WATER YOU WAITING FOR? ASSESSMENT OF WATER QUALITY ACROSS TWO DIVERGENT COASTAL WATERSHEDS

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DINGLE Oceanworld MARA BEO

Abstract - Coastal zones are among the world's most diverse and productive environments; they encompass a broad range of habitat types and harbor a rich and diverse array of organisms that provide ecosystem services that are critical to the livelihoods of people living in coastal zones. Understanding how human development affects coastal zones allows for sustainable development of coastal resources with respect to future changes in land use and tourism. We conducted a comparative analysis of water quality indices across two divergent coastal watersheds (Dingle and Ballyferriter) on the Dingle Peninsula in Ireland that vary temporally in land use and population densities. Preliminary analyses indicate yearly and seasonal differences between watersheds with respect to nitrate and phosphate load. In general, nutrient concentrations were higher in Dingle than in Ballyferriter. We discuss these results with respect to land use patterns and population density.

Introduction

The coastal towns of Dingle and Ballyferriter are located on the southwest coast of Ireland (Figure 1). Dingle has year round population of 2000 residents that swells to 10,000 people in summer months due to tourism. Ballyferriter has 268 year round residents with with the physical ability to accommodate a peak seasonal tourist population of 64 people in 16 holiday homes. While both watersheds have similar land use characteristics, Ballyferriter has more scrub type habitat and lower sheep density than Dingle (Figure 3). Given temporal differences in population density and land use, we investigated how nutrient levels in streams varied within and across watersheds with respect to seasonal differences (summer vs. winter) and stream order (e.g. source, midstream, mouth).

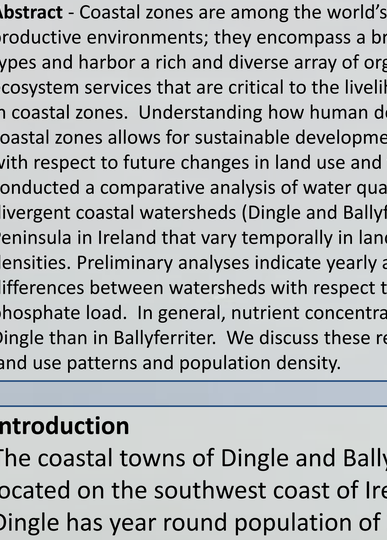

Figure 1. Location of Dingle, Ireland.

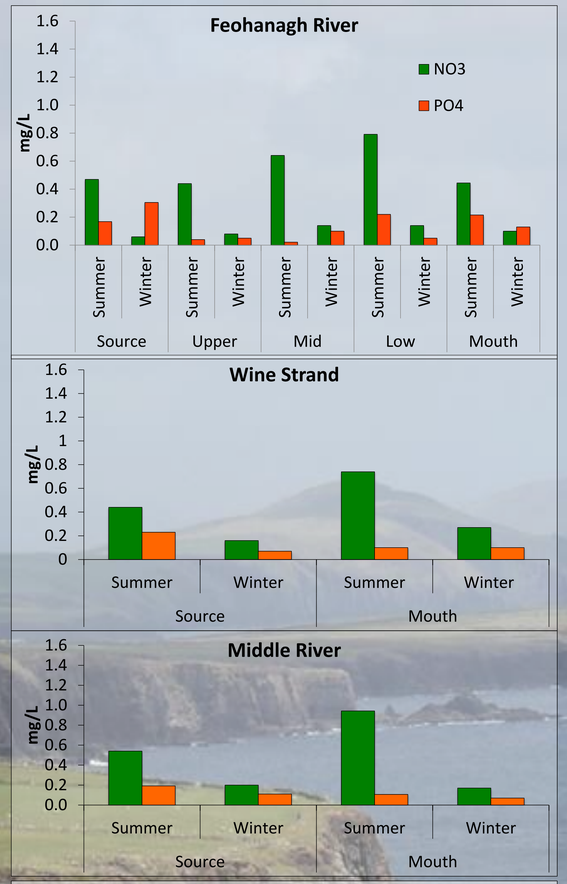

Figure 2. Ballyferriter Watershed nitrate (NO_3) and phosphate (PO_4) levels (mg/L) in by river, position within river and season. (N = 2 for all locations).

