The aim of this project is to understand how space has been created and is being developed on Lima’s Costa Verde using GIS. The Costa Verde is a stretch of ‘green’ coast along the Bay of Lima in Peru. This area is designated as the premier public space for the greater Lima Metropolitan Area. It is comprised by the six municipalities (from North to South: San Miguel, Magdalena Del Mar, San Isidro, Miraflores, Barranco, and Chorrillos). Each municipality has autonomy to govern their portion as they see fit.

With so much emphasis put on this region, many changes have taken place, particularly the extension of the coastal shelf to make new land. In order to understand how the coast has changed, the best course of action is to obtain a historic map and compare it to a present map, focusing on the change in area of the coastal shelf. What I want to learn from this project is how development differs between the six municipalities that comprise the Costa Verde and to reference my ethnographic research for interpretation for why development has occurred the way it has. This project is important to my greater thesis project in the Department of Anthropology in how it illustrates phenomena described in my interviews, with the capacity to confirm or disprove statements from my participants.

Development along the Costa Verde has been going on for many decades with varying enthusiasm. Natural disasters, coastal erosion, and other phenomena have reset many of the early efforts to alter the coastal shelf. In response, humans have continued efforts to make more space for beaches, highways, parks, and real estate. Humans and nature respond to each other in a constant tug of war of land reclamation.

### Methodology & Spatial Analysis:

The (2015) ESRI base map already had a coordinate system, but the 1908 map did not since it was a JPEG. The coordinate system is WGS 2008 Spherical. To geo-reference, I chose three points: the southwest pentagonal point of the Fuerte Del Real Felipe en Callao, Plaza Bolognesi near central Lima, and La Capilla in Chorrillos. These three points culminated in a close match between the two maps. In order to check that the two maps were accurately overlain, I set the 1908 map to 60% transparency and used major streets and historic landmarks as references.

(FIGURE A) Aside from the 1908 tideline, the 2015 map was used for creating all other feature classes. The aqua colored line indicates the 1908 coast and the blue indicates the 2015 line. I interpreted the foot of the cliffs (where the black ends on the 1908 map) to be the tideline based on historic images (see above) showing the sea nearly against the cliffs. On maps B and C, the lines are filled in with polygon features to indicate growth and loss of the coastal shelf.

*The term ‘coastal shelf’ is used throughout this report not as a geological term, but as a geographical term, in geographical terms I am referring to a small plain or stretch of land along a coast.

### Abstract:

This table indicates the amount of outward spatial growth each of the municipalities has experienced on their respective stretch of the Costa Verde. Corresponding to each of the names is the length or distance, of each of the municipalities’ coastline in meters (SHAPE_Length). (CV_Growth_Sq_Meters) is the area in square meters of the coastal shelf that has been extended along each of the municipalities’ coast. Finally, the (CV_LENGTH_TO_GROWTH_RATIO) shows the relationship between the length of the coast and the area added; it lists by municipality how many meters have been extended out to sea, for every meter along the coastline.

### Conclusions:

In order to understand how management styles differ across municipal borders, it is important to realize the disparity in how aggressively municipalities grow their coastal shelf while others do so more modestly. A grab for new real estate by reclaiming space is a novel way to beautify and economically stimulate an area. One major factor that can necessitate expansion is pre-existing area and its level of development/use. Logically, smaller municipalities are more pressured for land, while larger municipalities may not be as inclined to add or create land if they have intertidal space that be developed (as is the case with Chorrillos). Affluency is also a factor in how the coastline is developed. Since the Costa Verde is considered a public space, affluent areas may not have such areas at high priority if they have private areas already.

The table above lists each municipality and its total area in square meters as of 2015 (Municipal Area Total). Since I had polygonal area in meters figured from features illustrating growth and loss, 1908 area can be figured relatively easily by dividing the growth and loss areas by the (Municipal Area Total); the resulting number is the percent of the current total land of the municipalities that has been added via Costa Verde shelf-expansion since 1908. (FIGURE B) Some municipalities like Magdalena Del Mar and Miraflores have grown considerably since expansion began. Others, like Chorrillos do not show much growth; however, this is due to Chorrillos being the largest of the municipalities and having only a fraction of its coast included within the Costa Verde development region.

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**INTERPRETATION:** Magdalena Del Mar is the greatest beneficiary of CV expansion as evidenced by its 136 meter expansion for every meter of coastline. Chorrillos has a very low rate of expansion due to the small fraction of its total coastline being within the Costa Verde region. Participants in my ethnographic interviews stated that the Costa Verde is a public space and is therefore more intended for middle class citizens. The most affluent municipality of the Costa Verde is San Isidro. Residents of San Isidro do not wish to have middle and lower class citizens pouring into their municipality to take advantage of their stretch of coast; to discourage these visitors the municipal government decided to not build a pedestrian bridge from the top of the cliffs to the beach below. (FIGURE C) Access between the top of the cliffs to the bottom is paramount for the Costa Verde since the cliffs act as a natural barrier. By choosing not to build an access bridge, San Isidro isolated itself from other municipalities and the sea. Due to the affluence of its residents, many do not see this as an inconvenience because most of Lima’s elite have beach homes in communities south of the Lima Metropolitan Area.