Rutgers University
Department of Geography

Advanced Physical Geography 450:403-505

Drinking Water: Source, Distribution, and Use

Fall, 2005 R.M. Hordon

Introduction

It takes a very unusual event, such as a major blizzard, to close the university, yet Rutgers was closed on September 16 and 17, 1999 because of flooding problems in central New Jersey generated by the torrential rains of Tropical Storm Floyd (it was Hurricane Floyd before it came to New Jersey). The following week, water restrictions were imposed in selected buildings on the Busch and Livingston campuses because of low water pressure caused by the flooding of the main water treatment plant of the Elizabethtown Water Company in Somerset County. At the same time that the Busch and Livingston campuses faced restrictions, water was readily available on the College Avenue and Douglass/Cook campuses.

Why the differences between the campuses? Where do we get our drinking water? It turns out that New Jersey has one of the nation's most complicated networks for water diversion, storage, and distribution. The water purveyors can be public (New Brunswick Water Department), private (Elizabethtown Water Company), or quasi-public (Washington Township Municipal Utilities Authority in Morris County). The source of water can be surface (Raritan River), ground (such as the wellfields for Ridgewood in Bergen County), or mixed (South Brunswick Township in Middlesex County).

The focus of the seminar will be the examination of the historical use of water for public purposes, starting with the Roman aqueducts; the spread of shallow (and often contaminated) wells, the explosive growth in bottled water usage, and the development of the newest water treatment plants which both chlorinate and ozonate the water.

Field trips to major waterways and reservoirs will form an integral part of the seminar. Rutgers-New Brunswick has an ideal location - between the Coastal Plain of South Jersey, which has large ground water reserves, and the hilly parts of central and northern New Jersey, which have the bulk of the state's reservoirs. These physical features greatly facilitate field trips, which augment the discussion for the remainder of the semester.

Other than a hoped-for curiosity in the subject and some experience in drinking water, no particular background in the subject matter is required or assumed. As a final note, water use in New Jersey will be compared to other states and countries in order to consider their similarities and

differences, an especially interesting area when cultural factors are considered.

Outline

About 1/3 of the course (in September and October) will be spent on field trips. All you will need for these trips is something to take notes on as material covered in the field forms part of the one exam that will be given later in the semester. Obviously, you may also want to bring along clothing appropriate for the weather. Our departmental budget does not include clothing handouts.

Please avoid tardiness, as we only have a limited time to wander around the countryside. The later we leave, the later we come back. Note that the hours of daylight get shorter in the fall.

A field trip fee of $7.00 for the semester will be assessed for all students to cover travel expenses.

The next third of the course (approximately) will consist of lectures and discussion. Class participation is encouraged and will form part of the final grade. Attendance will be taken at each class and field trip and will also form part of the final grade.

The text for the class is Water Resources by Thomas V. Cech. Copies will be available at the Livingston Bookstore. Additional reading lists and handouts will be distributed later in the semester or placed on reserve in the Kilmer Library.

There will be one exam in November that will cover the material discussed in the field trips, lectures, and the readings. You will need a # 2 pencil, an eraser, and a calculator for the exam.

The remaining weeks of the semester will be devoted to oral presentations. Details about this joyous period are covered later on in this handout.

In order to maintain your typing talents and exercise your skills in written communication, you will have a wondrous opportunity to do so in the form of a term paper. Even better, the topic selection is entirely up to you as long as it broadly conforms to topics that fit within the subject matter of the course.

The term paper is due on or before the last day of class (Wednesday, Dec.7, 2005). Incomplete grades are given for late papers, so the sooner you start in the semester, the sooner you will finish (hopefully). Details about the term paper requirements are covered later on in this handout.

List of Major Topics

* Physiographic Provinces of New Jersey and Surrounding States

* Geohydrologic Characteristics of the Region

* Hydrologic Cycle

* Hydrologic Processes: Surface and Groundwater

* Water Use and Demand

* Bottled Water (is it worth the extra expense?)

* Water Treatment

* Water Quality

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Office Hours

Tuesday/Thursday, 1:00-2:30, Lucy Stone B-240, Livingston

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Phone Numbers; e-mail

1) Office: 732-445-3107 (leave a message any time with a slow, clear rendition of your phone number and area code). New Jersey now has 9 area codes; please include one if you want the pleasure of a return call.