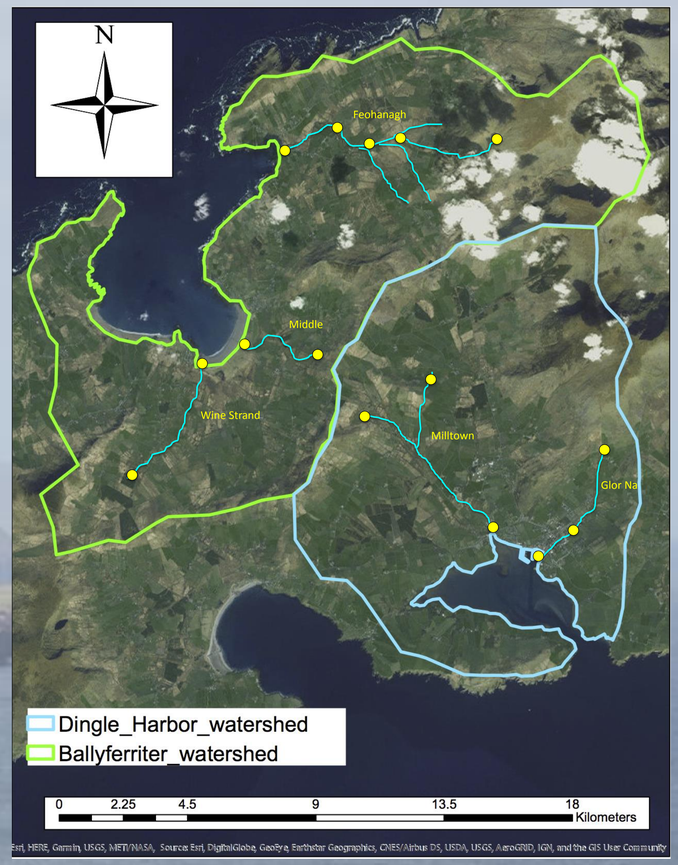

Figure 3. Satellite image of Dingle Peninsula with Ballyferriter and Dingle Harbor watershed outlined. Sampling locations are denoted.

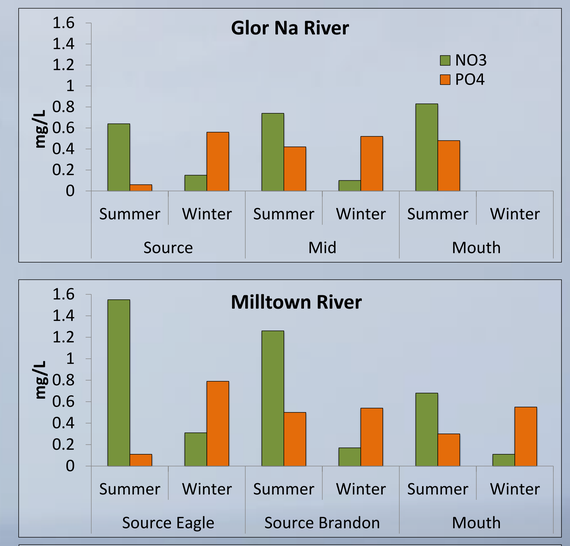

Figure 4. Dingle Watershed nitrate (NO_3) and phosphate (PO_4) by river, position within river, and season. (N = 2 for all locations).

Conclusions

- As one might expect, nitrate levels increased from river source to mouth across all streams except Milltown River (Figure 3, Figure 4 - bottom panel). One explanation for this could be high densities of livestock grazing around the upper reaches of Milltown River.
- Nitrate levels were higher in summer than in winter likely reflecting increased population densities during summer tourism season. Many holiday homes utilize septic systems instead of sewer treatment systems.
- The mouth of the Middle River had the highest nitrate levels of all rivers during summer sampling (Figure 5). Interestingly, the town of Ballyferriter straddles Middle River and the capacity of the sewage treatment system is estimated at 260 people. Any additional tourists would overtax the existing system.
- Phosphate levels are mixed across rivers, locations, and seasons. Additional sampling this summer will hopefully provide additional resolution.

Methods

- Water samples were collected from three rivers in Ballyferriter (Middle, Feohanagh, and Wine Strand Rivers) and two streams in Dingle (Glor Na and Milltown River) in January and May of 2015- 2017 at various locations along the stream (source, mid stream levels, and mouth).
- Indices such as temperature, dissolved oxygen, salinity were recorded at each location (not presented)
- Nitrate and phosphate levels (N=2 at each site) were determined using colorimetric assays (Hach DR2400 Spectrophotometer).

Figure 5. Nitrate (NO_3) and phosphate (PO_4) levels (mg/L) at the mouths of each river in winter (top panel) and summer (bottom panel). (N = 2 for all locations).

Acknowledgements
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