silvertip, occurred during the harsh winter months when temperatures reached a low of -5º F and, ice covered the river 5-feet thick. Here, ice prevented the oil from coating the riparian corridor as it had in Silvertip, and also made the sheen difficult to track by site or smell.

Of primary concern in the Bridger incident was that the Glendive water treatment plant was 6.5 miles downstream. As part of the already-developed Sub-Area Contingency Plan, Montana Department of Environmental Quality was notified and they implemented down-stream communications protocol, alerting the water treatment facility staff. Through earlier strategic planning, control points for the water treatment plant were already identified in the Viewer and were readily available to first responders.

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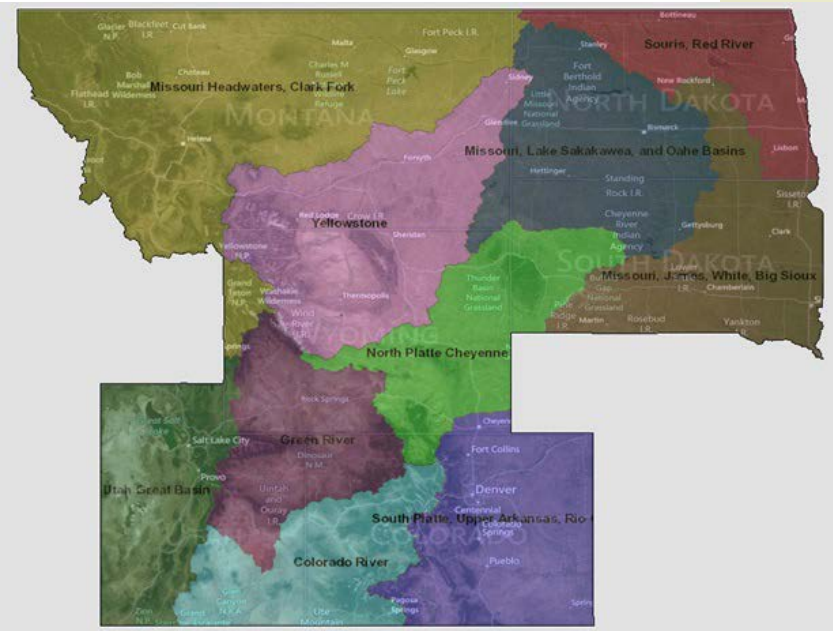


Status of the Comprehensive Geographic Response Plans (also called Sub Area Contingency Plans): Yellowstone, Mid-Missouri and Green are completed. Cheyenne/North Platte, South Platte/Arkansas, Colorado and the Utah Great Basin are in progress. The Upper Missouri/Clark Fork, Lower Missouri and the Red Sioux are planned. Image credit: US EPA

Image credit: US EPA

Included in the planning process is an interactive, web-based GIS-based Viewer. The Viewer is an important tool in the initial stages of a response and provides readily-accessible information to EPA's On-Scene Coordinators (OSCs), trustees, and state and local emergency responders. The Viewer integrates real-time information from numerous databases including facilities and pipelines; water bodies; water intakes; sensitive areas that are prioritized for protection in the event of a spill; land status; and pre-planned response strategies and control points as they are developed.

Also integrated into the Viewer are inland locations for Oil Spill Response Organizations (OSROs), identified when the U.S. Coast Guard revamped their classification system in 2013. EPA conducts preparedness visits to ensure their readiness for a spill response. EPA has been working collaboratively with industry partners to develop spill cooperatives and mapping out response resources and detailed geographic response plans for hundreds of control points. These geographic response plans are designed to help first responders and OSROs to identify viable control points downstream of spill locations and to implement containment and recovery efficiently.

GET INVOLVED

One way for stakeholders to get involved is to become a part of the planning committee chaired by the OSC. Interested stakeholders should call 303-312-6013.

