

# Can oil and wildlife mix?

For 40 years, the African republic of Gabon has been reliant on remote onshore oilfields that sit slap bang in the middle of pristine rainforest. And while logic would suggest that oil exploitation must be having a detrimental effect on the local wildlife, an innovative collaboration between the global oil company Shell and the Smithsonian Institution has proved otherwise. **Sarah Monaghan** reports

I saw my first elephant soon after touching down at Gamba airport in Gabon, on a runway that's little more than a strip of red earth slicing through the forest. A handsome male, with the straight tannin-stained tusks typical of the African forest variety, he emerged from the trees and began to career around the grounds. A couple of officials rushed to shoo him away, but moments later, the roar of an incoming de Havilland packed with oilmen did the job. As the plane descended, its propellers whirling, the elephant trumpeted and fled into the forest.

Lying on the central west coast of Africa, the Republic of Gabon has roughly the same land area as Italy. Around 80 per cent of the country is covered by rainforest, part of the second-largest contiguous block of moist tropical forest in the world (the largest being the Amazon).

The Gamba area in southwestern Gabon has no roads linking it to the rest of the country, and access is only possible by air or sea. This means that the region is one of the most isolated – and pristine – in the country. But the Gamba Complex of Protected Areas also hosts the oilfields of the global energy group Shell. These fields have been operating for more than 40 years; during the 1990s, the largest, Rabi, produced two thirds of Gabon's oil – a commodity that today accounts for more than 40 per cent of the country's GDP. While production has

dropped, the fields still deliver up to 60,000 barrels of high-grade crude a day.

The fields are sandwiched between two of Gabon's most beautiful national parks, Loango and Moukalaba-Doudou, amid a mosaic of rainforests, savannahs, mangrove swamps, lagoons, lakes, beaches and dunes. The 11,320-square-kilometre complex, from where the oil is drilled and pumped to the Gamba terminal with its thundering turbines, colossal holding tanks and maze of silver pipes, is one of the most biologically diverse places on Earth.

As soon as they land in Gamba, Shell employees new to Gabon receive a crash course on the realities of their rainforest surroundings. Biologist Olivier Pauwels is showing newcomers examples of venomous snakes when I arrive at Yenzi, Shell's residential camp, which is situated on the forest edge next to a lagoon and is home to 80 high-level personnel and their families.

Their neighbours include the Gaboon viper, which has the highest venom yield of any venomous snake, but fortunately is rarely encountered. The location is stunning, and offers plenty of opportunities to see wildlife – such as crocodiles, hippos, lizards and monkeys – close up; when I visit, elephants are everywhere.

'Right now, it's the mango season,' explains Pauwels. 'The elephants are coming out of the forest and into the camp to eat the mangoes that have fallen from our trees.' →





**Top:** Shell's main terminal in Gamba, the company's headquarters in Gabon, where oil is gathered before being transferred to tankers. With the accompanying infrastructure, residential housing and expanded human population, Gamba's ecological footprint is greater than in Rabi, where an offshore-style approach with no permanent residences and general environmental sensitivity has had a much less adverse impact on the wildlife; **Above:** Dr Henri Boroubou, a Gabonese botanist from Libreville who was employed by the Smithsonian Institution, identifies a tree in Rabi by studying its fruit through binoculars; **Above right:** a sitatunga crosses oil-carrying pipes in Rabi; **Right:** a white egret stands near the main natural gas flare in Rabi. The flare seems to attract insects, fish and birds – even elephants will stand and stare at the flames



Pressure from hunting – illegal in Gabon but not properly enforced – outside the complex is also encouraging them to enter the camp, as 'they feel safe here'.

Pauwels warns the Shell employees never to approach an elephant, leave food out on terraces, attempt flash photography or walk about camp after dusk. 'Impress this especially on your kids,' he says. 'They won't be able to outrun an elephant.'

### **PIONEERING PARTNERSHIP**

In 2001, conscious of its responsibility to protect the location of its activities in Gabon, Shell broke new ground by establishing an industry–research partnership with the Smithsonian Institution in the USA. Under the partnership, the Shell Foundation – an independent charity set up by Shell – provided



a US\$2.8million grant for the first in-depth study of Central African rainforest biodiversity across the Gamba complex.

Shell Gabon provided logistical assistance and the project won the full support of the Gabonese government. This was different, however, from the usual contractual relationship between industry and scientific consultant. From the outset, all parties agreed to respect the Smithsonian's scientific independence and committed to making the findings fully transparent.

For the Smithsonian, the project represented two opportunities. First, it offered the chance to delve scientifically into an unexplored environment. Second, it gave it the chance to provide information to a company that appeared to want to use it responsibly to improve its land-management practices.

As head of the Smithsonian programme, Pauwels was excited at the prospect of working in such virgin territory, but admits he was initially sceptical. 'I had a very bad impression of the oil industry when I was first told we would be doing an ecological survey on an oilfield in Gabon,' he says.

Five years later, however, the researchers' findings would stun the scientific community and turn the tables on everyone's expectations. When the project started, the first goal was to discover the extent of the biodiversity in the Gamba Complex. 'There were rumours of big populations of gorillas and hippos, but nothing was recorded,' says Pauwels.

Making a taxonomic inventory of the area's fauna and flora was a vast exercise, involving expeditions by a team of 29 scientists and





32 technical staff from various disciplines, agencies and parts of the world. A laboratory was established at Gamba in a group of disused Shell buildings to serve as a scientific base and repository for the natural history reference collections. Today, the laboratory houses a vast collection of flora and fauna and is used for research, training and environmental education.

