

## Evaluation of the anthropogenic impact on surface water systems: case of Lower Arges Basin, Romania

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## Purpose of the study

- Evaluate the degree of contamination with sewage water:
  - Bucharest sewage water
  - NO wastewater treatment facility
- Potential to use fluorescence spectroscopy for sewage water detection

Introduction Methodology Results Conclusions

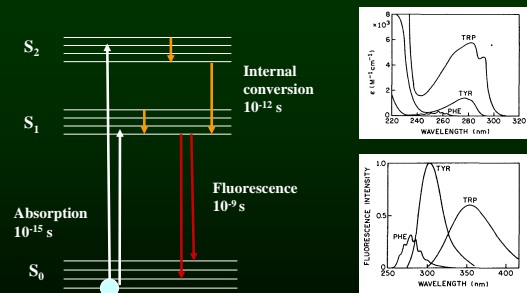
## Fluorescence spectroscopy – pros & cons

- Fast
- Sensitive
- Small quantities of sample
- No sample pretreatment
- Correlates with standard methods
- Qualitative
- Influenced by external factors
- Only organic contamination

No continuous monitoring fluorescence – based instrument

Introduction Methodology Results Conclusions

## Principles of fluorescence

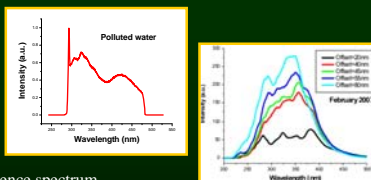


- Excitation spectra are mirror images of the emission spectra
- Emission has lower energy compared to absorption

Introduction Methodology Results Conclusions

## Fluorescence spectra

- Emission spectrum



- Excitation spectrum

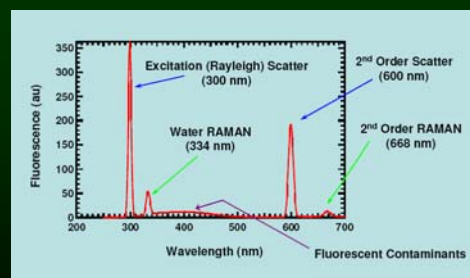
- Synchronous fluorescence spectrum

- Excitation – emission matrix  
abscissa – excitation wavelength  
ordinati - emission wavelength

- Synchronous fluorescence map

Introduction Methodology Results Conclusions

## Fluorescence spectra

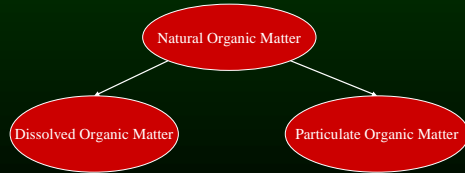


- Excitation 300 nm

Introduction Methodology Results Conclusions

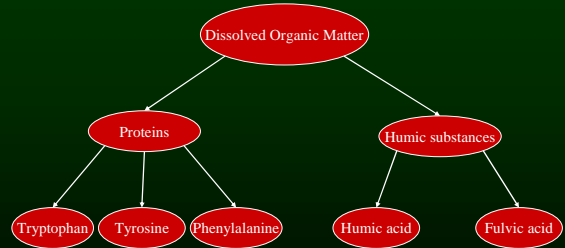
## Natural Organic Matter (NOM)

- comprises the decay products of animal and plant matter.
- NOM:**
  - Autochthonous – microbially derived
  - Allochthonous – terrestrially derived



Introduction Methodology Results Conclusions

## Natural Organic Matter (NOM)



Introduction Methodology Results Conclusions

## Methodology

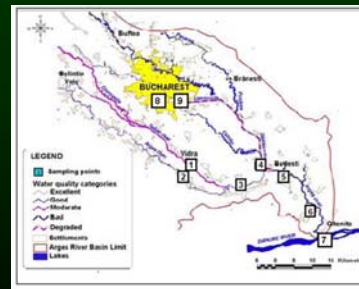


NO water treatment facility



Introduction Methodology Results Conclusions

## Methodology



- 1 – Sabar River
- 2 – Colibasi on Arges River
- 3 – Hotarele on Arges River
- 4 – Budesti on Dambovita River
- 5 – Soldanu on Arges River
- 6 – Clatesti on Arges River
- 7 – Sampling point on Danube
- 8 – Dambovita River
- 9 – Dambovita River

