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Iodine-129 as an environmental tracer of salinity and freshwater leachates in Boracay Island, Philippines

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Iodine-129 is a long-lived radioisotope considered an excellent environmental tracer due to its unique and conservative properties. Groundwater and seawater samples collected from Boracay island, southwestern Philippines, in April 2022 were analyzed for iodine-129, iodine-127, and stable isotopes of H and O. One groundwater sample with elevated salinity suspected due to seawater intrusion was proven to be caused by other factors as indicated by low $^{129}\text{I}/^{127}\text{I}$ supported by stable H and O isotopes. Moreover, two seawater samples had relatively low I-129 values, indicating possible freshwater dilution from a nearby treatment plant. In general, $^{129}\text{I}/^{127}\text{I}$ ratios measured in seawater were 10 to 14 times higher than pre-nuclear level ($^{129}\text{I}/^{127}\text{I}(\text{pre-nuclear}) = 1.50 \times 10^{-12}$), while groundwater $^{129}\text{I}/^{127}\text{I}$ ratios were measured to be 1.5 to 14 times higher than pre-nuclear level indicating effects of anthropogenic inputs. Since no known nuclear activities are recorded in the country, the anthropogenic I-129 must have originated from transboundary sources and transported by atmospheric deposition and ocean currents. Our results demonstrate the use of I-129 as a tracer of anthropogenic inputs in the water resources of Boracay island and also provide essential data in evaluating the possible effects of various NPPs along the seas of the Philippines in the future.

Student Submission

Yes

Primary author: Mr VALDEZ, Jeff Darren (DOST - Philippine Nuclear Research Institute)

Co-authors: Mr SUCGANG, Raymond (DOST - Philippine Nuclear Research Institute); Mr MENDOZA, Norman (DOST - Philippine Nuclear Research Institute); Mr RACADIO, Charles Darwin (DOST - Philippine Nuclear Research Institute); Dr BAUTISTA VII, Angel (DOST - Philippine Nuclear Research Institute); Dr MATSUZAKI, Hiroyuki (Micro Analysis Laboratory Tandem Accelerator - University of Tokyo); Mr YAMAGATA, Takeyasu (Micro Analysis Laboratory Tandem Accelerator - University of Tokyo); Mr TOKUYAMA, Hironori (Micro Analysis Laboratory Tandem Accelerator - University of Tokyo); Ms TOYA, Miwako (Micro Analysis Laboratory Tandem Accelerator - University of Tokyo)

Presenter: Mr VALDEZ, Jeff Darren (DOST - Philippine Nuclear Research Institute)

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