

An aerial photograph of a forest, showing a dense canopy of trees. A large, dark tree trunk is visible in the lower-left foreground. A white bird is captured in flight, its wings spread, in the upper-left area. The forest floor is covered in a mix of green, brown, and yellow, indicating different types of vegetation and possibly some bare ground or fallen leaves. The overall scene is a high-resolution aerial view, likely from a satellite or drone.

CHIAPAS STATE

Mexico Application

Forests 2020



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Forests 2020

Forests 2020 is a £14.2 million investment from the UK Space Agency to help protect and restore up to 300 million hectares of tropical forests across six partner countries – Indonesia, Mexico, Colombia, Brazil, Kenya and Ghana. Using Ecometrica's digital infrastructure – the Mapping Platform – data from satellites, drones and fieldwork can be overlaid into interactive maps providing information and actionable reports on how forest is changing, which areas are at risk of forest loss, and which areas might be most suitable for restoration.

Chiapas State: Mexico Application

This case study highlights an excellent Mapping Platform application created by ECOSUR, which illustrates the improvement of forest monitoring developed through Forests 2020. This application focuses on three regions within Chiapas state (Marqués de Comillas, Reserva el Ocote and Sierra Madre) which are at risk of deforestation from a combination of pressures including wood extraction, plantations (coffee and palm) and agriculture. This case study describes how data collected by ECOSUR for Forests 2020 is disseminated via the Mapping Platform platform.

Drone and Photo Imagery in Chiapas

Multiple sites in Chiapas state have been detailed with georeferenced drone footage and photographs from field trips made by Pronatura Sur, AMBIO and ECOSUR. These in-the-field images and videos provide supplementary information to other data on the application by helping users visualise what is really happening on the ground. The drone footage is accompanied by a voiceover, as well as details about the area documented, including GPS coordinates, elevation, direction facing, forest type and land use. To view some of the drone videos that have been uploaded to the Mapping Platform in Reserva el Ocote, simply [click here](#), and select the 'Description' button in the pop-up window. To see some examples of the georeferenced photos use the following links and select the 'Description' button in the pop-up window: [Sierra Madre demo](#), [Marques de Comillas demo](#), and [El Ocote demo](#).

Time Series of Land Cover Maps in Marques de Comillas: Manual Approach

For the Marques de Comillas region in south-eastern Mexico, ECOSUR used a manual photo-interpretation change detection method to produce land cover maps for 2005, 2009, 2012 and 2015. This method made use of SPOT 5, 6 and 7 satellite imagery along with field data and high resolution Google-Earth imagery for validation. The maps produced by this manual classification method are showcased on the Mapping Platform within a time series view of map layers; users can play through the four maps to visualise how and where land cover has changed for this region.

Beyond viewing land cover change through maps, the Mapping Platform enables users to query the data, extracting results using charts and tables. For example, by performing a query on Marques de Comillas land cover data within the platform, results reveal that the number of hectares occupied by palm oil plantations has more than doubled from 1554 ha in 2012, to 4810 ha in 2015. These statistics, combined with other results such

as deforestation by year, help to provide accurate, accessible information about what land cover changes (including changes to forest cover) are occurring in the Marques de Comillas region in Mexico.



To investigate the maps and query results for Marques de Comillas, please follow the brief instructions below:

- **To view the data results:** [Click here](#) and select the 'Results' button in the pop-up window. At the top of the results panel, the data for vegetation cover and land use for 2005, 2009, 2012 and 2015 are presented in an interactive bar chart and in a table.
- **To view the map time series:** Stay on the application after using the link above (or access the app [here](#)). Click on 'Display Groups' and scroll down to 'Vegetación y uso de suelo (Castillo, 2017)' - the one with the clock icon . Click on this series and then use the the tools that open at the bottom of the map view to play through the series of map layers.

Land Use/Cover Maps in Chiapas: Semi-Automated Approach

ECOSUR have also developed a method to detect change which makes use of a semi-automated (or hybrid) approach to land classification (Figure 1). This method involves several stages including supervised classification using the random forest algorithm and post-processing performed by expert photo-interpreters. Next, automated processes detect areas under suspicion of change by comparing satellite images from different years, and then these changes are corroborated by expert photo-interpreters. Using the first part of this methodology, ECOSUR has produced land cover maps for 2015 in the Marques de Comillas, Reserva El Ocote and Sierra Madre regions of Mexico. They are currently working to implement the second component of the change detection methodology for 2012-2015 and have built land cover change maps for 2005 to 2012.

To view the 2015 data for Marques de Comillas, Reserva El Ocote and Sierra Madre

and access results for these areas, please follow the quick instructions below:

- **To view the data results:** Click on one of the area names ([Marques de Comillas](#), [Reserva El Ocote](#), [Sierra Madre](#)) and select the 'Results' button in the pop-up window. To view the 2015 land use data within a bar chart for the area you clicked on, scroll down to the title: 'Cobertura y uso del suelo 2 (Castillo et al, 2018)'.
- **To view the map:** Stay on the application using the links above (or access the app [here](#)). Click on 'Display Groups' and scroll down to 'Cobertura y uso del suelo (Castillo et al, 2018)'. Click on this group and then click on 'Mapa elaborado con clasificación automatizada' map layer. Press the Zoom to Layer button () to view the map layer coverage for Marques de Comillas, Reserva El Ocote and Sierra Madre.

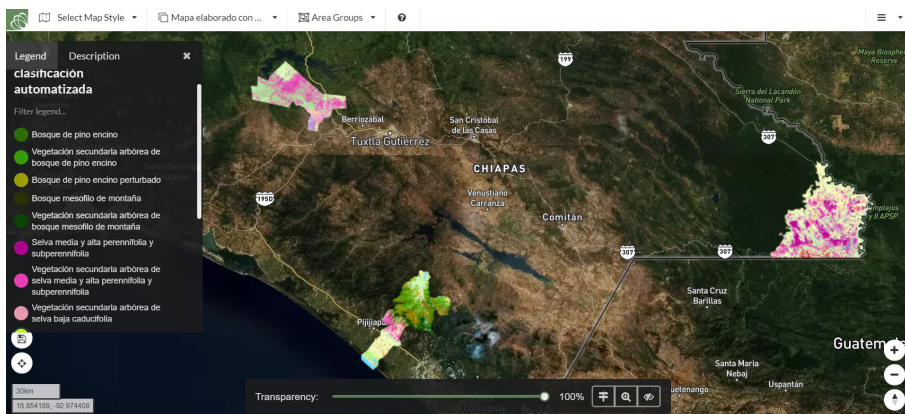


Figure 1 - Automated land cover change maps for Chiapas State

Support from Forests 2020

After conversing with researchers at the University of Leicester, ECOSUR translated their data processing chain into Python which has proven more efficient than past methods. Before Forests 2020 began, there were only low resolution maps available (1:250,000 scale) made from photo interpretation and updated every 5 years. With support from Forests 2020, ECOSUR are developing semi-automated high resolution maps (1: 50,000 scale), with approximately 30 types of land cover classification which could be re-created every 2 years to monitor forest change.

Looking Forward

ECOSUR's application is a great success of Forests 2020 in Mexico - it demonstrates different methods being tested in Chiapas to monitor forest change and shows how ground information can be used to validate and calibrate maps. The next twelve months will see a move from testing datasets to scaling up methods to larger areas (e.g. state level).