

photo of Morse Reservoir by Mike Berry



A White Paper on 2023
Themes and Future Directions

Indiana Water Summit



The Indiana Water Summit Leadership Team & Working Group

The members of the Leadership Team and Working Group have volunteered to contribute their time, expertise, and insights throughout the year to these purposes:

- Maintaining attention and momentum on issues highlighted in the [Indiana Water Roadmap](#) or addressed during the Indiana Water Summit,
- Bringing diverse perspectives and experiences to those issues, and
- Identifying actions that can be taken or advocated between annual Water Summits in order to help protect and improve Indiana's water resources.

Coordination and support for the Summit Working Group is provided by the White River Alliance.

Bob Barr, Center for Earth & Environmental Science, IUPUI
Mark Basch, Indiana Department of Natural Resources
Dan Boritt, Indiana Wildlife Federation
Keith Cherkauer, Purdue University
Jerod Chew, USDA - NRCS
Martha Clark Mettler, Indiana Department of Environmental Management
Larry Clemens, The Nature Conservancy
Katherine Couch, Hamilton County Tourism
Jeff Cummins, Indiana Farm Bureau (through Aug. 2023)
Mathilee Das Lappin, Greeley & Hansen
Toby Days, Hoosier Environmental Council
Greg Ellis, Indiana Chamber of Commerce
Summer Elmore, CHA Consulting / Indiana Wetlands Assn
Laura Esman, Purdue University
Indra Frank, Hoosier Environmental Council
Christian Freitag, Conservation Law Center
Jeff Frey, U.S. Geological Survey
Sue Glick, Indiana State Senate
Carey Hamilton, Indiana House of Representatives
Kay Hawthorne, Friends of the White River
Dave Henderson, City of West Lafayette WWRF
David Hillman, Nina Mason Pulliam Charitable Trust
Jill Hoffmann, White River Alliance
Chris Jaros, CTL Engineering

Dylan Lambermont, Wessler Engineering
Lance Lantz, Town of Zionsville
Jim McGoff, Indiana Finance Authority
Neal McKee, City of Anderson Water Department
Sheila McKinley, Christopher B. Burke Engineering (through Nov. 2023)
Matt Meersman, St. Joseph River Basin Commission
Kumar Menon, City of Fort Wayne
Lisa Milton, Newfields
Ryan Mueller, Indiana Department of Natural Resources
John Mundell, Mundell & Associates
Brian Neilson, HWC Engineering
Mike Pittman, Jefferson County Surveyor's Office
Gretchen Quirk, Marion County Public Health Department
Jason Ravencroft, Marion County Public Health Department
Liz Rice, Indiana Association of Soil & Water Conservation Districts
Brett Roberts, Indiana Finance Authority (through Nov. 2023)
Brian Rockensuess, Indiana Department of Environmental Management
Christy Schmidt, Brown County Water Utility
Kevin Strunk, Wabash Resources and Consulting
Marty Wessler, Wessler Engineering
Jack Wittman, Intera
Oliver Wittman, Intera

Note: Organizational affiliations are listed for identification purposes only. When participating in the Summit Working Group, members are sharing their expertise and perspectives, not necessarily representing the views of their respective agencies or organizations.

Why This White Paper Is Important to Indiana's Future

The participants in the 2023 Indiana Water Summit drew attention to several pressing water issues in our state, and to positive steps that can be taken to address them. There were also constructive examples of actions and progress from which much can be learned and used to protect Indiana's critical water resources.

In this White Paper we have identified five themes that draw much of that information together and a related set of actions that can be pursued in connection with each theme. This White Paper is intended to be a concise and useful resource for decision makers seeking to enhance the quality of life in Indiana and ensure economic vitality.

Why You Should Read This White Paper

You have received this White Paper because you are a decision maker or industry leader who can influence water policy and practice in our state and its local communities.

We hope you'll find it informative, inspiring, and action oriented. Continued progress in improving and protecting Indiana's water resources – some of the greatest assets we have – depends on your leadership and commitment. Thank you!

What You Can Do To Protect Indiana's Water

After you have reviewed this White Paper, please share it with colleagues whose roles and responsibilities relate to natural resource planning, land use, conservation, economic development, public health – in essence, water management!

