CHAPTER 7

Momence Wetland: Influence on Sediment and Water

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Many wetlands in humid and subhumid areas of the world are associated with riverine environments. Depending upon their size, wetlands play a vital role in modifying the sediment load and flow hydrographs of adjoining rivers. Research conducted on the Momence wetland in the central United States has shown that the wetland maintains maximum flow during low flow conditions in the downstream reaches of the river, and that it decreases the sediment discharge. Studies on two major tributaries of the river basin—one draining a wetland system and the other draining a similar watershed with a slightly different geological setting—were utilized to determine the influence of wetlands on the flow and sediment load of the river.

Introduction

Among the many hydrological influences of riverine wetlands, their effects on water and sediment discharge are most significant. In general, wetlands are expected to reduce flood peaks and to increase the low flows of streams that pass through them. Wetlands also reduce sediment discharge by entrapment of suspended material.

The influence of a riverine wetland on the water and sediment discharge of a stream was investigated along the Kankakee River in Illinois in the United States. The Kankakee River basin is an important natural resource for two states, Illinois and Indiana; and both states have devoted a significant amount of effort to the management of the resource. Several recent investigations and reports have been prepared that deal with various characteristics of this river, such as hydraulics and sediment transport (Bhowmik et al., 1980; Bhowmik and Bogner, 1981; U.S. Army Corps of Engineers, 1982a; Demissie et al., 1983; Bhowmik and Demissie, 1984), geology (Gross and Berg, 1981), and aquatic habitats (Brigham et al., 1980; U.S. Army Corps of Engineers, 1982b). Numerous studies carried out on the basin prior to 1980 have been reviewed and discussed extensively in the references noted above.

Background

The drainage basin of the Kankakee River is shown in Fig. 7.1. The gaging stations where water and/or sediment data have been collected are also shown on the map. The total drainage area of the Kankakee River, upstream of its confluence with the Des Plaines River, is 13,370 km². The drainage area upstream of the Wilmington gage is 13,338 km², which represents 99.7% of this area. For all practical purposes, therefore, water discharge and sediment records at the Wilmington gage reflect the entire upper watershed.

Just upstream of the City of Kankakee, the Kankakee River splits in two, with the main stem of the Kankakee River to the north and the Iroquois River to the south. The drainage area upstream of the junction of the Kankakee with the Iroquois is divided almost equally between the Iroquois and Kankakee Rivers. The drainage areas at the gages on the two main branches just upstream of their confluence are 5940 km² for the Kankakee River at Momence and 5416 km² for the Iroquois River near Chebanse. The division of the drainage area between the Kankakee and Iroquois Rivers is indicated by the drainage boundary line in Fig. 7.1.

The drainage area of the Kankakee River basin in
Indiana is approximately 8090 km². This includes 569 km² on Singleton Ditch, 4971 km² on the main Kankakee River, and at least 1709 km² on the Iroquois River. The drainage area in Indiana is therefore approximately 61% of the total Kankakee River drainage area of 13,370 km².

Major differences between the upper Kankakee and Iroquois Rivers are:

1. The presence of wetlands along the upper Kankakee River, while there are none or very few along the Iroquois River. The wetlands along the upper Kankakee River are the remnants of the Grand Marsh, which formerly had some 16,000 ha of wetland before agricultural development occurred in the area (about 65 years ago). The present Moment wetland extends about 35–40 km between Moment and Shelby in Indiana (Figs. 7.1 and 7.2).

2. Different surficial geology of the two watersheds. The upper Kankakee River basin is covered mostly by sand, while the Iroquois River basin is covered by clayey silt and fine-textured soils. These two factors have created significantly different stream discharge and sediment transport characteristics in the two river basins, even though the drainage areas, rainfall, and land use patterns are almost identical.

Stream Flow

The flow duration curves for the main Kankakee River near Wilmington, for the Kankakee River at Momence, and for the Iroquois River near Chebanse are shown in Fig. 7.3. The flow duration curve for the Kankakee River near Wilmington represents the whole Kankakee River basin. The flow duration curve for the Kankakee River near Wilmington is a summation of the flow duration curves of the Kankakee River at Momence and the Iroquois River near Chebanse, plus a small contribution from the drainage area downstream of these gaging stations.