Bob Zimmerman is the executive director of the Charles River Watershed Association, where he has initiated groundbreaking ecosystem analyses and land-planning studies, helped rewrite land and water regulation, developed restorative technologies, and served as a leading advocate for more-effective water management policy across the entire region. Prior to joining CRWA, he was a founder and headmaster of the National Sports Academy in Lake Placid, New York. He has degrees in history, English, and Middle English from Central Michigan University, and worked for two years as a consultant to the energy industry.

Jay Wickersham FAIA is a partner in Noble & Wickersham, a law firm specializing in design, construction, environmental, and land-use law, and is a lecturer at the Harvard Graduate School of Design. From 1998 to 2002, he served as assistant secretary of environmental affairs for the Commonwealth of Massachusetts and as director of the state’s environmental impact review program. He previously worked as an architect and urban planner in Boston.

Can one river change the world? With the science and political skill behind the Charles River Watershed Association, you wouldn’t bet against it.
**Jay Wickersham:** As a former headmaster with a degree in Middle English, you have certainly followed an unusual career path. You are now one of the leading authorities on water issues in this region, and your organization, the Charles River Watershed Association, is similarly known today for its leadership in statewide environmental policy. How did that transition occur?

**Bob Zimmerman:** Curiosity, I guess. That and the fact that there were about six jobs available in the US at the time. I got into water policy after I joined CRWA as executive director in 1990. Looking back, I would say that I was fairly naïve as far as environmental nonprofits were concerned. I thought that everybody knew what was wrong with the environment, that the only question was finding the will and the funding necessary to go out and fix it. I quickly became aware that that’s not the case.

I attended lots of extremely contentious meetings with federal and state agencies, municipalities, and consulting firms about combined sewer overflows [CSOs], a function of stormwater and wastewater using the same pipes and overflowing into the river and harbor when the stormwater volume is too great for the pipes to handle. It became very clear that there was this notion that the Charles River had always been dirty — the “ambient pollution” theory — so it wouldn’t really matter if the CSOs were cleaned up because the river would still not meet any water-quality standards. It occurred to me that perhaps we needed to take a broader look, so we launched the Integrated Monitoring, Modeling, and Management project in late 1994, to figure out how the Charles watershed really works. Where does the water come from? How does it get in the river? Where are the sources of its pollution? How do they all mix? When things go bad, why do they go bad? That’s remained the focus of the organization ever since.

CRWA has become a unique regional watershed organization; I don’t believe there’s another like it in the country. It has its own engineering and science staff and legal capability, and virtually all of the work we do is based on our own science and computer-modeling capabilities. Since 1995, we’ve been monitoring every two miles of the Charles River every month, so we have a fairly deep and broad dataset. It’s pretty easy for us to figure out whether our actions are making the river better or worse, or if things are staying the same.

**Jay Wickersham:** Can you talk more about this concept of a watershed? People think of themselves as residents of a particular city or town, but most probably don’t even know what watershed they live in. Why have you chosen a watershed as a territory to watch over and defend?

**Bob Zimmerman:** From an environmental perspective, a watershed is that area of land that can be expected to survive pretty much on its own as long as there is rain. In the case of the Charles, it’s the 308 square miles of land that drains to the Charles River. The nice thing about the Charles is that it’s only 80 miles long. So it’s relatively easy to study and to understand the interactions between humans and nature and the issues that we create. A lot of the work that we do is applicable to virtually any urban river system in the world.

**Jay Wickersham:** The Charles has long been associated in the public mind with severe pollution. Back in 1995, EPA regional administrator John DeVillers announced a goal that within 10 years, the Charles River would be fishable and swimmable; a year later, then-governor William Weld made his famous dive into the river to underscore the state’s commitment to the goal. We’re now five years past DeVillers’ deadline. How are we doing?

**Bob Zimmerman:** Currently, the river meets the swimming standard in the 10 miles of the lower basin up to 70 percent of the time, and the boating standard, which is five times lower than the swimming standard, virtually 100 percent of the time. Polluted runoff during wet weather is the remaining big issue.

Early on, assumptions about pollution in the river were driven by the mistaken notion that a tremendous amount of raw sewage from the entire watershed was coming over the Watertown Dam into the lower basin. Our monitoring showed that one outfall, slightly upstream in Watertown, was continuously dumping raw sewage into the river — a number of buildings had illegal cross-connections tying into a storm drain instead of a sanitary sewer. Once that was fixed, it became clear that most of the sources of the problems in the lower basin could be found in the lower basin itself: combined sewer overflows, sanitary sewer overflows, illegal cross-connections, collapsed interceptor pipes — failed infrastructure all. In the first three years of the DeVillers initiative, a million and a half gallons a day of raw waste dumping directly into the river was eliminated — a huge impact on water quality.

**Jay Wickersham:** Were those problems primarily the result of bad engineering or of inadequate maintenance over the years?

