Confluence

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Using the Watershed to Protect Water Resources

The United States Environmental Protection Agency (EPA) defines a watershed as *"the area of land where all of the water that is under it or drains off of it goes into the same place."* A watershed catchment or drainage basin, catches precipitation that falls within its boundaries and funnels it to a particular creek, stream, river or groundwater formation. Watersheds provide the natural catchment boundaries for isolating geographical areas with similar hydrological influence. Because of this, water quality issues are most often identified on a watershed scale.

Large watersheds can be subdivided into smaller sub-watersheds based on the intersection of smaller "feeder" streams that intersect and flow into larger rivers. The United States Geological Survey identifies watersheds on a hierarchy numbering system known as the hydrological unit code, or HUC (Click here to learn more about the HUC designation).

During the last two decades, the concept of identifying, remediating and protecting our water resources via watershed management has increased in volume and importance. The watershed approach to water management can provide a geographical focus needed to integrate protection efforts from many approaches and across many different sectors of society as watershed protection efforts range from state and federal regulations to efforts by local watershed organizations consisting of concerned citizens and volunteers.

Even with increases in knowledge in watershed science and management, developing a successful watershed protection approach can be difficult to bring together different sectors of society and

different protection strategies in a fair and equitable manner while preserving the integrity of the science associated with watershed management. Land-grant universities as well as EPA have recognized these challenges to watershed management and have developed watershed training programs designed for all watershed stakeholders from the water resource management professional to local volunteers. Below is a summary of just a few of the different watershed training programs within the Mississippi River Basin. While the land-grant university is listed as the lead, almost all of these programs were developed in partnership with respective state and federal agencies.

State / Lead	Description	Link
EPA	EPA Watershed Academy	http://water.epa.gov/learn/training/wacademy/
Arkansas / Univ. of AR Division of Ag. Coop. Ext. Service	Arkansas Watershed Steward	http://www.uaex.edu/environment-nature/water/docs/ag1290.pdf
Iowa / Iowa State Univ.	Leadership and Performance-based Watershed Management Project	http://www.soc.iastate.edu/extension/watershed/performance.html
Indiana / Purdue Univ.	Indiana Watershed Leadership Academy	https://engineering.purdue.edu/watersheds/
Kentucky/ Univ. of Kentucky		http://www2.ca.uky.edu/enri/stormwater.php
Louisiana / LSU AgCenter	The Louisiana Master Farmer Program	LSU Master Farmer
Minnesota / Univ. of Minnesota	Minnesota Watershed Specialist Training	http://wst.umn.edu/
Missouri / Univ. of Missouri	Missouri Watershed Information Network (MoWIN)	http://www.mowin.org/
Mississippi / Mississippi State Univ.	Community Watershed Protection	http://msucares.com/lawn/landscape/design_mgt/soil_water/community_watershed_protection.pdf

Ohio / Ohio State	Ohio Watershed Academy (OWA)	http://ohiowatersheds.osu.edu/
Tennessee / Univ. of Tenn.	Watershed Management for Tennessee	https://ag.tennessee.edu/watersheds/Pages/default.aspx

Protecting land and water resources for farming, recreation, drinking water, property values, and other public and private goods is no easy task. It takes leaders with a diversity of experiences and perspectives to get the job done. Watershed training programs and resources like these can provide science-based information and a foundation for moving toward common goals. We hope these resources assist you in moving your own watershed management efforts forward.

Sincerely, your Co-Editors:

Mike Daniels, Ph.D.
Professor, Extension Water Quality
University of Arkansas
Division of Agriculture

Rebecca Power
Interim Director, North Central Region
Water Network
University of Wisconsin

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REACH (Research & Education to Advance Conservation & Habitat)

Overview

REACH (Research & Education to Advance Conservation & Habitat) was developed to provide coordination and support for documenting the benefits of conservation efforts in natural resources and agriculture. The REACH program provides scientifically-defensible information to support efforts that meet the resource needs of landowners and producers, while increasing awareness of sustainable conservation efforts. REACH also provides education in agricultural natural resources conservation to producers, agricultural and natural resource professionals. The REACH mission is to disseminate information and educate producers and private landowners through the MSU extension network regarding: 1) environmental issues the state of Mississippi faces that are directly related to their agriculture operations, 2) how and which conservation practices can promote more sustainable agriculture systems, and 3) where producers can find financial assistance through government programs for the implementation of best management practices (BMPs).

