SenRa

CASE STUDY

Wildlife Conservation
Tiger Tracking

Reducing animal and human conflict leveraging LoRaWAN® trackers to inform park rangers of the whereabouts of tigers in near real-time.

Wildlife

THE CHALLENGE

India is home to 70% of all remaining wildlife tigers in the world or around 3,000 tigers today. However, the country only holds just 25% of the total tiger habitat. Due to India's growing population and its wildlife confined to ever-shrinking forests and grasslands, a deadly conflict between humans and the wildlife is underway. In addition to the reduced habitat, poaching is also a big concern for many wildlife conservation organizations, which according to officials, contributes to approximately 24% of tiger mortality.

One of the most common reasons why the conflict occurs is due to tiger predation, which is typically targeted around India's ungulates. Although government-owned forests where tigers live provide large numbers of livestock, tigers sometimes venture outside of the protected areas to other common pasturelands and nearby villages in search for food. Tigers consume around 12% of livestock herds on an annual basis which results in herder frustration and intervention.

The Wildlife Protection Act of 1972 makes it illegal to kill or capture wild animals even when animals are involved in severe conflict situations. Only authorized government officials or agents can intervene making it difficult to deal with life-threatening situations of human–tiger conflict.

Organizations like the Wildlife Conservation Society and the National Tiger Conservation Authority (NTCA) are focused on finding ways to reduce the conflict between humans and tigers.

WHY LoRaWAN®?

One way of implementing such preventive measures is by leveraging technology and smart solutions to reduce the conflict. Smart solutions are now starting to be used to track tigers, detect their movements in protected areas, and alert park rangers when tigers have exited their habitat and could potentially be approaching conflict areas. The Internet of Things (IoT), which include use of hardware, devices, and sensors to send information wirelessly, provide many flexible options for implementing these smart solutions. However, there are still some challenges which present itself when trying to determine which IoT technology is best suitable to meet their needs.

Due to the vast areas needing to be covered, the remote locations where the tigers live, the densely populated forests, and the need for long battery life, the wireless technologies suitable to address these issues are limited.

LoRaWAN® provides low-power, long-range, wide-area communication capabilities and can provide signal even in dense areas like the habitats which tigers live in. Since the smart solutions needed to monitor the whereabouts of the tigers do not require huge amounts of data to be transmitted, LoRaWAN® becomes the ideal option. Also, it requires minimal infrastructure and investment to bring LoRaWAN® coverage to the area.
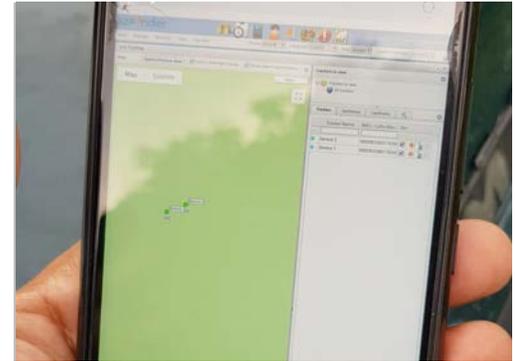
LoRaWAN®

LoRa Alliance™ Member

5 kms of dense forest was covered with one LoRaWAN® outdoor gateway

LoRaWAN® Gateway Installation Site

LoRaWAN® Signal Testing

Tracking Devices on Mobile App

LoRaWAN® IMPLEMENTATION

One of the largest national parks in India which is the abode of the national animal, tigers, wanted to explore the use of a smart solution which would allow them to track and monitor the whereabouts of their tigers. This solution was not only to be used to monitor the tiger locations, but also to protect the park rangers from being harmed during the tracking process.

The existing methodology used was a short-range RF solution which required the park rangers to enter the forest and physically search for the tigers. Unfortunately, there were some past instances were the park rangers where unintentionally harmed / attacked by the tigers. Over time, park rangers were reluctant to properly track the tigers in fear of being hurt. This resulted in increased human-tiger conflict and slower response times due to minimal to low visibility of the tiger locations.

SenRa was contacted to see if they could provide a tiger tracking solution which could address their requirements. The park officials were unable to leverage traditional cellular GPS trackers as coverage was poor in the area. Working with

partners, we were able to source LoRaWAN® enabled GPS trackers that would not only track the tigers but also handle the outdoor environmental factors such as rain and underwater submersion.

To prove the technology would work, the park officials wanted to test the network coverage and the trackers in an area of approximately 5 kms. The park provided access to a tower which was located by one of their park facilities, approximately 30 meters off the ground. The installation site was located on top of a hill which provided excellent line of site of the entire park.

After the installation of the LoRaWAN® gateway was completed, RF signal testing was conducted to verify 5kms of coverage would be provided as requested. SenRa's network engineer used a signal tester while being driven throughout the park by a park ranger and was able to confirm coverage was available.

After confirmation that the LoRaWAN® network was up and running, two park rangers each took a LoRaWAN® GPS tracker and simulated the path and movement of tigers throughout the park. The

data was streamed in near real-time to an application server and was accessible on a mobile application. The trackers were able to successfully send the locations (latitude and longitude) of the park rangers through out the simulation and was available for review post simulation to compare results.

The trackers were tested over a course of several days to confirm battery reliability and the overall performance of the device and network. Park and other government officials were provided a report of the pilot post completion and it was deemed to be a successful pilot by the officials.

Ungulates grazing in the national park

SenRa Network Engineer Touring Park

Park Officials Involved in Pilot

Park Officials Celebrate Success of Pilot

LoRaWAN®
BENEFITS

With the technology proven, the project is planned to move to the next phase which includes attaching trackers around the tigers' neck with the use of collars.

The officials are excited to be able to use this data to monitor the tigers and proactively take action to prevent tigers from venturing out of the protected areas which will inherently reduce human-tiger conflict as well as keep the park rangers safe while doing their jobs.

LoRaWAN® met the needs of the park officials and demonstrated the power of long-range low-powered capabilities which other technologies failed to do. LoRaWAN® can also be used for other smart projects at the park without the need for investing in new network infrastructure.

The proven benefits of LoRaWAN® are:

❑ Provides near real-time insight of sensor data

❑ Provides deep penetration through dense materials

❑ Low-cost deployment options reduce number of infrastructure hardware needed to provide connectivity

❑ The same infrastructure can be used with other solutions reducing the need to invest in new equipment

❑ Devices do not need access to power due to extended long battery life

❑ The Long-range capabilities provide last mile connectivity in rural or hard to reach areas

CONCLUSIONS

Human-tiger conflict is a serious problem that can be addressed with smart solutions. LoRaWAN® proved to be a perfect technology to meet the requirements of the park officials. With good planning, proper expertise, and the use of the right technology, the park officials will be able to protect the lives of the wildlife and reduce the chance of human injuries or even death.