

## Diversity II product application showcase: Lake Nicaragua

### Observing trends in phytoplankton community dominance

Lake Nicaragua is an obvious example for a rich biotope being increasingly threatened by anthropogenic influence, such as overfishing, intensifying land use, but mostly sewage and other pollution. Evidence that the lake's dominant cyanobacteria have declined in recent years are all the more surprising.

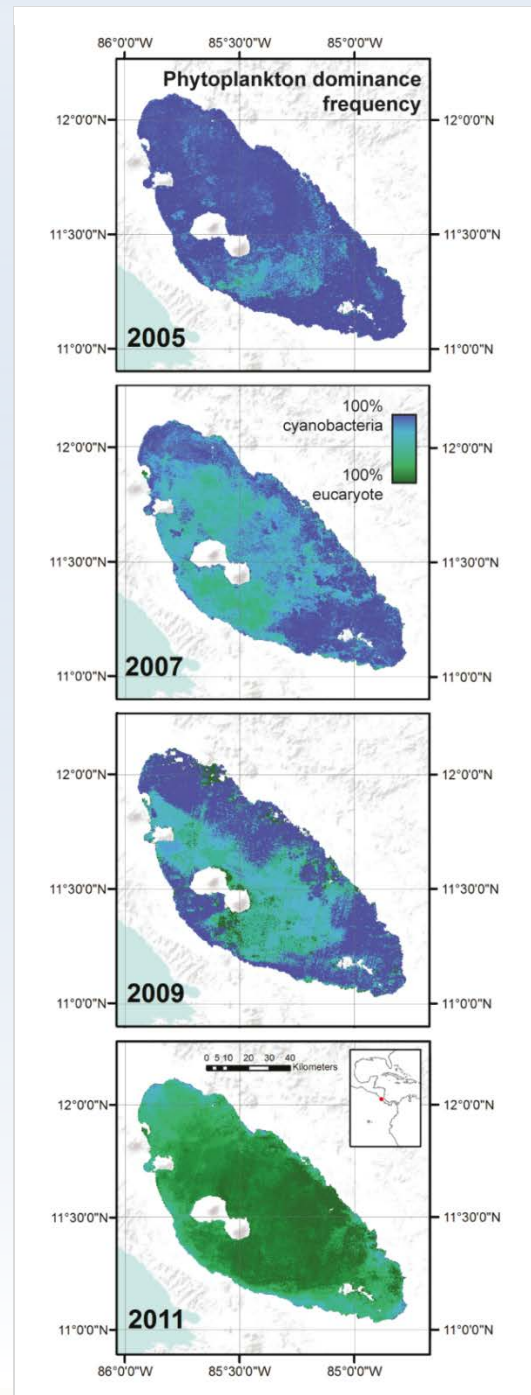
With more than 40 species of fish, and a connection to the Caribbean Sea through the San Juan River, Lake Nicaragua is not only the largest lake in Central America, but also a biodiversity hotspot. It's habitat to a diverse group of cichlids and many species associated with marine ecosystems, such as bull sharks (*Carcharhinus leucas*), sawfish (*Pristis perotteti*), tarpon (*Tarpon atlanticus*), grunt (*Pomadasyus spp.*) and snook (*Centropomus parallelus*).

In the past, this pristine ecosystem was subject to Mercury contamination from chlorine-alkali factories and mining activities, and became eutrophicated as a result of deforestation, erosion and soil loss, contamination with agrochemicals and pesticides, and uncontrolled urban and industrial waste discharge. Apart from these anthropogenic pressures, but many times aggravated, is the region's liability to natural disasters, such as hurricanes, storms, landslides, seismic and volcanic activity.

In the scope of ESA's Diversity II project, several hundred images acquired by ENVISAT MERIS between 2002-2012 were used to estimate water quality parameters in Lake Nicaragua. Contrary to expectations, a decrease in cyanobacteria dominance was observed towards the end of this time series. Such decrease may be related to decreasing nutrient concentrations, but more likely to a change in the ratio of available nitrogen and phosphorous, or other changes in chemical conditions.

US researcher Steve Greb, working on a grant from the Institute of Electrical and Electronics Engineers in cooperation with the Nicaraguan Center for Water Resources Research, has been investigating the application of Earth observation products to monitor the water quality of Lake Nicaragua. They currently aim to verify and explain the trend in phytoplankton dominance indicated by the Diversity II water quality products.

Diversity II will in the near future address the continuation of biodiversity indication by Earth Observation, using Europe's future Sentinel satellite fleet.



The relative frequencies of cyanobacteria and eucaryote dominance observations have shifted in Lake Nicaragua during recent years.