

summary

Students research, discuss and debate views on Great Lakes water withdrawals and exportation by taking different roles in the issue.

GRADE LEVEL

6-8

140 minutes

objectives

- Research varying views on the export of Great Lakes water.
- Defend one view on the export of Great Lakes water.
- Evaluate a debate.
- Articulate his or her personal belief regarding the export of Great Lakes water.

prerequisite

Water, Water Everywhere and Water Flow

vocabulary

Diversion: The transfer of water from one watershed to another. Great Lakes watershed: The lands where water from the ground, rivers and streams flow into the Great Lakes. Great Lakes basin: Great Lakes watershed

setting



materials

- Fact sheet (p. 441)
- Role cards Pencils
- Related news articles (on cd)
- Journal pages
- Clear plastic bag with holes in it

subjects

Social Studies, Language Arts, Environmental Science, Hydrology

standards



Science: 13.B.3d, 13.B.3e, 13.B.3f

Social Studies: 17.B.3a, 17.C.2c

Language Arts: 4.A.3a, 4.B.1b, 5.C.1a, 5.C.1b



Science: K.1.1, 6.2.8, 8.1.7, 8.3.6

Social Studies: 6.3.13, 6.3.16 Language Arts: 6.2.8, 6.5.5, 6.7.13, 7.5.4, 7.5.5, 7.7.11, 8.5.4, 8.5.7, 8.7.13



Science: SIC.II.1.E.4, SCI. II.1.MS.1, SCI.II.1.MS.5, SCI.III.5.MS.6

Social Studies: SOC. II.2.MS.5, SOC.VI.2.LE.1, SOC. VI.2, SOC.VI.2.MS.1, SOC.VI.3, SOC.VI.3.MS.1, SOC.VII.1, SOC. CII.1.MS.2 Language Arts: ELA.1.MS.1, ELA.2.MS.1, ELA.3.MS.7, ELA.10. MS.3



Science: A.8.8, B.4.1, C.4.7, C.8.10 Social Studies: A.8.11,

B.8.9, C.8.7, D.8.3, D.8.11 Language Arts: B.8.1, C.4.1, C.4.2, C.8.1, C.8.2, C.8.3

Fishbowl Debate

The style of debate the students will be using is called a fishbowl. Half of the class will debate while the other half, in a circle around the debaters, observes. The students switch between debaters and observers half-way through the time period. The observers may not speak during the debate. Their job is to take notes on the behavior of the debaters. Before students trade roles, the observers will report on their observations. The class may discuss ways to make the next round of debate more successful.

Export of Great Lakes Water

Are the waters of the Great Lakes at risk from being diverted to too many places around the United States and the world? In the next 25 years, at least 55 percent more freshwater than is now available will be needed to satisfy the growing global population. Communities in the United States and around the world are outgrowing their water supply.

The Great Lakes states and provinces depend on the Great Lakes for their drinking water and economy. Great Lakes water helps produce 60 percent of North America's steel and cars. The overall production in the Great Lakes states and provinces is about \$2 trillion annually, which is more than any other country in the world except Japan and the economy of the United States as a whole. The sport fishing industry is worth \$7 billion annually. Great Lakes waters provide drinking water for over 33 million people living in the watershed (Great Lakes basin).

The Great Lakes contain 20 percent of the world's fresh surface water, but only one percent of it is renewed through precipitation, groundwater and surface water (tributaries, snowmelt). This means that if the Great Lakes are too heavily used as a water source we could start to deplete the lakes themselves. There are already water shortages in many parts of the Great Lakes basin including Green Bay, Wisconsin, Chicago, Illinois, Saginaw, Monroe and Oakland counties in Michigan, areas in northwestern Ohio, Rochester, New York and Waterloo, Ontario. For an example of what has happened to the Aral Sea, another freshwater "inland sea," like the Great Lakes, see: http://nailaokda.8m.com/aral.html

The eight states and two provinces within the Great Lakes basin need to work together to find a way to manage and protect the Great Lakes from overuse. It is important that this be done together because the largest negative impacts to the Great Lakes are from the combined effect of the many withdrawals and uses within each of the states and provinces, not from one use alone. The Great Lakes governors and premiers signed a nonbinding agreement, called the Great Lakes Charter Annex, in June of 2001 to develop similar water management programs that would be legally binding in each of the Great Lakes states and provinces that would protect the Great Lakes from diversions and withdrawals of water that would be harmful. A draft of the binding agreement was released on July 19, 2004. The draft law has four requirements for new water use proposals to get approval to take water from the Great Lakes basin:

- 1. There are no alternative water supplies, including conservation of existing water supplies.
- 2. Water that is used must be returned (minus what was consumed).
- 3. The water withdrawal does not hurt the Great Lakes, including inland lakes, rivers, stream, wetland, fish and wildlife habitat.
- 4. Water uses must include conservation plans.
- 5. Water use proposals must do a project that helps improve the Great Lakes (such as: restore a wetland, take out an unused dam, stabilize a shoreline from erosion).

Once approved by all the Great Lakes governors it will take several years to become law.

There is a debate over whether there should be a new water use law and what it should look like. The debate is between groups that include: industrial users, agriculturalists, municipalities and environmentalists. Generally, the industrial users are not in favor of having a new law because they believe it will negatively affect the economy if there are any restrictions on water use. Because agriculturalists produce food we eat, many do not feel they should be part of any water use laws and their uses should be exempt. Municipal water suppliers that give water to many of our homes are generally supportive of the proposed laws, but do not always want to return the water after it is used because it is expensive to build the pipelines to do so. Environmentalists are supportive of the new law as they believe such measures are necessary to protect the Great Lakes for future generations.

For current updates on this issue, see: www.greatlakes. org

procedure

Part One: Large group discussion

- Introduce the topic of diversions and exportation of Great Lakes water and give a flavor for how controversial the issue is. Tell students they will study the issue and participate in a debate about it. Fill a clear plastic bag with water and poke several holes in it, while holding it over a sink or a bucket. Ask students to explain how this is similar to water withdrawals and diversions in the Great Lakes. How is it different? In the Great Lakes, water diversions can be very large, like for the City of Chicago, or smaller. They can be ongoing for companies or for communities. In any case, they involve taking water from the Great Lakes. Keep in mind that the Great Lakes are glacial deposits that are, for the most part, non-renewable. Each year only one percent of the waters in the Great Lakes are renewable through precipitation, tributaries and groundwater.
- 2. Discuss what makes a good debate. Have students brainstorm a list of ideas for ways to make the debate successful. List might include: Listening to each other, talking loudly enough for others to hear, being polite, choosing a moderator to facilitate.
- 3. Students review the information about Great Lakes water exportation. They should read the information on page 441 and/or the additional news articles on the compact disc. If they do not individually read all the articles, they can then break into small groups to teach each other about the one article they have read. Students should summarize their article to share with the other students.

- 4. As a class, brainstorm a list of relevant characters involved in water diversions, which can be gleaned from the fact sheet or articles the students read. Another option is to give students the included "role cards."
- 5. As a class, decide on the roles needed for the debate or have students work in teams to create solid arguments for the roles provided on the "role cards." For example, there could be a group of residents or a water company group that work together on preparing their role for the debate.
- 6. Once roles have been chosen, students should review their own roles, as well as the roles of others within the community for best preparation. Students create a written summary of the statements they would like to contribute to the debate. In addition students should write a three-five sentence summary of their personal beliefs on the water export issue.

Part Two

- 1. Review the elements of a successful debate and the guidelines for the fishbowl method. Divide the class into observers and debaters.
- 2. The moderator (educator, or can be another student) calls the class to order.
- 3. Each character group will have two minutes to make an initial statement. Once this is complete, each will have two minutes to make counter arguments.
- 4. Observers should report on their observations. Discuss as a class: What was positive about the debate and how could the debate have been more effective?
- 5. Trade fishbowl positions and repeat for the second group.

wrap-up

1. Students use their observations of the debate and their written summaries to answer the journal questions and discuss them as a class.

extension

- Student can write an essay summarizing the Great Lakes water diversion issue and explaining his/her stance on the issue. Opinions should be backed up by facts found either in independent research or the news articles provided.
- 2. If the class is so inclined, students can write a letter to their senator or representative expressing their views on Great Lakes protections. A list of senators and their addresses can be found at the U.S. Senate's homepage.

assessment

Rubric on next page.

resources

Alliance for the Great Lakes http://www.greatlakes.org/conservation/withdrawal_intro.asp

Whose Water?

ELEMENTS	****	***	☆☆	\$
DEBATE PREPARATION: Student prepares for debate by listing elements of a good debate, completing summary of specific article, and preparing to debate based on a specific view and/or character.	Addresses all of the components	Missing one component	Missing two components	Missing three or more components
DEBATE: Student (and group) presents a two-minute focused summary of group's perspective. Summary includes supporting evidence. Student (and group) presents a counter argument that addresses other perspectives. Argument is based on facts, not opinions. Student (and group) concludes with a final defense that summarizes stance and responds to others' critiques.	Addresses all of the components	Missing one component	Missing two components	Missing three or more components
DEBATE REFLECTION: Student reflects on the effectiveness of debate and debaters. Student notes areas of strength and areas for improvement. Student discusses how his/her opinions evolved through research and the class debate.	Addresses all of the components	Missing one component	Missing two components	Missing three or more components
LETTER: Letter is appropriately addressed. Student summarizes the issue and presents his/her views with supporting details from reliable sources. Letter is persuasive, advocates for a specific point, has minimal spelling/grammar errors and follows a letter format.	Addresses all of the components	Missing one component	Missing two components	Missing three or more components
ESSAY: Essay has a central theme developed throughout. Student presents and critiques all sides of the issue fairly. Student concludes the essay with his/her personal opinion and supporting details. Essay has minimal spelling and grammatical errors. Sources are cited.	Addresses all of the components	Missing one component	Missing two components	Missing three or more components

Role cards

Α

С

You are a local resident concerned about the future. You live in the Great Lakes watershed. What is your name? What is the name the community? You have children, which is one reason you are concerned about the future of Great Lakes water. What are other reasons that you are concerned? What is your job? Develop your character and opinion.