LEARN MORE:

EPA's **General Information for Disaster Preparedness and Response**

EPA's Emergency Response in My Community

Federal Oil Pollution Act (1990)

The day following the breach, Glendive began receiving taste and odor complaints, but there was no sheen or odor at the treatment plant. Though the drinking water intake was 14-feet below the surface of the river and should not have been impacted by the oil, EPA sampled the clearwell (a holding tank prior to municipal distribution) and analyses showed elevated levels of hydrocarbons.

A "do not consume" advisory was issued and free bottled water was made available for area residents. Work began to flush the treatment plant's distribution system. Instructions were sent out to area residents on how to flush individual area homes. Sections were isolated, drained and clean water pushed out. The entire distribution system flush took about 36 hours.

In the first few weeks, crews worked on the ice, tethered to air boats that skated on the frozen surface, auguring holes in cracks or in uneven areas where oil gathered, squeegeeing and collecting what could be extracted, about 60 barrels.

Within a few weeks ambient temperatures soared and the ice became too thin to safely support work crews, terminating that phase of the project. With all of the oil that had been trapped in cracks in the ice and in uneven ice layers, a surge of off-gassing from the oil was expected at the water treatment plant when the ice break-up occurred. On March 14, after several 50-degree days, the ice broke and, as expected, concentrations of volatile organic carbons (VOCs) spiked, going from non-detect to more than 200 ppb. The ice had trapped much of the oil and had not allowed the typical off-gassing that normally would occur in a release. The treatment facility was notified ahead of time and the water intake valves were shut off, averting a second public safety issue.

THE DAY MY RIVER TURNED ORANGE

By Barb Horn, Colorado Parks and Wildlife

At approximately 9:00am on August 5, 2015, the Gold King Mine broke its earthen dam and spilled metals laden acidic sludge into the headwaters of the Animas River above Silverton, Colorado. At 9:00pm the following day, the front edge of the butterscotch butter beer looking toxic plume began passing through Durango, Colorado, some 70 plus miles downstream of the mine. My office sits 150 yards from the river.

Although the Town of Silverton did not have adequate advance warning to respond to the disaster, Durango officials did. With such lead time for downstream communities, officials closed irrigation head gates and drinking water intakes and towns folk came out on all the bridges and banks waiting in anticipation to see the slug. That lead time also allowed for anyone who could to collect "pre" slug samples and put in live sentinel cages for fish and macroinvertebrates. And the data collected by the Animas Stakeholders - volunteers engaged in data collection and remediation in the headwaters of the Animas during the last twenty years – also allowed for a faster determination of when the river had returned to "pre" spill conditions.

Due to the mining legacy in the Animas headwaters, there were warnings about such events, and even resources allocated to preventing it. The work being done that caused the spill was part of that effort. A relatively large amount of data and information is available on the mines in the area and on the river itself - chemical, biological and physical data, on surface water, ground water and water in the mines themselves. What failed the community here was human error, faulty or invalidated information on the water level behind the dam of the Gold King, and an inadequate back up plan and emergency response plan.

The breach was caused by U.S. Environmental Protection Agency (EPA) contractors conducting maintenance and remediation at the mine, the same agency responsible for protecting our nation's waters. Yet, if anyone is going to be responsible for a toxic spill, better for it to be the EPA. Within a day, EPA had established a 24-hour emergency center that handled all concerns, financial claims, and other inquiries and staffed this center for three months. They collected water from Silverton down to Lake Powell, water quality and sediment. They worked with over 40 jurisdictions to provide drinking water, information and other needs. They conducted two internal investigations and participated openly in an external investigation. They built several holding ponds and a temporary treatment system to mitigate the now flowing Gold King Mine and have been working with all communities for a longer term treatment solution. Over 500 EPA staff has been involved in this spill.

As a result of this disaster, a new conversation has started about community resilience and what we can do together to prevent and respond to future disasters. Sometimes an event like this is what is needed to move the needle. For twenty plus years, the Animal Stakeholders has been advocating for greater engagement by downstream communities to clean-up headwater streams without much progress. Thanks to the spill, those conversations are now moving faster. Durango has formed several coalitions to look at disaster preparedness.