Major Objectives

1) To improve producer understanding of Mississippi's natural resource concerns regarding water, soil, and wildlife and why creating sustainable agricultural systems is critical to the longevity of Mississippi's agricultural productivity

2) To provide information regarding best management practices to protect natural resources and government programs for which financial assistance is provided

3) To create a network of producers to communicate the benefits of agriculture conservation to their peers and to develop a suite of demonstration sites for field days and training

Why REACH?

The REACH program is designed to address conservation needs of Mississippi's natural resources by providing research and education towards their protection while maintaining the sustainability of the State's economic industries, specifically agriculture. A key goal of the REACH program is to create a network of cooperative farms in Mississippi with variable agriculture practices to illustrate the success of conservation practice implementation on landscape stewardship while encouraging profitable and sustainable agricultural practices. While government assistance is provided by the US Department of Agriculture Natural Resource Conservation Service (USDA-NRCS) to implement BMPs, many farmers are unaware of many existing BMPs or do not know how to apply for government cost-share programs that they are qualified to participate in. REACH closes the loop between government and producers, helping them to adopt conservation practices that enhance their production, and in turn, providing the government with scientifically-defensible data that evaluates the BMP for which they provide hundreds of millions of dollars in financial assistance. Additionally, REACH utilizes the success stories of farmers that have adopted these practices to help promote conservation of our natural resources. At the same time, REACH helps promote the success of marrying conservation and agriculture, changing the public view of producers from polluters of our nation's waters to protectors of our nation's most precious resources – food, fiber, and water.

REACH Projects

The REACH program has been well-received by collaborating agencies and has received high levels of support since its inception. As REACH was designed to conduct research that followed demands of producer and government agencies, focus areas have evolved over the past couple of years. Research projects now focus on a number of different BMPs and their impacts on water quality and quantity.

Much the past work of REACH has focused on the investigation of low-grade weirs as a viable BMP and the work still continues at Mississippi State University's Southfarm Research Facility. In June, a PhD student working with REACH concluded field investigation of carbon additions to drainage systems with weirs during simulated runoff events. His hypothesis was that adding carbon would stimulate more removal of nitrogen from the runoff by increasing the rate of denitrification within the drainage system.

Currently, REACH's major projects include the investigation of tailwater recovery systems in the Mississippi Delta, and their potential as a BMP to impact water quality and quantity. REACH collaborates closely with Delta F.A.R.M., the US Geological Survey, the Mississippi Department of Environmental Quality, and the US Department of Agriculture – Natural Resources Conservation Service to further these research investigations. REACH is also investigating the recharge potential of these systems to contribute to aquifer recharge, which is an effort that was funded by the Mississippi Water Resources Research Institute, with additional support from Mississippi Farm Bureau, US Geological Survey, and the Mississippi Department of Environmental Quality. Other REACH projects include a long-term edge-of-field monitoring project funded by the US Department of Agriculture – Natural Resources Conservation Service to assess cover crops as a BMP for water quality, and a more short-term investigation of the use of polyacrylamide (or "PAM") as BMP to reduce suspended sediment in runoff funded by a private company that distributes this product.

For more information on the REACH program or Water Quality Laboratory Projects, please click on the following links:

www.fwrc.msstate.edu/water

http://www.reach.msstate.edu/

--- Beth Baker, Ph.D. Research Program Manager & REACH Coordinator Department of Wildlife, Fisheries, and Aquaculture Mississippi State University

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The Mississippi River: Mending the Mighty from North to the Gulf

The mighty Mississippi – it's a river with a history of romance and enchantment. Native Americans depended on the Mississippi River for food and water, and world explorers came in search of its riches.

Over time, farmsteads dotted the land, and small towns grew to large cities. Today, we see the fruits of our labor as industry, commerce and agriculture continue to thrive in the basin. But those successes come with environmental challenges. Many of the basin's waterways suffer from poor water quality.