In addition, you can support the Summit Working Group throughout 2024 by staying aware of our work, participating in our events, and letting us know what you think and care about.

Please feel free to designate someone in your organization, agency, or community to do so as well or in your stead.

The Indiana Water Summit

Themes & Directions from 2023



Introduction

On August 10th & 11th, 2023, the White River Alliance in collaboration with a multi-stakeholder leadership committee, convened the 6th annual Indiana Water Summit. This event, begun in 2018, provides an opportunity to gather stakeholders and users from across the water spectrum. There are two goals that have run through all Indiana Water Summits: 1) broadening understanding across sectors and localities, and 2) laying the foundation for better water management and policy in Indiana.

In the first years of the Summit, the attendees and presenters built an Indiana Water Roadmap, identifying priority strategies that can improve and protect our water. Beginning with the 5th Summit in 2022, the Water Summit Working Group now meets throughout the year, not only to help advise the Alliance staff and improve the Summit itself, but to advance the discussion of various policy-relevant water topics at forums between the annual events. Also in 2022, the Working Group published the first Summit White Paper to provide a synopsis of the event for an even wider audience.

The 2023 Indiana Water Summit covered many subjects and featured 40 presenters. From the wide variety of information shared and issues discussed, we have distilled in this White Paper several key points and items for further action organized into five

broad themes. These key take-aways are:

1. The Need for More and Better Data
Action: Invest in robust and strategic water monitoring (stream and well gages) statewide
2. The Connections Between Water and Development
Action: Conduct regional water studies statewide
3. The Value of Collaboration and Planning at a Regional Scale
Action: Support the creation of Watershed Development Commissions and other cooperative regional structures
4. Incorporating Nonstructural Options and Green Infrastructure into Our Water Management Toolkit
Action: Pursue policies and practices that support natural and built green infrastructure
5. The Future Won't Be a Replay of the Past: Resilience and Adaptation Are Essential
Action: Study and fund climate-related adaptations and utility preparedness

If there were one overarching takeaway from the 2023 Indiana Water Summit, it would be this: our state's collective policy approach to water doesn't match the significance of water to our state.

We are pleased to share this White Paper with you, on behalf of the White River Alliance and the Water Summit Working Group. You can always find out more about the Summit and the Working Group at IndianaWaterSummit.org.

Theme 1

The Need for More and Better Data

What the Speakers Had to Say...

Good decisions depend on good information. As we face many important choices and pressing challenges to protect and improve Indiana's water resources, we must make sound decisions, and, therefore, we need accurate and timely data statewide. Better information pays for itself in better decision making. This message was conveyed by several presenters in multiple sessions across both days of the 2023 Indiana Water Summit.

As an example, personnel in our state agencies such as the Indiana Department of Natural Resources or the Indiana Department of Environmental Management are often called upon to provide analysis to support decision making about proposed projects or requested permits, among other things. The modeling and forecasting that underlie those kinds of decisions require good data. Local and state public officials know that accurate data is also essential to justifying public expenditures and ensuring those dollars are spent efficiently.

There have been some improvements in the timeliness and accessibility of water resource data in Indiana, but for most water systems in our state we have only partial information that is not updated regularly. Much more needs to be done, and it should begin right away. As one panelist noted, we have inadequate data on where water is used and where it goes. This can and has

led to missteps in both policy and project development. In another session, a presentation on the recently completed White River Report Card project highlighted both the value of data collection and analysis and the gaps in our currently available data, including on critical issues such as water demand and flood impacts.

A number of presenters – and some audience members – pointed specifically to Indiana's groundwater resources as an area of need. **Despite the growing significance of groundwater as a water supply in Indiana, we have insufficient information about our groundwater conditions, uses, and quality.** To borrow a comment made during the World Water Week gathering in Stockholm, also in August 2023: "We are driving a car without a fuel gauge."

"Good data is the foundation of good policy."