2) Office fax: 732-445- 0006

3) e-mail: hordon@rci.rutgers.edu

4) Please, no calls to home.

Term Paper

One term paper will be required for this course. It can be on any topic relating to drinking water, water supply planning issues, water demand, water conservation, or water quality management. Feel free to discuss your proposed topic(s) at any time during the semester. Specific guidelines are as follows:

Date due: Wednesday, Dec. 7, 2005 (last day of class).

Text length: a maximum of 10 pages (excluding the cover sheet).

Tables, graphs, and maps: optional and recommended; up to 5 pages; should be paginated and referred to in the text.

Maximum length: 15 pages (includes text, tables, maps, and figures; excludes the cover sheet).

Spacing: double-spaced (excluding References Cited which can be spaced 1.0-1.2 lines).

Footnotes: avoid if possible.

Font type: your pleasure, but be reasonable (don't overdo it on **bold or *italics***).

Font size: 12-point (14 point for the cover sheet).

Margins: 1-inch on all sides.

Pagination: required on all pages except the cover sheet, including text, tables, graphs, and maps.

References in the text: refer to the references as follows:

1) (Smith, 1995);

2) (Jones, 1991; Harris, 1998).

References cited: should be at the end of the paper with spacing of 1.0-1.2 lines.

Cover page: required; is not paginated; does not count as part of your minimum length; should include the name and number of the course, your name, and the date (see sample page).

(Sample Cover Sheet: 14 point type)

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(Sample Title) Water Use in New Jersey

Name:

Date:

Oral Presentation

Each student will make an oral presentation based on their term paper during the last weeks of the semester. The details are as follows:

Length: 15 minutes (will be timed).

Visuals: Any type of illustrative material would be fine, such as overheads of maps and figures from your term paper. Be careful of using tables from your term paper as overheads as the print size would probably be too small.

In lieu of overheads, you may want to distribute copies of selected visuals to the class. It is your decision, but the important thing to remember is that visuals enhance your presentation.

Notes: Avoid reading your paper out loud; rather, use notes and cue cards.

Blackboard: feel free to use it whenever necessary.

Discussion: Each presentation will be followed by class discussion of the topic covered. It is expected

that each student will participate in the discussion.

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Exam

There will be one written exam on November 22, 2005 (note that this is a Tuesday) just prior to the Thanksgiving break. The exam will cover the material discussed during the field trips (heavy), class lectures (heavy), and from the assigned readings (see the individual chapters below).

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Final Grade

The final grade for the semester will be based on the exam, term paper, oral presentation, and class participation and discussion.

Reading List: Part I

Cech, Thomas V. Principles of Water Resources. 2nd ed., Wiley, 2005, ISBN # 0-471-48475-X. This book is available at the Livingston Bookstore.

Ch. 1: Historical Perspective of Water Use and Development (medium)

Ch. 2: The Hydrologic Cycle (medium)

Ch. 3: Surface Water Hydrology (medium)

Ch. 4: Groundwater Hydrology (medium)

Ch. 5: Water Quality (medium)

Ch. 6: Municipal and Irrigation Water Development (medium)
[omit Irrigation, pp. 167-178]

Ch. 7: Dams [omit]

Ch. 8: Water Allocation Law (light)

Ch. 9: Federal Water Agencies (light)

Ch. 10: Local, Regional, State and Multistate Water Management Agencies (light)
[omit Water Management in Mexico and Canada, pp. 305-316]

Ch. 11: Drinking Water and Wastewater Treatment (medium)

Ch. 12: Water, Fish, and Wildlife (light)

Ch. 13: The Economics of Water (light)

Ch. 14: Water Use Conflicts (light)

Ch. 15: Emerging Water Issues (light)

Reading List: Part II

The following set of readings will be on reserve in the Kilmer Library.

Kelland, Frank S. and Marylin C. Kelland. New Jersey: Garden or Suburb? Kendall/Hunt Publ. Co., 1978.

Ch. 2: "The Landscapes," pp. 9-22 (medium).

Ch. 4: "Water Supply," pp. 37-47 (medium).

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Reading List: Part III

Additional readings and handouts will be distributed in class during the semester or placed on reserve in the Kilmer Library.

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Remainder of Semester Schedule

Oct. 13 Lecture-Discussion # 1: Physiographic Provinces; Hydrologic Cycle

Oct. 20 no class: Annual Meeting of the American Institute of Hydrology
(Do not be too upset; perhaps you might want to start on your term paper.)

