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Study of Sediments in a Sub-Basin of the Panama Canal Using Nuclear Techniques

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In early December 2010 a storm that occurred was named “La Purisima “ the largest storm in the history of the Canal watershed. According to the Panama Canal Authority (ACP, acronym in Spanish for Autoridad del Canal de Panamá) Yearbook of suspended sediments for 2010, the storm was associated with the interaction of a low pressure center, the remnants of a stationary front and the intertropical convergence zone in the north-eastern part of the basin of the Panama Canal. The storm produced a record 760 mm of rain in 24 hours. There were more than 500 landslides in the watershed above the dam Alajuela. These landslides resulted in a large amount of suspended sediment lead to this dam, where potable water facilities for the City of Panama are located. This led to a turbidity of water from the dam to 700 Nephelometric Turbidity Units (NTU), causing the collapse of the water treatment plant, leaving a large part of Panama City without drinking water for nearly two months. On the other hand, waste waters contribute to serious pollution problems not just in Panama Canal basin but also at the Panama Bay influencing marine and coastal environment, and there is not an effective monitoring program for contaminants in treatment plants wastewaters effluent and coastal marine areas. In addition to this, the sediments are vectors of contaminants such as heavy metals, etc. The Panama Canal Authority (ACP) must operate efficiently and scientifically sediments from dredging works (suspension, deposition at some site, etc.) because it is basically great interest to maintain and better water quality both in Panama Canal river basin as in the urban area. Therefore, a characterization of the dynamics of sediment transport phenomenon using the radiotracer and chemical tracers would offer a rigorous and efficient methodology for a national program of measurements or monitoring plan of transport and behavior of pollutants into resources water of Panama, including the study of sediments at the biggest Panamanian WWTP.

For sediment transport monitoring, radioactive and chemical tracer technology was selected because it is a very reliable, accurate and non-intrusive procedure. Its use required low amounts of radioactive substance. Also, tracers have high resistance to physical factors, such as temperature and pressure, which make them ideal for this type of studies.

One of the goals of this study is to contribute in reducing contamination level to international water quality standards, through an efficient sediment transport monitoring program in a Panama Canal basin and check out the contribution of wastewaters treated at WWTP to marine and coastal environments. To achieve this goal, it is necessary to study and compare both methods, non-nuclear and nuclear techniques, using nucleonic gauge, and comprehend all the processes involved in sediment transport along the Panama Canal basin, including the contribution of treated waste waters, during dry and rainy seasons, considering also physic-chemical factors.

Country/Organization invited to participate

Panama

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