To address those issues, the USDA's Natural Resources Conservation Service (NRCS) works side-by-side with farmers to make conservation improvements to their land that clean and conserve water, boost the quality of soil and air and enhance habitat for wildlife. You can view some of the progress of Mississippi River-area farmers in this video "Farming the Upriver."

NRCS has identified the basin as a top priority because of high levels of nutrients and sediment found in many waterways, which affect the health of the Mississippi River as well as the Gulf of Mexico downstream.

In 2010, NRCS launched the Mississippi River Basin Healthy Watersheds Initiative (MRBI), accelerating conservation in priority watersheds throughout the basin. Since its launch, farmers have worked with NRCS to implement science-based practices on more than 1 million acres.

Meet Brian Parkinson, an Illinois farmer who uses no-till, plants cover crops and installs buffer strips to keep nutrients and soil on fields and out of waterways.

Brian Parkinson grows cereal rye and other varieties of cover crops near Milan, Ill. Parkinson works with NRCS District Conservationist Joe Gates to make conservation improvements to his land. Photo courtesy of NRCS.

"The idea of the saturated buffer strip is to intercept the water that is carrying nutrients that come from the fields and allows them to be taken up by the prairie grass that we planted in the buffer strip before it hits the creek," Parkinson said of one of the conservation practices in place on his farm. "We're trying to stop the problem here in my field before it becomes a problem for anyone else downstream."

Same goes for David Petersen, a dairy farmer in Iowa. He captures and safely stores the cattle's waste in an underground bin, which he then uses to fertilize fields to grow feed.

"He doesn't want to see that go into that waterway and down into the creek because we know it eventually will get to the Mississippi River and down to the Gulf where it has disastrous consequences," said John Matz, NRCS district conservationist, who has worked with Petersen to make conservation improvements to his land.

These conservation efforts are working. Watersheds prioritized by MRBI have shown clear successes in helping to improve water quality. For example, two stream segments in the St. Francis River watershed in Arkansas have been removed from the U.S. Environmental Protection Agency's list of impaired streams.

MRBI is now in its sixth year, and NRCS plans to continue its work with partners and landowners in the 13-state area.

The more farmers that say, "Hey, I can improve my operations for the good of water quality," the larger the impact will be downstream.

--- *Jody Christiansen, Natural Resources Conservation Service, Illinois*

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Mississippi River Basin Healthy Watersheds Initiative Thriving in Wisconsin

Current Program Highlights

Wisconsin's Natural Resources Conservation Service (NRCS) is committed to helping private landowners care for the land, use it productively, and excel as stewards for the future. America's working lands produce food and fiber, clear air and water, wildlife, and healthy soil. Through voluntary incentive-based programs, such as the Mississippi River Basin Healthy Watersheds Initiative (MRBI), NRCS works one-on-one with farmers and landowners to provide technical expertise and financial assistance to make conservation work on private lands.

The goal of MRBI is to improve the health of the Mississippi River Basin. This program helps producers implement voluntarily conservation practices that avoid, control, and trap nutrient runoff, restore or enhance wildlife habit, and maintain agricultural productivity. A MRBI conservation systems approach includes multiple practices that promote soil health; reduce erosion and lessen nutrient runoff; such as cover crops, reduced tillage and nutrient management; waste management systems that treat agricultural waste and livestock manure; irrigation systems that capture and recycle nutrients back to the field; and wetland restoration that increases wildlife habitat, mitigates flooding, and improves water quality.

In 2015, USDA–NRCS is investing $10 million in 27 new high-priority watersheds and 13 existing projects that will help improve water quality and strengthen agricultural operations through MRBI. This investment is part of a commitment of $100 million over four years to address critical water quality concerns in priority watersheds while boosting rural economies.

"Putting NRCS conservation practices on the ground helps clean and conserve water, makes agricultural operations more productive and resilient, and stimulates rural economies by tapping into help from biologists, foresters, grading contractors, welders, engineers and many more professions during the implementation process," said Jimmy Bramblett, State Conservationist in Wisconsin.

