



# Preserving Biodiversity through Geospatial Technology



Landsat imagery and Trimble's eCognition software prove invaluable to conservation effort in Laos

The Nam Et-Phou Louey National Protected Area covers almost 600,000 hectares of wild, mountainous terrain in northern Laos.

## Software

Trimble eCognition  
Developer software

Find out more at [ecognition.com](http://ecognition.com)

# overview

Laos is home to one of the last tiger populations in Indochina and one of the most important remaining populations of northern white-cheeked crested gibbons, a critically endangered primate found only in Vietnam, Laos and southern China.



One of the principal threats to wildlife in the protected area is habitat loss through deforestation and forest degradation. Increasing human population, shifting cultivation patterns and fire have resulted in forests being replaced by large patches of grasslands, bamboo and other secondary vegetation. These changes threaten local wildlife and exacerbate climate change.

A pristine, natural environment is vital to the preservation of the tigers and gibbons, as well as almost 40 other globally threatened mammal and bird species, making the protected area critically important for biodiversity conservation.



## CHALLENGE

To help protect this critical habitat, the Wildlife Conservation Society (WCS) in Lao PDR initiated a project to assess the potential for reducing harmful greenhouse gas emissions in the Nam Et-Phou Louey region. As with many conservation projects, one of the biggest roadblocks was lack of adequate and sustainable funding.

The local management unit, with support from WCS, implemented many activities to protectively manage the area, including community outreach and awareness—but securing sufficient funds to conduct the range of activities needed was a constant challenge. Laos is a “least developed country” or LDC, so government investment in biodiversity conservation is minimal. This leaves the protected area vulnerable and largely dependent on international donors.

To address the lack of financing and the threat of forest loss, the management unit and the Wildlife Conservation Trust joined forces with the Laos–German Climate Protection through Avoided Deforestation (CliPAD) project to develop the protected area as a United Nations Reducing Emissions from Deforestation and Forest Degradation (REDD) initiative for the voluntary carbon markets. REDD works to establish economic incentives for local people by making the forests worth more standing than cleared or burned. Projects that reduce rates of deforestation generate carbon credits that can be sold by communities as a way of diversifying and supplementing livelihoods.

Before the project could move forward, an extensive feasibility study was needed to determine if the area was viable for generating carbon credits. WCS enlisted the help of Planet Action, a non-profit initiative supporting organizations in their fight against climate change.



The intent was to use imagery and software provided by Planet Action to produce an in-depth assessment of the issues facing the Nam Et-Phou Louey region, including:

- ▶ A historical analysis of deforestation and degradation;
- ▶ The development of a model to predict future deforestation and degradation;
- ▶ An estimation of the project's carbon credit generating potential; and
- ▶ An assessment of the overall feasibility of the project to access carbon markets.
- ▶ The big question: How best to accurately and efficiently assess almost 600,000 hectares of forested, mountainous, challenging terrain?

## SOLUTION

WCS started by collecting Landsat imagery for the entire Nam Et-Phou Louey National Protected Area for four dates spanning the last 10 years, in order to identify past (and predict possible future) deforestation and degradation. To analyze so much image data manually, however, would take an overwhelming length of time.

Through a Planet Action grant, WCS obtained Trimble eCognition, an advanced image analysis software solution for geospatial applications. The software enables geospatial data to be integrated and analyzed in order to quantify features and detect changes over time, allowing for the easy extraction of accurate geo-information. It accelerates automatic mapping, change detection and object recognition, delivering standardized, reproducible image analysis results.

“The tools provided by Planet Action were absolutely invaluable to quantifying the extent the area was affected by deforestation. Without Trimble eCognition, we would have had to do manual classification on 600,000 hectares, for four time periods, across an area that's quite heterogeneous. It would have taken forever, and may not have been possible.”

Colin Moore, Regional Advisor on REDD+ and Climate Change on behalf of WCS – Lao PDR

The landscape, a vast sprawl of mixed deciduous, dry evergreen, and upper montane forests, is a huge expanse to conserve and monitor, and mapping the mountainous Laos terrain is incredibly challenging. The Landsat imagery can be difficult to automatically interpret due to shade, heterogeneous forest types and seasonal conditions, which strongly affect measurements.

Trimble eCognition's advanced object-based image analysis technology helped overcome these challenges. Topographic maps coupled with satellite data were integrated into the software to build a customized rule set to assess the variable Nam Et-Phou Louey terrain. High-resolution Spot image data provided by Planet Action was used to conduct accuracy assessments of the final products and ensure they achieved at least an 80 percent mapping accuracy of forested vs. non-forested land.

The image data collected by WCS was used to create detailed land cover and land use classification maps to help calculate carbon stocks and predict baseline rates and locations of deforestation. This allowed for accurate predictions of the project's long-term emission reduction potential, providing a basis to assess the project's ability to generate carbon finance.



## OUTCOMES AND STATUS

Following the area assessment using Trimble eCognition, it was discovered that deforestation rates within the area were lower than expected; in other words, the project would be financially unsustainable in the long run. So a different approach was needed.

In collaboration with CiPAD and the government of Laos, WCS designed a new project encompassing on the entire province rather than just the protected area. Trimble eCognition was used to track deforestation across this larger area, an expanse so vast it would not have been possible without the software. With these new results, WCS was able to develop a fresh REDD approach that targeted drivers of forest loss on a broader level.

The new project focuses on developing suitable framework conditions and pilot models for effective forest conservation at the provincial level, which could ultimately extend nationally. Continuous forest cover change monitoring will be integral, so Trimble eCognition will remain an essential tool for projects and governments as they move ahead with future REDD endeavours.

Unfortunately the tiger population has changed since the first proposal of the feasibility report. Current camera trapping suggests numbers have decreased drastically and a viable population no longer exists, only a few individuals. The Nam Et-Phou Louey National Protected Area, remains an important site for many other carnivore species.



Image courtesy © Colin Moore / WCS and DFRM Lao PDR

### Wildlife Conservation Society

The Wildlife Conservation Society (WCS) has been saving wildlife and wild places worldwide for over a century. Focusing on science, global conservation, education and the management of the world's largest system of urban wildlife parks, WCS works to enhance the integrity of life on earth by promoting the importance of living in harmony with nature.

### Planet Action

Planet Action is a non-profit initiative that supplies climate change projects with satellite imagery and geo-information; deforestation is a major part of the organization's focus.

To date, Planet Action and partners like Trimble have donated their Trimble eCognition image analysis software licenses to more than 50 conservation projects in 43 countries around the world.

### UN-REDD

The UN-REDD Program is a United Nations initiative on Reducing Emissions from Deforestation and forest Degradation in developing countries. REDD is a unique collaboration aimed at monitoring forests and engaging governments on the importance of conserving biodiversity and ecosystem services to improve food security and safeguard livelihoods.



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