

Explore More: Water Quality

Script

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OPEN	WATER IS ONE OF OUR PLANET S MOST IMPORTANT NATURAL RESOURCES. IN FACT, IT S A RESOURCE WE LITERALLY CAN T LIVE WITHOUT
INTRO	<p>HOW MUCH DO YOU REALLY KNOW ABOUT WATER? DID YOU KNOW THERE S THE SAME AMOUNT OF WATER ON EARTH <i>NOW</i> AS THERE WAS WHEN THE EARTH WAS FORMED? THERE WILL NEVER BE ANY MORE OR ANY LESS? DID YOU KNOW 97% OF THAT WATER SUPPLY IS SALTWATER IN THE OCEANS AND UNUSABLE FOR OUR DAILY NEEDS? THAT ANOTHER 2% IS FROZEN IN ICE CAPS AND GLACIERS? SO THAT LEAVES JUST 1% OF THE PLANET S ENTIRE WATER SUPPLY OUR RIVERS, LAKES, AND GROUNDWATER TO MEET EVERYONE S WATER NEEDS. NOW HERE S THE CATCH, MANY OF THOSE RIVERS, LAKES AND GROUNDWATER SOURCES ARE IMPAIRED ENDANGERED BY POLLUTANTS. THAT S RIGHT. THIS LIMITED RESOURCE WE ALL USE DAY IN AND DAY OUT, IS IN SERIOUS JEOPARDY. FROM PLAIN OLD DIRT TO TOXIC CHEMICALS, POLLUTANTS IN OUR WATERWAYS ARE THREATENING OUR HEALTH, AND THE HEALTH OF THE ENVIRONMENT. HOW ARE THE POLLUTANTS GETTING INTO THE WATER AND WHAT CAN WE DO ABOUT IT? THAT S THE COMPLICATED PUZZLE WE LL EXPLORE MORE.</p> <p>SOLVING THE WATER QUALITY PUZZLE IS AN ENORMOUS CHALLENGE, SIMPLY BECAUSE THERE ARE SO MANY PIECES TO CONSIDER. THE WAYS WE USE WATER, THE PRACTICES THAT THREATEN IT. THE DIFFERENT POLLUTANTS IN THE WATER, AND</p>

<p>SETUP</p> <ol style="list-style-type: none"> 1. USES 2. PRACTICES 3. POLLUTANTS 4. SOURCES 5. HYDROLOGY 	<p>THEIR SOURCES . AND HYDROLOGY THE WATER CYCLE AND WAYS WE VE INTERFERED WITH IT.</p> <p>COMPLICATING THE PUZZLE EVEN MORE, THESE PIECES NEVER COMBINE IN EXACTLY THE SAME WAY. EVERY COMMUNITY S WATER QUALITY PROBLEMS ARE UNIQUE, AND DEPEND ENTIRELY ON WHICH PIECES ARE IN PLAY. SIMPLY UNDERSTANDING THE ROLE EACH PIECE PLAYS ISN T ENOUGH. TO SOLVE PROBLEMS, YOU HAVE TO UNDERSTAND THE FIT BETWEEN THE PIECES, THEIR RELATIONSHIP TO ONE ANOTHER. THE WAYS THEY RE AT WORK WITHIN YOUR COMMUNITY CREATE YOUR SPECIFIC WATER PROBLEMS. READY TO DIVE IN?</p>
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USES

(puzzle piece graphic —
then dissolve to video)

THE FIRST PIECE OF THE PUZZLE IS OUR ABSOLUTE RELIANCE ON WATER. IT'S A RESOURCE THAT CAN'T BE REPLACED, WHICH IS WHY IT'S SO IMPERATIVE WE PROTECT IT. LET'S TAKE A QUICK LOOK AT THE DIFFERENT WAYS WE USE WATER.

WE ALL NEED DRINKING WATER. A HUMAN CAN GO WEEKS WITHOUT FOOD, BUT ONLY DAYS WITHOUT WATER. AND WE DON'T JUST NEED WATER TO SURVIVE, WE NEED **CLEAN** WATER. DRINKING WATER ACCOUNTS FOR A TINY PERCENTAGE OF OUR OVERALL WATER USAGE, LESS THAN 1%, BUT IT'S ONE OF THE MOST IMPORTANT OF ALL THE USES.

WE ALSO NEED WATER THAT WORKS FOR US, DOING THE DIRTY HOUSEHOLD JOBS LIKE LAUNDRY AND CLEANING. FOR GROWING GARDENS AND KEEPING LAWNS GREEN.

