

INDIANA'S WETLANDS: PAST, PRESENT, AND FUTURE

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This special issue of the *Proceedings of the Indiana Academy of Science* provides a record of the symposium on "Indiana's Wetlands: Past, Present, and Future." The program included seven speakers, who discussed the policy aspects, the geologic settings, the biochemistry of wetlands, the biological aspects of restored and artificial wetlands, riparian wetlands, and the biodiversity of wetlands.

The symposium was organized by the Science and Society Committee of the Indiana Academy of Science, which was chaired by Dr. David Sever of Saint Mary's College in Notre Dame, Indiana. This special event took place on the campus of Indiana University South Bend after the Fall Meeting of the Academy. On Friday, 4 November 1994, a reception was hosted by the Science and Society Committee at which William Beranek, Jr., gave a talk (co-authored by R.W. Van Frank) on the wetlands of Indiana. Six additional speakers gave their presentations during the morning and afternoon of Saturday, 5 November 1994.

Before the symposium, when Dr. Sever assigned me the task of arranging the program, I tried to gain a better perspective on the symposium's subject — wetlands. First, I queried the computer catalog of the library at Purdue University. I entered the keyword "wetlands" and immediately received a list of 332 entries, indicating the importance of the subject. Then, I assumed that hydrology would also be a subject of related interest, entered the keyword "hydrology," and was rewarded with a list of 799 entries, again indicating the importance of this related water field. Faced with such a large number of entries, I felt the immediate need to focus on a narrower subject and tested the entry "wetland hydrology," which, to my surprise, produced no entries. I concluded that, although there are many books and publications with the words "wetlands" or "hydrology" in their titles, very few books or publications combine these two words in their titles. However, chapters on the hydrology of wetlands occur in many of these books (e.g., Mitsch and Gosselink (1993) or Hammer (1989)).

Using these keywords, I also searched for texts at an Indianapolis bookstore and obtained the title of a very interesting book by Gilman (1994) on wetland hydrology, that was published by the Institute of Hydrology in Wallingford, England. Two facts then became clear. First, the British and American vocabularies are different. As pointed out by Mitsch and Gosselink (1993), the words bog, fen, marsh, etc., have slightly different definitions in England and in the United States. Second, the reason for the lack of entries on "wetland hydrology" is that the accurate measurement of the hydrologic processes in wetlands is very difficult and, as a result, usually imprecise. A simple measurement, such as water level, may be unreliable because of the shifts of the gauge datum. The imprecision results from ground movements in response to seasonal variation in the amount of water stored in the peat. New staff gauges for

measuring water level and special lysimeters to estimate evapotranspiration have been proposed by the Institute of Hydrology in Wallingford.

Having discovered that wetland hydrology is an excellent research topic but, perhaps, not an ideal symposium topic, I decided to approach the origin of wetlands from a geologic point of view with some emphasis on the description of hydrogeology. With this in mind, two presenters were selected to discuss the wetlands associated with glaciation and coastal processes. An understanding of the biogeochemistry of wetlands is also essential. Three presenters were asked to discuss the remediation of stream quality, the biology of constructed and restored wetlands, and riparian wetlands. Finally, I felt it was necessary to address the problem of endangered species. How is Indiana responding to the unprecedented loss of wildlife? Can a State biodiversity strategy be implemented? These questions are also discussed in the present volume.

The first paper, entitled "Wetlands: More or Less?," was authored by William Beranek, President of the Indiana Environmental Institute, Inc., of Indianapolis, who indicated the need for scientific clarity in the use of the word "wetland." Several different types of wetlands exist (e.g., lacustrine and riverine wetlands), and several different definitions of these wetlands have been proposed by Federal agencies. Land use policies must recognize the five separate groups that have a stake in wetlands: the landowner, the neighbor, local government, the environmentalists, and numerous government regulatory agencies. Good science must form the basis of an intelligent wetlands' policy for Indiana.

