

# Bathymetric variability within the Kigoma Bay region

**Student:** C. Winston Wheeler

**Mentors:** Ellinor Michel & Peter McIntyre

## Introduction

High topographic variability is inherent to rift escarpment morphology, such as that found in Lake Tanganyika's Kigoma Bay region. Over the past several years, the Kigoma Bay region has served as the base for a burgeoning number of limnologic and ecologic studies (e.g. this volume's studies within the littoral zone, Barrett et al. 2003, Olsgard 2002, Miller 2000, France & McIntyre 1998), promoting the need for an improved understanding of the area's geophysical setting. Local variation in bathymetry and shoreline aspect may generate different patterns of currents, wave action, and water column stratification, all of which influence the biology and chemistry of the littoral zone. We conducted a bathymetric survey to characterize and compare littoral sites used in ongoing Nyanza Project research and to offer a foundation for future work within the region.

## Methods

A bathymetric survey was conducted, primarily focused on resolving twelve littoral sites emphasized in a variety of Nyanza student projects during 2004. From an inflatable skiff, depth and location data were collected employing a Raytheon V8010 echosounder and a Garmin 48XL GPS, respectively, on August 6-8, 2004. See Figure 1 for the location of survey points. Bathymetric profiles were calculated by projecting nearby depth measurements onto idealized transect lines set perpendicular to the local shoreline and extending from the Nyanza 2004 limnologic and biologic littoral research sites to a 100 meter depth. A 60 meter contour was interpolated between all 60 meter depth measurements collected in this survey.

## Results and Discussion

Figure 2 exhibits the location of bathymetric profile transects and related depth profiles. These results highlight the pronounced variability in topography and aspect of sites in the Kigoma Bay region. Among the sites, Maji Menji and Jacobsen profiles exhibit the steepest slopes to the depth observed, whereas most Katabe North and to a lesser extent Mzungu Beach profiles exhibit a gradual slope to depth. The northern

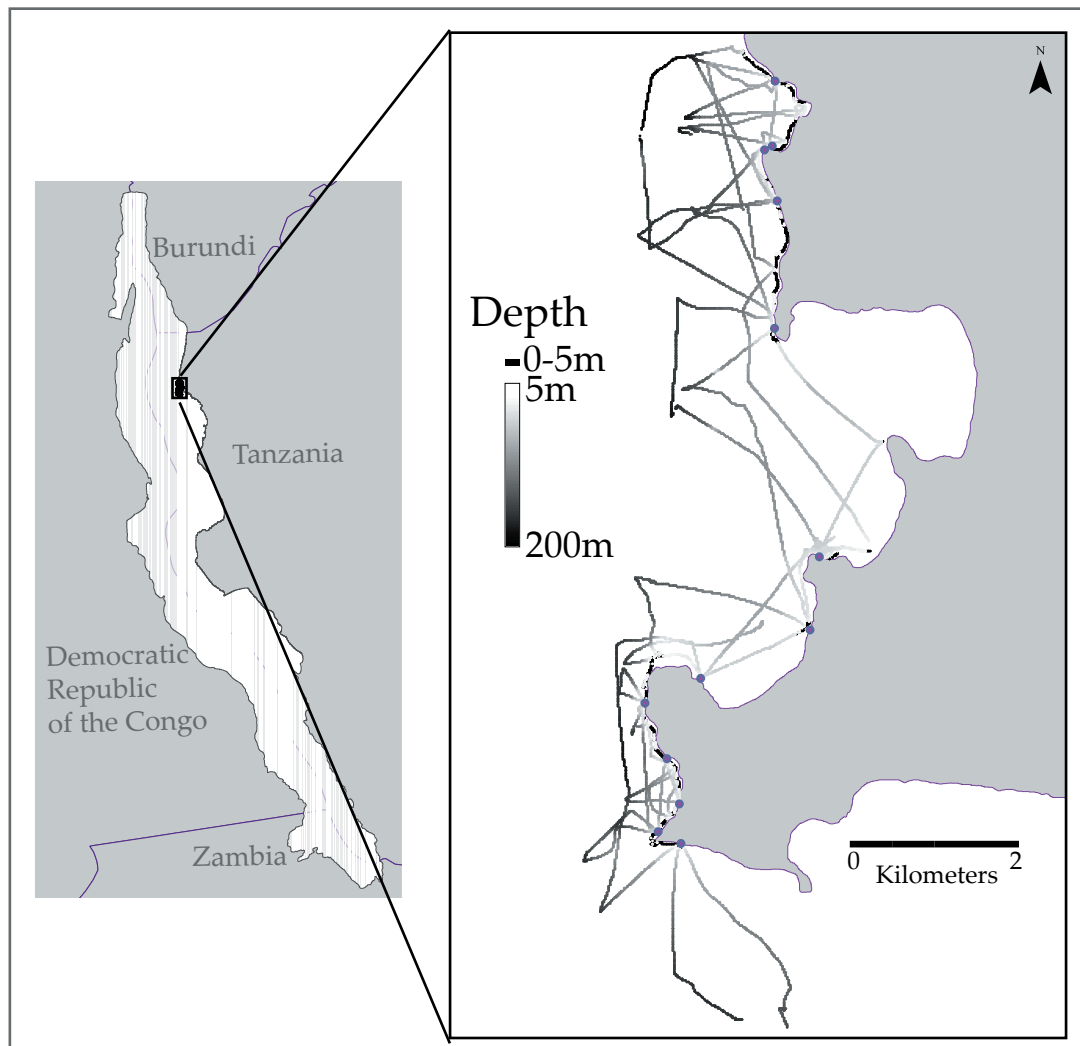


Figure 1. 2004 bathymetric survey lines in the Kigoma Bay region.

sites (the Kalalangabo sites, Euphorbia, and Nondwa Point) and Jacobsen profiles display a steep descent to ~40-60 meters then transition to a more gradual decline with depth. At ~80 meters the Kalalangabo and Jacobsen profiles display steep declines to depth. Among the northern group of sites (Kalalangabo to Katabe) and the southern group of sites (Bangwe to Mzungu), linked patterns of steep and plateau-like character along north-south axes are consistent with the area's border fault driven, half graben, escarpment morphology (Lezzar et al. 2002).