BEYOND HOUSEHOLD CHORES ARE THE HEAVY DUTY JOBS IN INDUSTRY. WATER IS USED IN MANY MANUFACTURING PROCESSES: AS AN INGREDIENT IN FOOD PRODUCTION, AS A COOLANT FOR PRODUCING STEEL AND POWER, AS THE DRIVING FORCE IN HYDROELECTRIC GENERATION. THE LIST GOES ON AND ON.

ONE OF WATER'S BIGGEST JOBS IS HELPING TO FEED THE WORLD. WATER IS ESSENTIAL TO AGRICULTURE, WITHOUT IT FARMERS COULDN'T GROW CROPS OR PRODUCE LIVESTOCK.

BEYOND IT'S USE IN THE PRODUCTION OF GOODS, WATER IS

OFTEN USED TO *TRANSPORT* THOSE GOODS TO MARKET.

WATERWAYS ARE INTEGRAL TO NATIONAL AND WORLDWIDE SHIPPING.

WHEN WATER S NOT WORKING, IT S PLAYING. ONE OF ITS MOST POPULAR USES IS FOR RECREATION WHETHER IT S SWIMMING, WATERSKIING, FISHING, THE WATER S GOT TO BE **CLEAN**.

POLLUTED RECREATIONAL WATERS SPELL TROUBLE FOR BOTH HUMANS AND WILDLIFE.

WHICH BRINGS US TO THE FINAL USE, HABITAT FOR WILDLIFE. RIVERS, LAKES, AND OCEANS SUPPORT ENTIRE DIVERSE AND FRAGILE ECOSYSTEMS. ECOSYSTEMS THAT CAN BE SHATTERED BY EVEN THE SMALLEST CHANGES IN WATER S QUALITY.

WE DEPEND SO HEAVILY ON WATER, ISN T IT IRONIC THAT MANY OF THE WAYS WE USE IT ARE ACTUALLY IMPAIRING ITS QUALITY? FOR EXAMPLE, CARELESS INDUSTRIAL USE OF WATER CAN CONTAMINATE THE RESOURCE WITH TOXIC CHEMICALS. RECREATIONAL BOATS AND JETSKIS CAN DUMP GAS AND OIL INTO THE VERY WATER WE WANT TO ENJOY.

IF THE WAYS WE *USE* WATER WERE THE ONLY PRACTICES CREATING POLLUTION PROBLEMS, THE PUZZLE WOULD BE SOLVED. WE D JUST CHANGE THE WAYS WE USE WATER. BUT IT S NOT THAT SIMPLE. A WHOLE RANGE OF PRACTICES THE INDIVIDUAL ACTIONS WE TAKE AND DECISIONS WE MAKE AFFECT WATER QUALITY. (WE ALL LIVE DOWNSTREAM

	<p>OF SOMEONE ELSE, AND THERE S SOMEONE ELSE THAT LIVES DOWNSTREAM OF US THAT NEEDS TO UTILIZE THAT WATER, SO WE HAVE TO BE CAREFUL HOW WE RE USING A WATERSHED, WHAT WE RE DOING IN IT) ONE PERSON S DECISION TO PROPERLY DISPOSE OF PAINT KEEPS THAT PAINT OUT OF A STREAM. ONE DEVELOPER S DECISION TO CONTROL EROSION KEEPS SEDIMENT OUT OF A RIVER. MULTIPLY THOSE INDIVIDUAL DECISIONS ACROSS AN ENTIRE COMMUNITY, AND YOU CAN SEE THE IMPACT PROPER PRACTICES CAN HAVE. PRACTICES ARE CLOSELY TIED TO THE CENTERPIECE OF THIS WHOLE WATER QUALITY PUZZLE, POLLUTANTS.</p>
<p>POLLUTANT TYPES</p> <ol style="list-style-type: none"> 1. sediment 2. nutrients 3. toxic chemicals 4. pathogens 	<p>SOME WATER POLLUTANTS ARE EASY TO SEE LIKE GARBAGE. BUT THE MOST SERIOUS POLLUTION PROBLEMS AREN T AS OBVIOUS: SEDIMENT, NUTRIENTS, CHEMICALS, PATHOGENS.</p>
	<p>SEDIMENT IS SIMPLY SOIL. IT S A VALUABLE RESOURCE IN A FARMFIELD OR ALONG A STREAMBANK, BUT IT BECOMES A MAJOR PROBLEM WHEN IT S WASHED INTO WATERWAYS. AT THE ROOT OF THE PROBLEM IS EROSION.</p> <p>(Siegley: erosion off of farmfields. construction sites, where you don t have proper sediment control structures in place- you can easily have sediment eroded off of those lands. you can have pasture areas that are overgrazed. then along all of our major rivers if you don t have a lot of vegetation sort of holding the soil in place, streambanks can be a major source of sediment into streams)</p> <p>WHY IS soil SO DAMAGING WHEN IT S IN WATER? IT AFFECTS</p>