Program Partnership Success

The Kettle Moraine Land Trust (KMLT) has a long record of forming valuable partnerships to protect and improve natural resources in Walworth County, Wisconsin. One of these partnerships is the Watershed Improvement Network (WIN). Partners, such as KMLT, have a crucial role in encouraging and supporting producer participation. Addressing resource concerns including water quality, soil health, and fish and wildlife habitat, are a priority for the initiative.

KMLT recognizes the importance of working with both urban and farming communities to tackle water quality challenges affecting watersheds in Walworth County. To improve the quality of water leaving agricultural lands in the Delevan Lake Watershed, KMLT asked NRCS–WI to become a partner of the WIN. NRCS agreed, and through MRBI, the trust was able to request and receive funds to help local farmers implement conservation practices that improve the quality of water draining to the Mississippi River and the Gulf of Mexico.

A Local Connection

Many farmers realize the advantage of protecting water quality and Charles Pearce of C&C Farms, LLC, is one of them. Charles has lived and worked on his family farm south of Delavan Lake Watershed for decades. He and his son Charlie now farm together and look for ways to improve the health of the lands they own. The Pearces place fields, prone to erosion, in hay to keep soils from washing downhill. "I remember when everyone used to plow everything; now you don't have dirty water like you used to, you don't have all the dust in the air," said Pearce. Through additional MRBI funding available in the

Charles Pearce, C&C Farms, LLC owner, assesses crops on his land located in the Delevan Lake Watershed.

Delavan Lake Watershed, Pearce planted a cover crop on several of his fields to help reduce soil erosion. “If we get a hard rain in the spring, the soil stays where it is,” says Pearce. After the cover crop is removed, corn or soybeans are planted directly in the ground without tilling the soil. The roots of the cover crop continue to hold on to the soil, and residue left behind from harvesting helps hold soil in its place as well. The Pearce family farm is one of many utilizing NRCS programs, like MRBI, to keep their land healthy and productive, while also improving water quality. Watersheds prioritized by MRBI have shown clear successes in helping to improve water quality.

Findings from a 2014 USDA report show conservation work on cropland in the Mississippi River Basin has reduced the amount of nitrogen and phosphorus flowing to the Gulf of Mexico by 18% and 20%, respectively. Models have also shown that the targeted approach of MRBI has enhanced the per-acre conservation benefit by 70% for sediment losses, 30% by nitrogen losses, and 40% for phosphorus losses, when compared to general program activities.

Charles Pearce (left), C&C Farms, LLC owner, discusses conservation and soil health efforts on his land with Maggie Zoellner (right), Mississippi River Basin Initiative Project Manager for the Delavan Lake Watershed Initiative Network.

Mississippi River Basin Initiative (MRBI) partners assess land in the Delevan Lake Watershed area before planting. (Left to right) Brian Smetana, Walworth County Land Use & Resource Management Department; Greg Igl, NRCS–WI District Conservationist for Walworth County; and Maggie Zoellner, MRBI Project Manager for the Delavan Lake Watershed Initiative Network.

“We know that when we target our efforts to the places most in need, we see stronger results,” USDA Secretary of Agriculture Tom Vilsack said. “These MRBI projects focus on watersheds in need, where we have opportunities to work with partners and farmers to get conservation work on the ground.”

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New water quality grant pours in more research dollars for nutrient management

Extension specialists with the College of Food, Agricultural, and Environmental Sciences at The Ohio State University will use more than $1 million in new funding to help farmers develop nutrient management plans and to assist fertilizer service providers gain certification in a national nutrient stewardship program.

The initiative — funded by $531,000 in grant money and $531,000 in local cash matches from various agencies and industry groups — targets Ohio's western Lake Erie watershed, home to rich agricultural land dedicated to field crop production and an important source of nitrogen and phosphorus that can affect the lake's water quality downstream, said Greg LaBarge, Ohio State University Extension field specialist for agronomic systems and co-leader of Ohio State's Agronomic Crops Team.

"The overall goal of the project is to continue to refine our nutrient management strategies to ensure better crop production with less residual nutrient exposed to loss," LaBarge said. "Every field has different risks. Separating high-risk fields so they can be targeted with more layers of appropriate best management practices is essential to seeing fewer nutrients in water leaving fields."

