

A Water Toolkit

By BETSY DAMON

Without Water

*The water molecule is the
most flexible molecule we know,
creating and organizing life
on earth and throughout the universe.*

Without water there is no life.

Without water there is no work.

Without water there are no biological or chemical transformations.

—Betsy Damon

INTRODUCTION TO THE TOOLKIT

This toolkit is a set of stepping-stones, guidelines. The goal is to give you ideas and information to restore the place of water as the foundation of planning and design in your towns and cities. We identify social, biological, and technological processes that can promote resilience, complexity, flexibility, and capacity in human and natural systems. This is not a philosophical or an academic perspective, it is a real world experiential perspective that has evolved from my work and the work of Margot Young.

It is relationships that assisted me to overcome discouragement. Friends cheered me on, cheer each other on and help me remember where I are going. We need to be a team, cooperation is essential. Good information is essential and it can be hard to find the right information. Once you have this information, you will be able to take concrete actions.

After 75 years of living and working in a classist and racist society, I know that both social and ecological complexity and flexibility are fundamental to our survival.

We need to recognize that we are interdependent, all of us. Every community, district and city shares life-sustaining resources. After learning about your watershed and your water bank, the next step is to find the motivation to implement flexible solutions. These solutions should have the capacity to respond to extreme weather events such as those that come with rapid climate change. They will restore the relationships of small streams to larger wetlands, give our rivers space to expand and contract, create infiltration where it makes sense or collect rainwater.

In my nearly 50 years as an artist working with communities and 30 years with water I have come to understand that discouragement and powerlessness are our biggest obstacles.

It takes an active choice to live harmoniously with other life forms and share our water—to become their



Listening is just listening, without thought, comment, or interruption. Set aside assumptions and judgments. Trust that the person you are listening to has something important to say.



Meeting people and hanging out in a community garden in Pittsburgh, PA, USA.

Listening gives people space to find their own thinking and to reveal what's on their minds.

For most of us, there are some topics or people that are easy for us to listen to, and others that are more difficult. The effort is worthwhile. We don't need to agree with what a person is saying to listen respectfully.

Choose to connect with and listen to people you don't know. If you do, you will be able to cross barriers and connect with people from different experiences and backgrounds.

When everyone is at the table listening and sharing ideas, the results can exceed expectations.



It helps to smile while you listen



*“Attention, for all its potent sensitivity, may be the spark that rekindles imagination.”
—Ellen Meloy*

Once someone is heard, they may become more willing to join and share their mind.



II. The Power of Art



Art the catalyst.

ART EDUCATES



Art inspires people to get involved.
Art generates public consciousness.



ART CROSSES BOUNDARIES

Art allows people to explore and thus come to understand water.

ART INSPIRES CARE



Through observation and attention, artists see people and needs that were not visible.
Art invites others to see, too.

Art takes all forms.



Creating is contagious.
All your thoughts are valuable.
Invite others to look, think,
and create with you.

If you begin creating and
thinking about water,
other people will be more
interested in thinking
about and taking action
for healthy water systems.

There are thousands of artists in the world bringing people's attention to water through the creation of songs, the planting of several thousand mangroves, protecting islands, saving wetlands, documenting, painting. Artists are a powerful force who initiate real actions on behalf of waters. They are teaching classes on eco-art. This work is building a vast network of consciousness and action.



Pole to measure floods in the Chinook Bend Natural Area in Carnation, WA.

As the public artist for the Chinook Natural Area, I was asked to create a work to celebrate the 58 acres of this park located beside one of the last pristine salmon spawning rivers. I met with all the parties involved, including numerous departments from King County Wastewater Ecology, Ducks Unlimited and citizens from the town of Carnation, WA. As we got to know each other something happened. It was decided that this site become a completely restored ecosystem, The removal of flood control berms to provide optimal conditions for salmon was a first.



