Use of mesocosm data to predict effects in aquatic ecosystems: Limits to interpretation: Chapter 16

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Abstract

Aquatic mesocosm studies are being used to refute a presumption of risk derived from laboratory toxicity tests conducted under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Mesocosm studies incorporate many biological, chemical and physical characteristics of natural ecosystems. Hence, they serve as realistic surrogates of natural ecosystems and allow tests of pesticide effect at the population, community, and ecosystem level. We discuss two factors, ecosystem trophic status and organism life history, which influence the results derived from aquatic mesocosm studies. Trophic status influences the fate and effects of chemicals which strongly sorb or biologically degrade, yet may not be as important in the fate and effects of more water soluble chemicals. Life history traits of organisms and the intensity, frequency, and duration of the pesticide disturbance also determine the mesocosm response pattern.
What limits the net primary production in aquatic ecosystems such as lakes and streams? Available sunlight and nutrients. Ecosystem. All living things and their physical environments within a particular area. Earth's major biomes. Tropical rain forest, dry forest Savanna, desert, temperate rainforest, temperate forest, temperate grassland, Chapparel, boreal forest (taiga), tundra. Gross primary production. Harsh winds, nutrient poor soil’s, freezing temperatures limit plant growth. Supports no tall trees. See dispersal happens by wind. underground soil remains frozen year round. Polar ice. Colder than tundra. The ground is ice. No land beneath ice. Open access peer-reviewed chapter. Ecosystem Approach to Managing Water Quality. By Oghenekaro Nelson Odume. The SDC define, and then impose limits, and restrict the use of water resources to achieve the desired levels of protection. Licensing, registration, authorisation and special permit are the tools used to achieve the control of water use impact on water quality. A multivariate predictive technique evaluates aquatic ecosystem condition by comparing biota at a site to those expected to occur in the absence of human disturbances [16]. A predictive model is constructed using reference sites' biotic communities and correlating the community to natural environmental variables using multivariate statistics to predict expected communities at the impacted sites. Both species use chemical cues to detect predators such as molluscivorous fish and typically respond by hiding under rocks and logs or in shallow water. © 2013 Nature Education Photo by Andy Turner. All rights reserved. These data support the notion that predatory top-down forces can have important implications for aquatic communities and ecosystems. With that said, fish-centric biomanipulation effects on water quality are typically short-lived (i.e., weeks to months), most obvious in small, easily-managed systems (i.e., ponds), and impacted by resource availability, namely phosphorus and nitrogen (Benndorf 1990; Carpenter et al. 1995). Figure 5. Predicting cyanobacteria dominance in lakes. Canadian Journal of Fisheries and Aquatic Sciences 58, 1905-1908 (2001). At the scale of the ecosystem, most of this energy comes from sunlight, which is converted into... Primary Productivity in Aquatic Environments. Berkeley, CA: Univ. of California Pr.; 1969.Google Scholar. Peterson, B.J. Aquatic primary productivity and the 14C-CO2 method: A history of the productivity problem. Annu. Rev. Wofsy, S.C. A simple model to predict extinction coefficients and phytoplankton biomass in eutrophic waters. Limnol. Oceanogr.