The first part of the project is the result of a cooperative effort funded by the Ohio Farm Bureau Federation, the Ohio Soybean Council, the Ohio Small Grain Marketing Program, the Ohio Corn Marketing Program and OSU Extension, with additional support from the National Fish and Wildlife Foundation. It involves working with growers to develop nutrient management plans for their farms, including the Phosphorus Index calculation, which helps them identify fields with a high potential risk of phosphorus movement to nearby waters downstream. Too much phosphorus can affect water quality in the basin, fueling the growth of harmful algal blooms.

To accomplish this work, the grant will fund four program coordinator positions with OSU Extension that will be based in county offices within the Maumee River watershed. These program coordinators will carry out four basic functions:

• Assist farmers in developing nutrient management plans that meet Natural Resources Conservation Service (NRCS) cost-share program eligibility. These plans can help identify a variety of conservation land-use concerns that could be further addressed by a certified farm conservation plan, LaBarge said.

• Help growers interested in developing voluntary nutrient management plans that meet statutory requirements for an approvable plan through the Ohio Department of Natural Resources and the Soil and Water Conservation District program. A voluntary nutrient management plan is an important step for farmers to defend themselves from lawsuits as stipulated in Ohio's new nutrient management laws.

• Provide technical support to private nutrient management plan development providers (including certified crop advisers, certified professional agronomists and technical service providers) who are developing plans that meet NRCS cost-share eligibility on behalf of farmers.

• With the written approval of a plan owner, use data gathered from the management plans (such as field distance from water, soil types and soil test values) to better understand the phosphorus index and

other water quality risk tools, in order to develop more user-friendly means for growers and farm advisers to monitor fertilizer use.

“Work from these four activities will support identification of critical resource concerns for nutrient management to be addressed as part of an NRCS cost-share program or individual farmer investment in nutrient reduction strategies,” LaBarge said. “The data will support ongoing research efforts to better identify environments where practices will be cost effective in reducing nutrient movement to achieve water quality improvement goals.”

The second part of the project involves working with agricultural nutrient service providers who deliver nutrient recommendation, nutrient application services or both to farmers so they can achieve certification in the voluntary 4R Nutrient Stewardship Certification Program— which encourages farmers to use the right fertilizer source, at the right rate, at the right time, with the right placement.

The goal of this effort is to increase participation in the 4R program among agricultural retailers, independent crop consultants and others who provide nutrient recommendation and application service to farmers in Ohio, Michigan and Indiana, LaBarge said.

This project is part of the college’s ongoing efforts to improve Ohio’s water quality by educating growers on ways to use less fertilizer and keep more of it on the fields, while increasing crop yields and boosting farm profits. Under the comprehensive Field to Faucet program, Ohio State is working to ensure safe drinking water while maintaining an economically productive agricultural sector.

--- *Ohio’s Country Journal*

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Joint Hypoxia Task Force & Land Grant Universities SERA-46 Spring 2015 Meeting

The Hypoxia Task Force (HTF) held a spring 2015 meeting in Columbus, Ohio, on May 20 and 21 in conjunction with a meeting of SERA-46. In 2014, the Task Force and Mississippi River Basin (MRB) Land Grant Universities (LGU) signed a partnership agreement and the LGUs organized into SERA-46, a newly-formed group of extension and research experts and scientists ready to advance the important outreach and research needs of HTF states as they implement nutrient reduction strategies. In Columbus, the HTF and SERA-46 members had an opportunity to learn more about each other’s work by attending the others’ meetings as well as through a joint session to discuss initial joint efforts.

The HTF is a 12-state and federal partnership working voluntarily and collaboratively to reduce nutrient pollution in the MRB and hypoxia in the Gulf of Mexico. The HTF public meeting was available as a webcast and is available here [Link to https://water-meetings.tetratech.com/Hypoxia/StaticPublic/materialstf.htm]. This session featured two panels of presenters. The first was a panel discussing State Nutrient Stewardship Programs. Participants learned about a few varieties of these programs, all linked through the promotion of the 4Rs for nutrient management on farms. Participants learned about the Ohio AgriBusiness Association's voluntary 4R Nutrient Stewardship Certification Program for fertilizer retailer outlets and the State of Ohio's Nutrient Applicator Certification Training Program.

