Water Sustainability and Climate
In the Yahara Watershed
UNIVERSITY OF WISCONSIN–MADISON

RESEARCH BRIEF

Yahara 2070 scenarios can inspire ideas and actions for a desirable future

Summary

Yahara 2070 is a set of scenarios that depict what life for future generations in Wisconsin's Yahara Watershed could be like if current generations made different decisions about environmental challenges. It is a tool to help decision makers build regional resilience and to facilitate broad public discussion about a desirable future.

Background

How can we ensure we are creating healthy and resilient communities for our children and their children? Understanding possible futures and discussing what is desirable in one way to start.

The health of our communities depends on the many benefits nature provides people. These benefits, called ecosystem services, include crop production, a clean and sufficient freshwater supply, outdoor recreation, and natural flooding controls, among others.

Changes in land use, climate, and human demand have long-term impacts on our ecosystem services and, subsequently, the well-being of our communities. The occurrence of toxic algal blooms in the Yahara lakes, driven by decades of polluted runoff, is just one example. Managing these impacts so future generations can continue to enjoy the benefits our land and water provide requires a long-term outlook in today's decision making processes.

Thinking about the long-term future is hard and uncommon, however. Deadlines, political impasses, psychological barriers, and the desire for immediate returns can obstruct our long-term vision. There is a need for tools that facilitate long-term thinking.

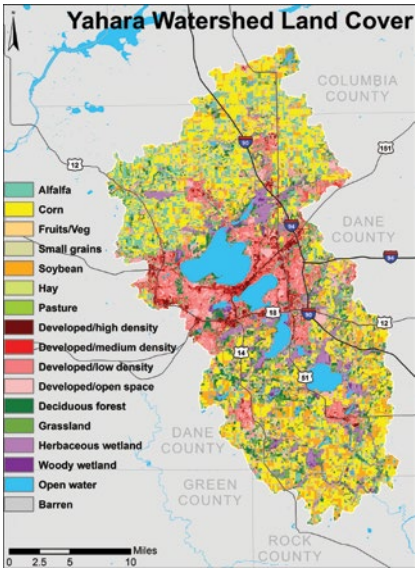
Scenarios are one such tool. Scenarios are provocative and plausible stories about the future that can guide planning. With roots in the military and business, scenarios have emerged as a scientific approach to envisioning possible pathways toward resilience and sustainability for communities and ecosystems.

The Water Sustainability and Climate Project at the UW-Madison has created a set of four scenarios for Wisconsin's Yahara Watershed in the year 2070, called Yahara 2070. The scenarios are framed largely around issues related to the region's lakes and freshwater, but also examine a variety of important social and environmental issues that affect the well-being of local communities over the long term.

Project Goals

1. To encourage long-term thinking among decision makers and communities by stimulating discussion about what is desirable for the future and what can be done now to achieve good conditions and avoid bad conditions.

2. To improve our understanding of the consequences of choices we face today through new computer models that will give us better estimates of future impacts on freshwater, food production, flood mitigation, fish and wildlife, and natural beauty.



The Yahara Watershed is the land area that drains into the Yahara river and covers over a quarter of Dane County. The landscape provides its residents many ecosystem services, including crop production, freshwater, flood mitigation, and recreation. This map shows the land cover as of 2010.

What would life in the Yahara Watershed in 2070 be like if...

Accelerated Innovation

We prioritize technological solutions to environmental challenges.

In response to environmental crises, national leaders decide to invest heavily in technology and innovation. As a seat of government and university research, Dane County becomes an innovation center and experiences a boom in the high tech, bio tech, and green tech industries. Society employs high tech solutions to achieve sustainable transportation, housing, food, and energy, as we adapt to more frequent environmental shocks. Bold experiments sometimes fail with catastrophic consequences, yet the entrepreneurial society always finds another technological solution. With the pervasiveness of technology, the Yahara Watershed becomes an engineered landscape by 2070. Water quality improves, but with a caveat: the intrinsic value of nature seems lost. While this doesn't bother most people, a subgroup of techno-skeptics emerges.

