

PREVENTION AND REMEDIATION OF ADVANCED (HYPER) EUTROPHICATION OF MULTIPURPOSE IMPOUNDMENTS - A CASE FOR INTEGRATED WATERSHED MANAGEMENT

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ABSTRACT

As a result of the intensification of agriculture in the last fifty years and building massive underground sewerage systems in growing communities in the last century, nutrient loads to surface and ground waters have dramatically increased throughout the world, creating eutrophic and hypertrophic water quality in lakes and reservoirs exemplified by harmful algal blooms (HABs) and hypoxic dead zones ([Novotny 2011](#)). The problem is magnified by global warming because the specific bloom causing genera, the cyanobacteria (blue-green algae), prefer warmer water where they can outcompete the other phytoplankton species. Cyano-HABs are exhibited by scums and pea-soup appearance of the water body. This problem is especially troublesome in impoundments providing water supply to large communities. The problem of the hyper-eutrophic status exhibited by harmful algal blooms of cyanobacteria (Cyano-HAB) is becoming endemic to many impoundments in the US, Europe and Asia. Remedies are very costly, drastic and sometimes unsuccessful or transient. The phenomenon of eutrophication has been studied for decades but recent new findings contradict the previous theories such as the role of a limiting nutrient, linearity of the eutrophication progression being related to the input of the limiting nutrient, effect and causes of internal loads, two sided effects of high nitrate loads and even carbon sequestering or greenhouse gases release. Cyanobacteria growth, occurrence and behavior in impoundments defy the traditional mass balance lake models by Vollenweider and others and new modeling methodologies are being developed. Several cases will illustrate the dilemma, including the stratified Svihov, Orlik and Brno Reservoirs in the Czech Republic, and shallow Lakes Taihu and Donghu in China and Okeechobee in Florida. The need for coordinated interdisciplinary research and implementation of remedial plans will be outlined, discussed and developed into a concept of an ecoregion for multiple purpose water bodies and watersheds providing water supply to communities.

BIO-SKETCH

Vladimir Novotny is Professor Emeritus at Marquette University (Milwaukee, WI) and Northeastern University (Boston, MA) and an internationally recognized scholar and educator. Currently, he is also a partner of AquaNova LLC in Gloucester (MA). His 2003 book on diffuse pollution and watershed management is a leading source of information on the topic of this seminar.

REFERENCES

Novotny, V. 2003. *Water Quality: Diffuse Pollution and Watershed Management*, 2nd edition, J. Wiley, Hoboken, NJ

Novotny, V. 2011. [The Danger of Hypertrophic Status of Water Supply Impoundments Resulting from Excessive Nutrient Loads from Agricultural and Other Sources](#). *Jour. of Water Sustainability*, Vol. 1, Issue 1, June.

