

# Nationwide Parcel Title Project in Peru Requires Fast and Accurate GPS Mapping

**Customer**  
**Ministry of Agriculture,**  
**Peru**

**Project**  
**PETT**  
**(Proyecto Especial de**  
**Tiutilacion de Tierras)**



In 1996, Peru launched a massive land-titling program aimed at mapping parcels and collecting property ownership information for the entire nation. Known as PETT (Proyecto Especial de Tiutilacion de Tierras), the ongoing project seeks to establish ownership rights and boundary lines for the more than four million parcels of land that have been purchased, developed, or settled by Peruvian citizens. To date, more than 2 million parcels have been measured and titles have been issued for more than 1.6 million of those parcels.

Establishing clear title to a parcel is of critical importance to the people occupying and using the land. Once a person has received the land title, that individual is eligible for a variety of assistance programs sponsored by the Peruvian government and international aid organizations.

Project plans called for implementing PETT in three geographic phases, beginning with Peru's extensive coastal region along the Pacific Ocean. With this coastal phase completed, the role of GPS technology in mapping parcel boundaries has expanded both in scope and importance as the project moved into the treacherous mountains and dense jungles of Peru.

The mountainous sierra region and tropical jungles remain obscured by clouds most of the day, which made reliable aerial photography virtually impossible. PETT decided to upgrade their GPS equipment and make GPS their primary property mapping tool. After testing several brands of receivers, PETT officials selected the Trimble line of mapping-grade GPS units designed for mobile GIS data collection. PETT initially purchased the GPS Pathfinder® Pro XRS receivers and base stations for use by field crews in its 27 regional offices. Subsequent sales have included the GeoXT™ rugged GPS handheld receiver, and the GPS Pathfinder ProXH™ receiver, introduced in 2005, which is capable of achieving subfoot accuracy.

In selecting the Trimble GPS equipment, PETT officials took into account two key requirements—speed and accuracy. With more than 1.2 million properties to map in the sierra region and another 400,000 in the jungles, crews are limited in the amount of time they can spend occupying one point. In these tests, the Trimble equipment consistently achieved submeter accuracy in one minute per point, even in the dense jungle and rugged mountain terrain.



During typical field operations, a three-person PETT crew departs from its regional office. In rare cases, the crew carries a decades-old reference map, but they usually rely entirely on their equipment and personal interviews to create maps and establish land ownership. The crew first visits the lieutenant governor who is the Peruvian government's local representative in specific jurisdictions. He provides the crew with leads on which properties are currently occupied and where they are located.

The crew travels to each property to interview the person using it. On private property, the person needs to prove that he has occupied and used the land for a period of time in order to receive title to that parcel.

As part of its property titling effort, Peru has passed laws that award parcel titles to individuals who have lived on or developed a piece of land for more than five years, even if the land, at one time, had been considered the private property of another owner. For a property that had previously been titled to the national government, a person

## PROJECT HIGHLIGHTS

- The government of Peru relies on submeter GPS receivers to quickly map parcel boundaries.
- Speed and accuracy are the two key requirements in GPS receiver selection.
- Submeter GPS data accuracy is achieved even in dense jungles and rugged mountain terrain.



need only prove one year's use to receive the title. Any land that does not have a current title and exhibits no agricultural or commercial activity is assumed to be government property.

PETT crews often must validate this one- or five-year occupation period through corroboration from the lieutenant governor or people on neighboring parcels. Once ownership has been established, the crew enters a basic property description into the digital data collection device integrated with the GPS receiver. Although collecting attributes in this manner is an extremely fast method of recording descriptive and legal information and linking it to the location data for each parcel, the crew also takes written notes.

The property owner must sign a paper to confirm ownership. These papers, along with the coordinates of the parcel, are published for public review. If there is no ownership challenge, the title is awarded.

With assistance from the landowner and often the neighbors, the crew identifies the property boundaries and collects submeter GPS points at the parcel corners. Each day, the crew establishes a GPS base station as a source of real-time differential correction near the properties that are being mapped. In the deep valleys of the Andes Mountains and the dense tropical jungles of the Amazon region, PETT crews continue to acquire submeter data in one minute or less.

The EVEREST™ multipath rejection technology built into the Trimble receivers has been credited with maintaining data accuracy and collection speed despite the extensive signal reflection that occurs in the mountains and under the jungle canopy.

By summer 2005, PETT had mapped about 60 percent of properties in the sierra region and about five percent in the jungles. The project is expected to continue for at least four more years.

**The equipment used on this project includes:**

- GeoXT handhelds
- GPS Pathfinder ProXH receivers
- GPS Pathfinder Pro XRS receivers



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