Introduction Methodology Results Conclusions

## Methodology



- Samples taken every season
- Measured within 24 h from collection
- Preserved at approx. 4° C

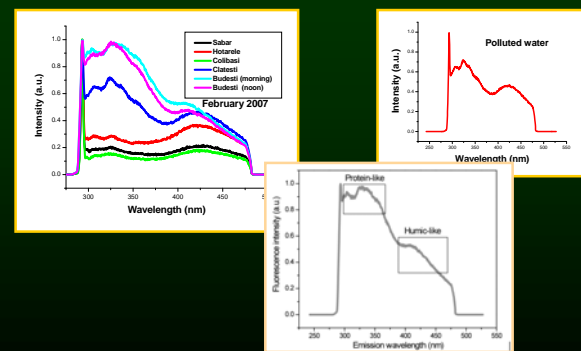
- Spectrofluorimeter PerkinElmer LS 55
- Portable spectrograph Ocean Optics USB2000-FL
- Pulsed light source Xenon PX-2.

- Q-switched YAG:Nd Laser
- Second, third, fourth harmonics
- 10 Hz repetition rate
- 4-6 ns pulse duration



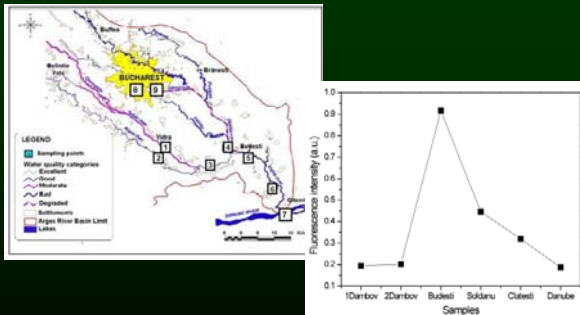
Introduction Methodology Results Conclusions

## Results



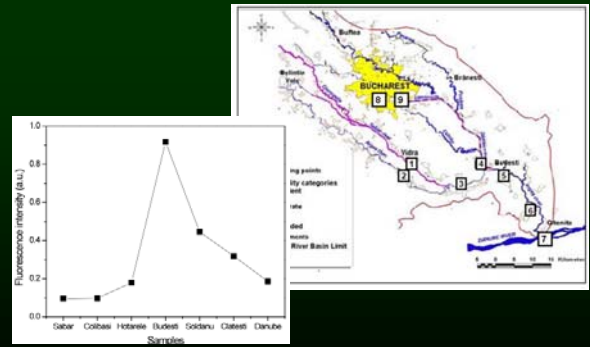
Introduction Methodology Results Conclusions

## Results



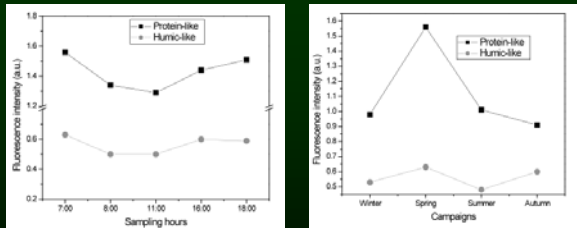
Introduction Methodology Results Conclusions

## Results



Introduction Methodology Results Conclusions

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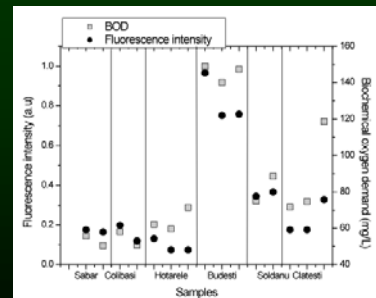


Hourly evaluation

Seasonal evaluation

Introduction Methodology Results Conclusions

## Results



Introduction Methodology Results Conclusions

## Conclusions

- Significant contamination with wastewater discharged from Bucharest, especially at Budești.
- An hourly organic matter trend connected to increased human activity in morning and afternoon hours.
- The usefulness of fluorescence spectroscopy in the quick evaluation of pollution for the water management (Amelene)

Introduction Methodology Results Conclusions