environmental studies on an urban area in egypt great cairo and fayuom

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In this thesis, we present an environmental study from physical and mathematical points of view. The study is divided into two main parts; the first one is related to a renewable source of energy that is one of the cleanest sources of energy, namely, wind energy.The second deals with the analytical models, which formulate the dispersion process of pollutants in the atmosphere. Atmospheric dispersion models, where proved that they are the most powerful techniques to perform any theoretical or experimental study in the field of pollution transport from the source to receptors.As an application to the theoretical results obtained, wind energy calculations and atmospheric dispersion modeling have been performed for two regions Cairo and Fayuom in Egypt.In chapter 1, an introduction to the structure of the atmosphere and the accompanying physical processes has been presented. Meteorological aspects of atmospheric phenomenon have been presented.In chapter 2, wind and temperature profiles and estimates for Cairo and Fayuom have been evaluatedIn chapter 3, meteorological data and parameters have been used to calculate the wind energy and power that can be generated from Fayuom region. Chapter 4 deals with the atmospheric dispersion process. The most powerful and widespread model used in pollution concentration calculations is Gaussian plume model (GPM). We used this model to develop an extension through which we can calculate, mathematically, the maximum ground level concentration (Mglc) of pollutant. The theoretical results obtained have been applied as a case study on an industrial area in Fayuom governorate, namely, Kome-Osheme area.Finally, we discussed the results obtained through the thesis. Some conclusions have been outlined which ensure the importance of the present work and how the mathematical physics plays an important role in the environmental studies.