Of course, it wasn't just the EPA responding. This acute toxic spill washed through Silverton and Durango, literally, politically, financially and emotionally as well as many other downstream communities, eventually impacting four states, three tribes, numerous municipalities, two EPA Regions, a national park, BLM land and many others before resting in Lake Powell. States, tribes and local entities also hit the ground running collecting samples, holding community meetings, helping agencies communicate and translate data to information, making hard decisions about when to open the river, head gates and intakes.

The Animas has experienced this kind of spill in its history, spills that did cause complete fish kills and Durango to move its primary water supply to the adjacent watershed. This spill likely killed some fish in the remote canyon, but did not kill any in Durango, or any macroinvertebrates. The question of what settled in the sediment and will metals be released in the future and other questions still remain

a concern. No human became physically ill or was hurt by this spill but emotional scars remain.

The public now understands the legacy of mining impacts on the Animas River, where even "pre" spill conditions carry the traces of our history. This spill awakened residents to the source of their drinking water, the fragility of the river to the community's economy and environment, and the importance of working with upstream and downstream communities and across political and jurisdictional silos to prepare for emergencies as well as sound resource management. Silverton and the Animas Stakeholders group had already been national leaders in pushing Good Samaritan Legislation (the ability for third parties to conduct remediation without assuming all the liability of owners) and the spill has re-energized that much needed tool to address the thousands of abandon mine threats across the West.

My advice to all communities, regardless of the type of environmental disaster you face, is to get moving on disaster planning now so that you are able to respond, recover, and maintain the essence of your community when the disaster passes.

LEARN MORE:

A River Runs Yellow by Richard Parker, The Atlantic (8/21/15)

Emergency Response to August 2015 Release from Gold King Mine by EPA

Water-Related Emergencies and Outbreaks by CDC

Image credit: Jerry McBride/The Durango Herald via AP

HOW FEMA FUNDING AND BIOENGINEERING CAN HELP COMMUNITIES RECOVER

by Jeanine Petterson, Federal Emergency Management Agency
**adapted from Region 8 Best Practices publication, July 2014*

The Federal Emergency Management Agency (FEMA) sits within the Office of Homeland Security. FEMA's primary purpose is to coordinate the response to a disaster that occurs within the United States and that overwhelms the resources of local and state authorities. FEMA will only engage once the governor of the state in which the disaster occurs has declared a state of emergency and formally requested from the president that FEMA and the federal government respond to the disaster. FEMA also administers the Flood Map Service Center which provides flood hazard information in support of the National Flood Insurance Program (NFIP).

Although some river and watershed groups may interact with FEMA to review or influence new boundaries for flood maps, most will interact with FEMA only through the lens of a local disaster. What many groups may not realize is that FEMA also maintains grant programs that can be used to fund restoration and expertise that can help communities recover from floods and other disasters.

When natural disasters happen, our rivers and the watersheds they flow through can take a heavy hit. Although these systems are designed by nature to be resilient and adaptive, they can take a long time to recover when significant changes to a river's fluvial geomorphology or bed-bank structure occur. In areas where extreme flood events have damaged the structure of a river, restoration that mimics natural patterns and structure is best. Bioengineering along with FEMA funding can help speed recovery.

UTAH'S VIRGIN AND SANTA CLARA RIVERS

For centuries, the problems of sandy, easily erodible soils have plagued the Utah communities of St. George and Santa Clara along the banks of the Virgin and Santa Clara Rivers. In 1862, settlers were forced to relocate homes and farms along the Santa Clara as a result of an extreme flood. Ever since, river flooding and lateral erosion along the riverbanks has caused significant damage to these areas.

