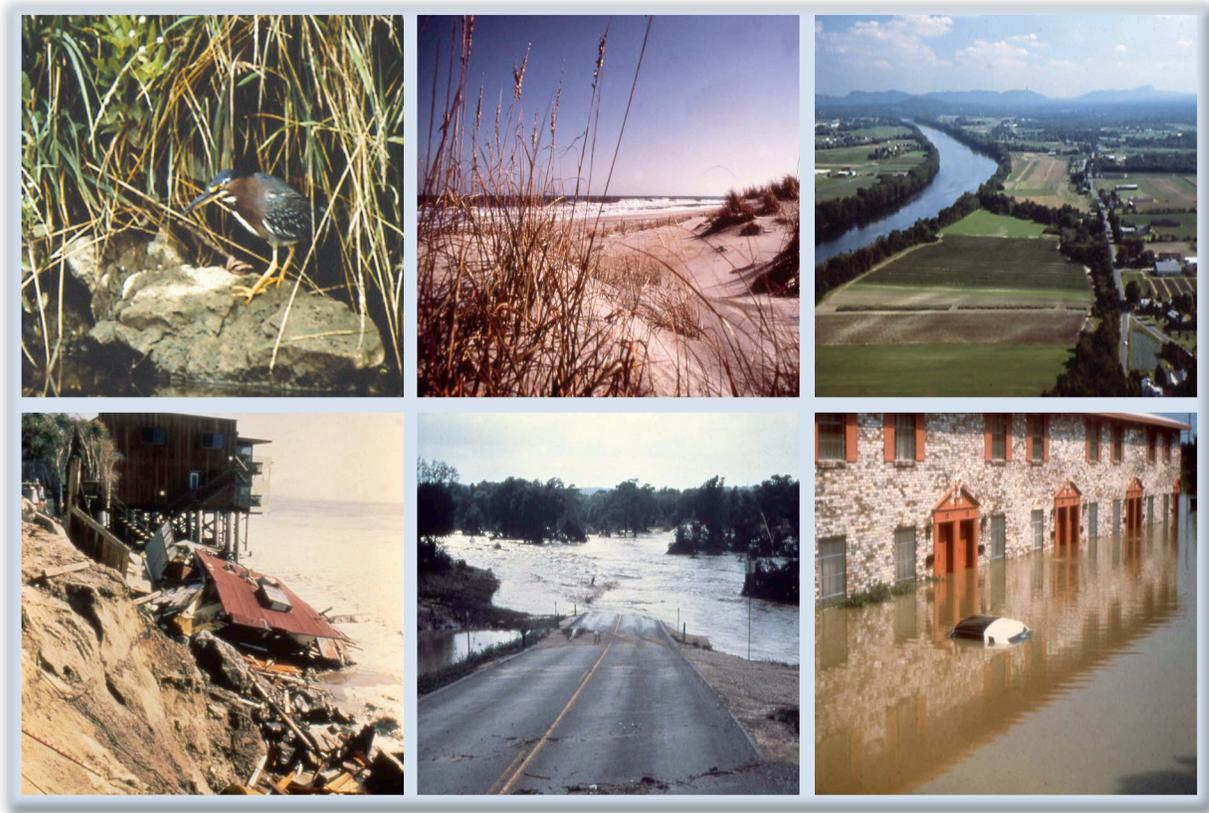


# FLOODPLAIN MANAGEMENT

## *PRINCIPLES AND CURRENT PRACTICES*



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## **Acknowledgments**

This course contains materials and illustrations from a number of sources. Every effort has been made to credit sources, either in the text or in footnotes. However, the present course has evolved over a 25-year period from the author's lecture notes and class handouts, his professional files, and from a variety of reference materials for student reading assignments. In this evolutionary process, material sources and illustrations may not have been adequately documented and acknowledged. Most sources were published federal documents. These are not copyrighted. The author is unaware of the use of any copyrighted material without written permission. Please call to his attention the use of any materials that have not been properly credited or that have been inappropriately used.

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Finally, the author gratefully acknowledges and expresses his deep appreciation for the immense contributions of Patricia Wardell Reed of Reed Design in creating this document in its present format. Without her considerable talents, this could not have been readily accomplished.

## **Note to Users**

This course's audience is typically graduate students in the fields of civil engineering and planning, although it has been, on occasion, modified for geography majors. This course is designed to be taught in twenty classroom sessions, each of 2 ½ hours duration. The course text is comprised of eighteen chapters, and with two exceptions, as shown in the subsequent syllabus, each chapter is covered in a classroom session.