The scientists recorded almost 3,000 species in the Gamba Complex, including fish, amphibians, reptiles, insects, orchids and trees that had never been seen before. Their inventory included 152 reptile and amphibian species, including the extremely rare giant red skink. There were more than 100 fish species, including seven types of electric fish – two of which were new discoveries; 493 bird species; and 110 mammal species. The scientists also examined 440,000 arthropods and recorded

more than 1,000 species, ranging from ants, grasshoppers, beetles and spiders to scorpions, moths and bees, resulting in the largest invertebrate reference collection in Central Africa.

### TEEMING WITH LIFE

The study was the most taxonomically inclusive to be carried out in Gabon, but the biggest surprise wasn't the dazzling breadth of the area's biodiversity, but where it was found. The greatest concentration of wildlife was recorded not in the two national parks but around Shell's oilfields. In fact, among the teeming forests and wetlands in the Rabi oilfield, the Smithsonian observed the highest number of reptile species ever recorded in Gabon, and discovered the country's second-richest site for amphibians.

This biodiversity is the happy consequence

**Top:** this frog from the genus *Leptopelis* was one of 75 species of amphibian recorded by the scientists, 73 of which were frogs (the other two were from a group of limbless amphibians called caecilians);

**Above:** elephants are particularly common in the areas of forest controlled by Shell – the survey teams would encounter groups of five to ten or more virtually every day. The reduced hunting pressure on Shell's concession is responsible for both their abundance and the fact that they are relatively fearless, often walking alongside moving vehicles; **Right:** the Gabon dwarf shrew, also known as Remy's shrew, is one of the world's smallest mammals: adults weigh in at just 1.4 grams

of the years of isolation imposed on the area by Shell. The field covers 136 square kilometres that have been intensively developed with platforms, infrastructure and laterite roads. However, the company's strict operating and security standards at Rabi, which control public access, land clearing, road construction and site restoration, ensure that no outsiders are allowed in, speed limits of 40–60km/h are enforced and night traffic is banned.

This has been great news for the wildlife. Here, elephants are abundant and monkeys can be spotted leaping through the trees everywhere you look. 'The Rabi oilfield is so well protected that the density is exceptional,' says Pauwels. 'If you want to see wildlife, Rabi is the place.'

'Our studies show that animals inside the Shell-patrolled area take much longer to flee than those outside, which are threatened by poachers,' says Dr Alfonso Alonso, director for conservation and development for the Smithsonian Institution's programme. 'Elephants in the oil concession walk next to you while you are driving along. But if you drive out of the oil concession, it's more difficult to see them. Certain large mammals have benefited enormously from an oil management process that has reduced human hunting pressure on them.'

The scientists' work proved so useful that Shell Gabon is continuing to fund studies, as well as the development of a biodiversity action plan. The relationship, says Pauwels, has developed far further than he initially expected, with the Smithsonian scientists moving beyond an observatory role to a collaborative one. 'We are working on developing recommendation sheets on how to decrease the impact of Shell on the environment and concentrating on practical solutions,' he says.

The Smithsonian team is looking deeper into the primary and secondary effects of Shell's activities. How do animals react when new roads slice through their habitat? Do the same elephants move between the two national parks or stay in the central industrial corridor? Understanding the ecological impact of natural-resource development on the habitat of wildlife is critical to the success of Gabon's protected-area system.

So far, the Smithsonian's recommendations





**Top:** a man waters his crops at the Plantation School near Shell's headquarters in Gamba. The school was funded by Shell in an effort to help locals improve their crop production; **Above:** school students from Gamba learn about the local wildlife at the collaborative Smithsonian–Shell laboratory; **Right:** a road snakes through the otherwise pristine rainforest in Rabi. Strictly controlled access prevents the roads from being used for hunting or logging



involve issues such as human–elephant interaction, road building, traffic speeds and the preparation of well sites. Narrower forest roads, for instance, are being built, with verges seeded with a mulch of indigenous plant seeds and nutrients to encourage growth and prevent erosion.

'We need roads, but they have all kinds of effects,' says Hans Bakker, managing director of Shell Gabon. 'I wasn't surprised to find that if you make a wide road, some animals won't cross it, but you wouldn't imagine that some birds won't fly over it either. So now we don't make the roads too wide to start with and leave the canopies intact in places so that the trees overarch and create paths in the air.'

Other recommendations include forbidding permanent settlements in the forest and keeping land clearance around wellheads to a minimum. Shell was previously restricted to drilling several vertical holes to reach each reservoir, which required a certain amount of clearing. However, recent technological advances now enable it to drill horizontally through oil pockets and around corners underground, reducing the number of wells that need to be created at the surface.

The effects of flaring on wildlife are also being studied. Wells bring a mix of oil, water and natural gas to the surface. After separation, the water is cleaned and released, and the natural gas – unprofitable in Gabon – burned in flares. This activity is especially hazardous to insects, which are attracted by the light and fly into the flames. However, the recently launched Rabi Phase III campaign aims to change that. The US\$300million project will end the need for flaring by reinjecting natural gas into the ground.

### LEARNING LESSONS

This groundbreaking partnership has already offered a fascinating insight into the long-term impact on the environment of oil companies' policies and operations. The Smithsonian Institution and Shell are now working to create an international code of practice that will be applicable to all of Shell's companies working in environmentally sensitive zones.

It has certainly been an excellent PR exercise for Shell, whose reputation was tarnished following controversies over its activities in the Niger Delta and the North Sea with the Brent Spar platform. The lessons learned in Gabon may have important consequences in its explorations in sensitive areas elsewhere in the world, such as Alaska, where it's part of the current oil rush.

The partnership, says Pauwels, is the closest collaboration yet between the oil industry and the scientific community. 'As far as we're concerned, this relationship is extremely solid and interactive. It's a great model for future work that can be done with other oil companies and industries.'