В

You are the chief executive officer of a water bottling plant. What is your name? Background with the company? Why are you concerned about Great Lakes water exports? You know that your water diversion from a Great Lakes stream has caused it to run dry, but do not plans to change to a new business. You want your business to be as profitable as possible. Many local people are employed at your plant. Develop your character and opinion.

D

You are a third generation farmer in a place where freshwater is becoming increasingly unavailable for you to use to water your crops. As a farmer, you do not feel that you should have to be concerned with new water use laws. After all, you are growing food for people in the region. Develop your character and opinion. You are a resident in a community just outside of the Great Lakes watershed with polluted drinking water. Because you are outside of the watershed, your community cannot access Great Lakes water. What is your name? What community are you from? What do you think should happen with the new water law?

Ε

You own a coal-fired power plant that uses water in order to run your plant. Your plant supplies electricity to the whole community. You think this new law might negatively impact the economy and do not want to spend money to build pipelines to put the water back in the lake, once it is used. You have a family and are concerned about the future and enjoy fishing on the Great Lakes.

F

Other Community member: Develop another role for the debate.

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Water pressures divide a Great Lake state

By DAN EGAN

Last Updated: Nov. 23, 2003

First of three parts

Knowing that New Berlin's public water supply is tainted with potentially cancer-causing radium doesn't keep Mayor Ted Wysocki up at night.

Troubled Waters

"I'm not even worried about the quality of the water. I'm worried about where the water is going to come from. You could come to the point where all we're sucking up is ... sand," he says. "If you don't have water, you don't have a city. You've got a ghost town."

Quietly, steadily, Milwaukee's fast-growing western suburbs have been sucking dry the underground body of water that for decades has been their main source of drinking water. Water levels in the deep sandstone aquifer have dropped more than 600 feet, and now it is only a matter of time - maybe less than a decade in places until the booming suburbs must find a fresh source of water.

Lake Michigan is only a 15-minute drive away and, with treatment, provides some of the best drinking water in the world.

But much of New Berlin - and most of Waukesha County - lies just beyond an invisible line that wraps around the Great Lakes, defining the watershed known as the Great Lakes Basin. It is the line Congress uses to determine who is entitled to Great Lakes water. And, in an increasingly thirsty world, it is a line that could become one of this century's most contentious borders.

The line is intended to protect the lakes from outsiders who would exploit them to fuel development in places such as the Great Plains and the arid West. But this isn't Arizona knocking on the door.

This is us.

And if that door is opened, if water flows beyond the dividing line and into the parched suburbs of Waukesha County, who will be next in line for a liquid some say will become more precious than oil in the coming decades?

"If we say yes to Waukesha County, it's hypocritical to say 'no' to the West, or Asia," says Cameron Davis, executive director of the Lake Michigan Federation, a Chicago-based conservation group.

Wysocki can see the city of Milwaukee from his streets, and just beyond that skyline lies the Lake Michigan shoreline. Just like everybody else in this part of the state, Wysocki likes to think of it as his lake, our lake.

"I can see the lake, but I can't get the water? Give me a break," Wysocki says. "Something is wrong here."

Trust tapped out Municipal systems, private wells both have problems

Something is definitely wrong with the water in Waukesha County. Cathy Short remembers reading with amazement about Europeans who lived in places so polluted and overcrowded they



A Coveted Resource

Managing the waters of Lake Michigan, and all of the Great Lakes, is becoming one of the most critical challenges of the new century.

Overview

Resource: Lake Michigan, one of the world's great bodies of fresh water, is at our doorstep.

Boundary: What amounts to a mini-Continental Divide encircles the Great Lakes and defines the Great Lakes basin.

Division: Water within the basin returns to the lakes, water outside the basin heads elsewhere.

Law: To protect the lakes, only communities within the basin are entitled to Great Lakes water.

Desperate: Communities just outside the basin -

especially those in Waukesha County - are struggling to find a consistent supply of fresh water.

Precedent: If an exception is made for communities just outside the basin, will far-flung places claim they have a right to the water, too?

could not safely drink what trickled out of their taps.

How grim, she thought, to live in an environment where bottled water was not a luxury, but a necessity.

In the early 1990s, the schoolteacher left West Allis with her husband and two young children for a home on metropolitan Milwaukee's western frontier. But the pastures that once surrounded their city of Waukesha home have given way to snaking suburban streets, and the rolling emerald fields have been chopped and freckled with new homes.

Short has lost more than her solitude.

She doesn't remember when it happened, when she stopped trusting her own faucet, but today she relies almost solely on bottled water. She turns to her taps on the rarest of occasions maybe to help wash down an aspirin in the middle of the night. Perhaps she is more prudent than paranoid.

Just like in New Berlin, the federal government considers her city's tap water potentially poisonous because of high levels of radium, a naturally occurring radioactive substance linked to bone cancer. The water left in the deep sandstone aquifer is so tainted with the substance that tests of some city wells have found levels at twice the legal limit.

The U.S. Environmental Protection Agency has given the city until Dec. 8 to settle on a plan to fix the problem.

It is a similar story in Brookfield, Pewaukee, Muskego and Sussex.

Not everybody in Waukesha County relies on municipal water systems that tap the contaminated deep aquifer.

But private well owners have their own worries.

For 20 years Brookfield Ald. Tom Schellinger's 145-foot-deep well provided a steady stream of safe, reliable water to his home. Then one day the well pump started to make a peculiar grinding noise.

"It was trying to suck water, and there wasn't any," Schellinger says. "You really don't appreciate water until you don't have it."

Until you have to join the local gym just to bathe in the morning. Or until your wife has to phone a neighbor and ask whether she can walk over in the dead of winter to borrow a ... shower.

It took three weeks for Schellinger to get water flowing back into his sinks, shower and toilets. It could have been worse. Schellinger was able to hook into Brookfield's municipal water system.

"I could have spent thousands and thousands of dollars digging the well deeper," he says. "But then you ask yourself: How long is it going to last? Did I drill deep enough? Is the well safe?"

Many Waukesha County residents who live outside municipalities have their own well systems, which typically tap a shallow aquifer, a water supply 25 to 300 feet underground. That water supply is separated from the deep sandstone aquifer by a thick slice of largely impenetrable shale. Those well owners may not have to worry about the radium that plagues the deep aquifer, but they do have to worry about inconsistent supply.

HOW MUCH WATER IS USED IN SOUTHEAST WISCONSIN

QUICK QUESTION:

How much is a million gallons

If a swimming pool were

to hold a million gallons of

water, it would have to be

at least 267 feet long, 50

feet wide and 10 feet deep.

10 ft.



50 ft. Source: USGS Water Resources 189.3 million gallons per day MILWAUKEE COUNTY TAPPING THE LAKE: Milwaukee Water Works operates at less than half-capacity and already supplies water to about a dozen suburbs. None is west of the JOURNAL SENTINEL Milwaukee's Linnwood Water Treatment Plant RACINE COUNTY 41.28 million gallons per day WATER WOES WAUKESHA COUNTY The biggest water user in the county is the city of Waukesha, which needs a system that can provide a maximum of 20 million gallons per day. City leaders want to tap Lake Michigan, but

tap Lake Michigan, but they need approval from the governors of all the Great Lakes states because the city lies outside the Great Lakes Basin.

The governors have yet to even consider the request.

Waukesha leaders say their needs are minuscule compared to the 2.1 billion gallons Chicago takes from the lake every day.

Chicago has tapped Lake Michigan for more than a century, and despite grumblings from surrounding states, the city has a U.S. Supreme Court order that allows the diversions to continue.

IAVID ARBANAS, ALFRED ELICIERTO/Journal Sentinel

neighbors chat about well depths and water availability in the same way that they banter about Badgers games and the places where their kids have applied to college.

And garden hoses are increasingly used for more than washing cars and watering tomato plants. At times they stretch across streets or under fences - green lifelines to neighbors whose wells have run dry.

Greg Domres of Herr Well Drilling in Dousman says in the past couple of years he has typically had to drill wells about 10% to 20% deeper in Waukesha County.

He blames some of the problems on old, inadequate systems. But he also points to the spate of dry winters and hot summers, and to the simple fact that more straws are sticking into the same cup of water.

"You're getting a lot more subdivisions," Domres says.

'Worse and worse' Conservation measures won't be enough

Most think water shortages plague only hot and parched areas, not a state famous for rolling pastures and thick green forests sandwiched between the Mississippi River, Lake Michigan and Lake Superior.

Not a region that receives almost three feet of precipitation a year.

