

ROBERT F. SAYRE

Learning the Iowa River

*When I say I'll learn a man the river, I mean it.
And you can depend on it. I'll learn him or kill him.
—Mark Twain, Life on the Mississippi*

When I started teaching at the University of Iowa in 1965, one of its beauties was the Iowa River flowing gently and picturesquely through the campus. At the University of Illinois, where I'd started teaching, there was no river, only a much-abused ditch (presumably once a creek) nicknamed "the Boneyard."

The Iowa also looked big enough for canoeing and boating, and there was an attractive stone canoe house on the west bank just upstream from the University theater. Farther upstream was the Coralville Reservoir, with a large swimming beach and campground. The dam that impounded it, just finished in 1958, was not attractive, but it was solid and imposing, a smaller version of the great government wonders on the Colorado. The rush of water from the outlet far beneath it was sublime, at least to my young son and me when we climbed on hands and knees up the rock rip-rap above.

But it was not long before I began to have other feelings about the Iowa River. The city's drinking water came from it, and in late February the tap water had so much chlorine that it smelled like a swimming pool. "Runoff," old timers said, "runoff from farms," explaining that the melting snow washed manure from the fields and barnyards upriver and that the water treatment plant had to counteract with extra chemicals.

So "runoff" was a euphemism: we were drinking treated and diluted dung and urine. But the word was pronounced with a tone of bold nonchalance and cultural superiority, the tone of people who'd learned to make the best of a rotten situation by using the local vocabulary. "We've accepted it," they were saying, "and so will you."

And so I did. Besides, in the 1960s and '70s there seemed to be bigger troubles than a seasonal smell in the local water. My wife, however, was not so accepting. My daughter reminds me that whenever the water was smelly, she bought a lot of Hi-C, a canned

fruit drink she dubbed “lollipop juice.” It was better than drinking “runoff” and claimed to have a lot of vitamins. Later she took to buying jugs of bottled water. My wife was not going to be seduced into accepting the unacceptable.

Meanwhile, our children, like a large number of Iowa City kids and University of Iowa students, enjoyed the river. During the spring and summer they drifted down it in old inner tubes and sometimes dared to jump off one of the campus footbridges, being careful to avoid a submerged supermarket cart that lay near one of them. Had I known about that cart I would have tried to stop them from jumping. Years later, after several students had died, the university put up a sign noting the date of the last death. Whether the cart was ever removed I do not know.

One spring my kids and some of the neighboring children piled up stones and bricks and broken concrete blocks to make a little dam on the section of Ralston Creek near their homes and then built a boat they christened *Titanic* on which they could pole and paddle their way up and down this usually shallow tributary of the Iowa. This, I thought, was exactly the kind of fun kids should have on a creek, and it annoyed me when city officials made them tear down the dam, lowering the water and grounding *Titanic*.

To officialdom, Ralston Creek was not a playground. In previous years there had been flash floods that did considerable damage to homes and businesses, including a popular grocery store and the home of a colleague. In 1982 the city built a dry dam upstream in Hickory Hill Park. It temporarily holds back flood water, and since then there has been no more downstream damage.

But we shall see.

The risk in building dams and levees is that they provide a false sense of security. Thinking that floods will now be contained or prevented, people build in floodplains and in time forget the floods of the past. Along comes extraordinary rain that the dam cannot hold, the expensive new structures are flooded, and the damage is that much greater. Fashionably, we can call this an example of the Law of Unintended Consequences. More bluntly, you could call it the Dam Truth. Just ask the victims of the floods of 1993 and 2008 in eastern Iowa and other parts of the Mississippi Valley. Between 1958, when the Coralville Dam was finished, and 2008, there was extensive development in the floodplains. The University of Iowa

built the English-Philosophy Building (1966), the Art Museum (1969), Hancher Auditorium and its attached Clapp Recital Hall and Voxman School of Music (1972), the Iowa Advanced Technology Laboratory (1992), and other buildings. It also expanded existing ones. All were flooded to various degrees in June and July 2008, and estimated damage is \$231 million. Flood damage in 1993, while not as great, was also considerable. In the same years, 1958 to 2008, there was further development in low-lying areas of Coralville and in residential areas of Iowa City. All were in the floodplain.

In retrospect it is clear that everyone should have known better. The original purpose of the Coralville Dam, as authorized by Congress in 1938 after the disastrous floods on the Mississippi in 1927 and the Ohio in 1937, was to reduce flooding on the Mississippi. Flood protection in Iowa was a secondary purpose, and the dam has always been controlled by the Corps of Engineers district headquarters in Rock Island. The dam's specifications, which also should have been known, state that it can hold 2.6 inches of runoff from the 3,115 square-mile drainage area above the dam. When that limit is exceeded, it discharges water at the rate of 20,000 cubic feet per second (cfs) or more, which is enough to begin flooding low-lying areas of Iowa City and Coralville. U.S. Geological Survey records of peak streamflow in the Iowa River in Iowa City report eight floods between 1851 and 1958, when the dam went into service, that equaled or exceeded that rate: 1851, 70,000 cfs; 1881, 51,000 cfs; 1903, 22,500 cfs; 1912, 20,000 cfs; 1915, 20,000 cfs; 1918, 42,500 cfs; 1944, 31,100 cfs; 1947, 33,800 cfs. Maximum flow in 1993 reached 28,200 cfs; in 2008, 41,100.

In 1958 and 1959, the Iowa City Planning and Zoning Commission, chaired by Joseph Howe, a professor of hydraulics who for years had studied the Iowa River, warned the city council against the development of low-lying farmland north and west of City Park. Developers called it Parkview Terrace, a name that implies it is above the park, which it is not. The popular name was Mosquito Flats. City Council overruled Planning and Zoning, and development proceeded. According to Richard Fedderson, a member of the Commission, Howe did not warn the university against building in its part of the floodplain. Howe retired in 1970 and died in 1983, at age eighty-one.

Nearly everyone likes to live near rivers. They can be lovely to look at, to walk along, and to swim and play in. Their waters reflect the sky, the sun, and the lights and buildings and trees along their banks. But they are not always benign to the people who enjoy them. Nor do people always treat them benignly, for we use them to carry away our waste and sewage and have made them dangerously polluted. Most of us also know astonishingly little about them—their history, the size of their watersheds, the risks of living along them, and just how polluted they are and where the pollution comes from. The Iowa and the Cedar and the other “brown, anonymous rivers of Iowa,” as they have been disparagingly called, are not as magnificent or celebrated as the Hudson or Colorado, but their floods of the last fifteen years have commanded national attention. They are also among the rivers that pour the silt, nitrogen, and farm chemicals into the Mississippi that cause problems downstream and create hypoxia in the “dead zone” in the Gulf of Mexico. How long can we go on accepting these unacceptable conditions? Will we do something about them or just call it “runoff” or, like my late wife, try to escape the dangers by buying bottled water and drinking “lollipop juice”?

HISTORY

The Iowa, or Ioway, River is named after the Ioway Indians, who lived along it and used it extensively for fishing and transportation. They also hunted game along its banks, harvested migrating water fowl, and trapped beavers along its many creeks. Some say that since the Ioway were known by their neighbors as people who slept a lot (or feigned sleep), the river should mean “sleepy waters,” but I rather doubt that, for the Ioway were acquainted with both its annual floods and its occasional rages. Or perhaps they also sometimes spoke the name ironically. Indians were among those who saw its great 1851 flood, and could later point to its high-water marks. Indians, however, could rather easily move out of a flood’s way. They knew that floods were normal and beneficial, leaving enclosed marshes and oxbows, distributing seed, and regenerating soil.