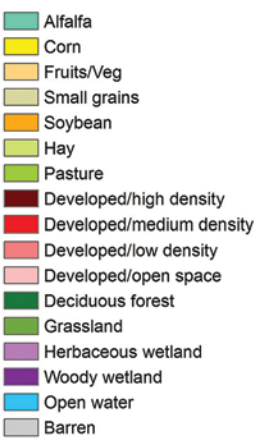
Connected Communities

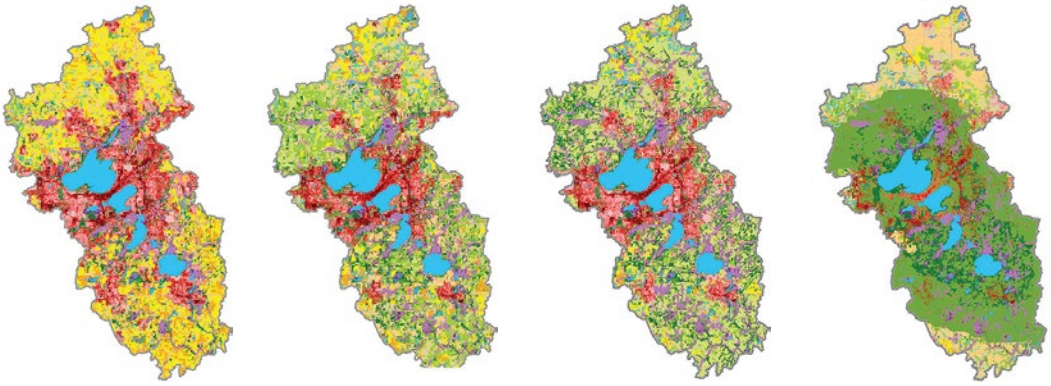
We shift our values toward community and sustainability.

The buildup of looming environmental crises and political conflict incites a global, youth-led movement to adopt sustainable values and behaviors. As the younger generation matures into leadership positions, sustainability and community become central to decision making and human activity. Sustainable transportation, housing, food, and energy become the norm, and life becomes oriented around community and non-material well-being and away from material consumption. The values shift has meant the loss of some conveniences, such as cheap air travel, due to incorporated environmental and social costs. By 2070, the Yahara Watershed is a mosaic of sustainable agricultural, urban, and natural areas, with healthier land and slowly improving water quality. The climate gradually stabilizes, but remains altered.

Illustrations by John Miller

Changes in land cover by 2070





Accelerated Innovation | Connected Communities | Nested Watersheds | Abandonment and Renewal

The Scenarios At A Glance

Nested Watersheds

We transform the way we govern water to better protect it.

Climate change is worse than expected and the nation faces a freshwater crisis. The public demands solutions from the federal government. In response, the Water Security Act of 2040 is passed, which reassigns authority of water governance to watersheds, a framework that makes ecological sense for protecting resources. The Yahara Watershed becomes part of the Upper Mississippi Watershed Unit. Watershed Management Authorities incentivize practices that ensure a clean and sufficient supply of freshwater, resulting in massive changes in land use. For example, farmers treat water as though it were a crop, and natural land area increases. By 2070, water is considered the region's wealth and, overall, is managed more holistically. However, the adaptive measures are mostly incremental, and climate change has still not been adequately addressed, compromising the potential for resilience.

Abandonment and Renewal

We aren't prepared to deal with environmental challenges.

Climate change is worse than expected, and society has not prepared well enough, leaving people unequipped to deal with environmental disasters. A national food crisis erupts, putting pressure on the Midwest to increase food production and thus exacerbating water quality problems. This causes an environmental health disaster in the Yahara Watershed. A new species of cyanobacteria, or blue-green algae, that emits toxic fumes emerges in the lakes and decimates the watershed's human population. Thousands die and thousands more abandon the region. In the disaster's wake, the dearth of people allows the land, lakes, and ecosystems to rejuvenate to a practically wild state. Novel communities of plants and animals can exist in the region's milder climate. The remaining people in the watershed—a mix of survivors and mavericks—build a new society, which is simpler than today's and focused on survival and resilience.

The Science Behind Yahara 2070

"The universe is made of stories, not of atoms."

– Muriel Rukeyser, poet

In reality, the universe is made of both stories and atoms. The human understanding of the universe just often begins with stories.