Not a place such as Waukesha County, once billed as the "Saratoga of the West" because of the bubbling freshwater springs that attracted people from all over the world a century ago.

But the municipal water departments in Waukesha County have been on a drinking binge for decades, mining water from the deep aquifer - actually a layer of porous, saturated sandstone - at a rate "that is just not sustainable," says Ken Bradbury, a hydrogeologist for the Wisconsin Geological and Natural History Survey.

Countywide, water use has jumped from an average rate of just under 28 million gallons a day in 1985 to 40 million gallons a day now.

The 66,000-resident city of Waukesha alone now needs a system that can provide up to 20 million gallons a day, and it can't keep going back to the same old wells, some of which are already tapping water 2,000 feet below the ground.

The water level is dropping 7 to 10 feet per year, and "the water quality isn't

getting better as the water table gets lower. It's getting worse and worse," says Dan Duchniak, general manager of the Waukesha water utility.

Beyond radium, the water is becoming increasingly concentrated with minerals.

"It tastes like hell. Liquid hell," says Waukesha restaurant worker Monty Crenshaw.

One response is for everybody to stop wasting so much water on their lawns and all those leaky faucets and running toilets.

Water experts say that is a step in the right direction, but the problem is bigger than that.

"We cannot conserve our way out of the water supply issue," Duchniak says. "Even if we did implement aggressive conservation measures, that doesn't change the fact that the aquifer would still be depleting."

The problem is conservation measures likely can't keep pace with growth in a county that has ballooned from 231,000 residents in 1970 to about 370,000 today.

"You can always say 'conserve water' is the answer, and in some cases it is part of the answer, but it's hardly the entire answer," says hydrogeologist Boyd Possin, president-elect of the Wisconsin Groundwater Association, a volunteer organization. "They're going to need more water, not less, any way you look at it."

Water blocked Aquifer is not replenished adequately

Nobody ever pondered that drinkable water might run out when the fear of fire drove the city of Waukesha to dig its first wells in the late 1800s. Until that time, settlers relied on rainwater collection systems, along with the bubbling springs, to provide their drinking water, says Brian Barrett, the former general manager for the city water utility.

The first wells in southeastern Wisconsin to tap the deep aquifer released so much pressure that water columns shot as high as 100 feet into the air.

Jump ahead 120 years, and the springs have dried up and pumps have sucked so much water from beneath Waukesha County that underground flows have been reversed. Historically, water in the sandstone aquifer percolated eastward toward Lake Michigan. The suburbs' thirst

Viewpoints

No one is looking at Waukesha's use of Lake Michigan water on its own as a threat to Lake Michigan. It's the policy precedent, the thought of opening the door.

- Noah Hall,

National Wildlife Federation

That's the whole point in drawing a line. There is always going to be somebody just on the side of that line who screams, 'That's unfair!' - Gary Ballesteros,

Milwaukee board member for Lake Michigan Federation

It tastes like hell. Liquid hell. - Monty Crenshaw, restaurant worker, talking about Waukesha water

I can see the lake, but I can't get the water? Give me a break. Something is wrong here.

- Ted Wysocki,

New Berlin mayor, standing on the shore of Lake Michigan

You could come to the point where all we're sucking up is . . . sand. - Ted Wysocki , mayor of New Berlin, on his area's increasing difficulty in obtaining water

has created an area known as a "cone of depression" - a dip in the water level that actually draws water back to the west.

But even that is not enough to refill the aquifer under Waukesha County fast enough. And the situation is exacerbated by a slice of shale that runs from Lake Michigan into Waukesha County and blocks percolation into the deep sandstone aquifer.

People have developed "a false sense of security that we have this resource that replenishes itself at the rate we draw from it," says state Sen. Neal Kedzie (R-Elkhorn), chairman of the Senate Environment and Natural Resources Committee, who represents some city of Waukesha neighborhoods. The deep aquifer, Barrett says, "has been a reliable source of water for many municipalities for many decades. But all good things come to an end."

That is already starting to happen in Muskego. To deal with its radium problem, the city will shut down a contaminated sandstone well and is looking toward



Urban development and all that comes with it - such as this asphalt parking lot - make it difficult for water to return to the earth, recharging natural water supplies.

Then And Now	
That was then: The first wells in	Thi
southeastern Wisconsin, dug in the	su
late 1800s, released so much pressure	Wa
that water columns shot up 100 feet.	de

This is now: So much water has been sucked from the aquifer beneath Waukesha County that it's created a depression in the water level that has reversed underground flows; water now flows underground away from Lake Michigan, instead of toward it.

a future where it may rely solely on the shallow aquifer.

Other communities, such as Brookfield, intend to install systems to remove radium from their contaminated wells, a costly prospect. The city also will look for new wells in the shallow aquifer.

"The downside to using that shallow aquifer is it is more likely to affect surface water resources, like springs, lakes and wetlands," says Chad Czarkowski, drinking water expert for the Wisconsin Department of Natural Resources. Officials at the DNR already are concerned about how a shallow well for Mukwonago could affect Waukesha County's last big nature preserve, the Vernon Marsh.

There may be ample water in Waukesha County's shallow aquifers to meet the demand, but those sources require undeveloped land to ensure that water can seep down and recharge the supply. Setting aside land for such a use can get tricky in such a fast-developing area.

"You can't recharge through buildings and pavement," says Don Swailes, drinking water quality section chief for the DNR. It can get even trickier if one city's aquifer gets its recharge from open space in a neighboring community. "One of the problems we've had," says Bradbury, the hydrogeologist, "is so many of the communities have grown together and merged together that we're using all the groundwater in one place."

Mini-Continental Divide East to the lake, west to the Mississippi

New Berlin's Bart Williams literally lives atop what could become the front line in the looming battle over exporting Great Lakes water.

The Great Lakes Basin border that slices through his backyard is actually a mini-Continental Divide, though much less dramatic than the famous Rocky Mountain rib separating Pacific Ocean-bound water from Atlantic Ocean-bound water.

Those who live inside the line are entitled to splash a virtually unlimited amount of Great Lakes water on themselves and their lawns, and use it to fuel industry and grow crops. Those on the outside - with the huge exception of the Chicago metropolitan area - generally can't touch it.

The rationale is that most of the water pumped from the Great Lakes but kept within the basin ultimately flows down rivers, drains and sewers back into the lakes. Water pumped over the basin line never returns.

So rain or snow that lands in Williams' backyard dribbles and trickles toward Lake Michigan; water in his front yard rolls toward the Mississippi.

Earlier this year, the City of New Berlin cut a deal with the City of Milwaukee to supply lake water to the eastern third of New Berlin - the portion of the city that lies inside the Great Lakes Basin.

That was great news to Williams, who has relied on his own water softener to remove radium from his faucets since he moved here in the mid-1990s. He takes the radium issue so seriously that he sent his daughter off to kindergarten with explicit instructions not to wet her lips at the school water fountain.

New Berlin Mayor Wysocki says the Milwaukee water deal will ease the water worries for all New Berlin residents. With the eastern third of the city no longer pumping water out of the ground, the city can shut off tainted wells and still have enough remaining good water to go around.

For now.

Wysocki figures the city will still need to find a new source in about a decade. One place to look is to the west, but he figures that putting in more wells just buys time, and pushes the problem onto neighboring communities.

"It becomes a domino effect of problems," he says.

The answer, the mayor says, is Lake Michigan.

But with that answer, far more is at stake than solving the water shortage in Waukesha County.

In 1986, Congress gave each governor of the eight Great Lakes states veto power over any out-of-basin diversions of water.

The idea was to give governors control over withdrawals because it was only a matter of time until parched regions of the country - or even the globe - came knocking.

"The big concern wasn't the Milwaukee suburbs or the Chicago suburbs. It was Phoenix or Albuquerque," says Michael Donahue, president of the Ann Arbor, Mich.-based Great Lakes Commission. The group represents the eight Great Lakes states and two lake-bordering Canadian provinces, and develops management programs for the lakes. "At the time, there was very little discussion about diversions of water to communities that are straddling the line."

The worry now is that opening the lake to suburban Milwaukee's far west side could have worldwide repercussions. Once you say yes to Waukesha County - without requiring the treated wastewater to be returned to the basin - it may be legally impossible to say no to anyone, anywhere, says Davis of the Lake Michigan Federation.

"No one is looking at Waukesha's use of Lake Michigan water on its own as a threat to Lake Michigan," says Noah Hall of the National Wildlife Federation. "It's the policy precedent, the thought of opening the door."

Rethinking the policy Governors consider loosening restrictions

The issue is a matter of common sense and fairness, says Waukesha water utility general manager Duchniak. Waukesha and the western suburbs, he notes, already use Lake Michigan water, and have since the first deep wells were drilled. Water in the sandstone aquifer, he explains, is connected by underground flows to the Great Lakes Basin.

"What's the difference if we get (drinking water) from the groundwater or the lake?" he asks.

The only two cities - with the exception of metropolitan Chicago - outside the basin

By The Numbers

7 to 10 feet Annual drop in the level of the deep sandstone aquifer that has been the main source of drinking water in Waukesha County for decades.

that have been granted diversions are Pleasant Prairie, Wis., and Akron, Ohio. Both approvals came with the condition that the cities eventually pump their treated wastewater back to the basin, something New Berlin already does through the Milwaukee Metropolitan Sewerage District. But Duchniak says such a requirement isn't practical for the city of Waukesha, which is about 18 miles from Lake Michigan and currently pumps its treated wastewater down the Fox River, a tributary of the Mississippi River. He says the cost would be too great to pipe the treated wastewater back to the lake, and losing that amount of water from the Fox likely would harm downstream wetlands and wildlife. The river is also a drinking water source for a number of downstream Illinois communities.