– 2023 Summit presenter Jack Wittman

This is not merely a matter of data for its own sake, or the unquenchable thirst of researchers for more information. There is much more at stake for all of us, and public health and safety is at the top of the list. As one pair of Summit presenters stated plainly, "Old data won't protect us from future floods." Timely and accurate data are needed to update construction and infrastructure standards, hazard mitigation plans, emergency response systems, and insurance coverage. **Other Summit presentations on emerging contaminants such as PFAS, coal ash impoundments around the state, and the storage and transport of hazardous materials underscored how much we do not know and how high the public health consequences of those blind spots may be.**

Theme 1 continued...

The Need for More and Better Data

Critical Take-Aways...

The emphasis here on timeliness is crucial. In Indiana as elsewhere, the kinds of data feeds we need are of real-time data that can help us identify changes and risks in time to respond to them. **This is not a need that can be filled by an occasional study here or there - it has to be a robust commitment to a policy of strategic investment in the information that will help us more effectively protect Hoosier families, livelihoods, and the natural environment.** There are simply not enough stream and waterway miles in Indiana with gages transmitting data on critical information, and every gap is a potential flood or spill caught too late. We also have too few monitoring wells gathering and transmitting data on groundwater levels. There are almost none providing continuous data on groundwater quality even though groundwater is the sole source of drinking water for hundreds of thousands of Indiana homes.

Efforts are being made to improve the situation; they should be applauded and, more importantly, supported. On a statewide scale, the inter-agency group known as the “Silver Jackets”, composed of representatives from state and federal agencies, has developed a proposal to analyze what it would take in equipment, personnel, and funding to optimize our water monitoring network in Indiana. It is clear that this study needs strong support and rapid implementation. On a local scale, Summit attendees heard about the major

investment Hamilton County officials have made in acquiring more information about water availability and use across the county, so they can track not only current conditions but change over time. Those officials understand the value of having information that can help them make better decisions about critical issues — from where to support and sustain development to how to protect lives and property from potential hazards.

And that brings us back to the value of data for decision making. Investments in data are a fraction of the cost of development and can improve decision making and risk management. Simply put, the cost of expanding our data capacity will pay off. **Supporting economic development, protecting critical habitat, and safeguarding public health and safety all depend on accurate and timely information, and we need to do better.**



A volunteer water monitor with the White River Alliance RAFT program.

Theme 2

The Connections Between Water and Development

What the Speakers Had to Say...

From the opening remarks on the first morning, a theme of the 2023 Indiana Water Summit was the relationship between water and economic development. To many, that relationship might seem obvious. The Summit, however, provided the opportunity for a closer and longer look at that relationship and showed that there are important layers and facets to it.

First, the relationship between water and economic development is a two-way street. In one direction, water availability, reliability, and quality affect development – facilitating it or constraining it.¹ In the other direction, development can affect water availability, reliability, and quality – sustaining those traits or impairing them.

Second, the water-development relationship involves more than the contribution of water supply to production processes – that is, water needed for growing crops or raising livestock or manufacturing parts. The relationship also involves the contribution of water resources to the quality of a place – scenic beauty, recreational opportunities, tourism, and wildlife. Quality-of-life factors are now as important to economic development success – especially to talent attraction and retention – as traditional factors such as taxes and regulations.

Protecting and improving our water resources should no longer be seen as in tension with economic development. Rather, it should be seen as contributing to economic development and even a factor in its promotion. As Summit presenters pointed out, Indiana’s neighbors clearly understand this – Michigan now uses a “Blue Michigan” identity to encourage development, and Ohio has dedicated considerable resources to its “H2Ohio” campaign. At the time of publication, the Indiana Chamber of Commerce is in the midst of an update to its important 2014 report that highlighted both the economic importance of the state’s water resources and the shortcomings of Indiana’s water management strategies.

“There’s a lot more than just clean water – it’s about economic development, property values, tourism, etc.”

– State Representative Dave Abbott

In addition, a diversity of water supply sources adds greater value to an area’s overall attractiveness, prosperity, and sustainability. The simultaneous presence of creeks, rivers, lakes and reservoirs, groundwater supplies, and wetlands and floodplains helps to stabilize the water system over widespread areas. These areas

1. For example, the experience of the LEAP district in Boone County has influenced the Indiana Economic Development Corporation’s (IEDC’s) site development process. Early testing of the water supply plan for LEAP suggests that securing a reliable and adequate supply does not present a problem, but concerns have been expressed by many and heightened awareness of the significance of water supply availability, reliability, and quality as matters that cannot be taken for granted despite Indiana’s perceived relative water abundance.