Yahara 2070 began with stories, too. The stories are based on interviews and workshops conducted with citizens of the Yahara Watershed, including government officials, NGO staff, business and community leaders, and farmers. Themes from these interactions, the scientific literature, and current trends provided the narrative ingredients for the four fictional but possible futures.

An advanced suite of computer models then enriched the stories with scientific analyses, or the "atoms." The models played out the narratives, simulating natural processes related to land use, climate, and water and providing estimated measurements of ecosystem services, such as flooding risk, agricultural production, and freshwater quality and quantity. These results translate into the natural conditions in which future generations would live based on the changes that occur in each scenario.

Implications

Freshwater is central to the economy and culture of the Yahara Watershed—now and into the future. By exploring how freshwater could be affected by changes in climate, land use, and human demand, we can make more informed decisions about maintaining the health of communities over the long term.

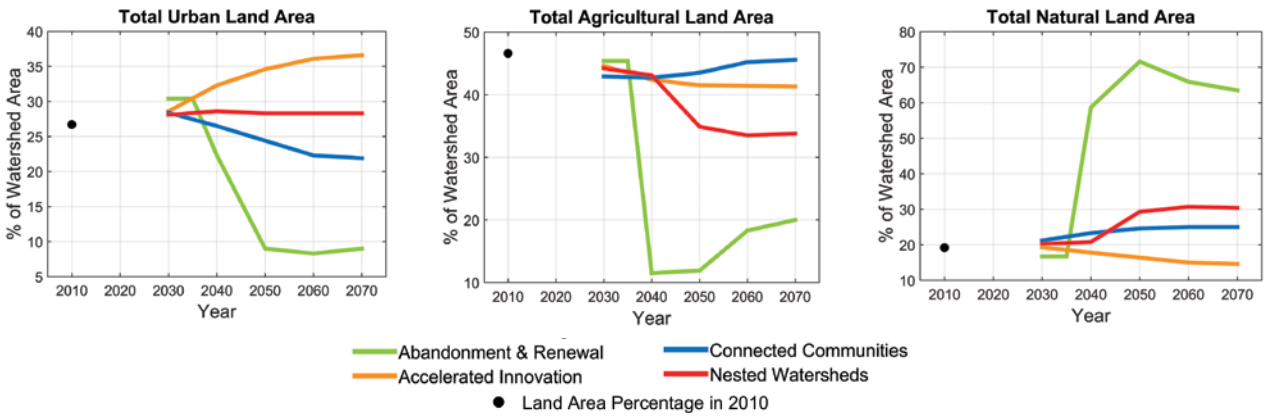
Yahara 2070 is a practical and empowering tool for considering options and imagining new ideas. The scenarios can help decision makers and communities think about the lives of future generations and what can be done today to ensure their well-being. They allow us to explore the uncertainties that lie in the road ahead and anticipate how we could prepare for them, in order to build the region's resilience.

The Yahara 2070 scenarios are not predictions, nor is there a best case or worst case. Each has pros and cons. Also, they do not represent our only options. The point is to use them to identify tradeoffs, stimulate ideas, discuss what is desirable or undesirable for the lives of future generations, and create solutions to achieve what is desirable.

Moreover, the implications of Yahara 2070 could be transferable to other places in the Upper Midwest, where climate and land-use change could follow similar patterns. The knowledge gained and discussions generated through this initiative could inform broader efforts to achieve regional water sustainability.

There is a wide range of possibilities for what life in the Yahara Watershed could be like in the future. The possibilities are partly dependent on the choices and actions of today's generations. We do have some power to create a desirable future, despite the uncertainties. Considering the possible effects and tradeoffs of our choices today—and whether we could do things differently—can help us be better prepared to cope with change and be more certain we are headed down a desirable path.

Explore the scenarios in more depth at **yahara2070.org**.



The amount of urban, agricultural, and natural land in the Yahara Watershed would change based on the events of each scenario. These land-use changes have implications for freshwater quality and quantity. Visit yahara2070.org for more visualizations of projected changes in land use, climate, and water.

Source

Yahara2070.org

Research sponsor

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The **Water Sustainability and Climate Project (WSC)** at the University of Wisconsin-Madison is an integrated effort to understand how water and the many other benefits people derive from nature could change over time. The five-year project (2011–2016) is focused on the Yahara Watershed in southern Wisconsin and funded by the National Science Foundation.