"The governors really need to take a look at how they define their boundaries, and who they are hurting," Duchniak says.

The governors are doing just that. The group is rethinking its diversion policies and may loosen the restrictions, although it is still likely to require that communities send their treated water back into the basin. Any changes are probably at least a year away.

Waukesha does not want to wait. In August, city officials went public with their

desire to link to Lake Michigan via pipeline. Included in the proposal is an offer to fund some restoration projects for degraded areas inside the Great Lakes Basin. They want Gov. Jim Doyle to pitch their case to the fellow Great Lakes governors, something state DNR officials say likely won't happen - if it happens at all - until after the governors rework the diversion rules.

Doyle declined repeated invitations to comment on the issue.

"Until that process has worked its way out, it would be premature to comment on any one particular application," says his spokesman, Dan Leistikow.

But he says it is an issue the governor takes seriously.

"This is critical," Leistikow says. "Water is going to be the oil of the next century, and places like Wisconsin are going to have a tremendously valuable resource.... How we manage this is a vitally important question."

Waukesha's short-term plan to meet the Dec. 8 EPA deadline is to treat some tainted wells and tap the shallow aquifer. This \$8 million plan will solve the problem only for the immediate future; the city will still need to find a new water source within the next decade.

A pipeline to the lake is the cheapest alternative - an estimated \$44 million. Another option is a \$77 million plan to drill new deep sandstone wells in far western Waukesha County, where land is undeveloped.



Unable to tap water from Lake Michigan, most Waukesha county residents are dependent on groundwater, as provided by the city.

EXCESSIVE WATER WITHDRAWALS THREATENING GROUNDWATER SUPPLY

In the last 35 years, wells tapping into southeastern Wisconsin's groundwater have not only grown in number but have become more high-capacity, digging deeper into underground aquifers. In areas with a natural concentration of toxic contaminants – such as radium, arsenic, lead, fluoride and iron – constant drilling and pumping may intensify the contamination.





Source: Southeastern Wisconsin Regional Planning Commission



Dots indicating location of wells in the 10 counties are sized according to pumping rate.

DEEP WELL
 SHALLOW WELL

Above dots represent a pumping rate of about 750,000 gallons per day.



DAVID ARBANAS, ALFRED ELICIERTO/Journal Sentinel

The current cost for residential water use is \$1.51 per 1,000 gallons. Going with a lake pipeline would double that cost; going with new sandstone wells would triple it.

The question on a lot of minds is how hard Waukesha is going to push for the oneway pipeline from Lake Michigan - and how hard others will push back.

"I'd actually go as far as to say that the experience of Milwaukee and its suburbs is going to be a test case for the entire Great Lakes region," Donahue says. "It's a lot easier for a governor to say to a state that is 2,000 miles away that this water needs to stay here. It is an entirely different matter when the diversion is going from one subdivision to another."

Old wounds An opportunity for regional collaboration?

The Waukesha push for lake water is tearing at old wounds between Wisconsin's largest city and its burgeoning suburbs. As far back as the mid-1950s, Milwaukee officials feared the exodus to the western suburbs would drain their tax base to the crippling point, and city officials bristled when told of the pipeline proposal in August. Access to Lake Michigan water would remove yet another restraint on development.

"Waukesha County has grown without restraint and beyond capacity of its water table to safely and economically sustain growth," says Jim Rowen, policy director for outgoing Mayor John O. Norquist. "These are issues that should have been addressed years ago. When you're obese, you don't look for a bigger buffet to eat at." It's not that the city wouldn't be in a position to help if a diversion were approved. The Milwaukee Water Works - upgraded with state-of-the-art equipment after the 1993 Cryptosporidium outbreak - runs at about half-capacity. Wisconsin Public Service Commission figures show Milwaukee's average daily consumption is 123 million gallons a day, and the water works has the capacity to supply a total of 380 million gallons. Milwaukee's extra capacity far exceeds the water demands for all of Waukesha County.

Sen. Kedzie acknowledges it may be time to take a look at the way the western suburbs are shaping up. Or out.

"We have the westward development of Milwaukee starting to bump up against the eastern development of Dane County, and we're starting to realize we have limitations," Kedzie says. "There really is a problem out there, and we can't ignore it any longer. This should be viewed as more of an opportunity for good longrange planning versus looking at it as an unnecessary burden."

Could the rancor lead to closer cooperation between Milwaukee and its suburbs?

"Water will help to advance the notion of regional government," says William C. Carey, an aide to former Milwaukee Mayor Henry Maier and a Wisconsin representative of the Great Lakes Commission.

Carey says, however, that Milwaukee will have to get something in return. One possibility would be a share of the suburban tax base. That happened in Akron after the city began providing Lake Erie water in 1998 to thirsty out-of-basin communities. New Berlin Mayor Wysocki says he appreciates the complexity of the issue, and the ramifications of what he and other suburban leaders are seeking. "There has to be a defined limit from which you can take water from the Great Lakes," he says.

He just doesn't think it should start inside his city's boundaries.

"That's the whole point in drawing a line,"says Gary Ballesteros, a Milwaukee board member for Lake Michigan Federation. "There is always going to be somebody just on the side of that line who screams, 'That's unfair!' "

Waukesha's Cathy Short lives just on the other side of the line, and she isn't screaming. She isn't even complaining.

She is just a little afraid - afraid her drinking water might make her sick, but also worried about diminishing Lake Michigan, and the prospect of opening the floodgates to non-stop development. Short rues what already has been lost in the city she still loves to call home, a city whose bubbling waters once drew people from all over the world.

"Now look what's happened. Isn't that sad?" she says. "What's the next 100 years going to hold for our families?"

From the Nov. 23, 2003 editions of the Milwaukee Journal Sentinel





State industry had the most dramatic increase in water demand in 50 years, from less than 100 million gallons in 1950 to more than 600 million gallons in 2000.

■ 15% of water used by the industrial sector is consumptive — it is not returned to the water source.

DAVID ARBANAS, ALFRED ELICIERTO/Journal Sentinel



Tale of 2 cities reveals water's impact

By LEE BERGQUIST

Last Updated: Nov. 29, 2003

Second of three parts

Michael Pollocoff remembers what the water was like two decades ago, before Pleasant Prairie bloomed into one of Wisconsin's fastest growing communities.

"It looked like orange Kool-Aid and smelled like rotten eggs," says Pollocoff, the village manager.

Like other communities with declining groundwater supplies, Pleasant Prairie struggled with radium in its municipal wells. Water bills would go out with warnings about carcinogens, and Pollocoff would field calls from exasperated residents.

"Do you expect me to pay for this?"

Yes, he did.

"Do you expect me to drink it?"

No, he didn't.

The solution seemed easy. Six feet from a Pleasant Prairie water main lay a water main from the city of Kenosha and a pipeline to Lake Michigan. In 1988, the two communities brokered a deal. Kenosha got 3 square miles of land and, for the first time, an important access point to I-94; Pleasant Prairie got its link to fresh lake water.

But the village could not turn the spigot on.

Water cannot be taken outside the Great Lakes basin without the approval of the eight Great Lakes states' governors, and as close as it is to the shoreline, about half of Pleasant Prairie actually is outside the basin. The governors had never approved a diversion from one of the Great Lakes, but most were willing to go along. The governor from Michigan, John Engler, was the primary stumbling block.

To push its point, Pleasant Prairie paid \$30,000 to a lobbyist in Lansing to tell its story. Soon thereafter, in September 1989, a picture of Pollocoff holding a bottle of rusty water appeared on the front page of the Detroit Free Press. Another picture showed residents being forced to fill up water bottles from a local artesian well.

Two months later, Michigan broke the logjam, sending a letter to Wisconsin officials saying it would not object to letting Pleasant Prairie turn on the Lake Michigan faucet. The decision was one of the most important in the history of Pleasant Prairie, transforming the village from cropland and faded barns to subdivisions, retail outlets and crisp industrial buildings.

Until then, the village had not been able to capitalize on its proximity to Chicago. Water made the difference.

Pleasant Prairie is a classic example of the power and politics of Great Lakes water, and the reason there is growing concern about the way it is managed.



Tale Of 2 Cities

Downtown Lowell remains a quiet economic backwater, in part because the northwest Indiana city, located just outside the Great Lakes basin, has not been allowed to replace its tainted water with Lake Michigan water. Photo Tom Lynn

Overview

Power: The governors of the eight Great Lakes states decide whether any community outside the Great Lakes basin can have access to lake water.

History: The governors have approved outside access on only two occasions.

Pressure: Demand for water is growing in some localities as some experts question the governors' constitutional authority to approve diversions.

Changes: To head off that challenge, the governors are re-evaluating their policies toward water diversion. Politics: All of this is happening as the political power shifts to states with growing needs for fresh water. Many of those states eye the Great Lakes with envy.

The flip side

What happens when water access is denied

Lowell, Ind., is also a classic example, but for the opposite reason.