Oct. 27 Lecture-Discussion # 2: Ground and Surface Water Hydrology

Nov. 3 Lecture-Discussion # 3: Steam Gaging; Water Quality; Water Treatment

Nov 10 Lecture-Discussion # 4: Bottled Water; Water Use

Nov. 17 Exam (you are all cordially invited)
Bring # 2 pencils, an eraser, and a small calculator.

Dec 1 Oral presentations and discussion:

1. Duffy, Michael	2. Eck, Hannah	3. Guidry, Marilyn
4. Hausker, Arty	5. Kocsis, Ryan	6. Kopec, Jeanine

Dec. 8 Oral presentations and discussion:

7. Pedde, Heide	8. Peduto, Michael	9. Stassi, Nicole
10. Sutherland, Kierran	11. Williams, Christopher	

Dec. 8 Term papers due

October 31, 2004

Dear Ms. Jeanine Kopec:

Enclosed please find $4.10 to help cover your driving expenses associated with the Physical Geography 403-505 field trips this semester. Your assistance is very much appreciated and I hope you enjoyed the outings.

Sincerely yours,

Robert M. Hordon

It is with a note of some sadness that this will be my last evaluation of an Honors Seminar. For a variety of reasons, the seminar on Drinking Water will not be offered again through the Honors Program. My regret reflects the fact that some of the best students at Rutgers were in this course for four years and embellished the class with their insights, probing questions, intelligent discussion, and appreciation for the myriad facets that govern the source, use, and distribution of drinking water.

The honors students this semester were simply excellent. Their oral presentations and term papers were on very interesting topics and were quite professional. Most of the class were not geography majors, so the initial concern of the Honors students that they would be at some disadvantage as their backgrounds were not in the field of hydrology and physical geography quickly disappeared. As it turned out, they were among the best students in the class.

The field trips were a bit of a novelty to them. The five trips focused on the various aspects of hydrologic infrastructure, such as detention basins for stormwater management, raw water conveyance systems such as the Delaware and Raritan Canal, the source watershed for part of New Brunswick's water supply (Farrington Lake), and the sewer plant that serves most of Middlesex County.

It was a pleasure to work with the Honors Program office and appreciation is expressed for all of their assistance.

The class also included geography may not have the opportunity see parts of the hydrologic infrastructure dT he format for the first two classes of "Drinking Water" in the fall of 2000 and 2001 consisted of field trips, lecture-discussions in seminar fashion, one exam, and oral presentations that

were based on the required term papers. The final grade was then based on four categories: class participation and discussion throughout the semester, the exam, the oral presentation, and the term paper.

This format was generally agreed to by the two classes and based on their reactions, was continued in the fall of 2002. The one thing that changed for 2002 was that my department (Geography) required that the course be cross-listed

with other geography classes. A few Honors students were concerned that they would be competing against a whole array of advanced geography majors who presumably would have a stronger background in the field. It turned out that this concern was unwarranted, as only four out of the 10 other (non-Honors) students in the class were majors. This is not surprising, as geography is a highly eclectic field that attracts many students with different majors.

We had very good weather for the field trips and most of the students appeared to enjoy them as a different and pleasant experience from the classroom. The field trips form an integral part of the course and appreciation is expressed to the Honors Program for van rental support.

The variety of topics selected for the term papers and presentations were impressive. They included water issues in Ancient Egypt, Middle East water conflicts, the development of the New York City water supply system, and water use in future space missions. The presentations were quite professional and many included excellent graphics to illustrate the major facets of their study.

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Name of Trip: Class Field Trip # _____

Destination: Central New Jersey

Date of Trip: _____

In consideration of your permitting me to participate in the aforementioned trip, I agree to indemnify and hold harmless Rutgers, The State University, its officers, agents, and employees from any claim of loss for bodily injury or property damage arising in any manner out of the presence or activity of the undersigned.

Signature: _____

Print Name: _____

Date: _____

Last name _____
(please print)

First name _____
(please print)

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Code Name _____

Rules:

1) any set of up to 10 alphanumeric characters;

2) can be more than one word as long as it does not exceed 10 characters;

3) please avoid gross or vulgar terms;

4) please fold in half and return to the instructor.

R.M. Hordon
Cell phone: 732-236-4462