Initially, white settlers used the Iowa in a somewhat similar fashion. The Iowa, Des Moines, and other rivers were their routes into the state, and they built their homes and towns nearby, benefiting from the bounty of the rivers’ waters and shores. There are reports

of channel catfish caught in the Iowa in pioneer days that were five feet long. But soon the settlers came by steamboat. According to an article in the *Waterloo Courier*, December 3, 1933, a Mississippi stern wheeler landed at Iowa City in 1840. About the same time, “a little steamboat managed to work up the Cedar to Cedar Rapids.” Later, a steamboat named the *Black Hawk* ran briefly between Cedar Rapids and Waterloo. Forty-four of the Mississippi’s tributaries were navigable, and settlement and trade in the larger Mississippi Valley would have been nearly impossible without them. *Leading Events in Johnson County, Iowa, History* (1912) records several more landings in Iowa City in the 1840s. The *Iowa River*, built in 1866, ran regularly between Iowa City and Burlington. Pilots of these boats would have had to learn the shallows, bends, and snags of the Iowa and Cedar Rivers as well as Mr. Bixby, Mark Twain’s teacher, learned the Mississippi.

Pilots and even passengers on ferries also had to know and adjust to the rise and fall of their rivers. *Leading Events in Johnson County* says that Allan Sutliff had a ferry across the Cedar where a bridge “now spans the stream”—or did until the 2008 flood knocked out the eastern span. An essential ferry across the Iowa was at Roberts Ferry Road, near where I-380 between Iowa City and Cedar Rapids crosses the Coralville Reservoir. Thousands of drivers pass the abandoned site every day, though probably unaware of it. The first “free bridge” across the Iowa in Iowa City was built at Burlington Street in 1860.

But bridges, mill dams, and railroads all impeded steamboats and put them out of business. The first dam on the Iowa River in Iowa City was begun in 1842 by a group of local businessmen, using their own labor and local logs and rock. When it opened on January 1, 1844, it had a fall of ten feet and provided power not only for grinding grains but eventually for “woolen mills, paper mills, sawmills...and the like,” wrote the *Iowa City Press-Citizen* in 1930. One of the owners was Ezekiel Clark, so prominent a personage that Coralville was first named Clarksville. Terrell’s Mill, in what is now Terrell’s Mill Park, was built about the same time, and Terrell provided it with a machine for carding wool. It was washed out by a flood in the fall of 1881. Other mill dams were built nearly all the way up the river and on many of its creeks, as they were on all the rivers of Iowa and neighboring states. They harnessed water power,

and the mill ponds became popular places for swimming, skating, and simple recreation. In time, towns and cities grew up at some of these mill sites, with coal power replacing the water power, and the manufactured products becoming much more varied. The Marshall County Historical Society's website has a picture of the "Gra Iron Foundry, ca. 1895" and says that Marshalltown was once called "Iowa's Pittsburgh." All such industry affected our rivers. But with these changes, people's relation to the rivers changed. Rivers were not so closely known and valued. They became mere sources of water for industry and a means of carrying away industrial byproducts and municipal waste.

Railroads provided faster transportation—especially in the direction most Americans wanted to go: not north and south but west. Thus they, too, changed our relation to rivers. We did not have to concern ourselves so much with a river's seasonal rise and fall, freezing and thawing, or whether it was any longer clear and clean. American progress, mythically and economically, went west. American waste went down the rivers, mainly south.

This is most vividly seen in what happened in the later nineteenth century along the Mississippi. After the Civil War, steamboat traffic virtually stopped, and the river became the means for floating logs from the forests of Wisconsin and Minnesota down to mills as far south as central Missouri and Illinois. By 1877 there were thirty-three lumber mills in Iowa alone. By "the late 1880s," writes Calvin Fremling, the best general historian of the Mississippi, "there were more than 80 sawmills located on the Upper Mississippi River and about 120 located on tributary streams." The rafts of these logs were gigantic, some over 1550 feet long, covering almost ten acres and containing over two million board feet of wood. Every year there were hundreds of them, jamming the Mississippi. Its water became clotted with sawdust from the mills and waste from towns and cities. According to Fremling, the Mississippi "was treated like a sewer." People protested. They hated all the sawdust and feces and garbage that collected on the shores and piled up against the "wing dams" that were meant to direct the flow into the central channel.

But protests had little effect. The lumber industry was powerful and produced great wealth and social benefit. The lumber that was milled along the Mississippi and carried west by train enabled people on the treeless prairies and plains to live in something big-

ger and better than sod huts and to build sheds and barns for their animals and hay. The lumber went west and brought back money. The waste went south. It was an acceptable bargain.

Rivers like the Iowa did not carry much waste from sawmills, but they did carry increasing amounts of silt from the plowing of the prairies. Pare Lorentz, in his great 1936 documentary *The River*, blames the Mississippi's floods on the cutting of the forests on its tributaries. And to be sure, the rivers of Wisconsin and northern Minnesota were forest rivers. Lorentz does not mention the prairie rivers whose hydrology was equally altered. Their waters, too, had been clearer and less flood-prone. Today, the popular belief is that all Midwestern rivers have always been muddy, like the Mississippi, or "Big Muddy." But according to Calvin Fremling, "early explorers were impressed with the quality of the Mississippi's waters." He quotes Stephen Long, who wrote that the river was "entirely colorless and free from everything that would render it impure either to the sight or taste." Though Long and Zebulon Pike described the Mississippi below the St. Croix as reddish and, in deep water, black, Fremling says we know now that this was because the St. Croix carried tannin from the bogs near its origins.

As for the Iowa, Iowa City historian Irving Weber writes that early historians "always seemed to describe the Iowa River as 'placid,' sometimes as 'limpid.'" Weber seems slightly incredulous, but that may be because the river certainly was not "limpid" by the 1980s when he wrote. Yet Weber also says that as late as 1918, there were three huge ice houses along Taft Speedway, across from City Park, and people would not like ice made from muddy water. The river was also clean enough for swimming, and in the 1920s and '30s the university swimming coach promoted an annual race from north of the Park Road Bridge to the Iowa Avenue Bridge. I've also heard that Bohumil Shimek, University of Iowa botanist and geologist, long ago wrote that unless Iowa farmers changed their practices, one would no longer be able to stand on a bridge over the Iowa River and see the bottom, but I have not been able to find the quotation. Prairie rivers like the Iowa used to contain very little silt and mud because the prairie grasses and their roots held back water and prevented erosion. So did the trees that lined the banks of rivers and streams. Even the once-numerous beavers helped keep water clear; their dams held back water and allowed silt and mud to

settle. Clams and mussels, also once very numerous in Iowa rivers, strained out impurities.

What changed the rivers of the prairie was not only plowing, however. It was also the drainage of their marshes, bogs, ponds, and lakes. Today we equate *prairie* with *land*, land covered as far as the eye could see with waving grasses and flowers six to eight feet high. But much of this “land” was actually *wetland* that has been drained over the last 150 years, so long ago that we have no living memory of it and cannot imagine how it looked. Beginning in the 1850s, the drainage became so widespread and so local that no one can say exactly how many thousands of square miles were affected. A map prepared by the U.S. Bureau of Census in 1920, however, is suggestive. It shows in black the lands drained in the upper Midwest, “lands” that are collectively as gigantic as the area of all the Great Lakes. A map of modern drainage would show an even larger area, for the practice went on and still goes on, with ever more efficient technology.