For years, this little town just beyond the boundary of the Great Lakes basin struggled with excessive levels of naturally occurring fluoride, making its water unsafe to drink. Like Pleasant Prairie, it petitioned the Great Lakes governors to allow a hookup to Lake Michigan water. And like Pleasant Prairie, the big holdup was Michigan, again under then-Gov. Engler.

Unlike Pleasant Prairie, Lowell was refused permission, and local officials are still steamed.

"We lost Lake Michigan water because of the capriciousness of one man, which I think is government at its worst," says David Gard, president of the Lowell Town Council. "... We were in a desperate situation, and they slammed the door on us."



The Answer Was Yes

Pleasant Prairie in Kenosha County has grown in large part because it gained approval to tap into Lake Michigan water. It has no defined village center, but the Prime Outlets, at Highway 165 and I-94, along with a hotel and restaurants, form the main business district of the village. Photo Tom Lynn



The Answer Was No David Gard is president of the Town Council in Lowell, Ind. The town is outside the Great Lakes basin, and its growth has been limited because it was denied Lake Michigan water. Photo Tom Lynn

Michigan has traditionally taken a hard line on diversions because it has no worries; the entire state is within the basin. In the past, the Michigan Department of Natural Resources has said it opposes diversions "supporting growth and expansion in an area unable to provide its own public water supply," according to documents.

These days, century-old brick buildings line Lowell's main street, giving the town a bit of a Norman Rockwell feel. But if he were alive today and painting Lowell, Rockwell might draw a town elder with a perplexed expression, as if thinking: "Where's everyone going?"

Cars and trucks lumber along Commercial Ave., without stopping en route to I-65 and

U.S. Highway 41 - the two main highways in the area. There's new commercial development beyond the edge of town. New homes and subdivisions are popping up as sprawl from Chicago and other northern Indiana communities moves southward.

Lowell has missed out.

After it was denied Lake Michigan water in 1992, the community was forced to spend nearly \$5 million to drill new wells and build a new municipal water system. The first six wells did not produce enough water to provide an adequate reserve.

Town officials ended up ignoring the recommendations of two hydrologists, took

the advice of a local farmer instead and drilled a deep well on the outskirts of town. They struck water. Supplies today are acceptable, officials say.

Like many communities, Lowell wants to grow, and it must annex surrounding land to do so. But water is the key to making everything else work. Council President Gard says his community will eventually ask the governors again for permission to use Lake Michigan water.

"We need to bring some ground into town," Gard says. "Will our well field support it? I don't know. But Lake Michigan would have been a clear and enduring answer for us."

Coveted resource Concern grows about mining Great Lakes

With their ocean-like grandeur, the Great Lakes may seem limitless. Even today, as lake levels have fallen close to historic lows, the total impact from users of the five lakes can be measured in a few inches.

But despite the lakes' immensity, agencies that protect them claim that little of the water can be wasted. Only 1% of the water is renewed annually by rain, runoff and the huge quantities that trickle in from neighboring groundwater, according to the Great Lakes Commission, a U.S.-Canadian agency devoted to resource issues.

There is concern that the lakes could be mined far beyond their current levels, and that concern is growing as fresh water becomes perhaps the most critical resource of the new century.

Amid this backdrop, the political strength of the Great Lakes states is waning. With congressional power shifting to the Sun Belt states, "we fear Congress may well come in and impose something on us," says Todd Ambs, administrator of the water division at the Wisconsin Department of Natural Resources and a staff representative on the Council of Great Lakes Governors. "If it's left up to them, we are, shall we say, somewhat skeptical the rest of Congress is interested in protecting Great Lakes water resources."

Such apprehension percolates across the region.

"You take all of these insecurities, plus the political problems that are inherent in water, and you see why people are worrying about the lakes today," says George Kuper, president and chief executive officer of the Council of Great Lakes Industries, an Ann Arbor, Mich.based organization that represents big water users.

People have long wanted to use the Great Lakes, which account for about 20% of the world's freshwater supply, to solve their water problems. One time it was a proposal to ship water to Asia in tankers; another time it was a suggestion to pipe water to the Great Plains.

"People look at these great bodies of water and say, 'It's ridiculous to say we can't use more of it,' " says Peter Gleick, an Oakland, Calif.-based water policy expert and co-founder of the Pacific Institute, a non-profit center that focuses on the environment and sustainable development. "I think it is a legitimate fear. I think it's perfectly appropriate for the Great Lakes community to worry about outsiders wanting to take Great Lakes water."

Alarm bells Governors, premiers work on new rules

Because they border Canada, the Great Lakes have been governed by international treaties and laws that date back to the Northwest Ordinance of 1787.

In 1985, in reaction to a new round of proposals to pull water from the lakes, the eight Great Lakes governors and the premiers of Ontario and Quebec (which is included because the St. Lawrence Seaway is considered part of the system) signed the Great Lakes Charter, which outlined a series of principles to collectively manage the lakes. A year later Congress stepped in and passed the Water Resources Development Act. The law required the governors of Wisconsin, Minnesota, Illinois, Michigan, Indiana, Ohio, Pennsylvania and New York to approve any water diversion outside the Great Lakes basin.

The basin marks all land in which water eventually flows back to the lakes. It twists and swerves, sometimes reaching inland for hundreds of miles. Other times, such as the stretch from Milwaukee to Chicago and into northern Indiana, it becomes a mere ribbon around the water itself, stretching no farther than a few miles from the shore.

In 1998, a business start-up called the Nova Group, based in Sault Ste. Marie, Ontario, persuaded Ontario officials to approve a request to use Lake Superior to fill up water tankers bound for Asia. The deal collapsed, but the United States would have been powerless to stop it because of Canadian sovereignty.

"That sent off alarm bells across the Great Lakes states," says Jeff Edstrom, a Chicago-based consultant and former staff member of the Council of Great Lakes Governors.

In addition, water law experts advised the governors in 1999 that their authority could be unconstitutional because states typically can't impose limits on the interstate movement of goods. In addition, their veto authority over water deals might violate international trade agreements.

Quotable

We were in a desperate situation, and they slammed the door on us.

- David Gard, president of the Lowell , Ind., Town Council

"Then there was declining lake levels and growing concerns about climate change, and all of a sudden you had a lot of people who said this is not a resource that we can take for granted," says Sam Speck, director of the Ohio Department of Natural Resources and chairman of the Great Lakes Commission.

All of these events prompted the governors and premiers to meet in Niagara Falls, N.Y., in June 2001 and pledge to find new rules for dealing with water management.

Calling themselves "Annex 2001," they set a deadline of June 2004.

A working group of officials representing the governors and premiers is expected to unveil a draft of new protections early next year.

The guiding tenet: Water taken out of the basin would have to be cleaned and returned so there is no net loss to the lakes. For the very largest of diversions, water would have to be returned at a higher quality than usual treatment methods.

WATER FACTS

■ Less than 1%: Percentage of the world's fresh water that is usable in a renewable fashion. This works out to 0.01% of all water.

1.2 billion: Number of people worldwide who do not have access to clean drinking water.

■ 5 million to 10 million: Number of annual deaths worldwide caused by about 250 million cases of waterrelated diseases.

One-half of all wetlands: An important natural resource worldwide that has been lost to development and conversion in the past century.

13 gallons per day: Minimum amount of water per person needed for drinking, cooking, bathing and sanitation.

1.3 gallons per day:

Minimum amount of drinking water needed by an average person to survive in a moderate climate doing an average level of activity.

■ 65 to 78 gallons per day: Amount of water used by an average person in the U.S. for drinking, cooking, bathing and watering the vard.

In the Netherlands, an average person uses only **27 gallons per day** to do the same tasks. In Somalia, the same tasks are done using only **2.3 gallons per day**. Many people in the poorest nations survive on far less water.

CONSUMPTIVE WATER USE* IN THE GREAT LAKES BASIN



* Means water that is used is not returned to the water source

DAVID ARBANAS, ALFRED ELICIERTO/ Journal Sentinel



Waves Of Development

The signs of growth can be seen in Pleasant Prairie in Kenosha County. A new subdivision (foreground) is in its final stages of development, and behind it, land has already been cleared for another. Highway 165 is at right. Pleasant Prairie owes much of its recent growth to linking to the city of Kenosha's water system, which uses Lake Michigan water. Photo Tom Lynn

Timeline

June 2001

When the Great Lakes governors and premiers of Ontario and Quebec initially met to pledge to find new rules for water management.

June 2004

When they hope to have those new rules completed.

And Then?

Once completed, the plan will go before Congress, the eight Great Lakes state legislatures, the two Great Lakes provincial legislatures, and the Canadian Parliament.

HOW THE FIVE LAKES STACK UP





Elevation, individual deput and volume measured at low water even. * Land drainage area for Lake Huron includes St. Marys River; Lake Erie includes the St. Clair-Detroit system; Lake Ontario includes the Niagara River.

DAVID ARBANAS, ALFRED ELICIERTO/

Journal Sentine

If water could not be returned, users would have to pay for projects, such as restoration of habitat or wetlands that would benefit the lakes.

States could be delegated the responsibility to decide small diversions, such as Pleasant Prairie, with some limitations.

The group is also working on a proposal that for the first time ever might force communities to adopt conservation measures if they want more water from the lakes than they now use.

Annex 2001 will eventually have to go before Congress and state legislatures, as well as the provincial legislatures and the Canadian Parliament. Experts believe it could overcome the legal problems while protecting the lakes from large-scale diversions.