Theme 2 continued...

The Connections Between Water and Development

or regions are therefore better able to thrive and manage the risks from natural variations such as flooding and drought. Increased resilience is a valuable outcome of maintaining and stewarding the co-occurrence of these resources as a interconnected system. Areas lacking one or more of these components are more vulnerable to risks and less adaptable to change.

For example, poor management of development near waterways leads to channel erosion, stream clogging, sediment and trash accumulation, poor water quality, and degraded or lost riparian habitat. Failure to protect wetlands reduces the natural removal of contaminants and increases the need and cost for water treatment. Failure to protect floodplains and keep up to date with changes in land use and weather patterns poses an increased risk of damage to structures or their complete loss.

Critical Take-Aways...

Water supply is a strength of the Midwest and especially Indiana. On the other hand, water quality is more like the Achilles' heel of the Midwest region and especially Indiana. **Water abundance alone will not sustain a successful long-term economic development strategy. That requires reliable, high-quality water, which in turn requires skillful stewardship and smart policy.** This is another illustration of the complex connections between water and development.

"If water is important and needed for incoming business then why not protect wetlands? Wetlands are the recharge areas for groundwater."

– a 2023 Summit audience member

It is important to be more than a state that naturally has a lot of water; it is equally important to be a state that takes care of its water. Water is a vital economic asset, but its value can be lost. The choice about Indiana's future goes beyond water for development – it must be a future of water and development sustaining each other.

Once again, information will play an essential role if we are to earn and maintain a reputation as not only a wet state but a smart state. The connections between water and development reinforce the importance of the ongoing monitoring and data needs we noted in the first theme. Recently, with the leadership and financial support of the Indiana Finance Authority (IFA), Indiana conducted some initial regional water studies. Those studies and more like them, conducted throughout the state, can strengthen our ability to strategically and effectively grow and sustain a prosperous economy, a healthy population, and an attractive environment. With the support of the IFA, the Summit Working Group is working to identify a strategic way to study Indiana's regional watersheds, and it will require the support of many agencies and stakeholder groups.

Theme 3

The Value of Collaboration and Planning at a Regional Scale

What the Speakers Had to Say...

Summit presenters and audience members from across the state emphasized that collaboration and planning at a regional scale is critical to sustainable water management for multiple reasons.

First, water doesn't care about our familiar political boundaries – city limits, county lines, even utility service areas mean nothing to water resources which flow and collect in streams, watersheds, and underground aquifers. Local water management efforts can help, and local neglect can hurt, but local efforts alone will necessarily be insufficient for truly effective water resource management.

Second, the impacts of our uses – and abuses – of water aren't neatly confined either. What happens on one property or in one locality affects neighboring properties and communities, sometimes over a large area.

Third, our water and wastewater utilities and agencies are facing multiple common problems: professional personnel are scarce, a large percentage of the workforce in the water and wastewater fields is retiring or about to retire, and the costs of personnel, equipment, and supplies have risen faster than revenue from rates. **These trends, which have persisted for**

several years and show no signs of abating, are prompting more conversations about regional cooperation and even consolidation of water assets and management in some areas.

No matter how compelling the reasons for regional collaboration and planning may be, actually doing it takes a great deal of effort and support which have to be sustained over time. Even if watersheds or other contours make sense for water planning and management, our existing political boundaries aren't going away, so the day-to-day work of regional planning and management requires communication and coordination among jurisdictions and officials who have multiple other responsibilities as well. In addition to the political authorities who need to engage in and support regional efforts, the nature of water resources and services requires the involvement of multiple other stakeholders – utilities, landowners, researchers, and water users of all kinds. As Summit presenters described, broad representation and participation are critical, and effective collaboration means creating and sustaining regional teamwork.

“Is there an overlap of agencies doing monitoring, or do they communicate with each other?”

– a 2023 Summit audience member

These essential aspects of regional collaboration are easier to say than to do, especially if those responsibilities are simply added onto other duties. For one thing, real collaboration means working with others, not just doing things for them. **Meaningful and ongoing engagement and participatory decision-making take serious commitment, not just a public hearing now and then.**

Theme 3 continued...