I first became aware of “ag drainage,” so-called, in the early 1990s when I was serving on the Iowa Environmental Council, which was trying to identify and close one of the most insidious forms of drainage, the holes, or “ag wells,” dug in the low parts of fields through which unwanted water flows out like water from a bathtub. By carrying with it fertilizers and poisonous pesticides, such water pollutes the aquifers from which more and more people draw drinking water. The problem gets worse the more chemicals are used. But similarly polluted water has also been flowing for years through the lines of drainage tile laid under fields and emptying into ditches, creeks, and rivers. In the late nineteenth century, the developers of Iowa farmland began to use rivers not to bring water (as is done with dry, irrigated lands elsewhere), but to carry it away. In the early twentieth century, Iowa farmers and officials began to straighten small rivers and creeks in order to make fields easier to cultivate and to speed up drainage. “The general plan of the work,” a reporter for the *Kingsley New Times* approvingly wrote in 1920, “is to dig a new channel for the river and straighten it out and then drain the adjoining land to the ditch.” The result was ugly. Northern portions of the Iowa River indeed look like a ditch, as I found ten years ago doing an article on “Iowa’s Lost Lakes” for *Take the Next Exit*. The banks are steep and treeless, and for miles the ditches

are perfectly straight. No one would ever want to swim, fish, or float a boat in them. They add to flood surges, too, for the faster water flows out, the faster it flows in, downstream; and it has no chance to stop and let the silt and pollutants in it settle. Thus we have made water itself into “waste,” as unwanted as sawdust from lumber mills, urban sewage, and industrial byproducts. Adding to this water that was once held back by meandering creeks, rivers, lakes, and marshes, is the water flowing rapidly off plowed land, parking lots, streets, driveways, roofs, and lawns. It, too, is full of “waste”—oily sludge and litter from the streets and parking lots, chemicals from lawns, pet waste from parks and sidewalks, and the silt, sand, and mud from construction sites.

The upshot is even more “runoff,” containing more than just the dung and urine that used to offend us in early spring. The two less and less acceptable conditions of the Iowa River and its sisters, more extreme floods and greater pollution, are both the consequences of changes in land use and bad land management. Both have possible additional causes, like global warming in the case of floods. But we can do more immediately, here and now, about land use and land management and so attack both of these conditions by some of the same measures.

Many of us may ask, What about bigger dams and levees? Both have a role, and I’ve written elsewhere that a change in management policies at dams such as the Coralville Dam might reduce flood damage. By releasing more water sooner, the reserve capacity of the reservoir could be increased, thus increasing its capability to reduce damage from large floods. This has not been done so far because it would create immediate floods in the lowest parts of the floodplain. But houses in those areas should be bought out and removed, and farmers with low-lying fields should be paid for flood easements.

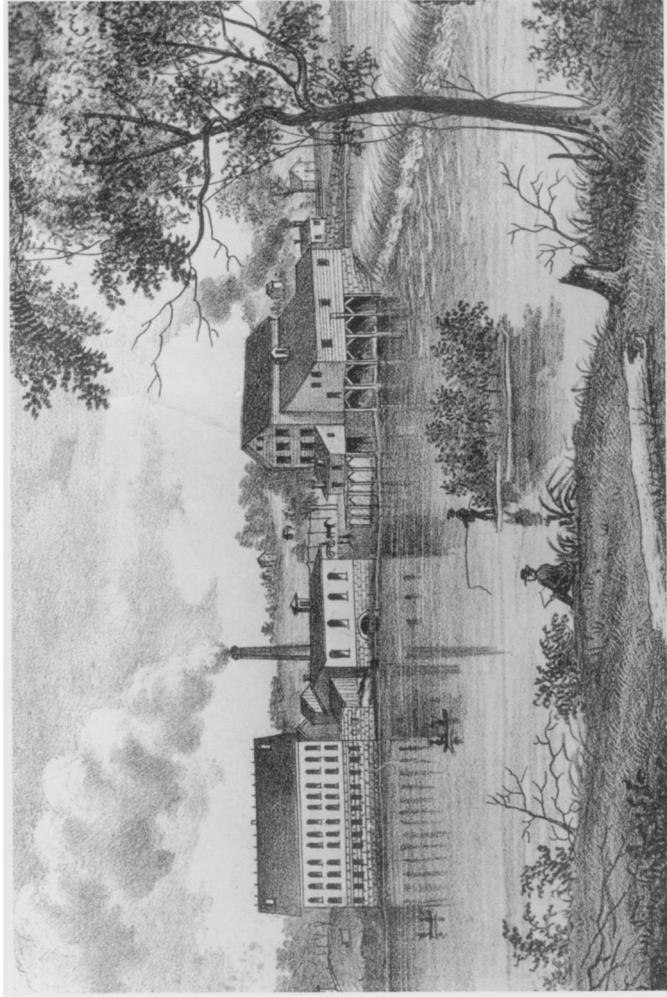
Like dams, levees provide a false sense of security, and gigantic ones, such as those on the lower Mississippi, are ugly and totally destroy the aesthetics of a river. But attractive, modest levees can protect against smaller floods, such as normal spring surges. Levees do nothing to protect us from pollution, however, and dams do relatively little and only temporarily. The better choice is to stop it at its source.

(Continued on page 123)

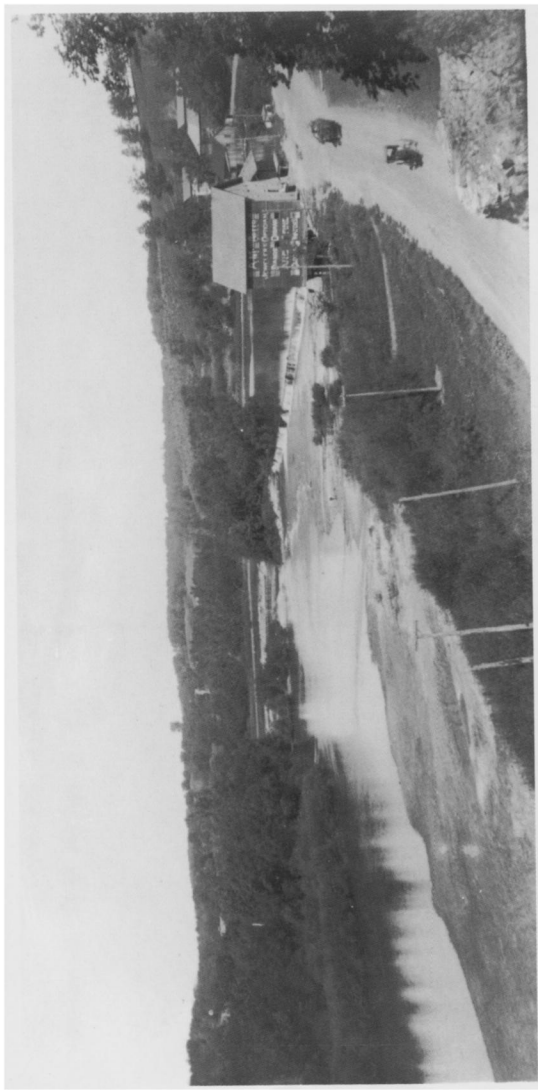
Changes in a River
The Iowa River through Iowa City, 1840s to 1955

The Iowa River in Iowa City provides a revealing example of how Midwestern rivers have been changed to accommodate urban needs: power, recreation, water supplies, protection from floods, transportation, and aesthetic pleasure. Thanks to skilled photographers like Bertha Shambaugh and Frederick W. Kent these changes have been exhaustively documented. The following pictures and photographs from the State Historical Society of Iowa in Iowa City (SHSI) and the University of Iowa Library's Digital Collections are a tiny selection from the hundreds that have been preserved. The part of each caption that is in quotations is from the sources. The remainder is explanatory and interpretive.