A thirsty country Big diversions unlikely, but can't be ruled out

The Great Lakes have long been the target of grandiose diversion proposals.

In the 1980s, the U.S. Army Corps of Engineers studied whether the Great Lakes could help the Great Plains by replenishing declining water levels in the Ogallala Aquifer, the vast supply of groundwater stretching from Texas to South Dakota.

In 1981, mining interests proposed a \$2.1 billion pipeline that would use Lake Superior

water to transport coal slurry from Wyoming and Montana back to the Midwest.

And in 1988, drought conditions prompted Gov. James Thompson of Illinois to call for diverting water from the Great Lakes to raise water levels on the Mississippi River and relieve stalled barge traffic.

As projects surfaced, so did politicians to denounce them.

"As far as I'm concerned, the only water we should sell is that which goes out in cans mixed with malt, hops and barley," Gov. Lee S. Dreyfus joked two decades ago.

With new protections in the works, will some faraway place with water troubles still want to tap the Great Lakes? High energy costs to pump water over long distances, and bitter battles with property owners along a project's path would present major obstacles.

"The era of big water transfer projects is coming to an end because we are finally beginning to understand the true costs of those projects," says water expert Gleick. But Gleick and others agree that the Great Lakes states need to make sure they are protecting the big waters.

"What happens if there are major changes in the economy?" asks Reg Gilbert, senior coordinator for Great Lakes United, a Buffalo, N.Y.-based environmental group. "Water at the moment is cheap. But will it be that way in the future? Who knows what people will consider the smart thing to do in the future?"

WISCONSIN

Areas of concern:

The Milwaukee Estuary, Sheboygan River, Green Bay/Fox River and Menominee River are among the 43 areas of concern named by the U.S. Environmental Protection Agency. Specific areas within the Great Lakes basin were rated based on the extent of pollution resulting from land use.

■ Green Bay/Fox River: Boasts one of the most productive Great Lakes fisheries but also receives waste from the world's largest concentration of paper mills.

Commercial logging:

Widespread logging, starting in the 1830s, damaged watersheds that feed the Great Lakes.

■ About one-third: Fraction of Wisconsin's 11 million acres – including 10,122 river miles that drain to its two bordering Great Lakes, Superior and Michigan.

■ 10 million: Number of people around Lake Michigan, including Wisconsin population, who get their drinking water from the lake.

■ 1,017 miles: The length of Wisconsin's Great Lakes shoreline providing the state with a reservoir of fresh water, commercial shipping and fishing and recreational facilities.

Sources: U.S. Environmental Protection Agency; Council of Great Lakes Governors; International Joint Commission; Pacific Institute; The Weather Book; World Book Encyclopedia; U.S. Army Corps of Engineers

DAVID ARBANAS, ALFRED ELICIERTO/ Journal Sentinel By The Numbers

34%

Population increase in Pleasant Prairie during decade after it gained access to Lake Michigan water.

HOW U.S. AND CANADA HAVE DEALT WITH GREAT LAKES ISSUES

1909 Boundary Waters Treaty

By establishing the International Joint Commission, the treaty provides a mechanism to help resolve and prevent disputes, primarily with water issues along the boundary between Canada and the United States.

CONSUMPTIVE WATER USE* BY THE TWO COUNTRIES



^{*} Means water that is used is not returned to the water source

1985 The Great Lakes Charter

 Signed by the governors of eight Great Lakes states and the premiers of two Canadian provinces, the charter outlines principles to

collectively manage the lakes. The states and provinces agree they will not proceed with any new or increased diversion of Great Lakes water over 5 million gallons per day without approval from the states and provinces.



1986 Water Resources Development Act

■ Congress steps in and prohibits any diversion or export of Great Lakes water outside the basin unless approved by the governor of each Great Lakes state. The law also prohibits any federal agency from studying the transfer of Great Lakes water for use outside the basin unless it is approved by the International Joint Commission.

2001 Great Lakes Charter Annex

The governors and premiers say they will have binding agreements in place by 2004 for reviewing proposed withdrawals of Great Lakes water.

> DAVID ARBANAS, ALFRED ELICIERTO/ Journal Sentinel

Boom times

Pleasant Prairie's growth started with water

Rick Anderson knows all too well the value of water, and what it means to be inside or outside the basin.

For years, he and many of his neighbors quietly endured foul-smelling water, and sometimes no water at all.

He lives in an affluent subdivision south of Gary, Ind., and from his lawn he could almost drive a golf ball into a big tree-lined pond. But the pastoral setting belied the troubles that lurked underground.

Anderson built his home in 1995 and dug 12 wells trying to find decent water. He bought \$20 water filters and went through them like toilet paper. He turned to a 90year-old water witch, who claims he can find water, with no success. But when neighbors finally did some research, they discovered something better than a rich vein of groundwater to solve their problems. The subdivision was tucked a half-mile inside the Great Lakes basin and was able to connect to Lake Michigan through the local water utility.

"You have no idea how fortunate we felt," Anderson says.

Great Lakes water also certainly was the answer for Pleasant Prairie.

The community's population, which had remained virtually unchanged from 1980 to 1990, jumped 34% to 16,136 in 2000, making it one of the fastest growing communities in Wisconsin. Property values zoomed during the 1990s, as well, skyrocketing from \$300 million to \$1.6 billion.

LakeView Corporate Park - 45 minutes from O'Hare International Airport - broke ground shortly after the village got water and helped jump-start the boom. The 2,100-acre business park is assessed at \$57 million; it now draws more than 30,000 workers every business day. Main St. is not a quaint village center, but a sprawling 65-store outlet mall just off I-94 that sells everything from Versace fashions to Waterford crystal to Maidenform bras.

The village built an \$11 million community center in 2000 - the LakeView Recplex - that lies on the shore of Lake Andrea, an artificial lake that used to be a gravel pit.

Many of the subdivisions are new, too. In the last decade, Pleasant Prairie became a magnet for Illinois homeowners - two-thirds of all new homes built in the first half of the 1990s were purchased by Illinois residents, according to the village.

New subdivisions and more traffic may not strike some as progress. But no one can argue that this would have happened without Lake Michigan water. "The essential elements of economic development are sewer, water and electricity," Pollocoff says. "If you miss any of those, you're done."

From the Nov. 30, 2003 editions of the Milwaukee Journal SentinelBy DAN EGAN

Last Updated: Nov. 23, 2003

GIFTS FROM THE GLACIERS

THE WORLD'S LARGEST FRESHWATER SYSTEM

The Great Lakes are oifts from the placiers, the first of which began to advance more than a million years ago. As they inched forward the glaciers, up to 6.500 feet thick, socured the earth and altered forever the previous ecosystem. Valleys created by the river systems o the previous era were deepened and enlarged to form the basin for what is now the Great Lakes. Thousands of years later, the climate began to warm, melting and slowly shrinking the ice – and filling the lakes. The cycle was repeated several times.



7 G37

Great Lakes tempt a thirsty nation

By DAN EGAN and LEE BERGQUIST

Last Updated: Dec. 6, 2003

Second of three parts

Scott City, Kan. - Chevrolet dealer Les Spangler looks down the road and into the future of this dry and dusty farm town built on the notion that its water supply for crops would never run out. The 56-year-old father of two doesn't like what he sees. "I'm really fearful," he says. "We have a bunch of guys on Main Street who are my age. What happens in 10 years when we retire? None of our kids are coming back."

The farms around Scott City are running out of irrigation water, the elixir that helped turn the rolling Great Plains from Dust Bowl to Breadbasket during that last half of the 20th century. With a body of groundwater once touted as equal in volume to Lake Huron disappearing fast in some places after decades of over-pumping, it's only a matter of time until communities across the Plains suffer similar irrigation shortages that could cripple one of the world's most important agriculture economies.

This was not supposed to happen. Great Lakes-sized bodies of water don't - can't - just disappear.

But a cautionary tale for the Great Lakes' distant future is unfolding today in Scott City, which is now paying the price for making it possible to rain around the clock in a land that normally receives an average of about 1.5 inches of precipitation a month.

And the farmers of the Plains are not alone. Water pressures are mounting from the arid West to the green valleys of New England to the booming southern metropolises.

Globally, the United Nations' March 2003 report on water estimates that, minimally, 2 billion people in 48 countries will live in water-scarce conditions by the middle of the century.

The fear is it's only a matter of time until a thirsty world comes calling on what we think of as "our" Great Lakes, the linked system of glacial reservoirs that hold nearly 20% of the world's surface freshwater.

"If you step back and look at the globe, this is a unique resource," says Bruce Baker of the Wisconsin Department of Natural Resources. "There are tremendous demands around the world for clean, fresh water. And it's pretty obvious where a lot of that water is."

The first wave of threats to the lakes likely won't come conveniently packaged in headline-grabbing proposals. There won't be a massive federal project to pipe Lake Superior to the cornfields of Kansas.

The first peril facing the lakes, Great Lakes authorities say, is the cumulative effect of little, seemingly innocuous diversions - a drinking water system for a city of 50,000 people here, an irrigation project to grow fatter potatoes there.

None poses an individual threat. But as the decades stretch, if the diversion numbers mount with no requirements to replenish what's



Tale Of 2 Cities

Farmer Robert Buerkle, 77, looks over his dry farmland just south of Scott City, Kan. Buerkle's farm ran out of water about a decade ago. He was able to dig a 780-foot well for drinking water but has no irrigation for his crops.