vo of barges on Miss	<p>EVERYTHING FROM THE WAY WATER LOOKS, TO WHAT CAN LIVE IN IT. SEDIMENT CAN BLOCK SUNLIGHT, INFLUENCING WHAT TYPES OF VEGETATION AND SPECIES CAN THRIVE IN THAT WATER. SEDIMENT FILLS IN WATERWAYS AFFECTING TRANSPORTATION AND RECREATION. AND SEDIMENT CAN BE A CARRIER FOR OTHER POLLUTANTS, LIKE TOXIC CHEMICALS, WHICH ATTACH TO THE SEDIMENT MAKING IT A DOUBLE THREAT .</p>
nutrient water droplet	<p>NEXT ARE NUTRIENTS, WHICH POSE AN ENTIRELY DIFFERENT PROBLEM. NITROGEN AND PHOSPHOROUS ARE NATURAL COMPONENTS OF MANURE, HUMAN SEWAGE, AND DECAYING ORGANIC MATTER LIKE LEAVES. THEY RE ALSO PRESENT IN MANUFACTURED FERTILIZERS. NUTRIENTS ARE APPLIED TO FARMFIELDS TO FEED CROPS, AND TO BACKYARD GARDENS. THEY RE USED TO GREEN UP GOLF COURSES AND LAWNS. THEY BECOME A PROBLEM WHEN PRECIPITATION WASHES NUTRIENTS OFF THE LAND AND INTO WATERWAYS. ONCE THEY RE IN WATER, THEY DO WHAT THEY DO ON LAND, ENHANCE PLANT GROWTH.</p> <p>(Robin: When we have too much nitrogen in the water your water tends to turn green and you get a lot of algae bloom. When those algae blooms finally die and decompose, they take up all the oxygen in the water an so there s a low amount of oxygen in the water which causes problems for fish and plants because they need that oxygen.)</p> <p>NUTRIENTS AREN T JUST DAMAGING TO WATERY ECOSYSTEMS, THEY POSE A REAL RISK TO HUMANS. NITRATES, A BYPRODUCT</p>

	<p>OF NITROGEN, ARE ESPECIALLY DANGEROUS (Robin: In drinking water for instance, babies under 6 months of age can develop something called bluebaby syndrome. And what that is their blood can't carry enough oxygen, and that can cause some health problems.) THE RISK IS SO SERIOUS THAT THE ENVIRONMENTAL PROTECTION AGENCY (EPA) TIGHTLY REGULATES THE LEVELS ALLOWED IN DRINKING WATER.</p>
Pathogens	<p>CHEMICALS ARE ANOTHER CLASS OF POLLUTANTS. SOME CHEMICALS COMMONLY USED IN MANUFACTURING: MERCURY, PCBs, LEAD ARE TOXIC TO THE ENVIRONMENT AND HUMANS WHEN THEY REACH CERTAIN LEVELS. BECAUSE OF THE HEALTH RISKS THESE CHEMICALS POSE, THE EPA CAREFULLY REGULATES INDUSTRIAL WASTE. SPECIAL PERMITS GOVERN THE DISPOSAL OF TOXIC CHEMICALS, BUT SPILLS, ACCIDENTS AND IMPROPER DISPOSAL MEAN THEY STILL GET INTO WATERWAYS. THE PROBLEM ISN T JUST INDUSTRIAL EITHER THINK OF THE TOXINS AROUND YOUR OWN HOUSE CLEANERS, PAINT THINNERS, PESTICIDES, OIL. IMPROPER DISPOSAL OF JUST ONE GALLON OF OIL CAN IMPAIR 250,000 GALLONS OF WATER, ABOUT THE AMOUNT OF WATER IN THIS POOL. AGRICULTURE ALSO RELIES HEAVILY ON CHEMICALS LIKE HERBICIDES AND PESTICIDES. THEIR APPLICATION NEEDS TO BE CAREFULLY CONTROLLED TO PREVENT CONTAMINATION OF WATER.</p> <p>THE LIST OF CHEMICALS WE USE EVERYDAY HAS GROWN FASTER THAN OUR KNOWLEDGE OF HOW THEY INTERACT WITH THE ENVIRONMENT. EMERGING CONTAMINANTS, A BUZZWORD IN WATER CIRCLES, LOOKS AT CHEMICALS NOT TRADITIONALLY TRACKED LIKE CAFFEINE, OVER-THE-COUNTER DRUGS,</p>

