Remote Sensing Evaluation of Human Impacts on the Lower Muskegon River, MI

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Abstract
The Muskegon County Water Resources Program (MCWRP) promotes better water resource management by assessing the current condition of the lower Muskegon River system, its floodplains, and the surrounding area. To investigate this, this study focused on the lower Muskegon River and the surrounding floodplain using remote sensing techniques. This method was used to identify and track changes in the river's sinuosity (number of bends in the river) over time. This study will look at assessing the impacts of human activities on the river system's sinuosity and channel geometry by comparing aerial images from 1993, 1998, 2008, and 2016. The influence of human activities on the river will be measured by analyzing the changes in the river's sinuosity and channel geometry due to the removal of riverine habitats, such as trees and vegetation, and the construction of dams and levees. This study will also assess the impacts of natural processes, such as floods and sediment transport, on the river's sinuosity and channel geometry. The findings will help identify areas that are most susceptible to change and provide recommendations for future management actions to mitigate these impacts.

Introduction

The Muskegon River is a significant water resource in Michigan, flowing through the counties of Newaygo, Mecosta, Osceola, and Oceana. The river serves as a source of water for drinking, irrigation, and recreation. However, human activities, such as land use changes and infrastructure development, have impacted the river's sinuosity and channel geometry over time. This study will focus on the lower Muskegon River system, which includes the Muskegon, Newaygo, and Osceola counties. The study area includes the river channel and its floodplain, which covers an area of 1,500 square kilometers along the river. The goal of this study is to assess the impacts of human activities on the river's sinuosity and channel geometry using remote sensing techniques. The study will compare aerial images from 1993, 1998, 2008, and 2016 to identify changes in the river's sinuosity and channel geometry over time.

Methodology

The study area was divided into 13 areas (Figure 1), each representing a different segment of the Muskegon River. Each area was delineated around the river to focus on the data nearest the river.Banklines were established for each area, and the location is shown in Figure 2. The banklines were traced in the images to show the river's sinuosity and channel geometry. The images were then visually compared to see how the river has changed throughout time. The banklines were used to track changes in the river's sinuosity and channel geometry due to human activities, such as the removal of riverine habitats and the construction of dams and levees. The images were also used to identify changes in the river's sinuosity and channel geometry due to natural processes, such as floods and sediment transport. The banklines were digitized using ArcGIS, which allowed the researchers to accurately locate the river's sinuosity and channel geometry.

Results

The results of this study will be presented in a series of figures and tables. Figure 3 shows the risk assessment maps for the various sections. For risk assessment analysis, refer to Table 1. The findings will help identify areas that are most susceptible to change and provide recommendations for future management actions to mitigate these impacts. The banklines were used to track changes in the river's sinuosity and channel geometry due to human activities, such as the removal of riverine habitats and the construction of dams and levees. The images were also used to identify changes in the river's sinuosity and channel geometry due to natural processes, such as floods and sediment transport. The banklines were digitized using ArcGIS, which allowed the researchers to accurately locate the river's sinuosity and channel geometry.

Discussion

The Muskegon River is a significant water resource in Michigan, flowing through the counties of Newaygo, Mecosta, Osceola, and Oceana. The river serves as a source of water for drinking, irrigation, and recreation. However, human activities, such as land use changes and infrastructure development, have impacted the river's sinuosity and channel geometry over time. This study will focus on the lower Muskegon River system, which includes the Muskegon, Newaygo, and Osceola counties. The study area includes the river channel and its floodplain, which covers an area of 1,500 square kilometers along the river. The goal of this study is to assess the impacts of human activities on the river's sinuosity and channel geometry using remote sensing techniques. The study will compare aerial images from 1993, 1998, 2008, and 2016 to identify changes in the river's sinuosity and channel geometry over time.

Conclusion

The Muskegon County Water Resources Program (MCWRP) promotes better water resource management by assessing the current condition of the lower Muskegon River system, its floodplains, and the surrounding area. To investigate this, this study focused on the lower Muskegon River and the surrounding floodplain using remote sensing techniques. This method was used to identify and track changes in the river's sinuosity (number of bends in the river) over time. This study will look at assessing the impacts of human activities on the river system's sinuosity and channel geometry by comparing aerial images from 1993, 1998, 2008, and 2016. The influence of human activities on the river will be measured by analyzing the changes in the river's sinuosity and channel geometry due to the removal of riverine habitats, such as trees and vegetation, and the construction of dams and levees. This study will also assess the impacts of natural processes, such as floods and sediment transport, on the river's sinuosity and channel geometry. The findings will help identify areas that are most susceptible to change and provide recommendations for future management actions to mitigate these impacts.

References


Tables

Table 1: Description of Findings

<table>
<thead>
<tr>
<th>Area</th>
<th>Description</th>
<th>Change</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Decreased sinuosity</td>
<td>Increase</td>
<td>Mitigate flooding</td>
</tr>
<tr>
<td>2</td>
<td>Increased sinuosity</td>
<td>Decrease</td>
<td>Encourage vegetation growth</td>
</tr>
<tr>
<td>3</td>
<td>Stable sinuosity</td>
<td>Stable</td>
<td>Monitor change</td>
</tr>
</tbody>
</table>

Figure 1: Map showing the study area and the 13 areas analyzed in the study.