



# A Novel Method of Monitoring the Health of our Global Fresh Water Supply using DNA Barcoding of Chironomidae (Diptera)

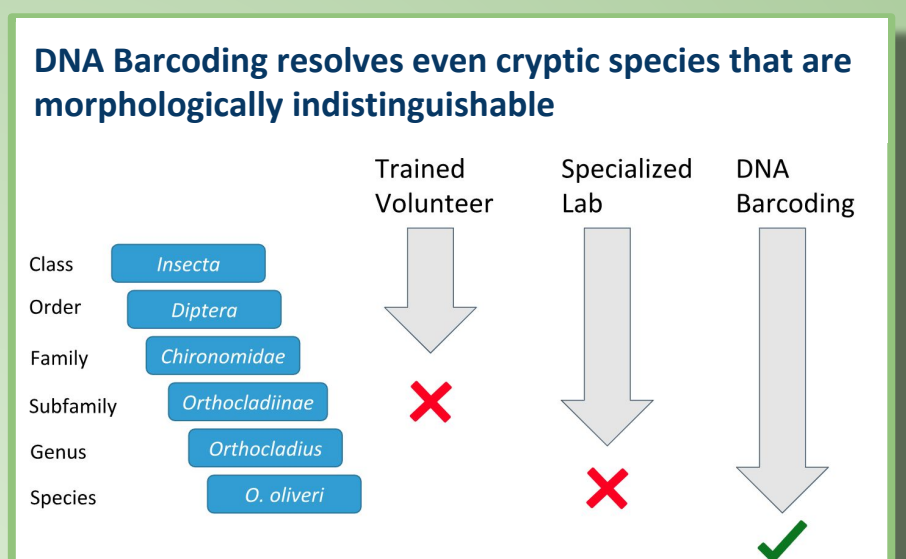
## Water Scarcity Affects Every Continent

- Largest global risk per World Economic Forum
- 2.7 billion people experience water scarcity (Falkenmark Water Stress Indicator)
- Water scarcity expected to impact two-thirds of the world's population by 2025



Dependency on surface water = more filtration infrastructure = more monitoring of surface water sources

SURFACE WATER MONITORING TODAY					
	Continuous / Cumulative Assessment	Includes All Stressors	Detects Subtle Changes	Scalable	Standard Methods Available
Chemical Monitoring	✗	✗	✓	✗	✓
Remote Sensors	✓	✗	✓	✓	✓
Bioassessment, Manual Taxonomy	✓	✓	✗	✗	✓
Bioassessment, DNA Barcoding	✓	✓	✓	✓	✗

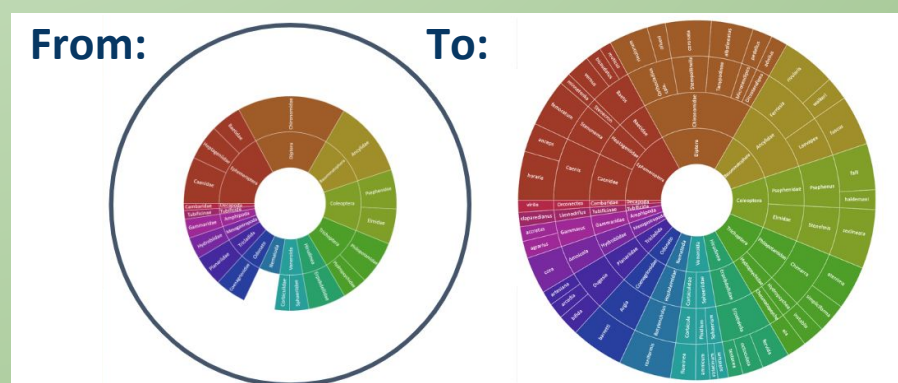


**Problem:** There is no standard freshwater bioassessment method, especially one that leverages the power of DNA Barcoding. Currently there are open investigations, including an EU COST Action.

**Solution: DNA Barcoding of Chironomidae** captures the cumulative effects of any stressor, from nonpoint source nutrient and heavy metal pollution, to temperature and dissolved oxygen, to flow alteration. Chironomidae are a global common denominator, extant on every continent and in a great range of altitudes, from millimeter-thick water films to 1360 meters below the surface of Lake Baikal, from glacial meltwater to hot springs.

- 1 Sample Chironomidae**
- 2 Isolate DNA and amplify COI region**
- 3 Species Level Database Match**
- 4 Accurate & Precise Quantification of Environmental Health Assessment**
- 5 Informed Decision Making**

**Results: Increased accuracy, precision, statistical power, and decreased cost.**  
This novel standard method of DNA Barcoding Chironomidae adds significant value for monitoring freshwater health and therefore for managing an increasingly scarce water resource.



**Using Genetics to Manage our Freshwater Resource**  
These data are being applied to develop a lab in a scientific water study institute. Laboratory space, scientific staff, and capital equipment are established. Currently groups are being scheduled for DNA Barcode citizen science training.