Two strikingly different geologic settings for wetlands were examined; those associated with glaciation, and those associated with nearshore processes. The geologic setting of the wetlands of northwestern Allen County and the Indiana Dunes were discussed by Anthony H. Fleming and Todd A. Thompson, respectively. Both researchers are affiliated with the Indiana Geological Survey. The topography and resultant hydrology of northwestern Allen County is a result of the interaction between the Saginaw and Erie Lobes of Late Wisconsin glaciation. Deglaciation in this area produced a knob-and-kettle topography with internally drained basins, resulting in bogs of various sizes. Peatlands are found in the regional groundwater recharge areas and are important to the quantity and quality of the underlying groundwater. In the Indiana Dunes, wetlands form as a result of nearshore eolian as well as overwash transport and depositional processes. The most important wetland in the Indiana Dunes is the Great Marsh. This wetland developed in a basin created inside the Tolston Beach by offshore beach ridges. The change from lagoon to isolated marl pools to peatland was in large part controlled by the falling water levels in Lake Michigan during the last 5,500 years.

Kimberly Gray (then of Notre Dame University) presented a paper on the biogeochemistry of inland and coastal wetlands. She discussed the benefits of preserving these ecosystems and the possible use of wetlands to control surface water quality. The Santa Anna River in California was used to illustrate her points. Only her abstract is published here.

Richard P. Reaves and Melody Croteau-Hartman (then of Purdue University) expanded on this topic in their paper on "Biological Aspects of Restored and Created Wetlands." Flood control, stormwater retention, mitigation of wetland

loss, municipal, industrial, and agricultural wastewater treatment, mine reclamation, and aesthetics are all reasons for creating wetlands. Created wetlands can be free systems that function as large trickling filters. The floral and faunal characteristics of created and restored wetlands were discussed and compared to their natural counterparts.

In his paper on "The Status of Riparian Wetlands in West-Central Indiana," James Gammon of DePauw University discussed the results of his surveys (in 1983 and 1993-1994) of the riparian wetlands along the Wabash River and three of its tributaries. Included in the survey was the Wabash River between Delphi and Merom, Indiana, as well as Big Raccoon, Big Walnut, and Deer Creeks. These studies indicated that significant portions of the riparian border of the Wabash River and its tributaries are bare and eroding. The riparian buffer must be reestablished to maintain the river ecosystem. Dr. Gammon concluded that "the well-being of the Wabash River ecosystem is highly dependent on the environmental health of its tributaries. The riparian wetlands of the Wabash River and three of its tributaries are currently incapable of providing adequate protection from agricultural nonpoint source pollution."

Forest Clark of the U.S. Fish and Wildlife Service in Bloomington, Indiana, discussed "Biodiversity, Wetlands, and the Indiana GAP Analysis Project." The U.S. Fish and Wildlife Service is concerned about the extinction of natural species and recognizes the need to establish a State biodiversity framework and to implement a State biodiversity strategy. To this end, a new approach, called GAP analysis, is under development by the U.S. Fish and Wildlife Service to aid in the assessment of biodiversity on a continental scale. GAP analysis should be a useful tool for evaluating, conserving, and restoring biodiversity in Indiana.

The symposium ended with a round-table discussion. This forum provided for a very interactive exchange of ideas, culminating with the proposal to publish the symposium as a separate volume of the *Proceedings* and to make it available to high schools and libraries in Indiana.

As preparations for publishing the symposium were underway, an additional paper on a related topic was brought to my attention. This paper, "A Record of the Natural History and Anthropogenic Senescence of an Indiana Tamarack Bog" by A.L. Swinehart and G.D. Starks, has been included as the final paper in the Volume.

LITERATURE CITED

- Gilman, K. 1994. Hydrology and wetland conservation. Wiley, New York, 101 pp.
Hammer, D.A. 1989. Constructed wetlands for wastewater treatment, municipal, industrial, and agricultural. Lewis, Chelsea, Michigan, 831 pp.
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