—RFS



1. "Iowa River Mills (Woolen, Paper, Flouring), Coralville, Iowa, ca. 1880." The first use of Iowa rivers, after transportation, was for water power. Started in the 1840s as a grain and lumber mill, this mill later had many other uses. After a fire in 1899, an electric generating plant was built on the site, with a new dam, in 1916. It was shut down in 1968, and in 1977 the building became a river-side restaurant. The present dam on the same site was finished in 2006 to ensure a supply of water for the Iowa City Water Purification Plant. (State Historical Society of Iowa)



2. "Terrell Mill shot from bluff looking north, showing Dubuque Road, Iowa City, ca. 1880." Also built in the 1840s about a mile downstream, Terrell Mill was a grain mill. When its dam was damaged by a flood in 1881, the building was used as glove factory. In the 1930s the WPA filled in the land along Dubuque Road (now Dubuque Street) and moved the channel of the river several hundred yards to the west and south. (State Historical Society of Iowa)

3. *“Iowa Avenue Bridge from north, Iowa City, ca. 1889.” The river is low because the picture was probably taken in the late summer, and because the dam at Burlington Street (the bridge in the background) was not built until 1906. But the bridge was high because of flood damage. Bowstring bridges like these were very common on Iowa rivers and creeks. (State Historical Society of Iowa, Bertha Shambaugh, photographer)*



4. "Iowa River nature scene, Terrell Mill in far background, ca. 1893." Probably taken from the bluff on the east side of the river and looking north-west. Note the islands in the river and the trees beyond, on the site today of Hancher Auditorium and lower City Park. (State Historical Society of Iowa)



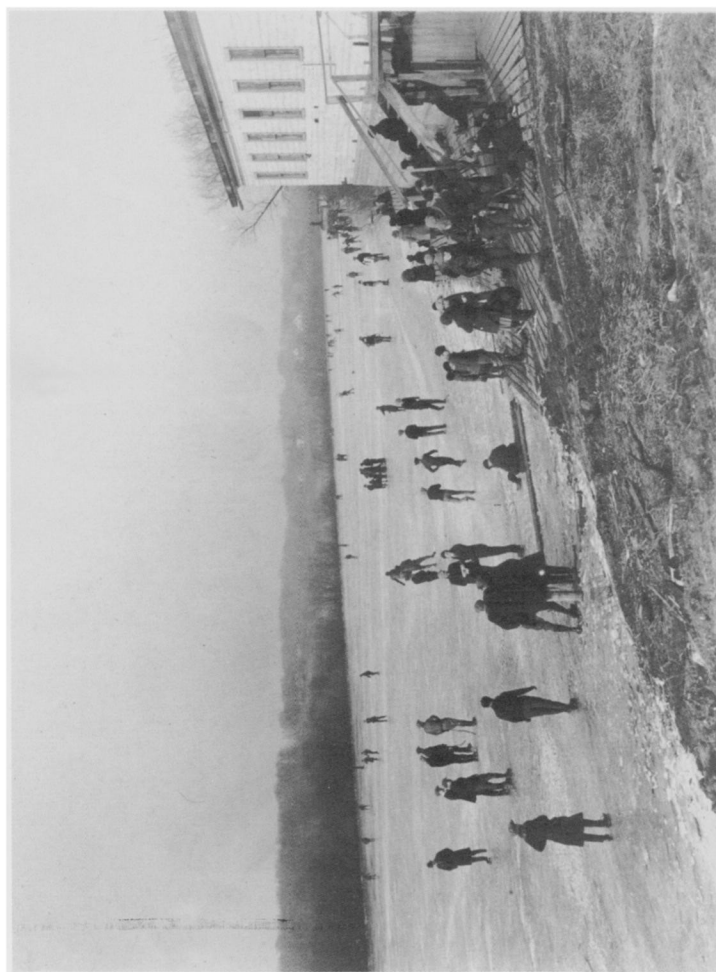
5. "Group swimming and wading in the Iowa River, Iowa City, ca. 1890." The low, clear water at this unknown location made the river very attractive for swimming. (State Historical Society of Iowa)



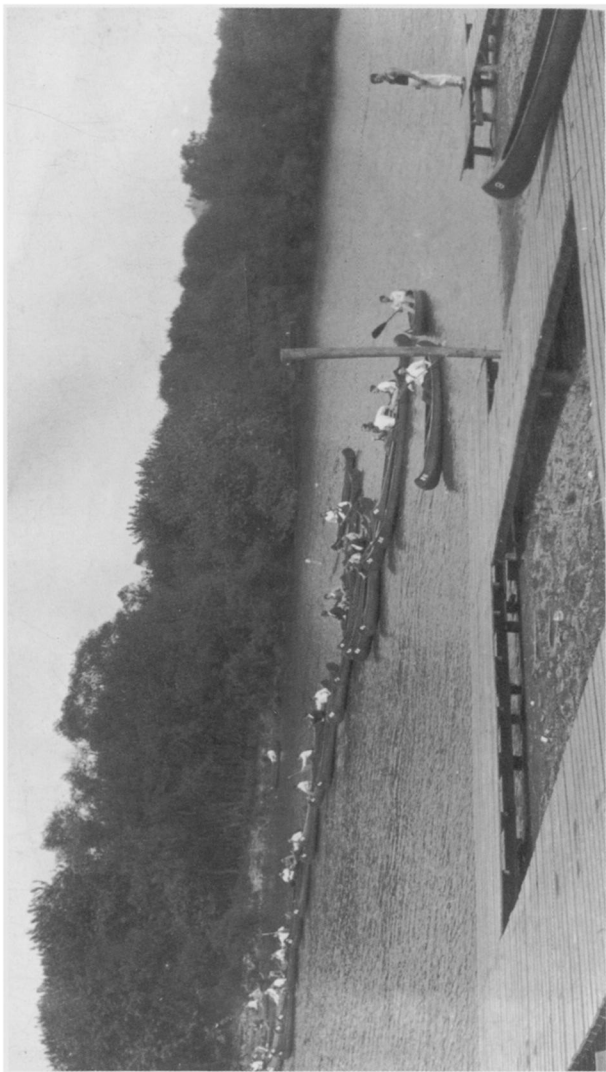
6. "Ice cutting on the Iowa River, Iowa City, ca. 1910." The exact location is uncertain, but this photograph was probably taken near one of the three ice houses that were on the north side of the river opposite City Park. (State Historical Society of Iowa)



7. "Ice skating on Iowa River, Iowa City, ca. 1920." Skating was as popular in winter as swimming and canoeing were in summer. The ice was firmer than after the completion of the Corps of Engineers dam in 1958, although people did fall through. The Fitzgerald Boat House, on the right, served as a warming hut. (University of Iowa Libraries, Dept. of Special Collections, F.W. Kent Collection of Photographs, Frederick W. Kent, photographer)