Members of the Hypoxia Task Force

- Arkansas Natural Resources Commission
- Illinois Department of Agriculture
- Indiana State Department of Agriculture
- Iowa Department of Agriculture and Land Stewardship
- Kentucky Department for Environmental Protection
- Louisiana Governor's Office of Coastal Activities
- Minnesota Pollution Control Agency
- Mississippi Department of Environmental Quality
- Missouri Department of Natural Resources
- Ohio Environmental Protection Agency
- Tennessee Department of Agriculture
- Wisconsin Department of Natural Resources
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture: Natural Resources and Environment
- U.S. Department of Agriculture: Research, Education, and Economics
- U.S. Department of Commerce: National Oceanic and Atmospheric Administration
- U.S. Department of the Interior: U.S. Geological Survey
- U.S. Environmental Protection Agency
- National Tribal Water Council

Additional Entities Participating on the HTF's Coordinating Committee:

- Ohio River Valley Water Sanitation Commission (ORSANCO)
- Lower Mississippi River Sub-Basin Committee

Partnerships between the Task Force and other organizations are key to meeting the HTF goals. The presenters on the second panel provided information on an array of existing partnerships, including a number of project scale examples funded through a variety of public, private and NGO sources. The HTF discussion centered on how to coordinate and scale these and similar projects in the HTF states to take a strategic approach to load reductions throughout the MARB.

A field trip for HTF members was hosted by the Ohio Environmental Protection Agency and The Ohio State University (OSU) following the public session. HTF members visited and learned about the Olentangy River Restoration Project, which includes removal of Columbus' Fifth Avenue dam and extensive restoration of the area upstream of the dam to help restore natural river function. The field trip also included a field demonstration of electrofishing methods and their application in Ohio's water quality program, and a walk through OSU's Olentangy River Wetland Research Park.

Prior to the HTF session, SERA-46 held a joint session with the HTF members to further discuss priorities for collaboration that will enable both parties to work together to advance research and extension activities. SERA-46 agreed to identify a number of short term and longer term deliverables on the list of priorities. The HTF looks forward to continuing the partnership with SERA-46 and to the valuable outcomes the partnership will bring.

The HTF meeting closed with an executive session focused on making progress in defining point and nonpoint source measures that states will use to track interim progress towards the overall HTF goal. The federal agencies and the states determined many opportunities to continue to collaborate and

support work in the HTF states, including ideas to further leverage strategic partnerships and support the work of SERA-46.

--- *Katie Flahive, US EPA & HTF Coordinating Committee Co-Chair*

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Soil Data Viewer 6.2 now available!

Soil Data Viewer is a tool built as an extension to ArcMap that allows a user to create soil-based thematic maps. The application can also be run independent of ArcMap, but output is then limited to a tabular report.

The soil survey attribute database associated with the spatial soil map is a complicated database with more than 50 tables. Soil Data Viewer provides users access to soil interpretations and soil properties while shielding them from the complexity of the soil database. Each soil map unit, typically a set of polygons, may contain multiple soil components that have different use and management. Soil Data Viewer makes it easy to compute a single value for a map unit and display results, relieving the user from the burden of querying the database, processing the data and linking to the spatial map.

Soil Data Viewer contains processing rules to enforce appropriate use of the data. This provides the user with a tool for quick geospatial analysis of soil data for use in resource assessment and management.

Download and Install Soil Data Viewer

Online User Guides

--- *From USDA*

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Upcoming: Healthy Soils for Healthy Waters Symposium

December 1-3, 2015

Memphis, TN

The December 2015 symposium will be part of the Nutrient Management and Edge of Field Monitoring (from the Great Lakes to the Gulf) Conference led by the University of Arkansas and the Soil & Water Conservation Society on behalf of the Hypoxia Task Force and SERA 46. The day-one HSHW symposium will focus on crop consultant and producer experiences with Nutrient Management & Soil Amendments, Quality No-Till, Cover Crops, and Water Management.

Days two and three will include region specific case studies in the Great Lakes and Mississippi River watersheds to further management practices to meet national water quality goals.

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