	<p>ANTIBIOTICS AND DISINFECTANTS. A RECENTLY COMPLETED STUDY BY THE USGS FOUND LEVELS OF MANY OF THESE CONTAMINANTS IN STREAMS ACROSS THE UNITED STATES. NOW THE REAL WORK BEGINS TO SEE WHAT, IF ANY, EFFECTS THESE CHEMICALS HAVE ON WATER QUALITY.</p>
<p>Pathogens</p>	<p>(PATHOGENS ARE PROBABLY THE MOST SERIOUS THREAT TO OUR HEALTH. PATHOGENS ARE DISEASE CAUSING BACTERIA AND VIRUSES. THEY CAN COME FROM HUMAN SEWAGE OR RAW ANIMAL WASTE. IF PATHOGENS CONTAMINATE WATER AND AREN T ELIMINATED DURING TREATMENT, THE TINY ORGANISMS CAN KILL.</p> <p>(Stowe: one of the real risks that anybody faces who treats water to drink or as we do to make it in a condition it can be returned to the river so fish and wildlife can use it, is killing certain kinds of viral infections or bacteria. Cryptosporidium is a virus that appeared in the Milwaukee water system about 10 years ago now, and killed a number of people up there.) THE STAKES DON T GET MUCH HIGHER THAN THAT.</p>
<p>HYDROLOGY</p>	<p>KNOWING WHAT S GETTING IN THE WATER IS IMPORTANT, BUT IT ISN T ENOUGH. THE NEXT PIECE OF THE PUZZLE IS UNDERSTANDING HOW IT S GETTING IN THE WATER THE BASIC HYDROLOGY OR WATER CYCLE THAT PICKS UP THESE POLLUTANTS AND MOVES THEM INTO WATERWAYS.</p>
<p>water cycle animation</p>	<p>(Seigley: A water cycle, hydrologic cycle, is the process by which water s transported from the land surface into the atmosphere and then back down to the land surface. you have precipitation which falls to the land surface either as rain, snow or ice, you can have some evaporation of water that heads back up into the atmosphere, you can have infiltration into the shallow subsurface</p>

where it replenishes soil moisture. some of the water can runoff the landscape to a nearby waterbody be it a stream, river, pond or wetland area. then there s some infiltration that occurs deeper into the surbsurface and replenishes our groundwater sources) DURING ANY OR ALL OF THOSE STEPS IN THE CYCLE, WATER CAN COME INTO CONTACT WITH POLLUTANTS. THEY GET PICKED UP, AND WASHED INTO WATERWAYS.

AS IMPORTANT AS THE CYCLE ITSELF, ARE WAYS WE VE INTERFERED WITH IT, THE MODIFICATIONS WE VE MADE OVER TIME TO THE LAND S NATURAL HYDROLOGY. THESE CHANGES GIVE POLLUTANTS A STRAIGHT SHOT INTO WATER.

(Siegley: The hydrology or how water moves across the landscape, through the underlying deposits has really changed through time. If we take rural areas for example, so many acres in Iowa have been tiled. And what tiling does is you re inserting tiles 3-4 feet beneath the surface and what that does is it drains the landscape and then funnels the water directly to a nearby stream. So it s speeding up the movement of water off the land surface into a nearby stream). THESE AGRICULTURAL MODIFICATIONS ESSENTIALLY SHORT-CIRCUIT NATURE S INTENDED PLUMBING SYSTEM THAT INCLUDES WETLANDS, VEGETATION AND SOIL. THESE NATURAL FILTERS SLOW DOWN WATER S MOVEMENT, ALLOWING MORE TIME FOR POLLUTANTS TO FILTER OUT OF WATER.

IT S NOT JUST AGRICULTURAL MODIFICATIONS THAT SHORT-CIRCUIT THE SYSTEM. URBAN AREAS, WITH ACRES OF CONCRETE, STEEL AND ASPHALT, DO THE SAME THING IN A DIFFERENT WAY.

