

NARRATIVES FOR the MAHOMET AQUIFER CONSORTIUM MEDIA PRESENTATION
“SUSTAINABLE WATER SUPPLIES IN EAST-CENTRAL ILLINOIS”
2011

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1. Welcome to the World of Water. #
2. Water is a precious resource and we take it for granted that water will flow **start sound** when we turn on a faucet. However, some states and other countries do experience water shortages. # **stop sound** In East-Central Illinois, we want to make sure that we will always have reliable supplies of clean water. #
3. The Mahomet Aquifer Consortium has prepared this presentation on Sustainable Water Supplies in East-Central Illinois. The Consortium is a not-for-profit organization based in Champaign and is devoted to educating people about sustainable water supplies. #
4. Here are four good reasons why each of you should care about water supplies. # Every day you need to drink clean water and you use a lot of water at home. You need a water supply that you can count on every day. # Neither you nor your neighbors own water. Water is a common resource that we all share. # As you will see, we extract water from various parts of the environment for our use and you can help protect the environment. # About one million people live in East-Central Illinois and how much water is used depends entirely on the actions of each person – including you. #
5. There are three parts to the presentation. # First, we need to understand the region and the factors that affect water availability and water use. # Second, we will quantify how much water we use today and how much we will need in the

PART 1: THE REGION

6. So, we start by talking about East-Central Illinois. #

7. The East-Central Illinois region includes 15 counties from the Indiana border near Danville westward to the Illinois River. From east to west, major towns are Danville, Champaign-Urbana, Decatur, Bloomington, Springfield, Pekin and Havana. There are two sources of water – water on the earth’s surface and water below the earth’s surface. Surface water occurs in rivers such as the # Mackinaw, # Sangamon, and # Salt Creek which flow westward into the Illinois River. # The Vermilion River flows southeastward into the Ohio River and # the Kaskaskia River flows southwestward to join the Mississippi River below St. Louis. The area around Champaign County is the headwater area for these rivers, but here the land is too flat to build reservoirs. Further downstream, Bloomington, Danville, Decatur and Springfield do obtain their water from reservoirs # # and dams have been built across these rivers to store large amounts of water in reservoirs . Below the surface are aquifers, which are thick layers of sand that store large amounts of groundwater. The largest source of groundwater is the Mahomet Aquifer, which extends across the region. #

8. Many communities obtain groundwater supplies from the Mahomet Aquifer, and some from smaller shallow aquifers. Is your community one of these? Champaign County # withdraws some of the largest amounts of groundwater and also serves communities outside the aquifer. Other communities that depend on groundwater include # Gilman in the north, # Rantoul, # Heyworth, # Lincoln, # Pekin and # Havana. In addition to these community water supplies, thousands of families living in rural areas have their own private wells and pump water for their own use. #

9. In our region, # about 22 percent of the water comes from surface waters; that is, from reservoirs. Some 10 percent of the water, # mainly for use in private homes, comes from small shallow aquifers less than 100 feet below the surface. And about # 68 percent of the water comes from the larger and thicker Mahomet Aquifer, which extends down to as much as 350 feet below the surface. The aquifer is about 200 feet thick. Do you know where your water comes from? #
10. Illinois water law governs how we can extract water from the environment and use water, but the law is not always easy to interpret. # We have already noted that nobody owns water. We all share water resources. # If you own land and want to withdraw water from a river or drill a well to withdraw water from the ground, you need a permit to ensure that the construction meets state standards. However, you do not need a permit to withdraw and use water. # The law says that it must be reasonable use – not wasteful. Of course, that leaves the barn door wide open as to what “reasonable” means. Conflicts are settled in court. # And there are no state standards that limit how much groundwater you can withdraw. #
11. Rainfall, surface waters and groundwater are linked together through the water cycle. # # When rain hits the ground, some of it runs off # # the land and fills # # lakes, rivers and reservoirs, which are surface waters. Some of the rain # # slowly infiltrates the soil and becomes groundwater, which is water in the ground. Rain water infiltrates the soil and slowly recharges the aquifers. # An aquifer is an underground layer of geologic material where sufficient water is stored for it to be withdrawn for useful purposes. The Mahomet Aquifer is

12. So let's start with climate and rainfall. Each year, on average, we receive about 38 inches of rain. But sometimes there can be too much rainfall, or not enough, creating floods and droughts. #

13. Average summer rainfall in Springfield is about 12 inches. # 1988 was a drought year and summer rainfall in Springfield was only 4 inches. # Five years later, in 1993, summer rainfall in Springfield was 20 inches. # These two satellite photographs above the juncture of the Illinois, Mississippi and Missouri Rivers near St. Louis dramatically show the impacts of climate variations on surface water supplies. In 1988 lakes and rivers dried up. In 1993, widespread heavy rains caused water levels to rise and rivers to flood. Even more severe droughts occurred in the 1930s and 1950s and it is a recurrence of these worst-case droughts that water supply planners must be prepared for, as well as global warming. #