### **Students**

This document is designed to serve **as is** for a course text on this subject matter, but may be used in part or otherwise modified by the instructor. It has been extensively tested, in its present format, within the university classroom setting by the author.

### **Instructors**

This course had been developed over a 25-year period by the author in serving as a classroom instructor. It has not undergone editorial or peer review. It represents one view of materials that should be presented to students about the subject for use in their post-graduate careers. Treatment of geological, meteorological, ecological, and stream mechanical processes in shaping watercourses, floodplains and watersheds, is not provided. Viewed as specialized areas within these sciences, they are covered in other academic courses.

The instructor is encouraged to arrange for a class-time field trip to several local streams to view and note floodplain development and use in order to allow the students an “on the ground” feel for the course subject matter. This is typically accomplished in the second classroom session, after a course introduction and student instruction on how to prepare for the field trip. However, it can occur at any point in the course, according to preferences and circumstances.

There are a number of references to “Tennessee” documents, websites, and examples. Users in other geographic locations are encouraged to locate and use comparable materials.

The homework assignment at the end of Chapter 6, involving the Kinston, NC, Flood Insurance Study report and maps, can be modified, utilizing other community Flood Insurance Studies. This will allow development of a similar exercise to test comprehension of the data contained in or on these reports and maps.

In addition to homework assignments to reinforce the learning process from classroom lectures, a mid-term exam is given to determine the degree of student mastery of the subject matter. Finally, to apply what is learned in the course to “real life” situations, students work together on teams (usually 3-4 members) to develop an actual management plan for a local floodplain. The plan should be designed to achieve the goals of flood loss reduction and maintenance of natural resources and functions. The plan is presented in the classroom during the last course session, with invited community professional staff in attendance. This is felt to be a better closure to the course than a final written examination of student comprehension of the subject material. In their subsequent professional practices, students may have the need to develop similar plans.

The following can be provided to the instructor, upon request:

- Suggested lecture discussion points for each chapter to evaluate and enhance the student's understanding of the previously read (hopefully) material.
- A suggested mid-term exam.
- A suggested final exam in the event the instructor elects not to have students prepare a local floodplain management plan.

## About the Author

James M. Wright has over four decades of involvement in programs and activities addressing floodplain management issues and practices. He has parlayed his own knowledge and experiences in this field of endeavor to develop a university course designed to introduce students to the many nuances of “floodplain management.” Asked, around 1980, by the Department of Civil and Environmental Engineering at the University of Tennessee to develop and teach such a course to its graduate students, it has morphed into its present form. Typically offered on a bi-annual basis through 2005, it is still a “work in progress” as the author struggles with assessing what the student should know about floodplain management principles and practices in their post-graduate careers.

Wright is a licensed professional engineer in three states and a Fellow, American Society of Civil Engineers. He holds an undergraduate degree in civil engineering and a Master of Science degree in water resources engineering, with additional postgraduate study in water resources. He was initially employed as a water resources engineer with the Tennessee Valley Authority (TVA), principally involved in studies examining local flood damage prevention planning. He subsequently helped to carry out Wisconsin’s floodplain management program and then developed and administered Minnesota’s state program for nearly a decade. He returned to TVA where he later became manager of its floodplain management program. He left the agency in the mid-1990s to pursue other career interests.

During his three decades of federal and state service, he served on numerous national task forces, panels, and technical committees established to develop policies and procedures for managing floodplains to reduce economic losses and losses of natural and beneficial resources. He has authored several dozen papers in this field, including numerous invited papers and has prepared a number of works for publication in magazines, reports, and books. Additionally, he managed development of “The Floodplain Management Plan for the Commonwealth of Virginia.” He also served as project manager for a federal interagency study of floodplain management in the United States, including publication of an assessment report.

He has received several national awards for his work in dealing with the nation’s flood problems. Since his retirement from federal service, he has served, on a number of occasions, as a disaster assistance reservist with the Federal Emergency Management Agency (FEMA) in a variety of roles. In this capacity he was the principal author of a floodplain management home-study course designed for North Carolina community officials. In private practice he developed a similar course for Florida officials and has provided other specialized services to state and federal agencies and national organizations.

In the absence of a known academic text pertaining to floodplain management, he is endeavoring to develop one version. As stated above, the present document is a “work in progress” in that undertaking.

# Syllabus

## Course Objectives

The purpose of the course is to provide the student with an understanding of the principles and current practices for managing floodplains, and other flood hazard areas, to bring about flood-loss reduction and natural resource protection, emphasizing multi-disciplinary approaches to management.