(Wayne; we now have what I call a runoff driven hydrology. so when rain now

	<p>falls on a roof, on an asphalt parking lot, on a concrete road, it can't absorb.)</p> <p>INSTEAD OF ABSORBING, WATER RUNS OVER THESE SOLID SURFACES, PICKING UP POLLUTANTS LIKE SEDIMENT AND OIL. THE RUNOFF MOVES BACK TO WATERWAYS, OR FLOWS DOWN STORMWATER DRAINS, WHICH DUMP DIRECTLY INTO STREAMS AND RIVERS.</p>
<p>SOURCES</p>	<p>THE LAST PIECE OF THE PUZZLE WE'LL LOOK AT, THE SOURCES OF THE POLLUTANTS. ALMOST ANYONE OR ANYTHING IS A POTENTIAL SOURCE OF POLLUTANTS. SO WATER QUALITY EXPERTS GROUP SOURCES INTO TWO MAIN CATEGORIES; POINT-SOURCES AND NON-POINT SOURCES.</p> <p>(LD McMullen: Point source discharges are discharges that come from a fixed pipe. It'd be like a wastewater treatment plant discharging wastewater into the stream.)</p> <p>POINT-SOURCE POLLUTANTS USED TO BE THE BIGGEST WATER QUALITY PROBLEM IN THE UNITED STATES. <u>THE CLEANWATER ACT</u> OF 1972 ADDRESSED THE PROBLEM, BY LAYING OUT STRICT REGULATIONS CONTROLLING LEVELS OF DISCHARGE, THE ACT EFFECTIVELY PLUGGED THE PIPES.</p> <p>NOW, THE FINAL FRONTIER FOR WATER QUALITY IS CONTROLLING NON-POINT SOURCE DISCHARGES. (LD McMullen: Non-point there is no one particular pipe that would be able to be identified as the discharge, it is just kind of an overland flow of the water that goes into creeks and drainage ways that ultimately end up in the river.) THAT OVERLAND FLOW PICKS UP POLLUTANTS IN ITS PATH, MOVING THEM INTO WATERWAYS. REGULATIONS THAT WORKED SO WELL ON THE POINT-SOURCE POLLUTION PROBLEM ARE NEXT TO</p>

	<p>IMPOSSIBLE TO IMPLEMENT ON A CASE-BY-CASE BASIS, MAKING THE NON-POINT SOURCE PROBLEM MUCH TOUGHER TO SOLVE.</p>
<p>PUZZLE PIECES</p>	<p>SO THERE THEY ARE, USES, PRACTICES, POLLUTANTS, HYDROLOGY, SOURCES — I KNOW- YOU RE WONDERING WHAT THAT FINAL PIECE OF THE PUZZLE IS WELL STICK AROUND WITH ALL THESE DIFFERENT PUZZLE PIECES TO CONSIDER, PIECES THAT ARE ALWAYS SHIFTING AND CHANGING, HOW ARE WATER QUALITY PROBLEMS EVER ADDRESSED? GOOD QUESTION, ONE MANY EXPERTS ARE ANSWERING WITH A POWERFUL TOOL CALLED THE WATERSHED APPROACH. IT ESSENTIALLY FRAMES INDIVIDUAL PIECES OF A SPECIFIC WATER QUALITY PROBLEM, PROVIDING A PERSPECTIVE ON THE PUZZLE. THE WATERSHED APPROACH NARROWS THE PHYSICAL SCOPE OF A WATER QUALITY PROBLEM, ALLOWING EXPERTS TO ISOLATE AND EXAMINE THE PIECES OF THE PUZZLE IN PLAY; PARTICULAR POLLUTANTS, THEIR SOURCES, THE AREA S HYDROLOGY. LET S EXPLORE MORE ABOUT THIS IMPORTANT FRAMEWORK.</p>
<p>WATERSHED APPROACH</p>	<p>(Seigley: A watershed is the land area that drains to a body of water, be it a lake, a stream, a pond. and watersheds vary in size.)</p> <p>FOR EXAMPLE, THE MISSISSIPPI RIVER WATERSHED DRAINS 40% OF THE ENTIRE UNITED STATES. THAT MASSIVE WATERSHED CAN BE BROKEN DOWN INTO SEVERAL LARGE WATERSHEDS, WHICH CAN BE BROKEN DOWN EVEN FURTHER INTO SMALLER WATERSHEDS, SCALING ALL THE WAY DOWN TO AREAS THAT MAY BE JUST A FEW SQUARE MILES IN SIZE. BY NARROWING THE SCOPE OF A PROBLEM, IT S EASIER TO ZERO IN ON THE THREATS TO AN INDIVIDUAL WATERBODY, AND TO TRACE THE SOURCES OF THOSE THREATS.</p>