Sounds of Water at Turtle Bay Arboretum in Reading, CA. Because the water is recycled through a wetland, it was able to operate during a drought..

It was fun to make *The Sounds of Water* at Turtle Bay Arboretum in Redding, CA in 2002. When I asked if they had sufficient water in this place, they told me they would have water forever. Nevertheless, I designed a piece with low water use and complete recycling through a wetlands filter system. In recent years a big drought suddenly caused their water supply to disappear, and this work was the only water feature still running.



III. Principles of Water

“If there’s magic on this planet, it is contained in water”—Loren Eiseley

Water is innately dynamic. There is alive water and dead water. Water is so universally essential in our lives but it is only recently that we have begun to understand the science of how water creates life. Aliveness is linked to the vital importance of water quality.

These are 3 principles that I think are important to keep in mind:

1. Water creates all life.



2. Water creates complexity.



In the unique medium of water, all life is born, grows, evolves, and regenerates. The complexity of life is automatic. The interdependence of all lifeforms is only partially understood.

3. Water creates coherence.



You can find coherence in leaf structures, animal circulatory systems, tree branches, and complex river systems. The fractal spiral is another.

IV. Mapping

If I had an hour to solve a problem and my life depended on the solution, I would spend the first fifty-five minutes determining the proper question to ask, for once I know the proper question, I could solve the problem in less than five minutes.—Albert Einstein

The Power of Maps

Mapping is more than a tool for organizing information: to map is to engage in a process of discovery. As you draw maps, you will discover the unique water circumstance of your community.

What is the question for your community? Is it, “What are the waters available to us?” Or, “How do we achieve higher water quality?” Or, “How do we achieve greater water access?” As you can imagine, there may be any number of key questions unique to your community.

Examples of Maps Relevant to Water

- Historical maps reveal past water sources that have been eliminated or altered. As our cities expanded, brooks and streams were covered and piped; the names given to the sewers often reveal the original water source (for example, “Freshwater Brook Sewer”). Old landfills, early industrial areas, railway yards, and other land uses that required large areas of flat land were frequently located on infilled wetlands. One use of this information could be to locate a stream that has been buried and day-light it—that is, restore it.
- Topographic maps show elevation and can indicate the natural movement of waters through the landscape. They can help you understand the contours of your watershed.
- Geological maps indicate the types of soil and bedrock in an area and can explain why water has carved a specific path or is clearer in some areas than others.
- Water infrastructure maps reveal the potable water supply systems and storm and sanitary sewer pipes that underlie our streets and buildings, as well as ditches and other water conveyances. Discovering where pipes, sewer lines, flood controls, and engineered systems are located helps us understand how our waters have been redirected, allowing us to imagine how to reconnect and restore our living systems.
- Economic maps of Area Median Income (AMI) or real estate prices often explain the distribution of present-day water resources. Too often, availability of good water is based on economics.
- Land survey and zoning maps help identify structures and interventions in the built environment by explaining the boundaries between public and private lands and permitted land uses.
- GIS (Geographic Information Systems) is the newest technology used to create the many maps you will find. It allows us to see deep beneath the surface of the earth, where underground waters travel, enabling us to determine where systems can leak or where interventions should be placed.

Where to Find Maps of Your Region

Map resources:

- Libraries
- Historical societies
- History museums
- City government offices: city planning, parks and recreation, and transportation and engineering offices
- Universities and colleges (libraries and various departments in them: geology, architecture, ecology, history, civil engineering, landscape architecture, geography)
- Municipal water treatment centers
- The Internet is a great resource for finding and making maps. Everyday citizens are recording information to make comprehensive maps of an area. Organizations are making maps available online to spread awareness of ecological and political issues.

Not all cities have maps readily available. It may be necessary to contact several institutions and companies to find what you’re looking for. Also, few organizations are interested in an overall and complete picture of the

water system, so you may need to combine a variety of maps, scales, and sources to delineate the waters in your community.

