Abstract from Pradeep Aggarwal, Ph.D.
Programme Manager (Water Resources); Head, Isotope Hydrology Section
International Atomic Energy Agency/ Box 100 (200 for personal mail); Wagramer Strasse 5, Vienna, Austria A1400

A lack of adequate scientific information and knowledge on water resources has been recognized since the 1977 United Nations Water Conference in Mar del Plata, but significant gaps continue to exist in resource assessments. The problem is particularly acute with respect to groundwater resources even though more than half of freshwater used worldwide is derived from groundwater. Fundamental aspects of aquifer hydrogeology, including recharge, groundwater-surface water interactions, and the extent and distribution of fossil groundwater remain poorly characterized.

Aquifer assessments at regional or national scales can be conducted more effectively and rapidly by using groundwater isotope signatures and ages. Groundwater age can also be used to develop important information for regional aquifer systems via a parsimonious approach to groundwater modelling where overly-complex representations of aquifer hydrogeology are actively avoided in constructing groundwater models. Simple effective modelling is essential for evaluation of aquifers that lack informative hydrogeologic databases, and interpreted ages are among the more-effective information sources for modelling such systems. Even in large aquifers that lack even minimum hydrogeological data, groundwater ages can be interpreted from isotope samples at a few downstream locations, providing hydrogeologic information from the entire upstream flowpath.

A recent IAEA initiative aims at expanding the availability of groundwater ages in large regional aquifers in Asia, Africa and Latin America and facilitate national assessment of aquifers. This includes re-evaluation of carbon-14 ages and application of noble gas isotopes, including Kr-18 and He-4 to ascertain groundwater ages. As of 2012, investigations are underway in Brazil/.Argentina, Vietnam, and Thailand.