	<p>(Seigley: What s going on in the watershed, what are potential sources for pollutants that might be contributing to that watershed.)</p> <p>KNOWING THE POTENTIAL SOURCES OF POLLUTANTS, THE DIFFERENT LANDUSES AND PRACTICES PLAYING OUT WITHIN A WATERSHED, GIVES EVERYONE A HEADS UP ON WHAT POLLUTANTS TO WATCH FOR. GOT A LOT OF AG LAND IN YOUR WATERSHED? EXPECT NUTRIENTS FROM FERTILIZERS. INDUSTRIAL DEVELOPMENT..EXPECT CHEMICALS. RESIDENTIAL AREAS EXPECT NUTRIENTS, SEDIMENT, HOUSEHOLD CHEMICALS.</p>
<p>dissolves into mike s watershed landscape</p>	<p>MORE THAN JUST A THEORY, THE WATERSHED APPROACH TAKES A PRACTICAL APPROACH TO SOLVING REAL WATER QUALITY PROBLEMS. LET S LOOK AT IT IN ACTION.</p>

	<p>WINTERSET IS A SMALL COMMUNITY IN CENTRAL IOWA FACING A BIG WATER QUALITY PROBLEM, NITRATES.</p> <p>(Nitrates can come from several different sources, in our watershed approx 80% of our watershed is cropland so we're fairly confident we know it's fertilizer runoff.)</p> <p>(One option is to put in a nitrate removal addition to our plant here, it would cost us approximately 800,000 dollars to make that addition. What we'd rather do, which is our other option, is do work in the watershed to try to solve the problem there. That would consist of constructed wetlands, ponds, buffer strips. We've had modeling done that shows as few as 3 to 5 wetlands in our watershed we should be able to cut our nitrate levels below our max contaminant levels.) (We're a pretty closed watershed, small and manageable and it's going to be a lot easier for us to do that provided we have cooperation, to see results and from all indications once we get these wetlands constructed we'll see results almost immediately.) (It's not real high-tech but it's something that's proven to work in the past.)</p> <p>THE WATERSHED APPROACH ALLOWED EXPERTS TO IDENTIFY THE POLLUTANT: NITRATES, IDENTIFY THE SOURCE: FARM RUNOFF, AND THEN WORK WITH THE WATERSHED'S HYDROLOGY TO COME UP WITH A SOLUTION. PRETTY SLICK. BUT WHAT DO YOU DO IF YOUR WATERSHED ISN'T SMALL AND MANAGEABLE? LET'S LOOK AT THE NITRATE PROBLEM PLAYING OUT ON A MUCH LARGER SCALE.</p>
	<p>AT THE END OF THE MISSISSIPPI RIVER'S LONG JOURNEY LIES THE GULF OF MEXICO & THE DEAD ZONE. THE DEAD ZONE IS A SEASONAL PHENOMENON, A HUGE AREA WHERE OXYGEN LEVELS ARE TOO LOW TO SUPPORT AQUATIC LIFE. EXPERTS BELIEVE THAT EXCESS NUTRIENTS, LIKE NITROGEN, WASHING</p>

DOWN THE RIVER AND INTO THE GULF ARE RESPONSIBLE FOR THE DEAD ZONE.

REMEMBER, THE MISSISSIPPI RIVER CARRIES WATER DRAINED FROM 40% OF THE UNITED STATES. WATER THAT MOVES THROUGH FARMLAND AND URBAN AREAS ALIKE. WITH SUCH A LARGE WATERSHED, IT S NOT AS SIMPLE TO PINPOINT THE SOURCES OF THE EXCESS NUTRIENTS. MOST OFTEN, THE BLAME IS PUT ON FARMERS.

(Emily Eide)

REMEMBER, AG LAND ISN T THE ONLY SOURCE OF NUTRIENTS, IT S ONLY THE MOST OBVIOUS. LAWNS, GARDENS, AND GOLF COURSES ALSO USE FERTILIZERS. (Emily Eide soundbite) SOME PROPOSALS ASK FARMERS TO CONSIDERABLY REDUCE THE AMOUNT OF NUTRIENTS THEY USE. BUT IF WE ALL CONTRIBUTE TO THE PROBLEM, IS IT FAIR TO EXPECT FARMERS TO BEAR THE BURDEN OF FIXING IT? (Emily Eide)

A TOUGH PROBLEM TO SOLVE, ESPECIALLY ON THIS LARGE SCALE. TRYING TO CONTROL SUCH VAST NUMBERS OF NON-POINT SOURCES IS DIFFICULT AT BEST.