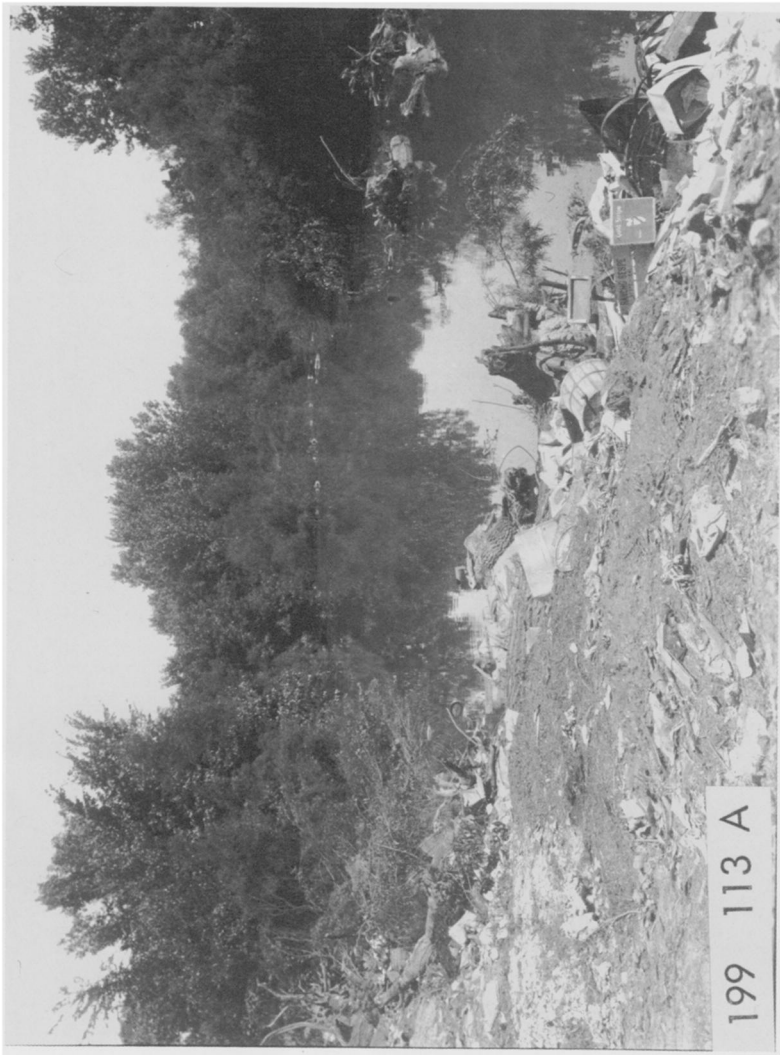


8. "Canoe race on the Iowa River, Iowa City, in front of Fitzgerald Boat House, ca. 1930." Fitzgerald Boat House, at the northwest corner of the present Iowa Memorial Union, rented canoes to students and townspeople. (State Historical Society of Iowa)



9. "Iowa Field, spillway, Iowa City, 1925." Until the 1930s, the University of Iowa's football and baseball fields were along the river. The Cedar Rapids and Iowa City interurban line (CRANDIC) ran under the east grandstand. The area is now occupied by the English-Philosophy Building and a parking lot. (University of Iowa Libraries, Dept. of Special Collections, F.W. Kent Collection of Photographs, Frederick W. Kent, photographer)





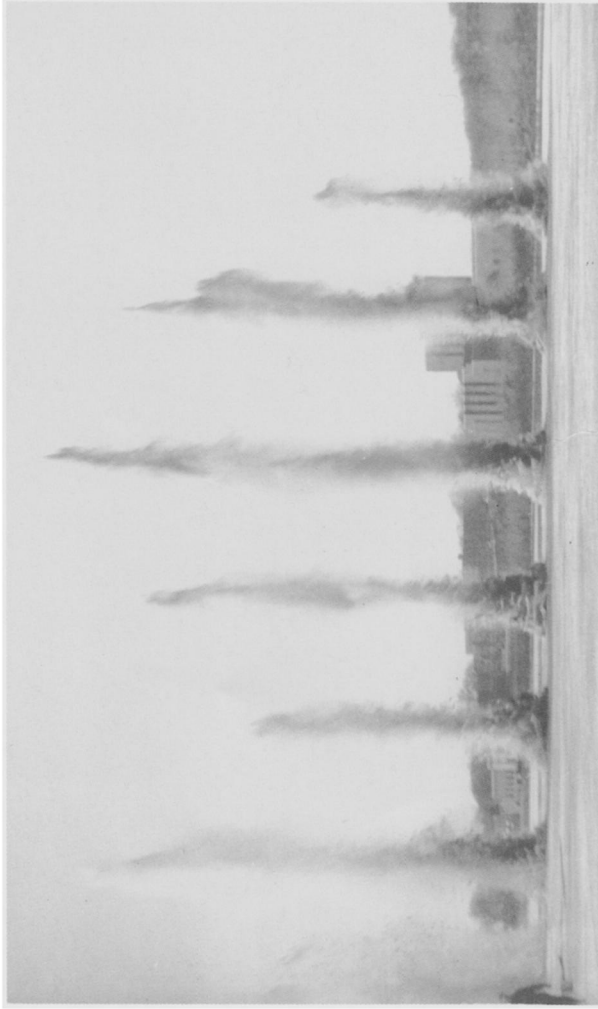
10. "Iowa River dump site, Iowa City, November 1933." View of Iowa River along Riverside Drive, where the art building now stands. Material was dumped here for the purpose of raising the land in order to improve the west flood plain. This was previously the main channel of the Iowa River, which was shifted to the east. In the 1930s, the university, with Works Progress Administration assistance, began altering the west side of the river to build the Art Campus. (University of Iowa Libraries, Dept. of Special Collections, F.W. Kent Collection of Photographs, Frederick W. Kent, photographer)

11. "Iowa River near park bend, Iowa City, August 1934." This idyllic scene shows the river near the site of old Terrell Mill (see photo #2). The WPA work a few years later moved it to the west and south, eliminating the sharp bend in the middle of the picture and the tall trees on the left. (University of Iowa Libraries, Dept. of Special Collections, F.W. Kent Collection of Photographs, Frederick W. Kent, photographer)



12. "Blasting ice on the Iowa River, Iowa City, March 1936." Under some conditions, ice could build up at bridges, creating temporary dams and floods and also endangering the bridge structures. Dynamiting was sometimes done to break up it up, creating spectacular sights and sounds.