I've had experiences where relevant maps could not be located. When I was visiting an artist in Dillon, Montana, I planned to hold two mapping workshops. However, nobody could find maps of the pipes and watersheds of southern Montana. Local historical maps were not readily available. Much information was missing. This was especially ominous as Dillon is surrounded by cattle ranches, which often contribute to runoff, and Montana's economy is based on the mining and extraction industry. Without maps of the infrastructure and a clear view of the watershed, we would be unable to trace how this industry might be affecting the city's water and local rivers.

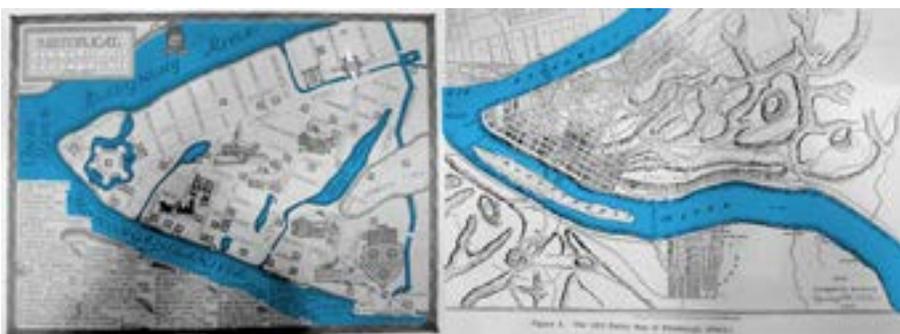
It is always good to ask what a map might not be showing you.

Historical Maps

Historical maps reveal how our relationships with our geography and ecosystems have changed over time. Many cities have archives of maps, some hundreds of years old. These maps can show us how water systems flowed prior to recent human intervention. They can show where streams, rivers, wetlands, and ponds once were. They allow us to compare how a city's water sources have changed and can illustrate how people and the landscape have influenced each other. You may also learn how old your water infrastructure is, enabling you to discover how its age affects the quality of your water.

What did this place look like before we moved here, before we filled in a certain lake or built certain dams? Each location presents different challenges and solutions based on its unique ecological and human history. For example, in the American west, water rights laws were put into place to meet the needs of the twentieth century cattle industry and a sparse population. In the twenty-first century, the needs of this region have changed, but the laws have not necessarily kept pace. Showing historic maps to present-day communities can change how we think about our water systems and begin a new conversation.

When I began working in Pittsburgh, Pennsylvania, one of my first destinations was the Heinz Historical Library. There I found maps dating back hundreds of years, including indigenous maps. These older maps show a landscape full of small streams and springs. Now, none of these smaller waterways can be found. Fifty-six streams have been buried or put into pipes, and one no longer hears the sound of water running in the city. Consequences of this include major flooding. These small streams no longer service their local ecosystems; instead, they are jettisoned into the main waterways and flow downstream.



Mapping in action: Larimer, Pennsylvania, USA

The premise of an equitable water system is that everyone has access to clean water; that the system is sustainable and the water is healthy for the people and the land.

At the beginning of my time in Pittsburgh, major turning points were joining the green team of Larimer and meeting Matt Graham. Matt had started a company called Land Based Systems, developing software to track stormwater flow in a landscape. The map he produced for the Larimer neighborhood was a powerful tool, immediately enabling the community to visualize how rainwater fell on the Larimer Plateau. It also allowed the community to see the potential to harvest it for benefit. Living Waters of Larimer began.

When we walked the streets of Larimer, it was clear where the waters flowed and where the drainage was not working.



Matt Graham's map. This map shows how the waters flow. The large dots show where the most water collects.

Hosting a Workshop with Maps

When you hold a mapping workshop, people like to locate their homes first. Then, invite community members to talk about the places seen on the map; they might provide a great depth of knowledge from experience, adding layers of information to the maps.

It is useful to have people with different skill sets present. Include someone who knows how to read maps, or someone that can draw and is excited about design.

