



Ohio River Basin Consortium for Research and Education

<http://www.orbcre.org>

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The Ohio River Basin Consortium for Research and Education (ORBCRE) was established in 1985 to provide a forum for academic, governmental and industrial entities with a stake in the Ohio River Basin. The commonality of purpose is to identify and assess gaps in knowledge, provide a research base to address issues, and to educate the public as to needs. Programs and results of investigations have led to overall improvement of the status of the Ohio River and the quality of life for Ohio River Basin residents.

The Ohio River Basin is a source of life for nearly 10% of the US population. The water of the Ohio River basin supports over 26 million people across 14 states—including the major US cities such as Charleston, Cincinnati, Columbus, Evansville, Indianapolis, Knoxville, Lexington, Louisville, Nashville, and Pittsburgh. The river and its major tributaries carry more than 10 times the commodities of the Great Lakes. The Ohio River Basin supports US energy needs: there are 49 clean hydroelectric power facilities, and it is the transport artery for three-fourths of the US bituminous coal reserves. Rivers cost-effectively transport enormous tonnages of not only coal to feed power plants and industries, but also grain to feed the world. Food from the Ohio River Basin's fertile farmlands support not only the basin's populations, but tons of grain are exported down river. Land in the Ohio River's watershed supports vital agriculture, essential industries, and important urban, suburban, and rural development. Populations and industries grew around the Ohio River and its tributaries because the water provided the requirements for drinking, industry, and transport. Unfortunately, after over 200 years of development, we still have a "science deficit" in our understanding of the Ohio River and its tributaries. The Ohio River Basin covers 204,000 square miles, which collects and transports a large percentage of the US's water resources. This region is rich in a resource that many people of the world envy—plentiful water. Ironically, we lack basic research on how large resource-rich river systems with multiple large tributaries, actually function. Although modern technologies and investments both public and private have fostered multiple uses of this resource, numerous new challenges have emerged.

If it is on the ground or in the air, it is in the water. Although states have cooperated to monitor the 981-mile main-stem of the Ohio River, many research needs are in the watersheds that feed into the Ohio. This forces us to manage symptoms rather than locating causes of water quality and quantity problems. The water level, ecological health, and water quality of the Ohio River is determined by activities in the watersheds of its tributaries. Sixty-nine major tributaries feed into the Ohio, each with a variety of sizes ranging from 41,000 square miles to less than 100. Each watershed has a unique set of landscapes and inputs that affect the waters as they move down to Ohio River. A basin-wide organization with connections to multiple users and managers, such as ORBCRE, would be best suited to help prioritize and communicate research needs and objectives.

Complexity at multiple scales: multi-state to local landowner. The broad mosaic of rural, urban, agricultural, industrial, and urban landscapes in the Ohio River Basin's watershed is in desperate need of research and education. Not only do different regions of the watershed have disparate water quality issues, there is little known about how the variety of land uses and pollutants integrate on their path downstream. Without a comprehensive and integrated research/education agenda for the Ohio River Basin watershed, it is impossible to tell where dollars would be best spent to alleviate water quality and quantity problems. The only way to optimize the limited local, state, and federal resources is to first invest in large-scale, multidisciplinary, integrated research to determine the needs, costs, and benefits of environmental changes. Just a couple of

decades ago, monitoring, modeling, and assessing large-scale changes in an enormous and complex watershed would have been cost-prohibitive or impossible. Technological advances in monitoring, geospatial information, and data management, can now be used to enhance our knowledge and understanding. This will improve the sustainable quality of life in the Ohio River Basin.

Basin-wide research and education. ORBCRE has brought together research needs based upon input from industries, state, local and federal government agencies and organizations, experts from top colleges and universities, and citizens groups. It is uniquely positioned and qualified to guide such a research agenda. We have the scholarly expertise, in conjunction with connections to with industry, non-profit groups, and government agencies and other stakeholders. To address these Basin-wide issues and to identify others, ORBCRE established a Research Priorities Council to identify the water-related environmental research needs for the Basin including priorities for execution.

Human Health. Impacts on the quality of life are inherent in all our research priorities. Exposure assessment to chronic contact with low levels of contamination; fate and transport of novel pollutants, such as waste pond sludge, are specific problems that need to be addressed.

Ecological. Ecological research examines the interactions between living things and their surrounding environment. We need to develop metrics to determine multiple impacts at multiple spatial scales--including specific biological indicators for the variety of ecosystems in the basin, and examining land-water interactions. Ecological studies of land use impacts can help determine how to best keep sediment and fertilizer on the land, and out of aquatic ecosystems.. Ecological studies can help determine how water flow, floods, and water quality can be managed.

Xenobiotics. Xenobiotics are chemical compounds, such as pesticides and polynuclear aromatic hydrocarbons, that are foreign to biological systems. These byproducts of mining, agriculture, industrialization, urbanization, and permitted and unpermitted discharges and spills have resulted in fish consumption advisories in the past. The fate and transport of these chemical in an between life, water, sediments, and air, is still not well understood.

Water Quality Indicators. Because the Ohio River Basin encompasses plains, mountains, knobs, and a variety of forest communities, no single indicator of water quality applicable across the basin. There is a need to develop comprehensive indicators that are concise and understandable to the public. Indicators are only as good as the quality of the measurements that support them. Currently, we lack good data. Investment in refining techniques for assessing sources of microbial contamination is essential to managing a major pollutant problem.

Socio-Economics and Management. The Ohio River Basin is under the management of a wide range of decision makers, stakeholders, and managers, each with differing values and objectives. Numerous units of state and regional government are involved in water resource use, land use, solid waste, and air quality. Decisions at all levels impact the physical, chemical, and biological character of the waterways. Evaluation of prior successes and integrated management will require research on public values and perceptions, goals, and spatial interrelationships. Recent advances in geographic information system (GIS) could allow us to better integrate and evaluate management options. This will result in more rapid spill responses and fish consumption advisories.

ORBCRE has identified these research needs based upon input from industries, state, local and federal government agencies and organizations, experts from top colleges and universities, and citizens groups. It is therefore uniquely positioned and qualified to guide a research agenda. We have the scholarly expertise, in conjunction with connections with industry, non-profit groups, and government agencies and other stakeholders. We can provide reviewers from our member institutions for research proposals that may be paired with monitoring activities undertaken by ORSANCO. Our annual meeting will be the forum for presentation of results, and discussion of ideas and future directions for sustainable management of the Ohio River Basin and its water resources.