

The Galapagos Archipelago

(globally unique, a prescient marine reserve, and otherworldly)

By Charles Rich

The Galapagos Islands, a unique World Heritage Site, is anything if not a preciously-important place to foster environmental education, conservation and preservation. The location of the Galapagos at the Equator, 1380 km (>800 mi) west of Quito, Ecuador is what makes it so special. It is situated at the nutrient-rich junction of several separate oceanic currents driven by the southern trade winds. Also, geologically, these Islands are situated directly atop an active tectonic plate rift zone producing a cluster of geologically-young shield volcanoes.

The respected Galapagos National Park Marine Reserve extending 40 miles out into the Pacific is a global model for intelligent protection and preservation of the myriad wildlife, species diversity, and geologic phenomena found here, unlike anywhere else on Earth – in short: “ evolution’s playground ”.

For example, on land, there’s the multi-colored Land Iguana, the Waved Albatross, the Giant Tortoise, the black and red Great Frigate Birds, and of course, the famously showy (sky-pointing) breeding Blue-footed and Nazca Booby birds. In the sea, enjoying the freedom of the well-managed Marine Preserve surrounding the Archipelago are Galapagos Sea Lions, the Ma-



rine Iguana, and the Hammerhead Shark to name just a few of the more publicly-popular species.

There are 5,000-10,000 robust land iguanas living in the Galapagos with colors ranging from golden yellow

- brown to orange and burgundy depending from which Island they inhabit. They live in the arid interior of islands in caves and on rough lava growing up to a meter in length. On the relatively smaller island of Santa Fe, the land iguanas are a different species from the ones found elsewhere and can grow up to nearly 2 meter length! Their marine counterpart swims, and like turtles, forages on the sea bottom.

The marine iguanas, endemic to the Galapagos, are a one-of-a-kind animal feeding on algae and able to remain underwater up to 45 minutes. The infamous land-borne Galapagos Tortoise is the largest of all tur-

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Get the Lead Out

By Richard Izzo

The recent events in Flint, MI; Newark, NJ and elsewhere around the country have put the issue of lead-contaminated drinking water squarely under the media spotlight. Lead is a naturally - occurring element and has been widely used worldwide since the days of the Roman Empire, due to its malleability and other properties deemed beneficial. Lead has historically had many uses including ceramic glazes, television screens (to block radiation), batteries (as electrodes), as well as the more familiar applications including as a gasoline additive, a paint additive and in plumbing pipes and solder.



The problem with lead is that it is one of a handful of heavy metals that have the most damaging effects upon human health, with the two primary exposure pathways being ingestion (in food, water or lead paint chips) and in-

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halation (lead dust). Lead has been linked to such health effects as brain damage (especially in children) as well as anemia, kidney damage, and nervous system impacts, to name a few.

According to the Center for Disease Control (CDC) and information compiled by the Mayo Clinic, most cases of lead poisoning in children still result from the ingestion of lead-paint chips, however, lead impacts from drinking water are also a burgeoning concern.

The sale of lead-based paint has been banned in the US since 1978, but the paint still remains on walls of many buildings constructed up until that time. Similarly, the use of lead pipes and lead solder has been banned since 1986, but these plumbing materials still remain in homes built prior to the ban.



Peeling paint on a window

Prevention of exposure to lead paint and lead paint dust is relatively straightforward. This may be accomplished by ensuring older layers of paint remain encapsulated under non-lead based paint, and remaining diligent in keeping painted surfaces free from chipping or excessive wear which may expose lead paint or release lead dust.

This is especially important for surfaces that receive a great deal of wear such as window and door frames. Also, it is important to prevent the release of lead dust during renovations in older buildings by eliminating or reducing sanding or scraping of older layers of paint.

Preventing exposure to lead in drinking water is complicated as one must consider both the quality of the water from its source as well as potential impacts from older plumbing fixtures.

The water supply system serving NY City from upstate reservoirs has been touted as delivering some of the

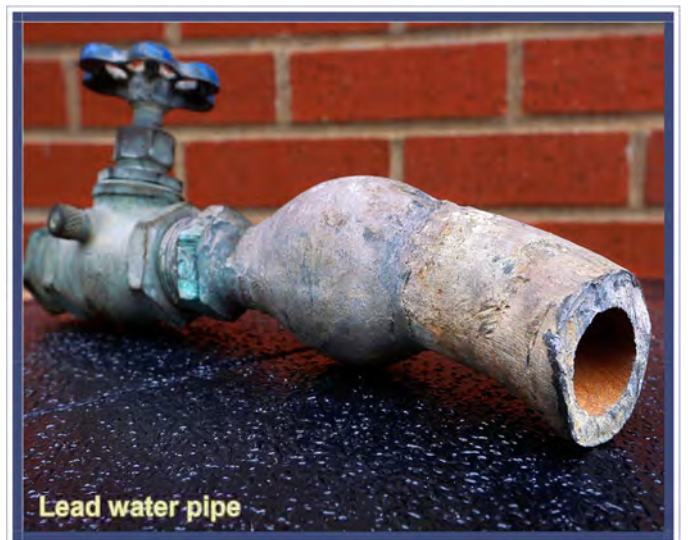
highest quality drinking water in the country. New York's upstate watersheds are protected from development and activities that may promote the release of contaminants into its surface water resources.

Most municipalities in Westchester County, north of NY City, are also provided drinking water from surface water reservoirs. On Long Island, three million residents rely solely upon subsurface groundwater aquifers to provide safe drinking water and the deeper water from these aquifers continues to be of excellent quality.