A major flood in 2005 ravaged the communities, resulting in the loss of 27 homes and triggering a federally declared disaster. Rock riprap, the layering of rocks along the riverbank to counteract erosion, was the primary mitigation technique used following the 2005 flood to rapidly stabilize river banks and protect vital infrastructure and homes from additional damage. Although effective in preventing erosion, the City of St. George recognized the drawbacks to riprap such as increasing the speed of water flow along a length of river causing potential downstream impacts; impeding the natural functions of a riverbank that interface between land and rivers or streams; and, the effect on wildlife, specifically fish.

Erosion protection improvements on the Santa Clara River. This project used bioengineering (pole plantings) to supplement riprap and is a good example of the city's overall vision. Image credit: FEMA.

Riprap reduces areas for vegetation or riverbank diversity in which fish seek refuge during high water events and often results in their being washed out of the area during flooding. Riprap also can leave riverbanks with an unappealing man-made look.

The city was introduced to alternative bioengineering solutions by the late Tom Moody, the principal engineer with Natural Channel Design and the primary author of the Santa Clara and Virgin River master plans. Bioengineering uses a variety of nature-inspired and environmentally conscious techniques to stabilize riverbanks from erosion. Mr. Moody's master plans provided the community with a road map for reconstruction, management and long-term maintenance of the river corridors that incorporates bioengineering.

St. George was hit with two more significant floods in 2010 and 2011. During the rebuilding process, the city used some form of bioengineering techniques on 100 percent of their bank stabilization projects as outlined in their master plans. Rick Rosenberg, of Rosenberg Associates, was selected as the City of St. George's project manager for the bank stabilization efforts. According to Rosenberg, "Bioengineering provides a much more natural method to improve bank stability and protection from lateral erosion. In the long run, it is better for the environment, it is more aesthetically pleasing, and it allows us to extend limited river bank stabilization funds. In many cases, the planting stock is readily available from the river and it greatly simplifies the environmental permitting process."

The most recent bioengineering method used on the Santa Clara River consists of embedding root wads and horizontal logs spaced at 90-degree angles into the river bank supplemented by rock riprap toe protection. This technique, adopted from the Natural Resources Conservation Service (NRCS), adds stability to the river bank using native cottonwood and willow tree pole plantings and root wads. Some rock is used in addition to the bioengineering to help stabilize and protect the highly erosive river bank soils until the vegetation becomes established.

BIOENGINEERING EFFORTS AND LESSONS LEARNED

The best restoration efforts return natural structure and function to a river. Bioengineering can help restore some of this structure and function when done well. Revegetation is often a critical component that requires a solid understanding of local conditions and the interplay between access of roots to water. Important lessons to keep in mind include:

• Water-quality testing to determine the salinity of the project site is critically important prior to plant selection for bioengineering work.

• Efforts should be made to measure the lowest groundwater levels throughout the year at the work sites to determine the required bury depth for plantings. Most of the failures of the early Virgin River projects are due to inadequate bury depth during construction.

• Consideration should be given to historic river erosion patterns when selecting bioengineering sites. Sites that are highly susceptible to routine lateral erosion damage (such as the outside of sharp bends) should be avoided.

• It is critically important to follow NRCS guidelines regarding cutting, storage, and presoaking of plant materials prior to planting.

ACCESS TO FEMA GRANTS

Due to the significant impacts of the 2010 and 2011 floods, Utah received Presidential disaster declarations for both events (DR-1955 and DR-4011, respectively). With these declarations came access to FEMA's Public Assistance Section 406 Mitigation grant funding and Section 404 Hazard Mitigation Grant Programs (HMGP). Section 406 provides funding for mitigation measures in conjunction with approved FEMA Public Assistance (PA) projects to repair infrastructure damaged during the declared disaster. Section 404 HMGP funding allows the state to identify mitigation projects that do not need to be directly related to the impacts of the declared disaster.

"The city has been able to effectively use the HMGP to fill in critical gaps in the erosion protection repair projects funded by PA and the NRCS Emergency Water Protection (EWP) programs along the Santa Clara and Virgin rivers to provide a more complete solution for bank stabilization," Rick Rosenberg noted.