<p>MANURE MANAGEMENT</p>	<p>SOME WATER QUALITY PROBLEMS AREN T ONLY DEFINED BY THE BORDERS OF A WATERSHED, ECONOMIC AND POLITICAL BOUNDARIES ALSO SHAPE THE PROBLEM. MANURE MANAGEMENT IS ONE OF THOSE PROBLEMS.</p> <p>IN BIG PORK PRODUCING STATES LIKE NORTH CAROLINA & IOWA, NOTHING GETS FOLKS FIRED UP FASTER THAN A GOOD HOGLOT DEBATE. (joe bolcom; record high nitrates, antibiotics in our water. we've had half the beaches at state lakes close this past summer, we've had a whole series of fish kills throughout the state. iowans want the issue of water quality and the negative impact of animal confinements on water quality to be addressed)TO SOME, THEY RE THE SWEET SMELL OF MONEY, TO OTHERS THE SMELL IS ANYTHING BUT SWEET.</p> <p>LARGE ANIMAL CONFINEMENTS REPRESENT A MAJOR SHIFT IN FARMING, FROM SMALL FAMILY OPERATIONS RAISING A FEW HUNDRED HEAD TO LARGE CONFINEMENTS RAISING THOUSANDS OF ANIMALS AT A TIME. CRITICS SAY THE SHEER CONCENTRATION OF ANIMALS MAKES THE FARMS MAJOR ENVIRONMENTAL HAZARDS: TO THE AIR, THE LAND, AND YOU GUESSED IT, THE WATER.</p> <p>MOST OF THE STINK, AT LEAST WHERE WATER QUALITY S CONCERNED, CENTERS ON THE WAY HOG CONFINEMENTS MANAGE MANURE. - A POTENTIAL WATER POLLUTANT. THE FARMS RAISE THOUSANDS OF ANIMALS, WHICH PRODUCE TONS OF MANURE. THE MOST COMMON WAY TO MANAGE THE MANURE IS TO STORE IT IN EARTHEN LAGOONS.</p> <p>(The lagoons can seep into groundwater and they can spill over which has happened from time to time. ") THE THREATS FROM STORAGE; THE</p>
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SPIILLS AND THE LEAKS, AREN T THE ONLY PROBLEMS. FARMERS USE MANURE AS FERTILIZER FOR THEIR FIELDS. **AND WHETHER THE MANURE COMES FROM A LARGE OPERATION OR A SMALL ONE, IT HAS TO BE APPLIED CORRECTLY.**

You can be a small farmer and still screw up the groundwater. we know that from history. But the one factor in which scale does make it more difficult to protect water quality, is that when you concentrate a lot of animals in one place, then it becomes economically difficult to spread that manure over enough land so that you don t overapply it. That in turn of course is a threat to water quality. THE MORE HOGS YOU HAVE, THE MORE MANURE YOU HAVE, AND THE MORE LAND YOU NEED TO ABSORB IT.

OVER-APPLICATION RESULTS IN RUNOFF, WHICH CAN PUT TWO MAJOR POLLUTANTS RIGHT INTO WATER — EXCESS NUTRIENTS, OR WORSE — PATHOGENS, BOTH OF WHICH ARE FOUND IN ANIMAL MANURE. IN IOWA, MANURE RUNOFF IS THOUGHT TO BE A MAJOR CONTRIBUTING SOURCE OF BACTERIA WHICH FORCED BEACH CLOSINGS DURING THE SUMMER.

SO IF THESE OPERATIONS ARE SUCH A THREAT, WHY DOESN T THE STATE JUST SHUT EM DOWN? TWO REASONS. THE FIRST IS MONEY. HOG PRODUCTION HAS A 12-BILLION DOLLAR ECONOMIC IMPACT IN IOWA, AN IMPACT THE STATE CAN T AFFORD TO LOSE.

THE SECOND REASON: NOT EVERY OPERATION IS A THREAT TO WATER QUALITY. IN FACT, MANY FARMERS ARE TAKING THE PROPER STEPS TO PROTECT WATER, ACTING AS GOOD STEWARDS OF OUR NATURAL RESOURCES. ALLEN BURT AND HIS FAMILY RUN A LARGE HOG OPERATION IN CENTRAL IOWA, AND TAKE