The Value of Collaboration and Planning at a Regional Scale

Effective and sustained collaboration also requires a commitment of resources and, therefore, the willingness of public officials, agency heads, workplace managers and others to free up some personnel time for the communication, meetings, plan development, and implementation work that are necessary. Here it is important to add that not all communities across Indiana are equally well positioned to devote those kinds of resources to regional efforts: coming up with personnel time and budgetary support may seem like a pinch in some places but nearly impossible in others.

A supportive state framework – providing data, technical assistance, and funding – is key to building a broad and successful initiative toward water planning and collaboration at regional scales. Fortunately, there are some resources available at the state level to help, although we must remind ourselves again that communities around the state are not equally adept at identifying, applying for, and securing funds or at using various data sources – here, too, some additional effort is necessary to support regional planning and collaboration.

If regional cooperation is so challenging, a logical question becomes whether it is worth the trouble. Summit presenters provided several reasons for answering yes.

- Panelists from the Pigeon Creek watershed in southwest Indiana shared that collaboration enhances the distinct and complementary strengths of the participating organizations. Nonprofits, local governments, and state agencies

have different strengths and capabilities to bring to the effort.

- Panelists from the Lake Monroe watershed demonstrated that investments in source water protection activities pay off in reduced drinking water treatment costs, and soil health and floodplain improvements lower flood risks and infrastructure damage.
- A particularly succinct response came from a Summit presenter who said, “There is no new water.” If we don’t put in a coordinated effort to protect and conserve what we have, the impacts of our failure may be more than we can recover from.

There are other positive examples around Indiana of regional and inter-jurisdictional collaboration including the Indiana Conservation Partnership, the Silver Jackets, and a few River Basin Commissions. Some Summit presenters complimented the Indiana Conservation Partnership as an effective group that may be unique in the US. Indiana Conservation Partnership agencies meet regularly to help promote each other’s water quality-related work and coordinate. Likewise, the Silver Jackets is an ad-hoc group of agency staff who collaborate on information sharing and hazard mitigation. And finally, similarly, at the 2021 Indiana Water Summit we heard from directors of three of the river basin commissions in the state which operate regionally to bring together local governments and others who share and depend on common river systems. **Each of these efforts is bearing some fruits, but because of differing mandates and structures, none are holistically planning for water at a regional scale or statewide.**

Theme 3 continued...

The Value of Collaboration and Planning at a Regional Scale

Critical Take-Aways...

Like Theme 1, this theme – the importance of regional collaboration – was also prominent at the 2022 Indiana Water Summit. In 2023, some of the same topics under this theme were discussed and examples of collaboration were showcased, yet it was clear that any such efforts to cooperate are haphazard and not supported by routine funding and data collection. Likewise, they don't benefit from any sort of standardized organizational structure or integrated work plan. However, those challenges may become challenges of the past.

“Water is a quality-of-life asset. Being able to employ our quality-of-life-assets and grow and sustain our prosperity requires us to (1) value and protect them, (2) collaborate regionally.”

– Marlon Webb, Indy Partnership

Now, in 2023, there is a new kid on the regional collaboration block. The 2023 session of the Indiana General Assembly passed into law a bill signed by the governor authorizing the creation of Watershed Development Commissions (WDCs) within the other river basins in the state. **This mechanism was workshopped and vetted at the 2022 Water Summit and has the potential to lay the foundation for regional water planning statewide. In a session with the legislators who shepherded the measure through the legislative process, Summit attendees learned that WDCs will have authority to generate the revenue they use for improvements within their respective river basins.** Although the ink is barely dry on this addition to the Indiana Code, discussions are already beginning within a couple Indiana watersheds about the possibility for forming a WDC to facilitate and enhance regional efforts.



Drinking water well in Carmel, IN
Photo credit: Intera



Drinking water intake at Eagle Creek Reservoir
Photo credit: 12 Stars Media



The John M. Craddock Wetland Nature Preserve in Delaware County
Photo credit: Chris Flook, Visit Indiana

Theme 4

Incorporating Nonstructural Options and Green Infrastructure into Our Water Management Toolkit

What the Speakers Had to Say..