In early 2013, St. George used FEMA Mitigation funding to repair and install erosion protection along the banks of the Virgin River to protect critical public infrastructure, the Millcreek Electric Generation Facility, a $64 million gas-fired power plant and substation. By working with FEMA, state officials and environmental regulators, the city was able to expand the scope of the total project to combine FEMA's two mitigation grant programs (Sections 404 and 406).

In early 2014, St. George completed a HMGP-funded bank stabilization project using bioengineering techniques just downstream of a PA mitigation repair project to replace a maintenance road crossing with a reinforced low-water crossing. These two projects work together to provide additional erosion protection for residents in the Monterey and River's Edge subdivisions, in addition to the city-owned Sunbrook Golf Course.

Also in 2014, 160 linear feet of riverbank at two locations along the Virgin River was repaired under the DR-1955 PA program. The DR-4011 HMGP program was used to extend and join the two completed sections under the PA program using a combination of rock and bioengineering providing an additional 650 feet of bank protection.

The city's vision for river-bank stabilization in the valley is beginning to take shape. Using FEMA's two mitigation grant programs and incorporating bioengineering, St. George has been able to leverage local flood-control funds and dramatically improve erosion protection along the Santa Clara and Virgin rivers. "The end result will be a more effective system to mitigate the risks of lateral bank erosion," stated Rick Rosenberg, "In time, the vegetation will become established and the rivers will again provide the much-needed habitat for birds, fish, wildlife and people as they always have."

LEARN MORE:

Hazard Mitigation Grant Program by FEMA

Hazard Mitigation Assistance Program by FEMA

Public Assistance Program by FEMA

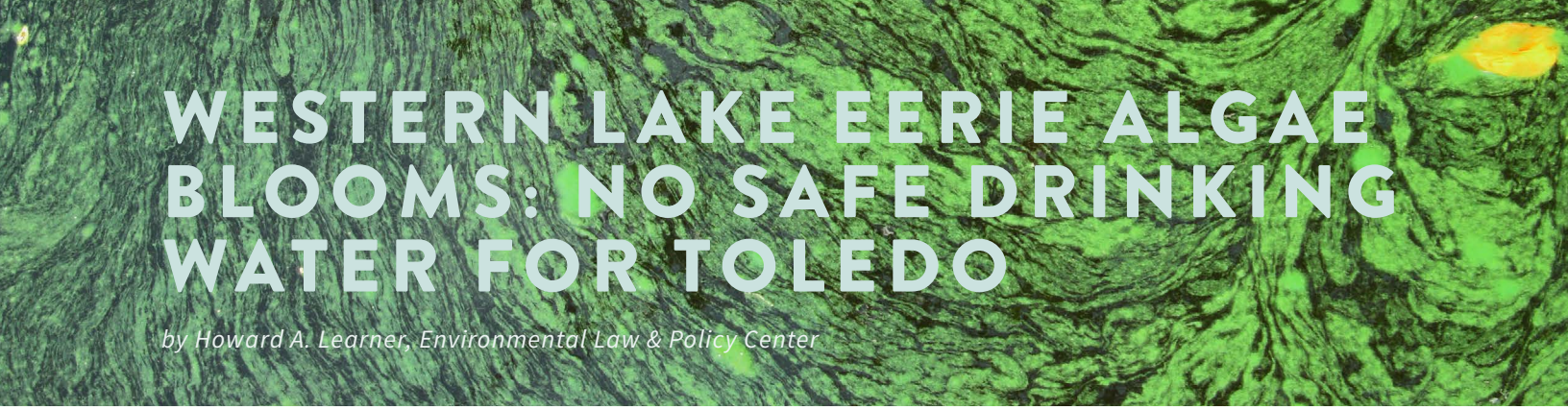
Engineering with Nature: Alternative Techniques to Riprap Bank Stabilization by FEMA

Riparian and Bioengineering Resources by NRCS

Emergency Water Protection Program by NRCS

Bank Stabilization Project to protect critical public infrastructure - the Millcreek Electric Generation . Image credit: FEMA.