**Bob Zimmerman:** A combination of the two. Boston started laying large interceptor sewage pipes in 1854. And to save money, it was decided that, rather than put the storm drain and the sanitary sewer
in separate pipes, they’d be combined in the same pipe, which is great, as long as it doesn’t rain. As the city grew, the capacity of those pipes was exceeded. A lot of the pipes were made of brick; brick has mortar; mortar fails over time. Nobody was checking the pipes: once you bury a pipe, it’s easy to ignore it. And that led to another significant concern for the region. Once the pipes start to fail, they leak in — they don’t leak out. So groundwater that the pipe passes through actually leaks into the pipe, because the pressure inside the pipe is so much lower than the pressure in the ground. In effect, what we’ve designed is a system that has created tremendous environmental problems for us.

Bob Zimmerman: One concern is the approach it promotes to the problems that we face with environmental issues. We tend to look at these problems in isolation. The Conservation Law Foundation and the Environmental Protection Agency brought suit in the early 1980s because of the condition of Boston Harbor, which violated the Clean Water Act. The issue was cleaning up Boston Harbor; and the solution was to create this enormous centralized system, the Massachusetts Water Resources Authority [MWRA], with this new enormous wastewater treatment plant. So we’ve ended up taking water from the Quabbin and Wachusett Reservoirs to serve communities in the MWRA district, using it, collecting it, and throwing it away, after treatment at Deer Island, nine-and-a-half miles out into the middle of Massachusetts Bay.

On top of that, half of the 43 communities that the MWRA serves actually pump their water locally instead of receiving it from the Quabbin and Wachusett Reservoirs. But that water also gets dumped into the big pipe and thrown away, nine-and-a-half miles out into the middle of Massachusetts Bay.

And then there is the fact that 60 percent of every gallon of water treated at Deer Island is otherwise potable groundwater or rainwater that has leaked into the system; groundwater alone accounts for 47 percent of every gallon. So we’re de-watering eastern Massachusetts. This has enormous consequences. We’ve all learned over the last decade or so that we’re running out of water and there are going to be water wars. I’ve got to tell you, we’re not running out of water; we’re throwing it away. That 47 percent of the water in those pipes represents, every single year, the same flow as the Charles River. So there’s the equivalent of one Charles River captured and thrown away. Then there’s the stormwater that we collect off impervious surfaces in the 43 towns of the MWRA that gets thrown away. That amounts to a second Charles River. And if you add in the wastewater itself, there’s a third Charles River. So every year, through Deer Island, we throw away three Charles Rivers from those 43 communities.

Jay Wickersham: And that must have huge implications, both for the environment and for our economy.

Bob Zimmerman: Yes. The bottom line is this: you’ve got parts of rivers like the Sudbury and the Ipswich that actually run dry in the summer because whatever groundwater is available is being taken for human demand. In urban rivers like the Neponset and the Charles, the impacts are in abnormally low flows, so what you get in the river is concentrated pollution. And when there’s less water in a river, the temperature goes up, so its carrying capacity for fish and wildlife is reduced. Have we felt it at the tap, in our kitchens? No. Will we? Yes.

Jay Wickersham: So what would you suggest as an alternative to the large centralized systems?

Bob Zimmerman: At CRWA, the first part of our strategy is to buy time. It’s going to take decades to effect broad change. In the meantime, we want to make sure that things get no worse than they are right now.

Associated with that is the work we’ve done in getting conservation-based water withdrawal permits and registrations,
Virtually all of the water problems that we suffer in urban areas are a direct result of the infrastructure we have built. *Bob Zimmerman*

so that we cap the amount of water being taken from the ground, so that the rivers get no worse. With the new conservation-based permits, towns that would have had to seek new sources of water supply beginning this year, 2010, won’t need to seek new sources of water supply until 2030. So we just bought ourselves 20 years.

Jay Wickersham: You mentioned earlier that CRWA takes a science-based approach. But you’ve also got an active and aggressive legal arm. How have you been trying to effect change through the law?

Bob Zimmerman: On the time-buying front, CRWA, representing the Ipswich River Watershed Association, the Essex County Greenbelt, and Mass Audubon, sued the state Department of Environmental Protection in 2003 under the Water Management Act for failure to balance human demand with natural resource need. When one-third of the Ipswich runs dry for more than a month every summer, something is clearly wrong in the way we allow water to be used. That suit was ultimately set aside because DEP agreed with us and started writing conservation-based permits. When those came out in early 2005, 11 of the 15 towns affected immediately appealed, and our general counsel remains in court defending DEP and continuing to make the case for the permits. So far, we’ve won in every venue, and I would expect that we’ll win in the end. In the interim, those permits are in place and they do help.

We are also examining policy and regulation. We build these enormous centralized systems because somebody demands them. We know the environmental damage they create — virtually all of the water problems that we suffer in urban areas are a direct result of the infrastructure we have built. So we’re looking at regulations that take a different approach, which over time mimics nature and eventually restores water bodies. We can restore trout streams, even the Charles River, and provide for human demand pretty much regardless of growth.

Jay Wickersham: What would that mimicry of nature look like? And how would it affect the way we build today?