(University of Iowa Libraries, Dept. of Special Collections, F.W. Kent Collection of Photographs, Frederick W. Kent, photographer)





13. "WPA dredging and filling the Iowa River near the University of Iowa, April 1938." Work on the west bank was extensive. This picture was probably taken from the top of the university's Mabie Theater, looking north. The stone work in the upper left was part of the border of the future canoe pond that can be seen, finished, in photo #16. The pond was drained in the 1970s for the construction of the Music School, Clapp Recital Hall, and Hancher Auditorium. (State Historical Society of Iowa)

14. "Iowa River flood, June 1947. Men working on dikes at flooded banks north of railroad bridge on University of Iowa campus." This flood, which nearly closed the university, added to support for building the Coralville Dam and Reservoir by the U.S. Army Corps of Engineers. (University of Iowa Libraries, Dept. of Special Collections, F.W. Kent Collection of Photographs, Frederick W. Kent, photographer)





15. "Art campus, the University of Iowa, 1955. View looking southwest." This aerial illustrates the fulfillment of the 1930s vision of the Iowa River as a safe, scenic enhancement of the university campus. The walls and dikes along the banks are complete. There is a pond for canoe instruction just north of Mabie Theater, and the stone canoe house, finished in 1939, lies between the pond and the river. The picture also shows many of the post-World War II Quonsets and barracks, which were later taken down and the canoe pond drained to make way for Hancher Auditorium and other additions to the art campus. (University of Iowa Libraries, Dept. of Special Collections, F.W. Kent Collection of Photographs, Frederick W. Kent, photographer)

SOURCE AND NON-SOURCE POLLUTION

Given our history of treating rivers as sewers and expecting that whatever goes into one “goes south,” to disappear or become some one else’s problem, this is a big order. But efforts to change this way of thinking and so to clean up rivers have begun in other parts of the country, like the Hudson Valley, and those of us who live along prairie rivers should take heart. Indeed, some progress has already been made. In the late 1950s, when Calvin Fremling began his PhD research, “No Iowa city along the Mississippi had municipal sewage treatment....” Fisheries biologists jokingly measured the raw sewage where they were working by “the ‘white trout index’” (“white trout” being condoms). Today all large towns have treatment plants, and industrial waste is much more carefully monitored, although many small towns still need plants.

But the enormous new offenders are confined animal feeding operations (CAFOs). In Iowa, the vast majority of our twenty million hogs are now raised in these buildings, with each hog producing “2.8 times more urine and feces per pound of body weight” than a human being. Thus any CAFO with thousands of hogs produces many times the excrement of a modest-sized town, with no “treatment” of it except to store it in a huge so-called “lagoon” from which it is eventually spread on fields as fertilizer. When a “lagoon” wall breaks, the mess flows into the nearest creek, killing fish and ruining the creek for years. In both cases the smell is abominable, and the eventual “runoff” is far greater than what used to seasonally offend us in the 1960s and ’70s. In the last few years CAFOs have spread across Iowa like an epidemic, locating wherever corn is grown cheaply, which is nearly everywhere. One of the densest concentrations of them is in the Iowa and Cedar River watersheds. Teresa Galluzzo of the Iowa Policy Project has calculated that there are 1,222 CAFOs in the Iowa watershed and 1,324 in the Cedar.

Unlike the waste that is discharged from factories and urban sewage plants—what is technically called “point source pollution”—the runoff of all kinds from fields, including those where CAFOs’ manure is supposed to be spread, is “nonpoint-source.” It does not run through a pipe where you can monitor it and maybe treat it. In this respect it is like most of the storm sewage that carries the sludge, weed-killers, dog feces, and other detritus from streets, parking lots, lawns, and driveways and goes unmonitored into ravines,

streams, and rivers. Thus it is much more difficult to control. The nonpoint-source pollution in Iowa, however, overwhelmingly comes from farms, because sixty-three percent of the area of Iowa is used for row crops. Only three percent is urban areas, and three percent is used for roads. (The remaining thirty-one percent is pastures, forests, public lands and parks, or covered by lakes and streams.) Thus row crops (mainly corn and soybeans) every year cover 22,643,000 acres, or nearly eleven times the area covered by roads, towns, and cities (2,093,400 acres). I do not have specific figures for the Iowa and Cedar River watersheds—unfortunately, Iowa keeps statistics of these kinds mainly by county, not by watershed—but we can assume the proportions are roughly the same.

What this all means is that currently the big place in which to work to improve water quality and reduce flooding in Iowa is on farms. Many farmers know this, and many are already trying to reduce the amounts of fertilizers and pesticides they spray on their fields, because it also saves money. Another increasingly common practice, no-till agriculture, keeps the soil covered, thereby reducing runoff and erosion. The downside is that not plowing and cultivating a field requires that a farmer use more herbicides. Other improvements could come from planting cover crops in the fall to stop erosion and provide natural soil regeneration, from greater diversification and rotation of crops, and, best of all, from turning to organic agriculture.

But bare soil is always extremely vulnerable to erosion, as every Iowan ought to know from listening to the laments of farmers who have had their newly seeded fields washed away by a May downpour or seen pictures on television of great sheets of muddy water pouring off fields, leaving them with ugly gouges anywhere from one foot to four feet deep. This is the water that makes creeks and rivers so universally brown and anonymous. Terracing is one defense, and creating “water courses,” where grasses are planted in those gullies the water flows into, are another. “The best place for a drop of rain is where it lands,” says my friend Wayne Petersen, and both of these measures help to ensure that the rain indeed stays put. We should keep water in the soil until it has done its work making things grow and then transpired into the air, entered groundwater, or eventually seeped into a river. At least, we should keep it in the field.

MULTI-SPECIES RIPARIAN BUFFER STRIPS

A very effective way of keeping water in the field is to grow what researchers at Iowa State University with support from the Leopold Center for Sustainable Agriculture, call “multi-species riparian buffer strips” (MSRBS). These are strips of grasses, shrubs, and trees approximately twenty-one meters wide planted along streams. The standard MSRBS begins at the stream’s edge with a ten-meter-wide zone of four or five rows of fast-growing trees like willows and cottonwoods. The second zone consists of one or two rows of native shrubs four meters wide. The third, seven meters wide, is planted in deep-rooted native grasses.

The first experimental MSRBS of this kind was planted on the Risdal farm along Bear Creek, near Roland, Iowa, in 1990. In the summer of 1997, while serving on the Leopold Center Advisory Board, I had a tour of it that was unforgettable. Although the farm is in Story County, in the watershed of the South Skunk River (the next river west of the Iowa), the topography is very similar to many fields in the Iowa River Valley.

The immediately visible evidence of the MSRBS’s success was that the fields had not been damaged by the 1993 flood: the stream banks had not been eroded, and the willows along them were thriving. This was because the trees had already grown high enough and deeply rooted enough to withstand the rush of water, which in turn had been slowed by them and by the stems and branches of the shrubs beside them. The wide band of grasses had trapped the water flowing from the fields.

The MSRBS at the Risdal farm has been equally successful in stopping the flow of sediment and chemicals. I did not at the time record the figures the investigators recited, but the figures in research reports on it and other strips are very impressive. The stems of the grasses and shrubs slow down the water coming off a field, so that the silt in it begins to settle, and the water itself sinks down into the roots. As much as ninety percent of sediment can thus be prevented from entering a stream. Once the water soaks into the ground, the chemicals in it are taken up by the plants. It is calculated that forty-three percent of the non-point source nitrogen in Midwestern streams comes from cropland, and “riparian forests and grass communities reduce nitrogen by 40–100 and 10–60 percent respectively.” The percentages vary because there are many

factors influencing the buffer strips' effectiveness, such as the slope of the land, the age and height of the plants in the strip, the volume of runoff and its speed, and the time of year and maturity of the surrounding crops. Because of these variations, not all strips need to be the same: some may need to be wider, and some, less wide. But I have heard of no other system so effective in holding back water from cropland and also purifying it. It is the best currently known system for reducing our prairie floods and cleaning up rivers like the Iowa.