Toe rock and bioengineering (pole plantings and brush layers) near the Monterey Subdivision and Sunbrook Golf Course in St. George, UT. Funded through DR-1955 HMGP. Image credit: FEMA.



WESTERN LAKE EERIE ALGAE BLOOMS: NO SAFE DRINKING WATER FOR TOLEDO

by Howard A. Learner, Environmental Law & Policy Center

On August 2, 2014 at 2:00 am, Toledo officials announced on Facebook that tap water for nearly 500,000 metro-area water customers was not safe for drinking or cooking. Drinking water supplies from Western Lake Erie were contaminated by a carpet of hazy, blue-green toxic algae that produced cyanobacteria, which contains a poisonous toxin called microcystin. The toxic algae-laden waters could not be effectively handled by the Toledo water treatment facilities. For three days, 500,000 people depended on bottled water and water deliveries by the National Guard.

What was the principal cause of the toxic algae? Nitrate and phosphorus run-off from agricultural fields into the Maumee River, its tributaries and surrounding waterways, likely exacerbated by climate change.

Typical exposure to cyanobacteria occurs through the mouth and skin when swimming in contaminated areas, drinking water, or showering. Tests of drinking water in Toledo that August 2014 weekend found microcystin levels more than double the World Health Organization's 1.0 ppb (parts per billion) threshold. One Ohio newspaper reported that 70 people went to hospitals because of health concerns related to water exposure.

Climate change has brought warmer weather and lower water levels to Lake Erie and other Great Lakes because of evaporation, as well as more violent rain that spring and summer 2014. Severe storms washed livestock waste and phosphorus-rich agricultural fertilizer into the Maumee River, which drains into Lake Erie. New studies also suggest a growing presence of invasive species of mussels might have encouraged algae growth.

This was not an isolated event. More large-scale toxic algae blooms will likely occur unless nutrient run-off from agricultural operations is significantly reduced. At the time, National Geographic described "algae blooms behind Ohio water scare [as the] new normal."

That's not acceptable. We cannot allow contaminated drinking water supplies for the 500,000 people in the Toledo area, or for large numbers of people anywhere else in the Great Lakes to somehow become acceptable or the "new normal." This is preventable. "Business as usual" must change with strong actions to reduce pollution. Fortunately, we know how to work together to get it done.

FIRST, farmers must stop spreading manure on frozen and wet fields when much of it washes off into the waterways. The costs and harms imposed on the public's health and environment from this farming practice are too high. Spreading bacteria-laden manure on frozen and wet fields is not a good – and shouldn't be a legally permissible – farming practice.

SECOND, it's time to find ways to reduce drainage of nitrogen and phosphate fertilizers into the river system both as a result of runoff and old drainage tiles. It's cheaper and wiser to control pollution at the source, rather than clean up the mess from toxic algae blooms in Lake Erie that contaminate drinking water supplies for 500,000 people. Starting in September 2017, Ohio will require anyone applying fertilizer to 50 or more acres of agricultural production to obtain a license, which includes completing a certification program that teaches farmers how to apply fewer nutrients without reducing their crop yields. That's a step in the right direction. All of the tools in the toolbox should be utilized in those watersheds where runoff pollution leads to such tragic results of contaminated drinking water supplies.

THIRD, the U.S. Environmental Protection Agency and state environmental agencies should set appropriate limits on nutrient levels in our waterways. Reducing the amount of phosphorus and nitrogen pollution that enters the nation's rivers, lakes and streams is essential to keeping algae blooms at bay. The Environmental Law & Policy Center, Ohio Environmental Council and other colleagues are developing new strategies to promote

enforceable limits on nutrient discharges at levels that will help prevent future algae blooms.