	<p>PROTECTING WATER VERY SERIOUSLY</p> <p>(My role as a farmer with the water is first of all, there s no more water ever being created. What is here is here. So for me to poison or contaminate the water that runs down through our creeks and rivers wouldnt be a smart thing to do. BURT SAYS HIS OPERATION GOES THE EXTRA MILE TO KEEP MANURE ON THE LAND AND OUT OF THE WATER.</p> <p>(Allen Burt: We try to maintain a small amount of tillage so our manure doesn t leave the farm. We put up grass waterways, buffer strips , we plant a lot of trees.) ALL OF WHICH ARE EXAMPLES OF RECOMMENDED BEST MANAGEMEMT PRACTICES OR BMP S. UNFORTUNATELY, NOT EVERY FARMER USES THOSE BMPs.</p>
	<p>BECAUSE OF POLITICAL AND ECONOMIC INFLUENCES, THERE ARE NO SIMPLE SOLUTIONS TO THIS PROBLEM. LEGISLATION, REGULATION, MANAGEMENT CHANGES, NEW TECHNOLOGIES, THEY RE ALL OPTIONS THAT COULD KEEP ANIMAL MANURE FROM THREATENING WATER QUALITY.</p>

NUTRIENTS	
URBAN RUNOFF	<p>FARMS GET A LOT OF THE FOCUS BUT URBAN AREAS CONTRIBUTE THEIR FAIR SHARE OF WATER POLLUTANTS TOO. ALL THE PUZZLE PIECES ARE IN PLAY; USES, PRACTICES, POLLUTANTS, SOURCES, AND HYDROLOGY - THIS PIECE OF THE PUZZLE IS EASIEST TO IDENTIFY IN AN URBAN SETTING, THE SHIFT FROM GRASSY NATURAL AREAS TO PAVEMENT AND ASPHALT EVERYWHERE. URBAN RESOURCE CONSERVATIONIST WAYNE PETERSEN SAYS THIS IS ONE PIECE OF THE PUZZLE WE CAN AFFECT DRAMATICALLY, BY EMPLOYING GREEN DEVELOPMENT.</p> <p>(Wayne: The definition of green development that I like to use is development that does not create or add negative environmental impacts. I believe we will see designs of new development start to incorporate more focus on how are we going to manage water, and how is water going to move off this landscape post-development setting.) PETERSEN ENVISIONS A RETURN TO A MORE NATURAL HYDROLOGY FOR URBAN AREAS. (Having water moving through the system properly in a sustainable way is kind of like the foundation of an ecosystem and if you ve got a bad foundation on a building its probably going to crumple over time. And if you don t manage water properly which is the foundation of the ecosystem, then I believe all other aspects of that ecosystem will tend to unravel. I know we re not going to turn the whole world back into prairie of course, but I do think we can understand how water might once have moved through this natural or native ecosystem and I think we can design new developments that will mimic the way that landscape functioned. Even if it doesn t look like it once did). KNOWING WHICH PIECE OF THE PUZZLE TO TARGET TO CREATE THE GREATEST CHANGE CAN</p>

	HAVE THE GREATEST AFFECT ON YOUR PROBLEM.
	<p>WHICH BRINGS US TO THE FINAL PIECE OF THE PUZZLE, YOU. INDIVIDUAL RESPONSIBILITY FOR WATER QUALITY IS THE KEY TO SOLVING THIS PUZZLE. AWARENESS OF THE PROBLEM ISN T ENOUGH, IT S ONLY WHEN THAT NEW KNOWLEDGE IS PUT INTO ACTION, THAT WE LL BEGIN TO SEE A DIFFERENCE IN OUR WATER S QUALITY AN IDEA THAT THESE KIDS HAVE TAKEN TO HEART.</p> <p>THEY RE THE ENVIRONMENTAL CLUB FROM DAVENPORT WEST. THEIR CITY SITS ON THE BANK OF THE MISSISSIPPI RIVER, BUT THEY MONITOR NEARBY STREAMS. TESTING FOR NITRATES, PHOSPHOROUS, AND THE STREAM' OVERALL HEALTH.</p> <p>(I guess I wanted to know how clean Iowa's water was since we re drinking it)</p> <p>THE CLUB REPORTS THEIR RESULTS TO A STATEWIDE CITIZEN BASED GROUP MONITORING WATER S QUALITY.</p> <p>(I think it s a good thing to get involved with especially kids our age. Knowing I m doing something to help the environment...it s a good feeling.)</p>
WRAPUP	<p>IT DOESN T MATTER WHERE YOU LIVE, DON T JUST SIT THERE, MAKE A SPLASH! GET INVOLVED! IDENTIFY WHICH PIECES OF THE WATER QUALITY PUZZLE ARE IN PLAY. THEN, TAKE ACTION. CHANGE A PERSONAL PRACTICE, MONITOR A STREAM, EDUCATE A NEIGHBOR. IT S UP TO YOU THE MOST IMPORTANT PIECE WHEN IT COMES TO SOLVING THE WATER QUALITY PUZZLE.</p>