Riparian buffer strips have several other advantages. The deep roots of the trees and native grasses stabilize stream banks and bind the soil. Native grasses have "nine times greater root mass extending more than three times as deep as cool season grasses." Another advantage is the improved in-stream environment. The trees shade the water and keep it cooler, while the leaves and litter are food for fish and other organisms. When trees and branches fall into a stream, they form partial dams that form "riffle pools." Sediment settles in the pools, while the riffles running over the logs oxygenate the water. Slower moving water then spreads through the surrounding soil and down into aquifers. Paradoxically, such streams are also more likely to keep flowing throughout the summer and to become better corridors for birds, plants, and animals. All this adds to the health and beauty of the rural landscape. In the summer of 1997, Bear Creek on the Risdal farm seemed the most beautiful creek in Iowa.

Federal funding is available to assist farmers in planting buffer strips, as well as to protect highly erodable land and restore wetlands. These are good investments that protect soil, improve habitat, and add to the beauty and diversity of the landscape. It also makes better sense to stop pollution and floods at their sources rather than pay for huge dikes, dams, and water treatment plants that purify runoff that should never have been allowed to run off. But government programs are not the only answer. As Aldo Leopold said sixty years ago, if landowners are conservationists just because they are paid to be, they will stop when the money stops. They, themselves, need to care. They, too, should not accept the unacceptable. They, too, should want better than bottled water and lollipop juice.

Wendell Berry's Golden Rule of living on rivers is, Do unto those downstream as you would have those upstream do unto you.

LIVING WITH THE IOWA RIVER

There is no written history of the Iowa River, but there are hundreds of photographs of it that can be found in the Iowa State Historical Society in Iowa City and at Special Collections at the University of Iowa Library, which has conveniently put over two hundred of them online. The earliest are from the 1880s, the most recent from the flood of 1993. Most were taken in Iowa City, but others are from up and down the river, from Iowa Falls to Columbus Junction and Wapello. And because they show the many things people did on the river, year-round, and the many other things people did to the river, to use it, enjoy it, and make it safer, they are possibly superior to a written history. Like a giant album of snapshots, they candidly show how we have lived with the Iowa River.

The earliest are pictures of Terrell's Mill and Dam, which must have been the river's most prominent feature. Fifty wagons sometimes lined up on the cart road that was once Dubuque Street to deliver grain to be milled there. A picture of a man and his canoe near the dam makes it look eight feet high.

But the majority of the early photographs are of recreation—canoeing, rowing, swimming, wading, fishing, diving, picnicking, sailing, and ice skating. Canoeing seems to have been especially popular: a skill learned by Boy Scouts, a romantic activity for university students, and a weekend diversion for families. But it was also a competitive sport. The "Iowater Regatta" in 1925 attracted 5,000 spectators to a women's canoe race, a men's swimming race, and various other competitions and stunts.

There were also excursion boats to take people upstream to the country club that used to be on the north shore of the river above the university. Fitzgerald's Boathouse, just upstream from Union Footbridge, rented dozens of canoes and in the winter served as a warming hut for skaters. Pictures show the river covered with skaters, though the sport "was not without danger," according to a caption in the *Pictorial History of the University of Iowa*. People often fell through the ice, and some drowned. But it would have been far safer than today, with the Coralville Dam releasing warm water from the bottom of the reservoir that keeps the ice thin. In those days, the ice was thick enough to be cut and stored. A picture of the Englert Ice House, circa 1911 or 1917, shows a large building four stories high with a trestle-like ramp on which the ice was taken to

the upper floors. In spring, the ice in the river sometimes had to be dynamited to keep it from backing up and causing floods—a spectacle many people came to the river to see and photograph.

Floods were the river's great danger, but they were frequent enough that people must have adjusted to them. They did not build major buildings in the floodplains. Indeed, one of the reasons Iowa City was located where it was, rather than at the site of the early Indian villages to the south, was that there were bluffs and hills near the river but safely above it. The only major university facilities right along the river were the first baseball and football stadiums at "Iowa Field," on the east side between Iowa Avenue and Burlington Street. The baseball team had a partially covered stadium along Iowa Avenue. The football field had two open grandstands just to the south, one right alongside the river, the other built up above the CRANDIC tracks on the east. A picture from one flood shows boys diving into the water from the bleachers. To most people, though, floods were simply another of the river's spectacles. Gawkers gathered at bridges and spots like the Burlington Street Dam to watch the rushing water.

The changes made to the river from 1900 to 1940 were meant to improve it, making it more attractive, better for recreation, safer during floods, and a more reliable source of water for the city. The building of the low dam at Burlington Street in 1906 raised the river's level all the way back to the old water treatment plant and made it deeper for swimming and boating. Even greater changes came with the New Deal in the 1930s. Starting in 1933, the river's main channel was filled in along Riverside Drive in order to move it east and make room for the university's art building. Later the channel at City Park was moved west and south. By the end of the decade, the WPA had also built the stone walls that line the river on campus and raised and graded the banks most of the way from the Park Road Bridge to the Iowa Avenue Bridge, forming a low, landscaped levee. In the process, the WPA built the stone canoe house on the west shore and created a pond just to the west of it that could be used for canoe instruction, although pictures dated 1948 show students also using Fitzgerald's Boathouse.

It was this landscaping of the river that after World War II made the floodplain available for veterans' housing and some temporary classrooms in Quonset huts.

Why is the river no longer so integral to daily life in Iowa City and at the university? Part of the answer is that we now have what we think are better, safer places for recreation. Public health scares here and throughout the country in the 1920s and '30s led to the building of swimming pools. The dangers of skating on the river led to the development of skating ponds like the once-popular one in City Park; these have since been abandoned in favor of indoor rinks. The Coralville Reservoir is now the favored place for boating and fishing. Being vastly wider and deeper, it serves much bigger, faster craft than canoes. The only new use of the river has come from the introduction of rowing in the 1990s and the establishment of women's crew as a varsity sport. The Head of the Iowa Regatta every October draws crews from all over the Midwest and is one of the most colorful events of the year. Rowing, however, is also hampered by floods and pollution.

Whether we have abandoned the river because of pollution and its other dangers and disadvantages or whether its pollution and disadvantages are greater because we have abandoned it are interesting questions. Certainly there are many other causes for the degradation of the Iowa River and ones like it. There are also many other reasons why people prefer swimming pools, ice rinks, and lakes, but I truly believe that if we used and enjoyed rivers more we would be much more diligent in caring for them and making sure that everybody cared for them. Conversely, if they were cleaner, we would use and enjoy them more. Rivers should not be just to look at. Nor should we be concerned only about floods. We should protect rivers, not just protect against them. And that means protecting them for the rich and rewarding interactions they have provided people throughout history, from the student and holiday canoeists of recent generations all the way back to the early settlers and the Ioway. Rivers are also for food, which means that they are and must be for their fish and birds and wildlife as well as for us.

Consider, too, how much more environmentally prudent and conservative were those older uses of the Iowa River. Canoeing did not require gasoline or produce carbon emissions. Skating on the river or a nearby pond did not require all the energy needed to produce artificial ice. Fish caught in the Iowa River and birds and game shot along it did not have to travel, pre-packaged, hundreds or thousands of miles. By restoring the Iowa River from just another one of the

brown, anonymous rivers of Iowa into a river valued as a real, living part of our community, the whole community of its watershed, would help in the restoration of the earth.