In Logan, Utah, a couple of two-hour-long workshops with students and faculty were very revealing. After studying the maps of the city sewers and surrounding waters, we focused on the campus water systems where a vast complex delivers water for lawns. The groups came up with many possible interventions on the campus. Utah is not a water-rich place, and as we were working, Salt Lake City was proposing to divert the waters near Logan for the city. Ideas flowed about what could be done to bring attention to the issues and capture rain-water.

Utilize the tools of the “Discovering Water” chapter of my



book, *The People's Water*, to explore your local waters with your group. Gathering these observations will help you build your maps further. Go out with members of your group the next time it rains and follow the rainwater, observing where it travels. Or take a walk along the edge of a stream or river. Notice where the water moves rapidly. You may discover more life near these areas of movement. Observe, too, where marshy areas or wetlands exist. Certain things will happen where water slows down. Your observations will be vital to restoring and designing water systems; you are building your knowledge of what is currently happening, and this is essential to deciding what the objectives of your designs should be.

Below is a series of questions that will help you define your local water system, how it functions, and its health. Some answers will be found in maps, others in the form of local stories, and still others in data collected by conservation organizations or governments.

- Where does your water come from: a river, reservoir, or aquifer?
- How would you describe the topography of your region? How does this affect the flow of water?
- Where are the bodies of water in your community: rivers, streams, lakes, ponds, wetlands, reservoirs, springs?
- Who has access to them?
- What kind of life do you find in and around them? Are there sources of pollution near them?
- What did your waters look like in the past? Are they different now?
- What is the groundwater situation?
- Where does it interact with surface water?
- Where does it come to the surface: wetlands, flooded basements, elsewhere?
- Are there any businesses or factories that pollute? Where? Does this affect any waterways?
- Are there areas where basements flood? Are there areas where people have very little water near their homes?
- Where does rainwater drain, and where do those drains lead?
- Where are there permeable surfaces like soil, gravel, and vegetation? Where are there impermeable surfaces like pavement, cement, and asphalt?
- Do people have problems with rainwater or water in general?
- Where and how is the water polluted?
- Watch how rainwater runs off from one property to the next or to the street. Where does it puddle? How quickly do the puddles dry? Why might that be?
- Does rainwater mostly run along paved roads or over vegetated ground and ditches?
- Where does water flow into storm drains?
- Does it run through polluted sites like driveways, roads, or fertilized lawns?
- Does it pick up sediment from yards and parking lots?
- Where does this water emerge?
- Does the stormwater run into a body of water?
- Where does your wastewater go: to a treatment plant, a river, or a septic system?
- Where is your wastewater treatment plant?
- How does it work?
- Does stormwater go into the sewer system?
- Is there a water treatment plant? Where?
- What chemicals and processes are used to treat the water?
- Where does the treated water go?
- How often does the wastewater treatment plant fail or not work?
- What happens when the treatment plant isn't working or is overloaded?

When your group has worked with maps, you will be able to see beyond your own neighborhood to the whole town or city, and beyond that to the larger landscape. Just as we can see rainwater flowing from our roof into the gutter, we can now picture where the stormwater flows into a river, where that river flows by another town and eventually into the ocean. The water that leaves our homes continues downstream, affecting people and land along the way.



The “Toolkit” in the book *The People’s Water* will continue with eight more chapters that guide groups through learning about, designing, and advocating for living systems and green infrastructure.

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Forty years ago, Betsy Damon stepped outside her traditional art training and carved a unique path to work with the environment, communities, science and art. She began looking to her inner consciousness as a source of inspiration which initiated her public engagement. She founded Keepers of the Waters in 1991 and has continued to work towards creating community-based models of water stewardship. Her work includes sculpture, teaching, lectures and workshops. In China, she created the nation’s first public art event for the environment, and most notably the Living Water Garden, a world renowned public park and natural water filtration model.