O EMPREGO DO GPR NA CARACTERIZAÇÃO DA SUPERFÍCIE E DEPÓSITOS DE FUNDO DA REPRESA GUARAPIRANGA, SÃO PAULO/SP

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ABSTRACT

The Guarapiranga reservoir was built between the years of 1906 and 1909 by the former Light Serviços da Eletricidade S/A power company, with the purpose of regulating the water flow from the Tietê river and generating electric energy at the Parnaíba Power Plant, located by the same river. The public authorities are currently concerned with the progressive quality deterioration of the water coming from this reservoir, due to the soil occupation increase in that region, causing a degradation of this system. This occupation has been growing in an irregular and illegal way, without the proper infrastructure and in disagreement with what was established by the law. This causes an increasing problem regarding the quality of the water coming from the reservoir, due to the significant increase of nutrient accumulation (mainly ammonia nitrogen and phosphorus), in addition to local coliforms through the tributaries or diffusely throughout the region around the reservoir.

Considering that the silting can be an important tool for the environmental management, there is the need, among other things, for evaluating periodically the accumulation of mud layer thickness deposited at the bottom of the Guarapiranga reservoir. The possibility to obtain indirectly and periodically detailed data from the reservoir (without collecting punctual samples) may help greatly in the proposition of proper methodologies to remove the mud layer, with cost optimization, as well as in the proposition of utilizing monitoring and control mechanisms of the silting and eutrophication processes in the dam. In this study, an arm of the reservoir associated to the Guaviruba creek micro-basin was chosen, where areas regarded as urban and with poor occupation comprehend almost 100% of the total of the basin, therefore, with an intense accumulation of sediments to the reservoir, which is deposited mainly in the mouth of the same. The GPR surveys were performed by using 50 MHz and 100 MHz antennas, coupled to a fiber glass catamaran, which, in its turn, was towed by an aluminum boat. After the processing and interpretation, the results were compared with the bathymetric survey data and with 13 boreholes performed in points coinciding with the GPR survey. Therefore, it was possible to verify the potentiality and the accuracy of the GPR method when dimensioning the sediment thicknesses. Some limitations regarding the electromagnetic waves in water columns were observed, probably related to the weakening of the signal due to the conductivity of the materials, not only when visualizing the bottom of the dam, but also when detecting the sediment layer thickness. To conclude, the GPR method turned out to be efficacious to be employed in the conditions of the performed test. It allowed to identify the bottom of the dam, from a depth of 0.56 m up to 12.47 m and the mapping of sediments with thicknesses up to 6.5 meters (50 MHz antenna), even with the high water conductivity and the pollutant concentration above the acceptable regarding fountain waters.