Overview

Predicament: The availability of fresh water is a growing worry across the country.

Examples: Some farmers in the Great Plains have run their wells dry; some communities in the Sun Belt keep developing even as water concerns mount. Bounty: The Great Lakes system holds nearly 20% of the world's surface freshwater.

Attraction: Some fear it's only a matter of time before pressure will grow to tap the Great Lakes to solve water availability problems in other areas.

Action: The governors of the Great Lakes states and the premiers from two Canadian provinces are developing a new set of rules to govern water diversions.

Perception: The larger issue is that the public still perceives the Great Lakes as an inexhaustible resource. That, many experts say, needs to change.

been removed, the toll could be desiccating for a system that replenishes itself at a rate of only 1% a year, experts say.

"If somebody puts a straw in Lake Michigan and pulls out a tiny bit of water, it may have no impact," says Michael Donahue, president of the Ann Arbor, Mich.-based Great Lakes Commission, a group representing the eight Great Lakes states and two Canadian provinces that develops management programs for the lakes.

"But with 1,000 straws"

Well, perhaps one need only look at Scott City.

Depth varies

Huge aquifer runs from Texas to South Dakota

Farmers around Scott City pumped with abandon from the underground reservoir called the Ogallala Aquifer in the 1960s,



Pouring It On

Photo/Tom Lynn

A sprinkler system waters a farm near Garden City, Kan. Although the area is just 40 miles from Scott City, farmers still get water from the Ogallala Aquifer for their crops.



Life Lessons Photo/Tom Lynn

Dalana Billinger (second from right) works with 5-year-old kindergarten student Rogelio Maya at Buffalo Jones School in Garden City, Kan. The minority population at Buffalo Jones is 93%, giving it a diversity unheard of in nearby communities.

'70s and '80s, raising record wheat, corn and alfalfa crops, and never once worrying that they might hit "E" on the tank fueling the economy.

But today, in a withering downtown that no longer has a place for residents to buy shoes or dress clothing, some have likened the situation to a car running out of gas.

Car dealer Spangler doesn't buy that analogy.

"It's a little more frightening than that," he says.

Just ask farmer Kelly Crist.

"If you run out of water for your crops, that's one thing," he says, recalling the day about a decade ago when his well went dry. "But when you go to your house and turn the shower on and there is no water, it's a serious situation."

Today, the 46-year-old farmer relies on an 800-foot-deep well that pokes into a deeper but smaller aquifer to fill his toilets, sinks and bathtub. In his farm fields outside Scott City, he depends solely on what falls from the sky to raise milo. He fears there isn't enough of a future to lure his children back to land their great-grandfather first tilled in 1890. Water levels in the Ogallala, which stretches from Texas to South Dakota, vary in depth, and some communities have decades - or even more than a century before the water runs out.

Scott City sits atop a shallow portion of the aquifer. Water experts say that makes it a window into the Plains' future.

"The area around Scott City is beginning to experience what the rest of the region is going to experience if we continue to pump the way we do," says Rex Buchanan of the Kansas Geological Survey. "If they keep going at the rate they are, it's not a sustainable lifestyle. Something has to give."

Scott City, which now has a population of about 4,000, won't become a ghost town. There won't be a violent economic crash, Buchanan says; it will be more like a bumpy landing. The irrigated corn will be swallowed up by dryland grain farms - a much less lucrative enterprise.

"We will do what we have to," says 49-yearold farmer Jay Wiechman, who still has some water left for irrigation on his farm just north of Scott City.

Farmer Greg Graff already is. He has a foot in both worlds - half his operation still has adequate irrigation to grow corn, the other half has reverted to dryland farming. He says his pumps used to suck 1,500 gallons per minute out of the ground, but now that's dropped to between 200 and 300 gallons a minute. It is a pace that keeps the slow-recharging aquifer from depleting even further.

"For so many years, nobody thought about this," he says of the aquifer depletion. "Had we known then what we know now, we would have managed our aquifer differently."

Graff, 52, is confident Scott City will carry on. He doesn't like to think otherwise.

"You hate to think you're going to lose your town, that you'll have to drive an hour to get groceries. You hate to think that."

Quotable

What happens in 10 years when we retire? None of our kids are coming back.

- Les Spangler, car dealer, on the future of Scott City, Kan., without sufficient water

Ripple effect

Availability of water becomes key to growth

Forty miles down Highway 83, Garden City grade school associate principal Martha Darter is equally consumed by the future. But she worries about how to shepherd into mainstream America a bunch of classrooms packed with brown-skinned children yearning to learn English.

They are the children of thousands of immigrants who have flooded into Garden City during the past two decades for jobs in the thriving meatpacking industry.

The fuel behind the economic boom: water.

Garden City sits atop one of those deeper regions of the Ogallala Aquifer.

"You get an amazing ripple effect because of the water," Buchanan says. "Without water, you don't have corn. Without corn you don't have feedlots. And without feedlots, you don't have meatpacking plants."

Garden City has all of that, and as a result the city has about doubled in size in the past 30 years to nearly 30,000 residents. Along the way, it has emerged as a commercial center for western Kansas - the place where, Graff's fears notwithstanding, people from places such as Scott City already come to buy things like boxer shorts, socks and big boxes of breakfast cereal.

"Everybody who lives in this part of the state understands that water is the key," says Garden City Manager Bob Halloran.

When associate principal Darter first took a job there in the early 1990s, she figured she and her husband would last only a couple of years. But Garden City has grown on her, because, thanks largely to water, Garden City has grown.

"This was just supposed to be a starting point for us," she says. "We never thought we would be here 11 years, but it has everything you need."

Outside her office and across the hall, preschool-aged kids scramble about the gym as a teacher speaking Spanish tries to explain the concept behind musical chairs. More than 90% of the 400 kids at this school don't speak English as their first language. City manager Halloran says minorities are actually the majority in the city's school district - hard to fathom for a city that had a minority population of about 15% when he was a kid.



To Have

Photo/Tom Lynn Downtown Garden City, Kan., bustles with life, thanks to a thriving meatpacking industry. The fuel behind the economic boom: water.

And To Have Not

Photo/Tom Lynn In Scott City, Kan., business can be slow, even at midday. Water problems jeopardize the city's economic future.



Not all the new blood is Hispanic. Lots of southeast Asians have arrived, and former school board member Richard Strandmark says a tally taken several years back showed that 17 languages were spoken in the homes of district students.

This keeps Darter busy, too busy right now to worry about aquifers or depletion or the lessons up the road in Scott City.

"We don't have any worries about water right now," she says.

Water pressure

In some parts of country, demand has skyrocketed

Drive through bustling Garden City or walk across a dry field on the outskirts of Scott City, or visit any place where water supplies are dear, and it's startling to learn this fact: Water use in the United States has been falling since 1980. Peter Gleick, founder of the Pacific Institute, an Oakland, Calif.-based think tank on water policy issues, estimates that water use is down about 10% in the past two decades.

He attributes the decline to the country's more efficient use of water. Consumer products such as low-flush toilets drive down water use. So does drip irrigation. And there has been a shift from an industrial to a service economy.

The problem is that in some parts of the country, demand has skyrocketed. "Big cities continue to grow, and as the population grows, the amount of water we think we want to use goes up," Gleick says.

His point is reinforced in virtually every region of the country.

In northeastern Massachusetts, portions of the Ipswich River have literally been



Water Hazard Photo/Tom Lynn

Surrounded by desert, a golf course in the Lake Las Vegas community gets watered to keep the fairways lush and green. For the first time, watering restrictions have been placed on the region's 50 golf courses because of concern over the availability of water.

pumped dry some summers by 15 communities that use the river as their water supply. The biggest culprit: 15 million gallons a day used to water lawns. The Ipswich supplies water to 335,000 people, and the population is growing.

In Tampa, it rains a lot - about 52 inches a year, some 20 inches more than in Milwaukee. But growing demand from both homeowners and agriculture is pressing supplies, and residents can face up to \$500 fines for watering their lawns more than once or twice a week. The water utility has been forced to build a \$110 million desalinization plant, and a \$121 million reservoir is under construction.

In Atlanta, the region's population is projected to double by 2030, but an adequate water supply may not be there. Georgia, Florida and Alabama are fighting over rights to a critical river system, and the issue may be headed to the U.S. Supreme Court.

Some entrepreneurs are floating deals to supply water to and profit off of thirsty towns. Oil tycoon T. Boone Pickens has sparked controversy with a plan to pipe water hundreds of miles from north Texas to cities such as Dallas and San Antonio. Pickens has a permit, and the green light to tap water beneath 90,000 acres.

Despite worries that the project could endanger supplies in that part of the Ogallala Aquifer, his plans call for a 50% reduction of water levels in the area over 50 years, according to the Panhandle Groundwater Conservation District. worried about entrepreneurs profiting off of water sales.

"There is no real protection," says Ken Kramer, state director of the Sierra Club in Texas. "What we really need is a system that identifies how much water people are entitled to and what's sustainable."

Rolling the dice

Las Vegas gambles that it won't run dry Ken Kramer, meet Las Vegas.

Beyond the glitter of the famous strip and past the dusty tracts of Las Vegas' non-stop sprawl, the Mojave desert is the closest place to a moonscape on earth.