14. Here we see how Lake Springfield dried up in the 1988 drought. #

15. We now examine how climate changes long ago shaped the geology of the region and its water resources. # Some 20,000 years ago we were in the middle of an Ice Age and much more of the Earth was covered by glaciers, shown here as the white areas. The glaciers spread southwards from Canada and covered much of northern and central Illinois. # The glaciers gouged the landscape and filled the valleys with thick layers of sand, gravel and clay. #

16. This slide shows, in a much simplified way, a vertical slice down through the geology of East-Central Illinois from the Indiana border in the east to the Havana Lowlands near the Illinois River in the west. At the bottom, several hundred feet below the land surface, is solid bedrock, which formed hundreds of millions of years ago. Over the past few millions of years glaciers have deposited layers of sand on top of the bedrock, and the sand forms the Mahomet Aquifer. # There also are some shallow layers of sand above Mahomet Aquifer that serve as shallow aquifers. In the central and eastern parts of the region, clay was deposited above the layers of sand. Clay particles are very fine and tightly packed and water moves down # through clay only very slowly # – perhaps an inch per year – to slowly recharge # the groundwater in the Mahomet Aquifer below. In the Havana Lowlands, the sand comes right up to the surface. Farmers need to withdraw large amounts of water from the aquifer to irrigate crops in summer, but because there is no clay to slow the downward movement of water # #, rain soaks into the ground very easily and recharges the aquifer much faster than in the central and eastern parts of the aquifer that are covered with clay. #

PART 2: WATER USE

17. We can now look at how much water we use today and how much we will need in the future. #

18. We start by illustrating a public water supply system. It shows where water we use in our homes comes from and where it goes to after it is used. For municipalities, water is pumped from a # reservoir or # an aquifer to a # # water treatment plant. At a water treatment plant, water is cleared of impurities to meet drinking water standards and to taste good. The water is then piped # to your home, # where it is metered so that you know how much water you use and have to pay for. # After water has been used in homes and businesses, it goes through # sewer drains to a # waste water treatment plant. Each customer is billed for water services. At the waste water treatment plant, waste water is cleaned to environmental standards before being # discharged # to ditches or streams. For surface water that was initially withdrawn from a stream or reservoir, the cycle is complete when the cleaned waste water is returned to the stream. However, groundwater is not returned to the ground. Treated groundwater is discharged to a stream and increases streamflow. All the treated surface water and groundwater discharged to a stream can be used again further downstream, that is, it can be recycled. If you have a well at home, you have your own water supply and waste-water disposal system – a septic system – separate from these large municipal systems. #

19. We measure water in millions of gallons of water per day - mgd. This water tower stores one million gallons of water. # On an average day, we use 200 million gallons of water in homes, schools, factories and offices in the region. 140 million gallons per day are used for agriculture and irrigation. Over one thousand million gallons – that is, over one billion gallons – of water are used in electric power plants each day to generate electricity. However, a high percentage of this large amount is recycled and returned to the source after it has been used for cooling. # At home, each person on average uses about 70 to 90 gallons per day. #

20. At home we use water in many ways. We use most water ## to flush toilets, # # in the bathroom, and ## to wash clothes. Other major uses of water are ## washing dishes and ## in sinks. #
21. We also use a lot of water outdoors # to keep our lawns green, # irrigate golf courses, # wash our cars, and # provide water for # # farm animals and # fish farms. #
22. Irrigating agricultural crops in summer, especially during drought conditions, uses a lot of groundwater from the Mahomet Aquifer, especially in the sandy Havana Lowlands. #
23. The nuclear power plant at Clinton draws large amounts of water from Lake Clinton, but nearly all the water is returned to the lake, at higher temperature, after it has been used. Industry, # here a food processing plant, and # offices and hospitals also use considerable amounts of water. #
24. And we must not forget aquatic ecosystems, that is, the plants and animals that live in and along streams, rivers, lakes and wetlands and are dependent on water. When we take water out of the environment for our use, we must be careful to protect aquatic ecosystems. #
25. Data on how much water is used can be grouped by county. Again excluding water used for electric power generation, the table shows reported water use for each county in 2005 and estimates of a range of possible water uses in 2050. The quantities are in millions of gallons per day. You will be able to pick out your own county. Mason and Tazewell Counties use the largest amounts of water, mainly for irrigating crops. Total water use in 2005 was 341 million gallons per day. # Water use in 2050 could be up to 68 percent higher than in 2005, mainly due to population growth and economic development, but the increase can be

PART 3: SUSTAINABLE WATER SUPPLIES

26. So what do we mean by sustainable water supplies? #

27. Definitions of sustainability vary, but here are some aspects of sustainability that most people would agree to. #

First, we recognize that water # is a valuable and precious resource. Most of the time, water is plentiful, but there are limits to how much water is available and can be withdrawn safely. #

Secondly, we must plan on meeting the needs of today's population # and the needs of future generations. #