FOURTH, this won't come easy. Public engagement is necessary to drive policymakers to enact improved statutes and regulatory standards focused on reducing pollution of our rivers, lakes and streams. And, then, we must make sure these laws and standards are effectively and fairly implemented and enforced.

The Great Lakes are a global gem that contain 22% of the world's freshwater resources and provides safe drinking water for 42 million people in eight states and two Canadian provinces. We can and must step up to take the necessary actions to prevent toxic algae blooms that contaminate drinking water supplies in the Toledo area and, increasingly, elsewhere in the Great Lakes. That's just not acceptable in our modern American society.

We know and understand the causes, the problems and the solutions. Let's move forward with the necessary solutions for our future.

LEARN MORE:

The Algae that [Almost] Ate Toledo by Barry Yeoman, NRDC (7/9/2015)

Another Toledo Water Crisis? by David Kushma, Toledo Blade (7/26/2015)

A Joint Plan for Lake Erie by Great Lakes Commission (9/29/2015)

Additional Options for Lake Erie Nutrient Reductions by Great Lakes Commission (9/29/2015)

Lake Eerie Algae Bloom. Imagecredit: **Flickr/Creative Commons by NASA** under **CC BY,** cropped.

COLORADO'S 1,000 YEAR FLOOD: SUPPORTING COMMUNITY AND WATERSHED HEALTH

by Chris Sturm, Colorado Water Conservation Board

In mid-September 2013, a prolonged rain event caused destructive flooding across Colorado's Front Range (Fort Collins to Colorado Springs), delivering most of the year's annual precipitation in under five days. People lost their lives, homes, and businesses as the waters ripped down steep mountain streams and spread across a floodplain that includes most of Colorado's larger cities. The end result was the deadliest flood since 1976 (ten lives lost), the costliest flood in state history ($4 billion of damage across 24 counties), and the first Presidentially declared flood disaster since 1999.

Once the rains diminished, and the floodwaters began to recede, people affected by the damage were looking for answers to difficult questions. Who is responsible for putting the rivers back in the previous alignments? When will they arrive? Will they listen to input from those directly affected? While emergency services provided food and shelter as well as other assistance for those most heavily impacted by the disaster, a cohort of agencies began working overtime to advance integrated solutions.

The Colorado Water Conservation Board (CWCB), a division of the Colorado Department of Natural Resources (DNR), immediately put together a team of state and federal agencies to help communities strategize the short- and long-term stabilization and rehabilitation of stream channels. This stream task force advised on all aspects of rehabilitation, including assembling local watershed coalitions, permitting, technical assistance, funding, project design, project prioritization, and project implementation.

The stream task force quickly concluded that no single government entity had jurisdiction over the impacted stream channels. The issue was largely an individual property owner decision. It was also determined that a strategy focused on realigning all channels back to their previous locations was not the best path towards creating more resilient stream systems. The locations of the streams needed to be informed through a master planning process that considered damage, projects, and priorities on a watershed scale. Local watershed coalitions would be a vital component of implementing this process. The CWCB, in cooperation with the Colorado Department of Public Safety, developed a special grant program to fund watershed master planning in flood-affected watersheds.

The watershed master plan grant program was created to guide communities towards prioritization and implementation of stream restoration projects that improved ecological conditions as well as protecting life and property from flood hazards. The primary objectives of the plan were to develop conceptual channels designs, cost estimates, and priority projects.[1] The funding contributed to the formation and fortification of watershed coalitions in affected areas: Fish Creek (Estes Park), Fall River (Estes Park), Big Thompson River, Little Thompson River, St. Vrain Creek, Left Hand Creek, Boulder Creek, Fourmile Creek, Poudre River, Coal Creek, Middle South Platte River (near Evans), and Fountain Creek.

As the master plans reach completion, these coalitions will look for guidance about funding sources to implement projects identified in their plans.

