

Agricultural Encroachments in The Chiquibul Forest 2016 - 2018



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INTRODUCTION

Agricultural encroachment for "*milpa*" farming (slash and burn agriculture) is the main cause of deforestation within the Chiquibul Forest. Slash and burn agriculture (is a shifting farming system in which cleared fields are cultivated for fewer years than fallow) supports the livelihood of many, usually poor populations in the tropics. This practice is also a major precursor of permanent monoculture agriculture and cattle ranching. Within the Chiquibul, the forest is cleared by poor peasants from nearby Guatemalan communities for planting mainly corn, beans, and pumpkin, but recent trends demonstrate that pastures for cattle ranching are being established. In some cases, marijuana is cultivated in new isolated, deforested patches or within existing *milpa* farms.

Satellite imagery shows that in adjacent Guatemala, forest cover is almost non-existent, despite it being a biosphere reserve; while in Belize's Chiquibul the forest remains contiguous. The first deforestation patches in the Chiquibul were recorded around 1985 and this has continued to rise. Within the Chiquibul Forest there are no legally recognized permanent human settlements, but 11 Guatemalan communities are in close proximity to the Chiquibul Forest, some located less than 200 meters from the Belize-Guatemalan border (Map 1). In addition, over 60 other communities exert some level of pressure over the resources found in Belize. These communities are highly dependent on the natural resources and due to the high level of forest fragmentation in Guatemala, villagers have been illegally harvesting the resources found in the Chiquibul Forest for decades. Illegal activities include poaching, illegal wildlife trafficking, looting of Mayan ruins, illegal logging, xaté extraction, gold panning, cattle ranching and agricultural encroachments.

METHODS

Deforestation, in the Chiquibul Forest was analysed using 30-meter resolution Landsat8 satellite images from the following dates: 17th April 2016, 23rd February 2017, and 3rd March 2018. These dates coincide with the peak season for *milpa* farming and thus land clearing. Deforested patches were manually digitized and size calculated. The deforestation analysis was carried out at two levels:

1. All deforested patches were digitized and analysed by year; and
2. Only active *milpa* fields were digitized and analyzed by year.

This was done to understand the dynamics of deforestation in the study area.

RESULTS

From 2016 to 2018, the results indicate a clear decline in the accumulative area deforested in the Chiquibul Forest (Figure 1). In 2016, an estimated 3,754 ha. had been deforested compared to 2,888 ha in 2018.

