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RAZVOJA I ŽIVOTNE SREDINE**  
ENVIRONMENTAL AMBASSADORS  
FOR SUSTAINABLE DEVELOPMENT

# Scientific signals No 3:

## Science of The Total Environment

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### **Using diatoms to monitor stream biological integrity in Eastern Canada: An overview of 10 years of index development and ongoing challenges**

published in Science of the Total Environment.

**Keywords:** Benthic diatoms; Stream biological integrity; Nutrient criteria; Ordination; Self-organizing map

#### **Abstract**

An improved version of the Eastern Canadian Diatom Index (IDEC: Indice Diatomées de l'Est du Canada) was developed, incorporating modifications to optimize diatom-based monitoring in Eastern Canada. The most significant improvement with this version of the IDEC is the extended coverage area including additional reference sites. This new version of the IDEC also incorporated a simplified list of diatom taxa to reduce the variability among analysts as it gains in popularity. Rare taxa (< 2%) were excluded and various morphotypes were grouped. The index was created based on three sub-indices that were adapted to cover the range of natural pH and conductivity values allowing us to partial out the strong influence of natural pH and conductivity from the general pollution gradient. The index was created using 648 diatom assemblages including those from nearly 150 reference (or least-disturbed) sites. The reference sites covered a large range of natural characteristics. The diatom assemblages collected in these environments constitute "biotype class A" in each sub-index and represent a realistic goal for restoration. Associated total phosphorus and total nitrogen showed that class A generally reflects conditions that are considered oligotrophic (< 0.025 mg L<sup>-1</sup>) or oligo-mesotrophic, while class D at the opposite end of the pollution gradient reflects eutrophic or hyper-eutrophic environments. There is a good correspondence between IDEC values and nutrient criteria, water quality indices based on physico-chemistry measurements, the presence of agricultural activities, and urban areas. The IDEC has a great potential to assist water quality monitoring, particularly when the objective is to assess the trophic status of a watercourse.

<http://www.sciencedirect.com/science/article/pii/S0048969713005263>

July 2013