## Course Schedule

<u>#</u>	<u>Topic</u>
1	Situation assessment, issues, identification, resources and values, goals, strategies, tools, attitudes, statistical data; floodplain management as part of water resources management; course requirements and conduct.
2	Field trip to visit several local floodplain areas
3	Historical perspective; types of floods and floodplains; comparison and contrast of floods and stormwater drainage.
4	Defining floodplain boundaries; Risk assessment: hydrologic computational techniques.
5	Risk assessment: delineation of hazard areas; nature of hazards; floodways.
6	Utilizing information from flood hazard studies; discussion of floodplain management plan.
7	Flood damage reduction strategies and tools.
8	Flood damage reduction strategies and tools (continued).
9	Natural functions and resources of floodplains and their value.
10	Strategies and tools to preserve and/or restore natural and beneficial floodplain resources.
11	The National Flood Insurance Program.
12	Section 404 of P.L. 92-500 (Clean Water Act), other legislation: Executive Orders 11988 & 11990–Floodplain Management and Protection of Wetlands.
13	Legal, liability, and ethical issues, Quiz.
14	Regulatory and Design Standards.
15	River corridor and watershed management; presentation of outline of team floodplain management plan.
16	Floodplain management regulations.
17	Floodplain management regulations (continued), administration; other commonly applied measures: flood warning, acquisition.
18	Structural adjustments to flood risk.
19	Developing and implementing a local floodplain management program; incorporating measures in class plan
20	Presentation of community floodplain management plan to class; equipping the next generation.

## **Floodplain Management Plan**

The class will be divided into teams of three-four students (as enrollment permits). Each team will prepare and submit a comprehensive floodplain management plan for a selected stream reach or for an entire community.

## **Course Grading**

Homework – 30%

Quiz – 20%

Team plan – 50%

## **List of references:**

1. *Floodplain Management in the United States: An Assessment Report*, Federal Interagency Floodplain Management Task Force, 1992
2. *The Natural and Beneficial Functions of Floodplains: Reducing Flood Losses by Protecting and Restoring the Floodplain Environment – A Report to Congress by the Task Force on the Natural and Beneficial Functions of the Floodplain*, 2002
3. *Protecting Floodplain Resources: A Guide for Communities*, FEMA, Sept. 1995.
4. *Floods, Floodplains and Folks*, National Park Service, 1996.
5. *Questions and Answers on the National Flood Insurance Program*, FEMA, 2004.
6. *Flood Insurance Study*, City of Kinston, NC, 1981.
7. *Common Legal Questions Pertaining to the Use of Floodplains and Wetlands*, Association of State Floodplain Managers, 1984.
8. *Common Legal Questions About Floodplain Regulations in the Courts*, Association of State Floodplain Managers, 2003
9. *Flood Proofing Systems and Techniques: Examples of flood proofed structures in the United States*, U.S. Army Corps of Engineers, 1987.
10. *Protecting Nontidal Wetlands*, American Planning Association, Planning Advisory Service Report No. 412/413, Dec. 1988.
11. *Get Ready for Floods*, Children's Television Workshop, 1990.
12. *Urban Hydrology for Watersheds*, Technical Release No. 55, USDA-SCS, 1986.

## Introduction

The course materials address floods, which are one of six principal natural hazards occurring in the United States. The others are:

- Extreme winds (tornadoes, hurricanes)
- Ground failures (landslides, mudflows, sinks, subsidence)
- Earthquakes (occasionally creating tsunamis in coastal areas)
- Volcanic eruptions
- Extreme droughts

The course purpose is to provide, through an interdisciplinary approach, an understanding and working knowledge of various programs, practices, strategies and tools for managing flood-prone lands within stream corridors and coastal zones in order to achieve flood-loss reduction and maintenance of natural and beneficial resources and resource values.

Managing floodplains is but part of a broader water and land resource management issue, involving various governmental levels and the private sector, various disciplines, and seeking to achieve multiple objectives.

Although initially offered in the University of Tennessee's Department of Civil and Environmental Engineering as a graduate-level course, its focus is not on engineering design or treatment. Solutions to problems and situations will not be provided, nor will formulas be available for problem solving. Instead the overall situation or "puzzle" will be provided and "pieces" to arrive at a **solution** identified.

Because of the pervasive extent of flood-related problems in the United States, affecting an estimated seven percent of the nation's total land area, almost every professional discipline will undoubtedly address, or be impacted by, the likelihood and consequences of floods. The course is designed, through the knowledge and experience of the instructor, to help the student prepare for the variety of situations possibly to be encountered in his/her professional career.

This is the only known course, addressing management approaches to flood-prone areas, that has been offered at an academic institution in the United States.