Residential communities in Nassau and Suffolk County are provided water from municipal water purveyors which maintain municipal well fields. Some residences on Long Island and in upper Westchester also rely upon private wells for drinking water but these are becoming fewer in number. Both the upstate reservoirs and the subsurface aquifer water systems are highly regulated and the drinking water provided must pass strict water quality potability standards promulgated by the NY State Department of Health. In fact, these rigorous State standards generally exceed those required for commercially available bottled water.

However, once the water is conveyed, impacts from older plumbing fixtures may still represent a source of lead which can leach into the water from older lead pipes or lead solder if the water is allowed to sit in the pipes for extended periods.

To avoid these impacts, it is recommended that the cold water be allowed to run for a couple of minutes or until it gets as cold as possible prior to potable usage, to flush the standing water from the pipes. It is noted that this is only effective with cold water because hot water is normally drawn from standing water in a tank. Newer water heating systems providing hot water "on demand", however, may also be flushed in this fashion.



Lead water pipe

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Galapagos Land Iguana

the species reaching weights exceeding 400 kg and lengths over 2 meters. With a life span over 100 years, it is one of the oldest vertebrates on Earth.

The waved albatross is the largest seabird with wingspans from 175 up to 340 cm only going ashore to nest. It has a narrow sharp beak and is omnivorous eating mostly squid. The Great Frigate birds are large black birds with long wings and curved beaks. The males, during breeding season (Springtime) inflate their bright red chests that look like globes (comprising as much as 40% of the bird's body weight) – a unique physical feature designed to attract females. The notorious Blue-footed and Red-footed Boobies are also a unique species. They live along Island coasts, and do not nest.

The sea lions of the Galapagos are playful social animals. They have a variety of vocalizations (sounds) which include snarling, barking, and sounds of horns. They are avid swimmers and can easily outmaneuver sharks underwater. The large hammerhead shark is one of the most iconic animals in the Marine Reserve. It is now a protected species and present in large quantities and short distances offshore. These sharks often swim in pairs, and their hammer-shaped heads are instantly recognizable. They can swim to depths as great as 3,000 feet.

Examples of other interesting animals too numerous to list include the bright-orange Sally Lightfoot Crab, Lava Lizards, Chocolate Chip Sea Stars, Spotted Eagle Rays, White Tipped Reef Sharks, Streamer Hogfish, Moorish Idols, Angelfish, Trumpetfish, Parrotfish, Ocean Sunfish, Dolphins, Puffers, Fur Seals, Orca, Pilot Whales, Galapagos Penguins, and the Flightless Cormorant.

The largest Galapagos Island is arid Isla Isabela shaped much like a large seahorse comprised of several basaltic shield volcanoes in a northwest/southeast alignment (named from north to south: Wolf, Darwin, Alcedo, Chico, Sierra Negra & Cerro Azul) along with their numerous lava tubes, and coastal mangrove forests and lagoons.

One of the oldest islands is San Cristobal – home to Puerto Baquerizo Moreno, the capital of Galapagos Province. The 'youngest (geologically) island is Isla Fernandina – known as one of the most pristine islands in the world. Here, no known introduced animals have become established. The famous Flightless Cormorant also inhabits this island, as well as the relatively small Galapagos Penguins. Geologically, Isla Bartolome had the most recent volcanic eruption of pahoehoe lava as recently as 1897, some 60 years after Darwin had visited these Islands. This lava flow is essentially unweathered and untouched by erosion, and due to its youth, the basalt retains a visually-remarkable rainbow patina.

There are just two seasons in the equatorial Galapagos: January to roughly mid-May is the wet/warm breeding season, with June to December being the dry/cooler season. Late May is the transition month. Fresh water is scarce or non-existent throughout the Archipelago and consequently, the greatest population center of about 35,000 is concentrated in the town of Puerto Ayora on Isla Santa Cruz.

This is also the location of the Charles Darwin Research Station – the center of evolutionary science and conservation in the Galapagos. This facility houses captive breeding programs designed to return the Islands to a more pristine pre-colonization state. Needless to say, it is obvious why these Islands are so important to global species diversity and preservation and serve as a model for protection of our Earth's natural resources.



Isla Isabella and Isla Fernandina

What's new at CA RICH

Firm President, **Charles Rich** has been selected by Engineers Without Borders (EWB) as the Professional Mentor to assist the EWB travel team and locals with design, installation and development of a new bedrock water well desperately needed to provide potable water to rural Mphero Village (population 600) situated in Malawi Africa. This work will begin next month.

Congratulations to our own **Jason Cooper** on his recent promotion to Senior Project Manager. Jason continues to display professionalism, technical prowess and strong managerial skills in his effective dealings with the Firm's diverse clientele and his mentoring of younger staff.

CA RICH remains at the forefront of remediation under the NY State Brownfield Cleanup Program with recent enrollment of two additional Sites (on behalf of valued clients) into the State BCP. One of the redevelopments represents the first affordable housing Site accepted by NYSDEC under the recently enacted Brownfield Cleanup Program Reform.

Project Environmental Scientist, **Mike Yager** completed the installation and is now managing the operation, maintenance, and monitoring of a combinative system of in-situ groundwater treatment utilizing air sparging and soil vapor extraction at an industrial/commercial Property in Islandia, under a NYSDEC Order on Consent. Mike also manages the Firm's highly successful Tenant Inspection Program serving industrial/commercial property owners on Long Island.

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