Managing and protecting water entails several functions and activities – capture and storage, filtration and treatment, and so on – that we broadly associate with the idea of infrastructure. Not all of those functions and activities have to be performed by human-built, fixed capacity structures, however. There are nonstructural options (like zoning requirements, special area protections, preservation ordinances, etc.) and more naturalized approaches to stormwater management. These nature-mimicking stormwater approaches are often referred to as “green infrastructure” in contrast to the more traditional “gray infrastructure” of dams, culverts, pipes, and treatment plants. The 21st century has awakened widespread awareness and implementation of these nonstructural and more naturalized alternatives, and one of the themes of the 2023 Indiana Water Summit was the value of incorporating these options in the effort to protect and improve our water resources.

One important advantage of green infrastructure and other naturalized features is that they can be easier to adjust, so both design errors and changed conditions are less costly to address. One Summit presenter used the example of the “Dig Indy”

project – the deep rock tunnel under portions of Marion County which is a textbook example of a gray infrastructure solution to a wastewater problem. Dig Indy is a nearly \$2 billion project. It was designed to intercept storm water flows and prevent combined sewer overflows (CSOs) based on data reflecting conditions before the year 2000. Unfortunately, as Dig Indy nears completion following 20 years of design and construction, it is already too small to manage (as designed) the increases in storm water volume and frequency that have been occurring over the last couple of decades and which are projected to continue indefinitely. **Massive gray infrastructure projects, such as this and many others, means fixed structures, sunk costs, and the possibility of proving to be too big or too small to be efficient under changing circumstances.**

Green infrastructure projects have costs, too, and aren't necessarily simple to change, but they are much easier and less costly to change compared to gray infrastructure projects. Most also provide water quality treatment benefits in their design. For stormwater flows, for example, “green” options include positioning vegetated retention ponds, park lands, and other land uses in locations that are likely to be inundated during storms to capture, retain, and slowly infiltrate the storm water, thereby lessening the volume that hits our storm drains and sewer lines, overwhelms our wastewater treatment facilities, or is diverted directly to our waterways where it creates a challenging set of problems both locally and downstream. Adjusting the size and shape of these types of stormwater facilities does take time and money, but the amounts of both pale in comparison to reconstructing gray infrastructure installations.

Theme 4 continued...

Incorporating Nonstructural Options and Green Infrastructure into Our Water Management Toolkit

In most cases, this new approach can be both effective and economical with the added benefit of providing aesthetic amenities such as parks, gardens, or playgrounds that benefit the public between significant storm events. In addition, the reduced flow of stormwater to waterways can save significantly on water and wastewater treatment costs. **A Summit presenter from Bloomington Utilities explained how improvements in watershed protection, including designed and natural green infrastructure, were economically preferable to expanding or intensifying water treatment processes – having cleaner water reach the city’s drinking water treatment facilities in the first place helped the city avoid much higher expenses to bring that water to drinking water standards.**

Likewise, the City of South Bend found that a combination of green infrastructure and improved technology (i.e. trunk line capacity allocations) for the management of storm and sewer flows was able to divert or deter most of the stormwater flows that otherwise would have resulted in CSOs. This nonstructural approach was hundreds of millions of dollars cheaper than trying to combat CSOs with gray infrastructure alone.

In another example, the Elliot Ditch in Tippecanoe County saw water quality improvement (including the remediation of PCB pollution) plus stormwater capacity

enhancement, floodplain protection, and protection of utility infrastructure all achieved through waterway restoration solutions such as two-stage ditches and stream channel riffles.

Critical Take-Aways...

Two of the 2023 Summit presenters described the change we need as primarily a mindset shift. One aspect of that shift involves the ways we view and think about our waterways. They can be neglected at best, poorly managed and even deliberately degraded at worst, and generally overlooked as the valuable resources they are. **Therefore one signpost of Indiana’s water future must be transforming our view of our waterways from hidden problems to community assets. Another aspect of the mindset shift is flipping our familiar approach – defaulting to gray infrastructure – into a new way of thinking that begins by asking what green infrastructure can do and then fills in the remaining gaps with gray infrastructure as needed.**

“How are you providing support for disadvantaged communities that don’t have staff capacity?”
– a 2023 Summit audience member

As is often the case, the local communities that have experimented and innovated with green infrastructure have been the ones with greater resources. Not all communities have tried these naturalized options, so a supportive state policy framework and flexible technical assistance funding is once again important to further improvements in this direction.

