

Historical-Geographical- Cartographical study of environmental impacts caused by landfills in the Bay of Ilha do Fundão, Rio de Janeiro - Brazil

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This work studies the environmental impacts caused by landfills of the Island of Fundão, situated in the city of Rio de Janeiro – Brazil, one of the largest landfill projects of sea areas executed in the city. The objective of this work was to build a model of university for the others which would arise in the other states of the country.

The construction of the Island of Fundão brought impacts to the environment, since this significantly changed the water circulation in the portion of the bay where the Island is placed. This event has aggravated the environmental problems, in the studied location, which already exist from the middle of the 19th Century and early 20th Century with the increase of urbanization of the city of Rio Janeiro and industrialization.

This work points the primary anthropic changes in space within the historical context of the city, using to this maps, history books and historical geography, that shows the transformations of the studied location, how the landfills of the eight islands and the advance of the coastal line, that contours the insular complex. Furthermore, it was quantified the real landfill area, making possible to point some environmental impacts caused in this part of the Guanabara Bay. Data like the bathymetry, landfills localization, the geomorphology of the bay and degree of environmental sensitivity according to the narrowness of the water channels, the remoteness of bay entrance and depth was analyzed.

After the historical, bibliographical and cartographical search, the charts that had shown changes from one to another were selected, to be vetorized, making possible to quantify changes in the landscape through overlapping of such charts. It's easy to realize that one of the biggest challenges to this research was the compatibilization between the cartographic documents, seeking its georeferencing, especially of the older documents. The third step was a more accurate analysis of the hole material and some conclusions about the changes in water circulation and renewal of the bay, evaluating the environmental impacts in the Guanabara Bay, in a local scale, during the construction of the Island.

Trying to analyze the environmental impacts in the studied zone, provided by landfills, there are some considerations about the geomorphology of the bay, because the environmental quality depends not only of human actions, but it's rather a result of various factors combined, including geomorphological. Thus, the geographical positionig, the size, shape, bathymetry, the drainage network, renewable power of the water and also its ability to resist the high anthropogenic impacts. The landfills done in the area intensified the environmental degradation where it was already considered an area of critical sensitiveness. The landfills were more condensed to this region, increasing the rate of silting across the bay, hindering the circulation of water.

The ultimate effect was a lower penetration of the circulation of water, a fact easily detectable and making worst the situation of the channel between the island and the mainland of Fundão, where there were strong currents of ebb, which interfered in the execution of the landfills island. After the works this channel has drastically reduced its bathymetry on account of siltation, as water is pushed

by the tide from both ends of that channel. Thus is visible around the island of Fundão the damage caused to the water circulation by landfills and siltation. In previous studies, this area, among all the bay, is having the most acute conditions on the loss of environmental quality.

The landfill in bays have their impacting effect on the quality of water, and consequently on environmental quality. This dependence is not only for its size in area, but also for its location, which affects in a different way the circulation and renewal of the water body in focus. In Guanabara Bay of the example we have, the different effects produced by the landfills done on the Flamengo beach and on the Island of Fundão. Therefore, we cannot consider only the extension of landfilled areas but also its location, and still, the nature of the bottom and margins.

We can conclude that the water circulation in the Guanabara bay is governed mainly by the tidal currents. The existence of a central longitudinal water channel, deeper, commands the main stronger circulation, by the entry of saline wedge. The contribution from the continental waters of numerous (about 35) rivers of small and medium size enters the bay saturated of industrial (approximately 6,000 industries) and domestic dumping (around 10 million inhabitants) - (FEEMA, 1990), and merges with the upper layers. Different authors also draws attention to the increased rate of siltation of the bay caused by destabilization of the river system (river retification and channeling of rivers and deforestation of hillsides) and construction of landfills.