Thirdly, during periods of drought and hot weather, less water is available and people use more water. Climate change also can affect how much water is available and how much is used. # This tells us that we must be prepared for droughts and possible climate change. #

Fourthly, # we must maintain and improve infrastructure; that is, we need to construct wells, reservoirs, water treatment plants, and pipelines. #

And # we need to protect the environment. #

28. So how can we protect our aquifers and ecosystems? The following three slides show some important challenges to sustainable water supplies. #

This diagram illustrates the situation about one mile from the center of pumping in Champaign County, a few miles west of Champaign before large amounts of water were pumped from the aquifer. The blue box at the bottom represents groundwater stored in the Mahomet Aquifer under Champaign County. Dark blue signifies high water pressure. The top of the box represents the top of the aquifer. The aquifer recharged slowly and groundwater flowed ever so slowly from east to west. #

When a well is drilled into the aquifer, high water pressure in the aquifer forces groundwater in the well to rise above the top of the aquifer. Decades ago, when the first well was sunk into the aquifer, high water pressure in the aquifer caused groundwater in the well # # to rise about 160 feet above the top of the aquifer.

And groundwater flowed ever so slowly from east-to west. #

29. Today, more than 30 million gallons of groundwater # are pumped from the Mahomet Aquifer in Champaign County each day, water pressure in the aquifer has decreased, shown by the lighter blue color, and the water level # # in wells has dropped to about 80 feet above the top of the aquifer. In order to supply more than 30 million gallons of water each day, groundwater flow to the west has been reversed # and water now is drawn in # from up to about 20 miles around the wells, and more water # is drawn from streams to recharge the aquifer. So let's see what **could** happen in the future if we continue to pump more and more water at that location. #

30. This is the big bang – a warning of what we absolutely do NOT want to happen. As more and more water # is pumped from the aquifer, water pressure could decrease further, as noted by the even lighter blue color, and the water level in wells # could drop to below the top of the aquifer. When groundwater level in a well drops below the top of the aquifer, water is removed from the top portion of the aquifer and that part of the aquifer is dewatered. The white shows that there would no longer be water in the top part of the aquifer at that location. Water quality would deteriorate, pumping would become more difficult and the properties of the aquifer would change. More groundwater would be pulled in #

31. Once we know what we **don't** want to happen, it becomes **our responsibility** to make sure that this **never** happens. This critical situation that **can** be **avoided** by **#** monitoring water levels in wells, by **#** water companies and city councils taking management action to keep water levels above the top of the aquifer, including water conservation and **#** by spacing pumping wells further apart. **#**
32. As you can see from this map of Lake Springfield and the proposed second reservoir, Hunter Lake, constructing reservoirs necessitates flooding thousands of acres of land and building dams. So expanding surface water supplies also has its own challenges. **##**. This aerial photograph shows Lake Decatur. **#**
33. Over time, soil particles are eroded from the land **##** and move downstream as sediment. Sediment builds up in the reservoirs **#** and decreases the depth of water and the amount of water stored. This is happening in Lakes Springfield, Vermilion, Decatur, Evergreen and Bloomington. As water storage decreases and the demand for more water increases, sediment can be removed by dredging, the reservoirs can be enlarged, or new reservoirs can be built. But all options are very costly. **#**
34. A key challenge in creating sustainable water supplies is to weigh benefits against costs. You, your families and future generations all benefit from having **#** reliable and **#** adequate supplies of **#** clean water every day. On the other side of the scales, there are **#** financial and **#** environmental costs to providing these benefits. It is expensive to drill wells and build reservoirs, water towers, water treatment plants and pipelines. These costs are passed on to you and me, the consumers, in the form of water and sewerage charges. Do you know how much

35. A goal is to **# maximize** benefits **# and minimize** costs **#**. This can be done by examining a variety of options and balancing competing interests. This is at the heart of planning for sustainable water supplies and where you can make your voice heard. **#**
36. So I encourage you **#** to be informed - search out information and ask questions. **#** Get involved with sustainable water planning. Don't leave it to others. Each of you can help shape the future. **#** And only use the water you need. Conserving water reduces costs and helps protect the environment. **#**
37. One important step you can take is to develop a water conservation plan at home. Here are five things each of you and your families can do to help ensure that we always have sustainable water supplies – and you can save money. **#**
- You can install low flush toilets that use less water. **##** Similarly, you can install low-pressure shower heads and take shorter showers. **##** When you wash clothes, make sure you set the appropriate water level for the amount of clothes you are washing. **##** Only run the dish washer when it is full. And, **##** don't leave the faucet running at home, in school or at work. **#**
38. Finally, I would like to thank the many people in these organizations who have contributed material and advice for this presentation. You can access additional information on the Mahomet Aquifer Consortium, the Regional Water Supply Planning Committee and the Illinois State Water Survey at the websites shown here. **Thank you** for **your** interest in **our** water resources.

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