FROM THE JOURNAL OF A QUIXOTIC CANOEIST

In 1993, for our fifth anniversary, our children gave my wife and me a canoe. Ironically, that was the year of the flood, so we did not use it until 1994, when our friend John Loomis suggested we start exploring the Cedar River. John thought the stretch of the Iowa below Iowa City was uninteresting because the land was mostly flat and the banks so high that not much could be seen. Upstream, the Reservoir was too big. But the Cedar, the Iowa's mightier tributary, proved very interesting, and over the years we have canoed long stretches of it, from as far north as Orchard, above Charles City, to as far south as Moscow, Iowa. We have also canoed parts of the Upper Iowa, the Wapsipinicon, the Turkey, Lake Delhi, and a stretch of the Iowa from Steamboat Rock to Pine Lake State Park. On one extraordinarily warm January day, we even canoed through Iowa City.

Most of these explorations required careful planning. We not only had to pack camping gear, life jackets, clothes, and food, but we had to locate launching and take-out points and arrange to leave one of our vehicles at each and find the roads between them. Despite efforts by state and local governments and chambers of commerce to promote river usage, access points to Iowa rivers are often far apart and not well maintained. One result, however, is that on some stretches of the Cedar we felt as far away from civilization as we ever have in Iowa. On lovely fall afternoons there were only us, the river, and dozens of migrating herons, coots, gulls, egrets, cormorants, and white pelicans. As we floated past fallen trees, sleeping turtles would wake up, look at us with their little diamond-bright eyes, and slip into the water. "Think," John said one afternoon, "in Colorado you'd have to hike up a mountain to have this solitude. And even there you might be surrounded by backpackers. Or think how this river would look in India, with a hundred people every ten feet, bathing, washing their clothes, chanting prayers, or cremating the dead."

But our canoes, like the traders' boats of long ago, enabled us to carry luxuries: fancy salads, deviled eggs, cold meats, French bread, fruit, and bottles of red and white wine. We'd pull up on a sandy

beach, get out our coolers, and enjoy an elegant picnic. Sometimes I also went for a swim, though my wife and our friends were always shocked. “How can you go into that dirty water?” they cried. But if the day was hot, I could not resist. The water was so cool, and, if there had not been a recent heavy rain, it was pretty clear. Most of the time you can’t see pollution. The amounts and kinds of noxious chemicals also vary with the seasons and the weather. So I took my chances, but kept my sneakers on in case I stepped on a rusty can or broken bottle. A lot of river users are careless.

River people are largely friendly, however, with a wry sense of humor. On the piers of a vanished bridge someone had painted geese. On another someone had attached plastic swans. One woman on the bank of the Cedar saw us and called to her husband, “Here come two canoes—get the potato canon!” But she didn’t shoot.

Some local groups have also fought to protect their rivers, an indication that attitudes may be changing. One of the most dramatic examples appeared to us on our trip down the Iowa near Steamboat Rock. That part of the river flows through the Iowa River Greenbelt, with high bluffs on either side and old-growth forests that were being ardently defended by local and state preservationists. We’d read about this and knew that the Iowa Department of Transportation was building a very unusual bridge for the new route of U.S. 20. The DOT was using a new European engineering technique that “launched” the bridge from the bluffs, so that no piers needed to be placed in the river and no forests bulldozed. But we did not know where it was or how far it had progressed until we rounded a bend and saw it, high above the trees and about 130 feet above the river. It truly was “launched,” taking off, like a swan with its long neck reaching straight out and its legs and body still on earth. This section of the beautiful unfinished bridge stretched unsupported from the bluff on our left halfway to the pier it would eventually reach. A white concrete road reaching out in thin air—a sublime, futuristic symbol of what can be done to protect the river, its course, and its watershed when there is human will and ingenuity, and the necessary funding.

A Note on Sources

To begin to study the Iowa it is important to read up on the history of the Mississippi, beginning with John M. Barry, *Rising Tide* (1997), because Congressional action after “the Great Mississippi Flood of 1927...” (its subtitle) and the disastrous Ohio River flood of 1937 instigated the studies by the Army Corps of Engineers that led to the building of flood control dams like the Coralville Dam. *Immortal River: The Upper Mississippi in Ancient and Modern Times* by Calvin R. Fremling (2005) is an excellent general history of the upper river and its watershed. Peter V. Scarpino’s *Great River: An Environmental History of the Upper Mississippi, 1890–1950* (1985) describes lumber-milling, the shell-button industry, and early conservation movements.

Specific data about the Coralville Dam can be found in Corps manuals, primarily the *Water Control Plan with Final Supplement Environmental Impact Statement* (1991) and *Water Control Manual, Coralville Lake* (2001). John Castle, superintendent of the Coralville Dam, lent me the first. Dave Martin, Water Control Engineer at Corps District Headquarters in Rock Island, gave me a copy of the second. I used both in writing “The Dam and the Flood—Cause or Cure?” for a book edited by Cornelia Mutel tentatively entitled *The Iowa Floods of 2008*, which is to be published in 2009 by the University of Iowa Press.

Books on wetlands and drainage are: Ann Vileisis, *Discovering the Unknown Landscape: A History of America’s Wetlands* (1997) and Hugh Prince, *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes* (1997). For more information about drainage in Iowa, I am in debt to Linda Applegate, Charlotte Hubbel, Susan Heathcote, and Teresa Opheim. My own pursuit of this very important subject is chronicled in “Iowa’s Lost Lakes,” in *Take the Next Exit* (2000).

Historical background on the Iowa River required piecing together information in the county histories available at the Iowa State Historical Society in Iowa City and the Johnson County Historical Society in Coralville. The ISHS also has a vertical file of newspaper and magazine articles on the river, in addition to several excellent collections of photographs, many superb ones taken by Fred Kent. The folder on WPA work in Iowa visually documents the work on the river in the 1930s. The University of Iowa Library Special Collections (<http://digital.lib.uiowa.edu>) has more photos by Kent

and by Bertha Shambaugh and Samuel Calvin. Iowa City historian Irving Weber wrote three popular articles on the river for the *Iowa City Press-Citizen* in June 1985 that were reprinted in *Irving Weber's Iowa City*, Vol. 3, pp. 243–260.

More information about buffer strips and CAFOS can be found online. See “Restoration of Riparian Zone Conditions” (<http://www.unl.edu/aug94/rip-crop-2.html>) and “Permitting Pigs: Fixing Faults in Iowa’s CAFO Approval Process” by Teresa Galluzzo and David Osterberg (www.IowaPolicyProject.org). The Iowa Geological Survey website (www.igsb.uiowa.edu) has many useful maps, including maps of the watersheds of all the Iowa rivers, water monitoring points, and land surfaces and covers. Also informative are current data on the pollution-impaired sections of rivers, streams, and lakes. For tables of streamflow on the Iowa River, consult the U.S. Geological Survey website or <http://nwis.waterdata.usgs.gov/ia/nwis>.

I have also benefited from conversations with Marc Linder of the University of Iowa School of Law, who wrote an op-ed piece for the *Press-Citizen* (July 12, 2008) about the development of Parkview Terrace in the 1950s; Richard Fedderson, a member of the Iowa City Planning and Zoning Commission at that time; Carol Sweeting of the Iowa City Water Treatment Plant; Laura Rigal and Barbara Eckstein of the University of Iowa Department of English; and Jessica D. Garrett of the U.S. Geological Survey in Iowa City.

Lastly, I want to thank my daughter, Laura Sayre. She described her memories of drinking lollipop juice, sailing *Titanic*, and swimming in the Iowa River during a university talk she gave about the chemical pollution of the Iowa in October 2008.