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Apple will contest a court order to help FBI investigators access data on the phone belonging to San Bernardino gunman Syed Rizwan Farook.

The company had been ordered to help the FBI circumvent security software on Farook's

iPhone, which the FBI said contained crucial information.

In a statement, Apple chief executive Tim Cook said: "The United States government has demanded that Apple take an unprecedented step which threatens the security of our

customers."

Since September 2014, data on the latest Apple devices—such as text messages and photographs—have been encrypted by default.

If a device is locked, the user's passcode is required to access the data. Entering an

incorrect code ten times will automatically erase the phone's data, if this option has been enabled. Apple says even its own staff cannot access the data—a move the company made following the Edward Snowden revelations into government surveillance. (BBC)



life

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River limes do affect fish and their homes

SHEREEN ALI

Who in Trinidad doesn't love a good river lime? Some folks leave from early in the morning to visit their favourite river spot, to picnic, splash around and just have family fun. Others have parties by the river, with loud music on portable sound systems. And of course, no lime seems complete without a proper cook-up, often on a coal pot or small portable barbecue. Some limes, fuelled by rum and curry duck, can go on late into the night.

Long popular among Trinis of Indian heritage, river limes are not the only human uses of our river areas. Hikers, religious pilgrims including Shouter Baptists and Hindus, eco-adventurers and nearby river residents all also visit rivers and may affect natural life there—impacts which we, for the most part, don't even consider.

The real river residents are the fish, other animals and plants which live there. Even the microbes in the river water may be affected by our presence—or by what we leave behind, whether it's trash; food; soap from washing dishes, clothes or bodies; chemicals; candle wax; religious oils or various other substances which we humans leave unthinkingly in or beside rivers.

Dr Amy Deacon, a British scientist who's been in Trinidad since 2010, decided to study some of these human impacts on the fish life in our rivers. Dr Deacon was a postdoctoral research associate at the University of St Andrews in Fife, Scotland, and is now a lecturer at UWI. She is passionate about conserving diverse biological life, and is involved in the BioTIME project.

BioTIME project: How do species survive change?

The BioTIME project is funded by the European Research Council, and aims to explore why some species are so common while others are rare, and how the structure of a biological community persists through time. How do species withstand change, and how do they recover from it over time?

"Trinidad's rainforest-covered mountains are the location of the BioTIME Trinidad project. Here, the numerous parallel streams of Trinidad's Northern Range provide an ideal 'natural laboratory' for investigating patterns of biodiversity over time," wrote Dr Deacon in her online blog for the project.

"As a post-doc on the project, my job includes coordinating the data collection and managing an enthusiastic team of field and lab assistants—as well as many hours wading through some of the most (and least!) beautiful streams on the island," she wrote.

The Guardian caught up with Dr Deacon at her UWI office on Tuesday for an update on the project. Deacon

recently published her research paper—From Species to Communities: The Signature of Recreational Use on a Tropical River Ecosystem—in the journal *Ecology and Evolution*. The paper explores the effects of "recreational disturbance"—such as river limes—on rivers and streams.

"The paper is one of the results of the five-year BioTIME project, which began in 2010. It's the reason I moved to Trinidad," said Deacon. She explained:

"The project is a collaborative effort between the University of St Andrews in Scotland, and the University of the West Indies. The purpose of the project is to collect long-term data on freshwater communities in Trinidad, as part of a wider project of how biodiversity can change over time."

The river lime study selected 16 river sites in the Northern Range—eight pairs of sites, with each matched pair of sites consisting of one well-known liming spot and a nearby, less-disturbed, site. Then a small team of researchers sampled these sites every three months over a two-year period, identifying, measuring and comparing the different species of life they found.

The study considered several levels: total fish biomass, total fish species richness, diversity indices, and guppy sex ratios.

Researchers also noted the garbage they found at these sites. Some sites, which started off as pristine, became disturbed by people during the course of this study, noted Deacon.

"With any natural community, some species are going to be common and some are going to be rare. The rare ones aren't necessarily more endangered; they're just different. So, for example, some species of fish (like guppies) will shoal together, which means when you find one, you're going to find 100.