[1] Conceptual design of stream channels focused on alignment at different flow elevations, including low flow channel design, average high water flow, and flood flows. Low flow channel design is a critical element to consider as it addresses habitat conditions. Average high water or "bankfull" flows are integral in influencing a stream channel's geometry. These flows are considered to occur every one to two years. Finally, 100-year or greater flood flow design contemplates the entire river corridor, including the active channel and surrounding floodplain. Other elements of the master plans included channel stabilization strategies, floodplain preservation and restoration, aquatic and terrestrial habitat restoration, wetland restoration, flood control, water supply diversion reconstruction, utility protection, and road and bridge protection.

Two Housing and Urban Development (HUD) initiatives may provide important opportunities: Phase II Community Development Block Grants – Disaster Recovery (CDBG-DR) as a result of the Presidentially declared disasters, and Watershed Resilience Pilot Program grants administered by the Colorado Department of Local Affairs (DOLA) in partnership with the DNR and CWCB.

The primary function of the Watershed Resilience Pilot Program is to support the watershed coalitions developed by watershed stakeholders and the CWCB. Capacity building grants include funding for full-time watershed coordinators, program assistants, and a CWCB/DOLA managed technical assistance team. Project implementation funding is used to design and build resilient, multi-objective stream restoration projects.

The Watershed Resilience Pilot Program is the first significant source of grant funds available for watershed coalitions completing their master plans. Other federal, state, local, and private resources will be necessary for the continued implementation of stream restoration projects. The watershed coordinators and their support staff will be tasked with grant writing and fundraising as an essential job duty. The intent of this capacity building portion of the grant is to empower the local watershed groups to successfully implement their master plans by offering the necessary staff and resources. This part of the program was built on the philosopher Maimonides principle, "Give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime". The CWCB and DOLA are optimistic that the capacity building portion of the grant will help the watershed coalitions achieve success by offering support beyond that covered by short term federal and state grant programs.

LEARN MORE:

Watershed Resilience Pilot Program by State of Colorado

Community Development Block Grants – Disaster Recovery by HUD

SIDEBAR: A CHANGING CLIMATE MEANS A CHANGING SOCIETY

Last year, Harriet Tregoning, head of HUD's Office of Economic Resilience (OER) and President Obama's chief resilience officer, provided a useful perspective about disasters and their role in community engagement during her interview with Laurie Mazur, from Island Press's Urban Resilience Project. With permission from the author, we are reprinting the relevant portion of that article here:

Q. When I look at what needs to be done to make communities more resilient, it seems that there are some fairly major changes that need to be made. Where will the push to make those kinds of changes come from?

A. Some of it comes from the shock of the events themselves. It's the 10-year anniversary of Hurricane Katrina this year. We've had some very big and costly disasters in the last 10 years. There were more than 200 presidentially declared disasters just between 2011 and 2013. Hurricane Sandy, in particular, was the second most costly disaster we've ever had. It affected the East Coast in a way that was, frankly, shocking to the communities and the states that were so impacted.

I think every event is an opportunity for people to say, "Wait a minute. We weren't prepared, and this could happen again. How can we get more prepared?" I think people are getting more sophisticated. Whatever the next event will be, it won't be exactly like the one we just had. How do we more broadly prepare for this more uncertain future, this more extreme weather, these rising sea levels?

That conversation doesn't necessarily happen in the immediate wake of disaster. It's actually an awfully hard conversation to have right after a disaster because it's the normal human impulse to want to try to return to the previous state as soon as you can. You want to feel normal again. You want things to return to where they were.

It either takes a prepared mind before a disaster or some amount of time to have passed before you're ready to say, "Wait a minute. We have a lot of long-term recovery resources coming to our community. We need to do better than just building it back as it was."

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MISSION, VISION, AND FOCUS

River Network empowers and unites people and communities to protect and restore rivers and other waters that sustain all life. We envision a future of clean and ample water for people and nature, where local caretakers are well-equipped, effective and courageous champions for our rivers. Our three strategies for focused investment are strong champions, clean water, and ample water.

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