Traditional sources of funding and other support for water and wastewater improvements have focused on gray infrastructure, but as 2023 Summit attendees heard, that is changing. Several funding sources – including some of the additional federal funding

Theme 4 continued...

Incorporating Nonstructural Options and Green Infrastructure into Our Water Management Toolkit

that has recently become available – allow for the support of projects for source water protection on agricultural lands, flood risk mitigation through changes in land use, and pollution reduction through the preservation of natural or the construction of artificial wetlands. The federal-state Silver Jackets group now supports an Interagency Nonstructural Program to address and mitigate flood hazards without construction projects.

The awareness and incorporation of “green” water management alternatives is redirecting attention to the value of wetlands and floodplains. Two highlights of 2023 Summit presentations stood out.

First, wetlands accomplish multiple beneficial purposes: flood attenuation, water storage, groundwater recharge, water filtration and pollutant removal, carbon storage, habitat, and streamflow protection. Although constructed wetlands are better than nothing, they do not perform as well as natural wetlands. The sensible strategy is to protect our remaining natural wetlands rather than destroy them and then spend money trying to imperfectly recreate their functions.

Second, in Indiana flooding is the most impactful natural disaster, accounting for the great majority of the \$1 billion in disaster relief funds in the state since 2014. But on average every \$1 of mitigation saves \$6

“We are designing infrastructure based on a climate we no longer live in.”
– Antonio Arenas, Iowa State University

of disaster costs, and many of the effective mitigation measures are nonstructural. The state can lower both risks and the negative consequences of natural disasters by avoiding construction in floodplains, keeping floodplain data current, and letting stormwater remain temporarily on the landscape and percolate to groundwater rather than rushing it into drains and feeding it to streams that are already carrying heavier flows.



Green infrastructure at Butler University, Indianapolis, IN
Photo credit: 12 Stars Media

Theme 5

The Future Won't Be a Replay of the Past: Resilience, Adaptation, and Foresight

What the Speakers Had to Say...

A consistent message of the 2023 Indiana Water Summit was that changes are coming, and we need to anticipate and adapt to them quickly. **Although much of the discussion and many of the presentations at the Summit referred to the impacts of climate change on Indiana's water resources, the discussion of this theme was not confined to climate. Other change processes need to be recognized and managed.**

Population dynamics that have been underway in Indiana and elsewhere carry important implications for water planning and management, including infrastructure and finances. Growth in several of the state's metropolitan areas creates one set of pressures and challenges to anticipate in order to meet future water needs.

Population loss in other areas creates different pressures and challenges, such as how to maintain existing infrastructure at acceptable levels of performance while the base of ratepayers shrinks.

Changes in water use matter, too. Thanks to improved appliances and public attitudes toward water conservation, water use per person in Indiana and the entire United States has begun to decline, but we finance our water and wastewater utilities almost exclusively on the basis of use volumes.

Raising water and sewer rates to try to make up the shortfall also increases users' incentives to conserve further.

Emerging contaminants pose challenges of their own. The class of compounds known collectively as PFAS are especially vexing for a combination of reasons: first, their sources are so widespread that PFAS are already present in virtually every waterway and human body, and second, they are resistant to the most common methods of water and wastewater treatment. **Meeting new regulatory limits on PFAS in drinking water appears likely to be one of the most daunting challenges ever faced by water utilities throughout the United States.**

"No person, community, or country will emerge unaffected by current and future climate change."

– Gabriel Filippelli, Indiana University

And then there are the water implications of climate change. Purdue University's Climate Change Impacts Assessment program issued its report on water in the weeks before the 2023 Indiana Water Summit, and the findings of that report were the subject of a presentation at the Summit. Indiana's changing water conditions don't all run in the same direction. Overall, annual precipitation is increasing, especially during winter and spring, and flooding is becoming more frequent and severe. Indiana's flooding situation has changed and will continue to change. **The large and damaging floods of the past are becoming more frequent (and recall that they pose a billion-dollar burden). At the same time, the warmer temperatures that are driving those winter and spring conditions are also making the average summer and fall hotter**

Theme 5 continued...

