

ENVR 104

Water Resource Management module

Dr. Greg Characklis

Rosenau Rm. 112

Email: charack@email.unc.edu

Phone: (919) 843-5545

Background

Water scarcity has become a reality in a growing number of regions throughout the world as increasing demands associated with population growth and economic development have strained finite water resources. Growing environmental concerns over the maintenance of instream flows and the impacts of large-scale water resource development projects (e.g., dams) have served to further limit, and in some cases even reduce, the volume of available supplies. In addition, research suggests that global climate change may increase hydrologic variability (e.g. more frequent droughts) making the maintenance of water supply reliability even more challenging. This combination of factors has made meeting water demands more difficult, and a growing number of regions are seeking water resource strategies that will allow them to meet future demands within budgetary and regulatory constraints. The development of such solutions requires the use of tools from both engineering and economics, as well as an understanding of the related legal and political institutions.

Objectives

This module is intended to provide students with a basic introduction to some of the qualitative issues and quantitative methods that have relevance in the development of regional water resource management strategies. The student will gain some (very limited) exposure to the concepts and optimization techniques that can be used in making decisions related to the design of new infrastructure or the operation of existing facilities.

Tasks

1. Review Lecture 1, both the notes and accompanying slides.
2. Read “The Changing Water Paradigm: A Look at Twenty-first Century Water Resources Development“, by Peter Gleick and respond to the questions provided.
3. Read Chapters 1 and 2 in *Civil and Environmental Systems Engineering* by Revelle Whitlach and Wright (you can find it in the library or make photocopies from my copy). If you have had a linear programming course, you may be able to skip this step.
4. Download a trial version of the LINDO linear programming package from www.lindo.com and replicate the simple Homewood Masonry problem using the problem formulation provided (see “LINDO Homewood Exmpl.pdf”).
5. Read Chapter 1 “Water Resources: Surface Water Systems” in *Design and Operation of Civil and Environmental Engineering Systems* by Revelle and McGarity (you can find it in the library or make photocopies from my copy).
6. Review “Reservoir Operation Problem.pdf” and develop a simple linear program in LINDO (or the software package of your choice) to solve it. Provide a copy of the program and a brief (1 pg, single space) discussion of your results.