

International Partnership  
Space Programme



## Case Study

# Earth Observation for the Preservation of Ecological Bacalar Corridor

Project lead



Prepared by



# Earth Observation for the Preservation of Ecological Bacalar Corridor

## Overview

**In Mexico there are many societal challenges that could be addressed by exploiting Earth Observation (EO) data, but historically the country has not had sufficient expertise or infrastructure to tackle them. An example is Laguna Bacalar and the surrounding wetlands, a fragile ecological corridor near the Caribbean coastline for which designation as a Wetland of International Importance is being sought. Human impact is already affecting the area but it has been hard to monitor.**

With funding from the UK Space Agency International Partnership Space Programme (IPSP), Surrey Space Centre has been leading a project to set up a monitoring programme for the Bacalar Corridor, with the additional aim of developing links between commercial and academic organisations in the UK and Mexico. The project has also resulted in the creation of a Mexican Centre for Space Applications and training of around 50 students.



## Partners

- UK – Satellite Applications Catapult, Deimos Space UK Ltd, Surrey Satellite Technology Ltd (SSTL)
- Mexico – Agencia Espacial Mexicana (Mexican Space Agency), National Institute of Statistics and Geography, National Council of Science and Technology, El Colegio de la Frontera Sur (ECOSUR), Universidad Autónoma del Estado de México

## Challenge

Laguna Bacalar is a 53km long, narrow lake in the state of Quintana Roo which is the second largest natural freshwater lake in Mexico. The wetlands area between the Laguna and the Chetumal Bay (15km away) is known as the Bacalar Corridor. This area is threatened by ecological and socio-economic changes, primarily from tourism, and there are also concerns about the potential impact of future climate change. The Bacalar Corridor is rated as the highest at-risk conservation area in the Caribbean.

The challenge was to understand the impact of recent human activities and provide data and a local infrastructure that would allow successful stewardship of the area in future. The project also aimed to provide evidence and support for a Mexican application to have Laguna Bacalar designated as a Wetland of International Importance under the Ramsar Convention.



Bacalar lake, the lake of seven colors, monitored during the IPSP project

## Solution

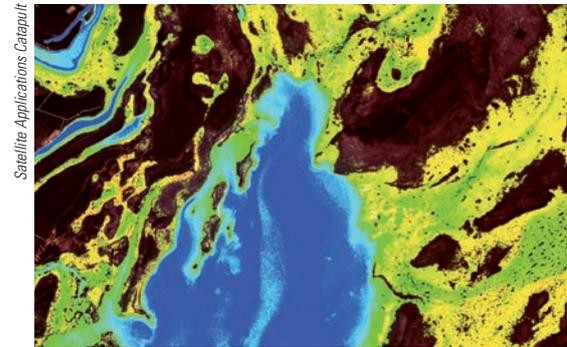
The UK consortium has developed an automated, integrated, user-friendly platform that presents information about the key indicators of environmental degradation in the Bacalar area in real-time, such as the impact of human activities, along with mapping and monitoring of the mangrove ecosystem and water bodies. The system can also generate alerts when intervention is required.

A team of experts from the UK and Mexico identified and analysed UK and EU satellite data, along with local environmental information, to determine which satellite data was most useful for ongoing support using the new platform. The data would also be used to provide evidence required for the Ramsar Convention application. Data from a wide variety of satellites, including the EU's Copernicus programme – specifically Sentinel-1 and Sentinel-2 – plus RapidEye, TerraSAR-X, Alos PALSAR and Landsat, were used to produce local maps showing current land use and changes over the last 9 years.

The solution made use of the Climate, Environment and Monitoring from Space (CEMS) platform, which is hosted by the Satellite Applications Catapult, to support the intensive processing required.

It was clear that this project and future similar ones would benefit from a dedicated centre within Mexico plus additional expertise. This led – during the course of the project, but not funded by it – to the creation of a Mexican Centre for Space Applications within ECOSUR in Chetumal and the initiation of refurbishment of the ERIS antenna, also at Chetumal.

Although the initial plan included training for three Mexican students in the UK, this was changed to enable around 50 students to receive training (in two tranches) in Mexico in remote sensing, Synthetic Aperture Radar and mission design. Holding the training locally enabled Mexican academics to attend as well.



Map showing level of water turbidity in the Bacalar lake and in Chetumal Bay in 2010



Group picture for the UK and Mexican consortia in Chetumal. December 2015

## IPSP benefits

Funding from the IPSP programme has enabled Surrey Space Centre and its partners to support Mexico in addressing a very important ecological project.

More broadly, the project has enabled the UK partners to build on the Memorandum of Understanding signed by the UK Space Agency and the Mexican Space Agency in 2013, leading to much closer ties between commercial and academic organisations in the two countries and opening the prospect of future work in the region for UK companies.

*continued overleaf*

Thanks to the publicity surrounding the project, Surrey Space Centre has received requests for further training and research from within Mexico, from companies wishing to understand how satellite applications can benefit their businesses and solve specific challenges. The publicity may also attract more international students to the University of Surrey, of which Surrey Space Centre is part.

Possibly the biggest benefit for the whole UK consortium is that there has been strong interest from three other countries already for similar ventures.

## Outcomes & Future

The IPSP-funded programme has resulted in a user-friendly platform for monitoring and managing the fragile ecosystem within the Bacalar corridor.

The Mexican Space Agency has taken the opportunity to set up its own Mexican Centre for Space Applications and should have an operational antenna later in 2016 to enable download of significant datasets, and there is potential for UK agencies to be involved in its exploitation.

So far around 50 students and academics have received training, and the Mexican government has expressed interest in more training.

Publicity surrounding the project has also led to interest from other countries in setting up similar centres and providing training, led by the UK partners.

*Be prepared for the 'barriers' presented by different languages, cultures and time zones. If you plan in advance how to cope with the impact of these then you will reduce the chances of your projects failing.*

*Also, from early on in the project consider how the project will survive beyond the end of the funding period – ensure all partners discuss and plan for sustainability.*

### IPSP

The International Partnership Space Programme was a two year, £32 million pilot programme established and led by the UK Space Agency. The aim of the programme was to open opportunities for the UK space sector to share expertise in real-world satellite technology and services overseas and develop international partnerships for mutual benefit. The objectives for this programme were to show the benefits that UK satellite or space technology can provide above and beyond terrestrial solutions; these were provided in terms of societal or economic benefits, for countries that currently do not have these capabilities or wish to develop them further. The aims were for the UK to learn from partnerships with these countries and to establish the UK as the partner of choice with these countries once they are in a position to acquire or enhance their own space or satellite infrastructure.

### UK Space Agency

The UK Space Agency is an executive agency of the Department for Business, Innovation and Skills (BIS) and lies at the heart of UK efforts to exploit and benefit from investment in space technologies and satellite applications. The Agency was created on 1 April 2011, and for the first time integrated UK civil space policy and the majority of programme funding from across Government, the Research Councils and Innovate UK (formerly known as the Technology Strategy Board).

To view profiles of IPSP partners and learn more about satellite applications in emerging markets visit: [starhub.sa-catapult.co.uk](http://starhub.sa-catapult.co.uk)