The typical upper level of the thermocline (i.e. 60 meters depth; Coulter 1991) is plotted in Figure 2, because of the importance of this stratification zone in nutrient interactions. Lateral distances between this depth contour and the shoreline study sites are presented by Corman (this volume). Lake Tanganyika experiences strong vertical gradients in nutrients and dissolved oxygen due to a persistent thermal stratification, where the thermocline divides clear, relatively nutrient impoverished surface waters from nutrient rich anoxic bottom waters (Coulter 1991). Local water column stability breakdown due to wind induced events or internal seiching facilitates nutrient upwelling, altering habitat conditions in both benthic and pelagic environments. We hypothesize that distance from the thermocline, bathymetric gradient to the thermocline, and shoreline aspect play controlling roles in susceptibility to the impacts turbulent or mixing events.

Differences in lake physical dynamics and related nutrient dynamics may have substantial consequences in limnologic and biologic variability at the sites in the Kigoma Bay region. The bathymetric profiles presented in Figure 2 enhance the geographic background necessary for interpreting system dynamics. To understand the now evident differences in primary productivity and faunal composition among littoral sites in the Kigoma Bay region, future work should further investigate the links and empirical relationships between the geophysical setting and biogeochemistry, as well as geophysical setting and habitat quality.

## Acknowledgements

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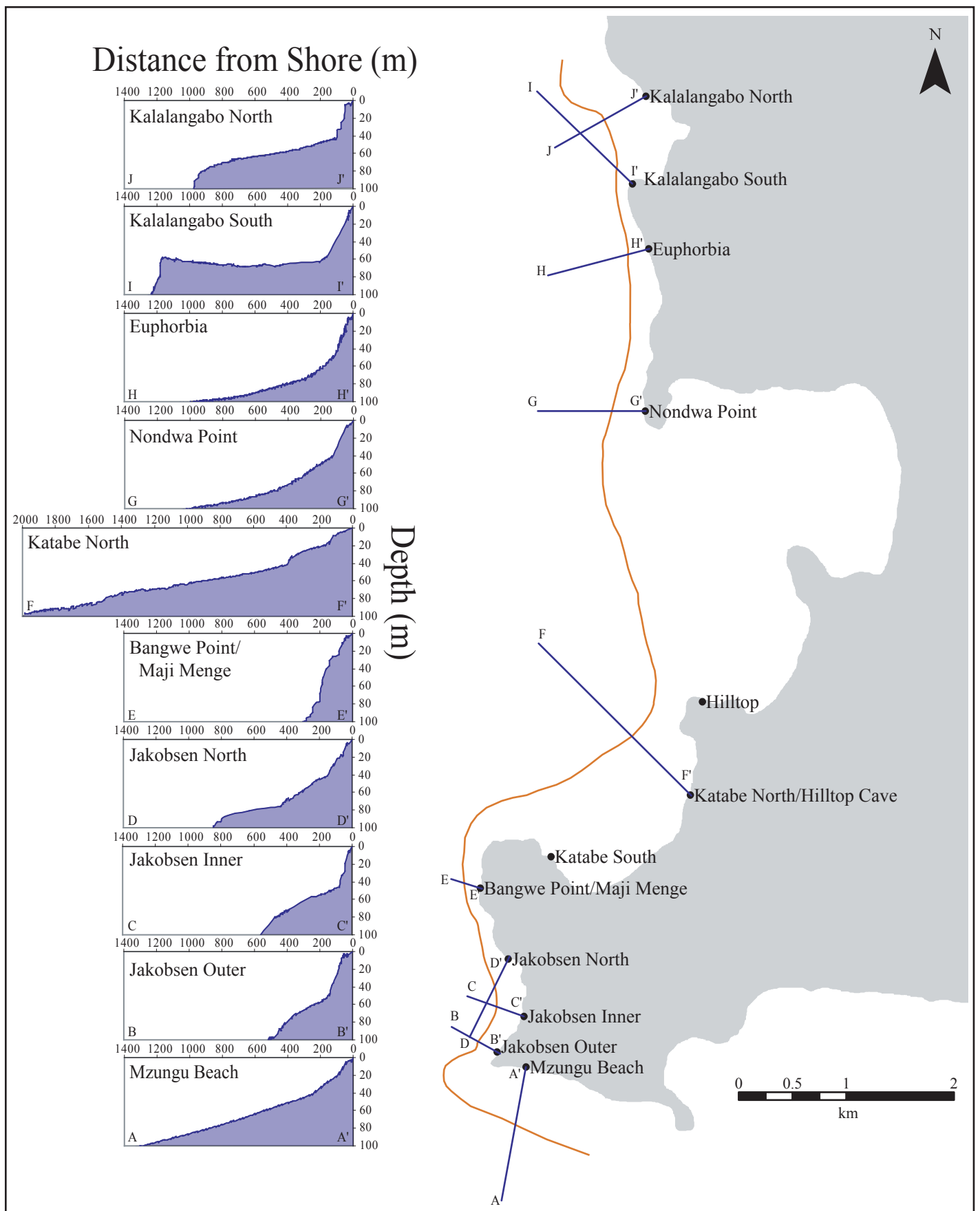


Figure 2. Bathymetric variability among sites within the Kigoma Bay region