It seems incongruous that people could live here. Las Vegas gets only four inches of rain a year. It's only a few hours away from Death Valley. And its long-term water picture is cloudy.

Still, the population has almost doubled to 1.5 million since 1991. More than 5,000 people move to Las Vegas every month, and 22,502 new homes were built in the metropolitan area last year. The sprawling Las Vegas School District opened the year with 12 new schools. Last year, schools

Quotable

The Great Lakes are, for all intents and purposes, a non-renewable resource. A one-time gift.

- Cameron Davis, executive director, Lake Michigan Federation

By The Numbers **4 inches** Amount of rain a year in Las Vegas, the fastest-growing metropolitan area in the United States.

spent \$5.5 million just to water the grass.

Demand for water in metropolitan Las Vegas jumped 25% between 1995 and 2000 and shows no signs of abating, according to Southern Nevada Water Authority.

Different versions of Las Vegas' story can be seen in Tucson, Phoenix, Los Angeles and San Diego. They are all big, growing cities in the Sun Belt. The biggest difference is that Las Vegas is growing the fastest.

Almost nine out of every 10 gallons of Las Vegas' water is from the Colorado River and lies in storage behind the Hoover Dam in the deep blue waters of Lake Mead.

But Lake Mead, fed by the Rocky Mountain snowpack, is shrinking and is at its lowest point in 40 years, due to four straight years of drought. For the first time, homeowners were told this year which days they could water their lawns. At the same time, rates for a median single family home will rise by 22%. The water authority has beefed up enforcement and has more than tripled the number of fines on those who violate watering restrictions.

Restrictions have also been imposed on the region's 50 golf courses this year.

That's been especially hard for the three 18-hole courses at Sun City Summerlin Community Association. The 8,000-home community looks out on a verdant expanse that, save for the barren mountains that ring the city, could have been plucked from the middle of Wisconsin.

The courses were built in the 1980s, "before anyone was concerned about water," says P.J. McGuire, turf manager for courses. Newer courses are a mix of grass and desert, but Sun City Summerlin is entirely grass.

'Maniac speed'

No one has slammed brakes on development With its famous fountains that sway like

With its famous fountains that sway like dancers and shoot into the night air like beams of light, the Bellagio hotel is held up as an example of Las Vegas' over-the-top

The \$1.2 billion plan has conservationists

excess. But in fact, the strip and the rest of the gambling industry represent only 7% of the local water use, according to the Southern Nevada Water Authority.

Most of the water use comes from homeowners. And local officials say the biggest problem are those who can't give up their lawns.

Southern Nevada uses 308 gallons a day per person, according to the authority. By comparison, residents of Phoenix use 235 gallons a day, and those in Albuquerque use 197 gallons.

For comparison, Milwaukee uses 128 gallons per day.

"Easterners who move to the city of Phoenix embrace living in the desert," says Pat Mulroy, general manager of the authority. "They put desert landscaping in their front yard. An East Coast individual who moves to Las Vegas defies living in the desert."

The Nevada Seniors Coalition says local government agencies such as the water authority have ignored the crisis. The group's biggest complaint: No one has slammed the brakes on development and locked up water supplies to meet future demand.

"We can't grow at this maniac speed, but nobody will talk about it anymore," says Ken Mahal, president of the group and a retired Minneapolis architect.

Those who want to slow Las Vegas' growth say the water authority could stop providing water to new developments.

But Mulroy rejects such thinking. It's not water, she says. With most land in Nevada owned by the federal government, Mulroy says, the federal policy that opens public land to development plays a bigger role than water.

The water authority is trying to find more water because the Colorado River alone won't meet future needs.

"Will it be a challenge? Yes." she says. "There will always be a balancing act between managing the demand side and managing the supply side.

"Will we be spending more for water? Yes. Will that change the way we grow and how we see ourselves as a community? Yes. And will it evolve over time? Yes."



Putting Down Roots

Photo/Tom Lynn

The suburb of Henderson is part of the urban sprawl surrounding Las Vegas. More than 5,000 people move to the area every month, and many of them insist on having yards with trees and shrubs.



Photo/Tom Lynn

Lake Mead water levels are clearly down as the water has calcified along the rocks. From the water's edge at the Lake Mead Marina the water levels are visibly low.

Legal action

Governors work on rules to manage Great Lakes University of Arizona law professor and groundwater expert Robert Glennon has a stock joke he whips out every time he ventures from Tucson to this water-rich part of the country.

"I say the idea of draining all the Great Lakes is just absurd," he says.

"We'd be happy to have just one - say, Superior."

The joke doesn't always get a lot of laughs. There is indeed a certain anxiety inherent in linking the words "Great Lakes" and "water exports," and it hit a high note five years ago in the wake of a Canadian firm's proposal to load up a tanker with Lake Superior water and ship it to Asia.

The public was outraged, even though the Great Lakes remain a net importer of water, thanks to Canada's two huge river diversions into Lake Superior. The Ontario Provincial government quickly rescinded the approval of the tanker plan, and leaders in the U.S. and Canada vowed to step up protections for the lakes. Five years later, the premiers from two Canadian provinces are still working with the governors of the Great Lakes states to develop a new set of rules to govern diversions. A draft of the plan, which many hope will be a legal dike strong enough to keep virtually all of the lakes' 6 quadrillion gallons inside the Great Lakes Basin, should be released in the next few months.

It can't happen too soon for conservationists, who consider the existing set of rules too vague, too open to court challenge and too open to political whims to hold up in court.

"The rules of the game are very unclear for water withdrawals - who gets what and what hoops they have to jump through," says Cameron Davis of the Lake Michigan Federation

THE LAS VEGAS WATERSHED: LOSING WATER

The Colorado River is the source of 88% of the water used in southern Nevada – only 12% comes from groundwater. In a continuous cycle, both river water and groundwater are collected at Lake Mead, a man-made lake that is seeing its lowest water levels in 40 years. Once in Lake Mead water is treated, consumed by homes and industrial users, sent back to the lake as wastewater, then filtered and treated again for reuse



reservoirs is ultimately distributed to

homes and businesse

of the precipitation seeps through mountain rock to the aquifers underneath the valley, a process that can take up to 10,000 years.

governors.

basin.

As the law works now, any U.S. diversion

The governors have a history of saying no;

only two communities, including Pleasant

the law was passed in 1986. Most believe

Prairie, Wis., have gotten approval since

it's only a matter of time until a jilted city

"Just folding our arms and shaking our

heads is not going to be an option," says

Noah Hall, an attorney who works for the

National Wildlife Federation in Michigan.

The governors' new rules likely will

allow some out-of-basin diversions for

communities in need of drinking water.

However, they would be conditional on

piping treated wastewater back into the

outside the basin sues.

outside the Great Lakes Basin requires

approval from all eight Great Lakes

Treated water is then stored in reservoirs.

> It is a myth that thrives even as places such as Scott City shrivel on another

"It's hard to fault somebody for these kinds of misperceptions," Davis says. "I grew up a few blocks from the lake, and as a kid I always thought Lake Michigan went on forever."

Plenty of people still do.

"Great" - the Great Plains.

At a public hearing held last January in New Berlin to discuss shrinking groundwater levels in the Milwaukee suburb, a consultant told the gathering there is only one way out of the problem: Lake Michigan.

The east side of the city lies inside the Great Lakes basin, and people there are eligible for lake water.

Take advantage of Lake Michigan, he says. That would ease the groundwater shortage in the rest of the community.

"There's a heckuva lot of water in there," he assured the gathering. "You're not going to run out."

Sources: U.S. Geological Survey: North Plains Groundwater Conservation District: Office of Arid Land Studies, Arizona; Southern Nevada Water Authority; The Kerr Center for Sustainable Agriculture, Poteau, Oklahoma; College of Agriculture and Life Sciences, University of Arizona; Associated Press

back to Lake Mead.

DAVID ARBANAS, ALFRED ELICIERTO/Journal Sentine

It is a pitch that likely will be made in the coming years to communities all over the Midwest and, perhaps, beyond.

It is a pitch Scott City heard decades ago.

"When I was growing up, they kept telling us we didn't have to worry about water because there was more water here than we could ever use," says 77-year-old farmer Robert Buerkle, whose well went dry about a decade ago. "Well, we proved them wrong, much to our sorrow."

Staff writer Dan Egan reported from Kansas; staff writer Lee Bergquist reported from Nevada.

Clinging to 'greatness'

Experts try to puncture idea that lakes are inexhaustible. Davis says the biggest threat to the Great Lakes lies in their very name, in the notion of their greatness, the idea that they are too vast, too durable to be dented by man. It is "the myth," Davis says, "that the Great Lakes are inexhaustible."

DESALINIZATION: A COSTLY OPTION

In some parts of the country, communities are trying to make saltwater drinkable. The West, for example, has been plagued by drought even as states that are heavily dependent on Colorado River water have seen their allotment reduced. The Metropolitan Water District of Southern California, in response, is taking the promising, albeit expensive, desalinization route





The Colorado River usually runs dry before reaching the Gulf of California after seven states and Mexico have dipped into it and drawn their share of its annual average of 15 million acre-feet. The river has become increasingly polluted by agricultural runoff.





Million acre-feet; one acre-foot is equivalent to 43,560 cubic feet or 325,851 gallons.