Others, like the Zangee (the swamp eel or *Synbranchus marmoratus*), are more solitary...We'll rarely find more than one of those at a site at a time, and that's normal," said Dr Deacon.

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Kharran reacts to a guabine (*Hoplias malabaricus*) fish found during a study on the impact of liming on river life.

People use rivers in many different ways

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"So you have these patterns. Over time, populations of species go up and down—through environmental reasons, seasons, chance, predation. The challenge is to know when those patterns are natural, and when they're being influenced by us humans. You can't really do that unless you have long-term data," explained Deacon.

More fish biomass, changed sex ratios in disturbed sites

So: what did the study find? The scientists discovered that fish biomass significantly increased in river sites disturbed by recreational human use. So humans are definitely affecting river life.

The reasons for the biomass increase in the river lime study are unclear, but it could be due to increased nutrients in the water coming from runoff, dumped waste or other human activities. For Deacon, this suggests that our freshwater fishes may be more resilient to change (human impacts) than we might assume.

The study also found a wider species richness in human-affected river sites—at least in the short term of the study's life.

Among guppies, the study also



Dr Amy Deacon, from the UK, recently finished a study on how recreational use of rivers, such as river limes, is affecting fish life.

found more females in recreational river sites than in undisturbed, pristine river sites. It seems human disturbance may possibly be affecting sex ratios. Other studies, Deacon noted, have found that male guppies are more sensitive to pollution than females; she speculated this may be what is happening here, or it may be for another unknown reason; or it may



Female guppies (like the one in the foreground) outnumber males in a recent study of how river limes affect biodiversity. PHOTO: SEAN EARNSHAW

be just coincidence.

The study did not analyse any toxicity effects of human impacts in fish life, as this was not part of its aim or scope. And the longer term effects of the study's findings would be material for future studies.

"River liming seems to be ingrained in Trinidad culture," said Deacon:

"People use the river in so many different ways, including religious ceremonies. We've found melted wax, food offerings, different oils and essences, prayer flags, and once we even found a goat that had been sacrificed at the side of the river—charred on a pyre.

"People use the river to wash clothes—we find detergents, for instance. And here (she showed a photo), we found KFC boxes in the upper reaches of the Caura Valley ...

PROTECT OUR RIVERS

From the bizarre, armoured Jumbie teta—a prehistoric-looking bottom-dweller of a fish—to shoals of tiny, beautiful guppies, buzzing dragonflies and curling slithery eels, our rivers are homes to many kinds of life. Magnificent bamboo groves and other tropical plants form part of the riverscapes which make our river sites so beautiful and part of our natural heritage. Rivers, however, don't exist just for our benefit. They are diverse and complex ecosystems and host a great many communities of plants and animals that exist together in balance. When something disrupts that balance, the chain of effects can be destructive. To maintain healthy, beautiful rivers, here are some tips.

- When going on river limes, always carry garbage bags, use them, and dump them properly—in bins at the site, if they

exist, or if there are no bins, then carry the trash bags back home and dump them safely. Never leave full trash bags, plastic or glass bottles, cans, fast food containers or other garbage behind you—this is lazy, rude to fellow users of the site, ignorant of the value of preserving beautiful spaces, and often dangerous to the natural life there, as pollutants can contaminate river water and soils.

- For easy after-lime cleanup, visit river sites already provided with facilities—such as the Caura River site, which has trash bins and picnic benches.
- Never put soap, detergent or bleach in river water—this kills aquatic life.
- Do not remove plants, build mini-dams, or disrupt what you find.
- Enjoy yourself—but don't kill or harm river life in the process!

in a beautiful, pristine part of the river.

"People also bathe and play, stirring up the water, and make noise, which can affect wildlife. And the whole process of cooking also happens at the river, where people rinse their meat, prepare their vegetables, and throw away leftovers, which adds nutrients to the water..."

Dr Deacon says her study shows humans are having a definite—and, in view of human population increas-

es, most likely rising—effect on river life. It's important we understand what these effects are, so as to better manage our rivers now and in the future, she says, adding:

"For me, I think people using the rivers is really important. So many people live in cities and have less and less connection with nature... It's the people who enjoy the rivers, who may often be more willing to protect them, if they are aware how their actions affect life there."