The Future Won't Be a Replay of the Past: Resilience, Adaptation, and Foresight

and drier with more 90+ degree days and reduced streamflow. This is the recipe for increased droughts and significant risks to human health.

Those changes have water quality as well as water supply effects.

- Increased frequency and intensity of storms and flooding generate greater runoff of pollutants from the landscape into our waterways. We already have high levels of nitrate, phosphorus, and E.coli in our waterways, and the trends we are observing in precipitation and runoff seem likely to impede and even reverse progress in bringing those pollutants down.
- After higher runoff volumes push those contaminants into our waterways every winter and spring, the summer and fall reductions in streamflow, lower lake levels, and higher water temperatures are aggravating algae blooms and generating higher contaminant concentrations.
- Of particular concern is the amount of accumulated coal ash in Indiana, greater than any state in the nation. Our reduced dependence on coal for energy doesn't repair this coal ash legacy, and in the meantime, heavier storms and more precipitation increase the likelihood of failure at our coal ash facilities. This is not just an environmental problem—it's a threat to public health and safety.

Critical Take-Aways...

Climate instability alone poses serious economic implications for all. For Hoosier farmers, crop selection and soil practices will have to adjust. Projections indicate that the corn and bean belt in North America will continue to move north, affecting a nearly \$4 billion industry. And for communities large and small across the state, the changes we are seeing in our climate impact

"All but one of Indiana's coal ash sites has contaminated the groundwater."
– Indra Frank, Hoosier Environmental Council

infrastructure design, construction, financing, and operation. Two Summit presenters shared the findings of a survey of municipal separate storm and sewer system (MS4) operators that garnered 643 responses from 47 states. **The respondents expressed an urgent need for projections of rainfall amounts and storm durations and their impacts on infrastructure sizing guidelines. These are changes with multi-million dollar ramifications in addition to their potential significance for public health and safety.**

These numerous and significant changes are evident – they are not speculations about some science-fiction future. They're happening now. The question can no longer be whether they will occur or who to blame. The question that matters far more, and which becomes more pressing every day, is how we are responding now and how we will respond in the future.

There are some encouraging responses under way even as much remains to tackle.

- With the assistance of the Indiana Resilience Funding Hub at Indiana University, communities in Indiana are developing climate resilience plans.

Theme 5 continued...

The Future Won't Be a Replay of the Past: Resilience, Adaptation, and Foresight

- With the encouragement of state and federal personnel and organizations such as IN-Climate and the Natural Resources Conservation Service (NRCS), an increasing number of growers across Indiana are adopting adaptive agricultural practices.
- Bills have been introduced in the last two sessions of the Indiana General Assembly – thus far unsuccessfully – to establish a climate solutions task force or commission for Indiana.
- Both science and practice demonstrate that, if we can protect our remaining wetlands and floodplains in Indiana, they can aid many of the emerging impacts.

None of this, however, directly addresses the other pressing challenges mentioned above. We must plan for how we will help water and wastewater utilities prepare for the population changes and infrastructure costs that will drive service rates increases, and how they will protect our drinking water from emerging contaminants.

Funding will play a key role here—a demand that will have to be balanced with the many other needs discussed herein. Rate structures should be considered as well in order to prevent widespread affordability threats.

There are economic opportunities to be realized if we can pivot and change and serious economic risks if we don't.

"It's of importance to all of us – no matter where we live – that we protect and enhance our water resources."
– State Representative Sue Errington

Adaptation needs to be a core element of a supportive state policy framework for Indiana's water future. Meeting that future will require everything summarized in this White Paper and discussed at the 2023 Indiana Water Summit – more and better data, regional collaboration, nonstructural options, and an unrelenting commitment to foresight, adaptation, and resilience.

We need to do better. Indiana's water future is also Indiana's economic future and the future of its people, communities, and environment. That future is calling, now.

Let's answer.

