

## Environmental Water Quality BAE 452/552

### Session 1 Introduction and Definitions

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## Introduction

- Jan Boll
- Class web page:  
<http://www.agls.uidaho.edu/bae452-552>

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## Web Site Items

- Class outline
- Problem sets and solutions
- Exams
- Syllabus and Course organization
- Grades (via WebCT)
- This week (for live students only)
- Term paper ideas
- Water Quality Links

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## 2 credits vs 3 credits

- BAE 552 is offered as a 2 credit course to all off-campus students
- BAE 452-552 is offered as a 3 credit course to all on-campus students
- Difference between 2 credit and 3 credit is a laboratory section

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## 452 versus 552

- BAE 552 includes requirements for BAE 452 and:
- additional questions on some problem sets
- additional questions on exams
- a critical review of a journal paper of choice related to water quality as covered in the course (related to non-point source pollution)

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## Term Paper

- Each student shall write a term paper due during the final weeks of the semester (see web site for details)
- Each student shall present the main points of the term paper to the entire class during the final weeks of the semester (see web site for details)
- The web site has term paper ideas listed

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## Suggested Textbook

- Novotny and Olem (1994). Water Quality: Prevention, Identification, and Management of Diffuse Pollution. Van Nostrand Reinhold, NY. pp1054.
- Novotny (2002). Water Quality: Diffuse Pollution and Watershed Management, 2nd Edition, Wiley & Sons. ISBN: 0-471-39633-8, pp888.
- (I can send you the Table of Contents if you are interested)

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## Course Objectives

1. Provide basic information about physical, chemical and biological processes related to water quality with main emphasis on non-point (diffuse) source pollution
2. Provide insight for future use of water quality models

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## Course Objectives

3. Create ability to interpret stream water quality data and formulate their relationship to land use in a watershed
4. Learn about water quality monitoring
5. Become familiar with water quality sampling and sample analysis (lab section only)

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## Main Course Components

- Definitions
- Receiving water impacts
- Sources of Pollutants
- Transport of Pollutants
- Loading Functions
- Control of non-point source pollution

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## Video

“Luck isn’t enough:  
The Fight for Clean Water”  
NEMO project, University of  
Connecticut Cooperative Extension

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## Definition of point sources

(Water Quality Act, Sec 502-14, US Congress '87)

- “...any discernable sources, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft from which pollutants are or may be discharged.”

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## Definition of non-point sources (diffuse):

“everything else”

“Diffuse, difficult to identify, and intermittent sources of pollutants, usually associated with land or land use.”

or

“Contamination of streams and ground water by water draining the landscape”

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## Examples of Point Sources (PS)

- Municipal and industrial effluents;
- Runoff and leachate from solid waste disposal sites;
- Runoff and infiltrated water from concentrated animal feeding operations;
- Runoff from industrial sites not connected to storm sewers;
- Storm sewer outfalls in urban centers (>100,000);
- Runoff and drainage from active mines or oil fields;
- Runoff from construction sites > 2 ha (5 ac).

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## Other Characteristics of PS

- Regulated in the US;
- Their control is mandated;
- A permit is required for the waste discharges.

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## Examples of Non-point Sources (NPS)

- Return flow from irrigated agriculture;
- Other agricultural and silvicultural runoff and infiltration except confined animal operations;
- Unconfined pastures of animals and runoff from rangeland;
- Urban runoff from sewer outfall (<100,000);
- Urban runoff from unsewered areas;
- Runoff from small construction sites (< 2 ha);
- Wet and dry atmospheric deposition

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## Examples of NPS (Cont'd)

- Flow from abandoned mines including inactive roads, tailings, and spoil piles;
- Activities on land that generate wastes and contaminants, such as:
  - deforestation and logging
  - wetland drainage and conversion
  - channeling of streams, building of levees, dams, causeways, and flow diversions
  - construction and development of land;
  - interurban transportation
  - military training, maneuvers, and exercises
  - mass outdoor recreation

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## Characteristics of NPS

- NPS enter receiving surface waters in a diffuse manner at intermittent intervals related to meteorological events;
- Waste generation arises over an extensive area of land
- NPS are difficult to monitor at point of origin;
- Abatement of diffuse land is focused on land and runoff management;
- Compliance monitoring is carried out on land rather than in water;

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## Characteristics of NPS (Cont'd)

- Waste emissions and discharges cannot be measured in terms of effluent limitations;
- Extent of NPS is related to certain uncontrollable climatic events, geographic and geologic conditions, and may differ from place to place and from year to year;
- Most important waste constituents are suspended solids, nutrients, and toxic compounds.

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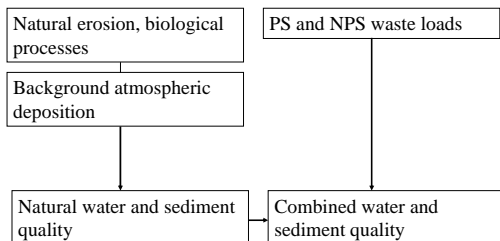
## Definition of Water Quality

- Reflects the composition of water as affected by natural causes and man's cultural activities, expressed in terms of measurable quantities and related to intended water use.\*

\*From Novotny and Olem (1994), page 11/12

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## Concept of Water Quality



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## Definition of Pollution I

- Man-made or man-induced alteration of physical, chemical, biological, and radiological integrity of water, where 'integrity' means being unimpaired.\*

\*From Novotny and Olem (1994), page 12

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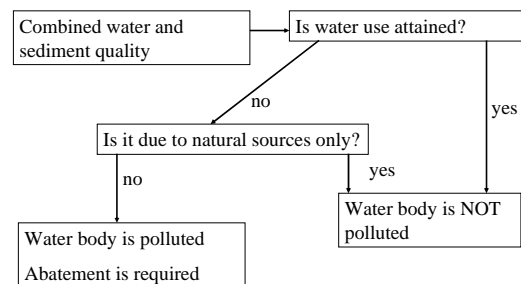
## Definition of Pollution II

- A change in the physical, chemical, biological, and radiological quality of the resource (air, land, or water) caused by man or due to man's activities that is injurious to existing, intended, or potential uses of the resource.\*

\*From Novotny and Olem (1994), page 13

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## Concept of Water Quality (cont'd)



Source: Novotny and Olem (1994)

## Definition of Criterion vs Standard

- Criterion: scientific quantity upon which a judgement can be based (based on experiment).
- Standard: applies to a definite rule or measure established by an authority.
- For details on standards visit:  
<http://www.epa.gov/waterscience/standards>

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