Bob Zimmerman: First we need to understand how nature works here in New England. Nature wants to hold on to precipitation, so water infiltrates the soils and collects in underground aquifers with tremendous storage capacity. What we typically do instead is to collect the water off impervious areas — parking lots, buildings, roadways, sidewalks, heavily compacted soils — in a storm drain in the side of the road and then throw it away. And of course, in the process of running across all of this pavement, the water also gets pretty heavily polluted — a regular pollution cocktail. If we were to mimic nature, we would not let that water get away. We would use techniques such as swales, rain gardens, and porous paving — techniques associated with Low Impact Development (LID) — to let it run through the soil to clean up the vast majority of those pollutants. In the summer, it would support plant life and trees, which provide cooling and sequester carbon, and in the winter, it would percolate back into the ground to recharge the aquifers, as it would have 300 years ago.

The idea can be applied in other ways as well. When we pump water from town and private wells for use in our homes, we can cycle it back rather than throw it away. We’ve created a computer model at CRWA to locate areas in cities and towns where that water can be cleaned up and then discharged back to the ground, so it goes back to the surface water bodies it would eventually have fed if it had not been pumped. So you get a big recycling process that restores in-stream flow, protects us against drought, and reduces flooding.

Jay Wickersham: But you well know that local treatment can sometimes lead to local opposition.

Bob Zimmerman: No matter what you do in the United States, the “not in my back yard” attitude is going to remain a problem. In the end, however, we need this infrastructure. The nice thing about these wastewater treatment plants is that they’re not the kinds of plants that currently dot the landscape — with the smells and the big surface water separators and tanks. These are, in effect, huge septic systems. Most of the discharge occurs underneath the ground. You could build playing fields over the surface. They’re not huge. The other nice thing about groundwater discharge is that you eliminate the problem of releasing pharmaceuticals and personal care products into waterways. The University of California Berkeley has shown that, within 90 feet of filtration through the ground, that stuff is eliminated.

Jay Wickersham: So the ground serves as a natural filtration and cleaning system?
Bob Zimmerman: Absolutely. It allows you to replicate, technologically, the kinds of systems that nature created before we built Boston.

Jay Wickersham: What kinds of changes should we be asking for, as citizens and consumers, as homeowners or tenants? In the face of large, complex problems like this, people often think there is little they can do as individuals.

Bob Zimmerman: The first thing we need to do is buy time. We need to reduce water demand so that we have the time to test, investigate, and put in place water infrastructure that’s restorative and sustaining.

We can demand that our municipal leaders and the consultants and contractors they hire think about the larger system instead of isolated one-off solutions. We can push for local zoning modifications to allow Low Impact Development. We can ask how we want our towns to function 20 years, 100 years from now. How do we provide for and sustain water resources? How do we provide for growth? Where do we want the growth to happen? Can we create infrastructure that causes smart growth?

One of the things we’re working on now is a process we call “spot sewering.” Many suburban and exurban communities don’t have any wastewater treatment plants. And they want to guide and control growth; they want to create a walkable village center. So let’s sewer that village center, but only the village center, to direct development to the core.

Jay Wickersham: I’ve been working on a project in North Easton, Massachusetts, which is looking at a plan to redevelop a wonderful historic factory complex. And in order to support that, the developer, with funding from the town, would provide an onsite wastewater treatment plant with enough capacity to pick up the rest of the downtown in order to foster exactly that kind of redevelopment, while discouraging growth along the outer arterial roads.

Bob Zimmerman: And if they use an anaerobic treatment process to capture the methane, they can burn the methane, spin a turbine, and generate energy for that downtown district. Methane, by the way, is 23 times better at trapping heat than carbon dioxide, so burning it is actually a good thing because it removes it from the atmosphere, a form of climate-change mitigation. If they do this we’re looking at regulations that take a different approach, which over time mimics nature and eventually restores water bodies.

Bob Zimmerman
right, if they run our computer model and figure out the best spot to discharge that water to the ground, and if they use an anaerobic treatment process to generate energy, they will create a profit center for a town that’s probably struggling with property taxes.

Jay Wickersham: Looking back over 20 years of stewardship of the Charles River watershed, are you optimistic about our ability to make the kinds of broad changes that you’re talking about?

Bob Zimmerman: Sometimes I feel like we’re just not moving fast enough. But then I reflect on what’s actually been accomplished, which is remarkable. I think we’re going to see some changes in the next three to five years in eastern Massachusetts that will show the way for the rest of the country and, in my opinion, the rest of the urban world. The rest of the world, particularly western Europe, is still pursuing perverse solutions, by which I mean human-managed river systems. I just can’t go there. I’m for restoring wild rivers. This is America, you know? We don’t want to go see a Yellowstone that’s in a pipe. I would love to see a Charles River where unnecessary dams are removed in Hopkinton and Milford and Dover and Sherborne, where we can fish for trout again. And that’s within our grasp.

For more information: www.crwa.org.

Photos of the Charles River: page 38 (top and bottom), and page 43 by Alex Budnitz; page 38 (center), and pages 39 and 40 by Christine Fernsebner Eslao; page 41 by Paul Keleher.