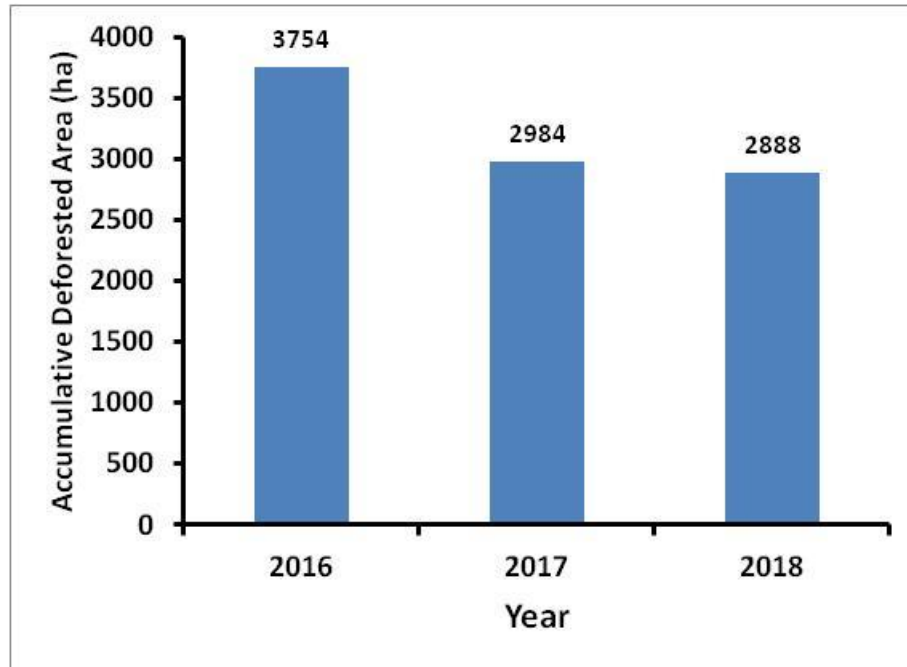
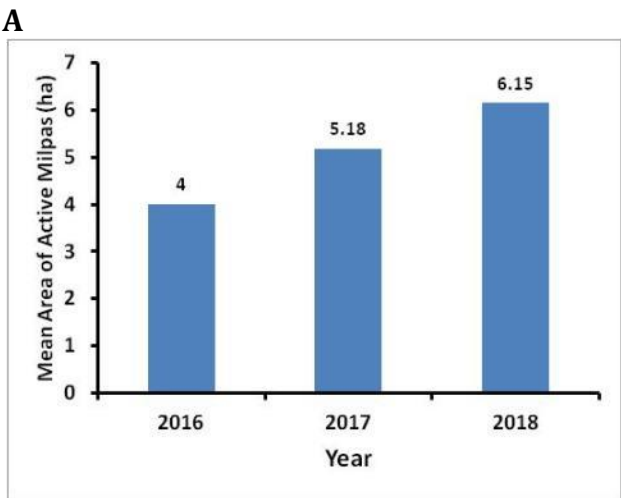
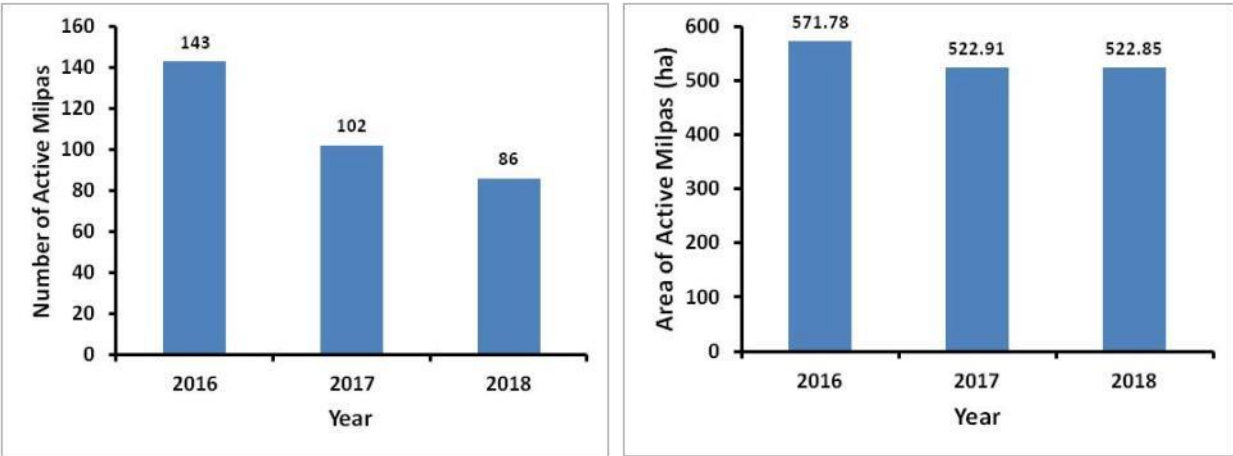


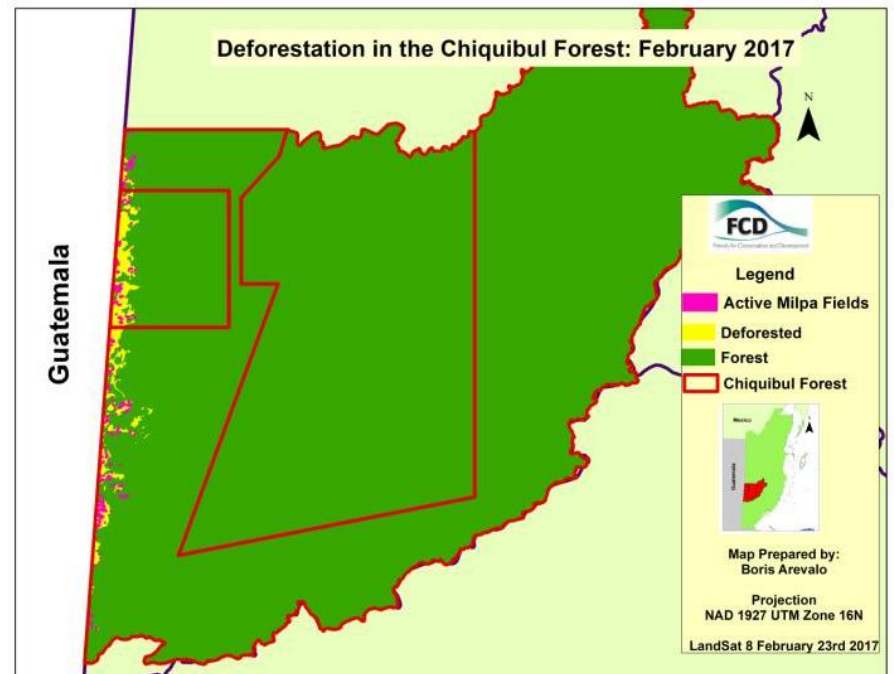
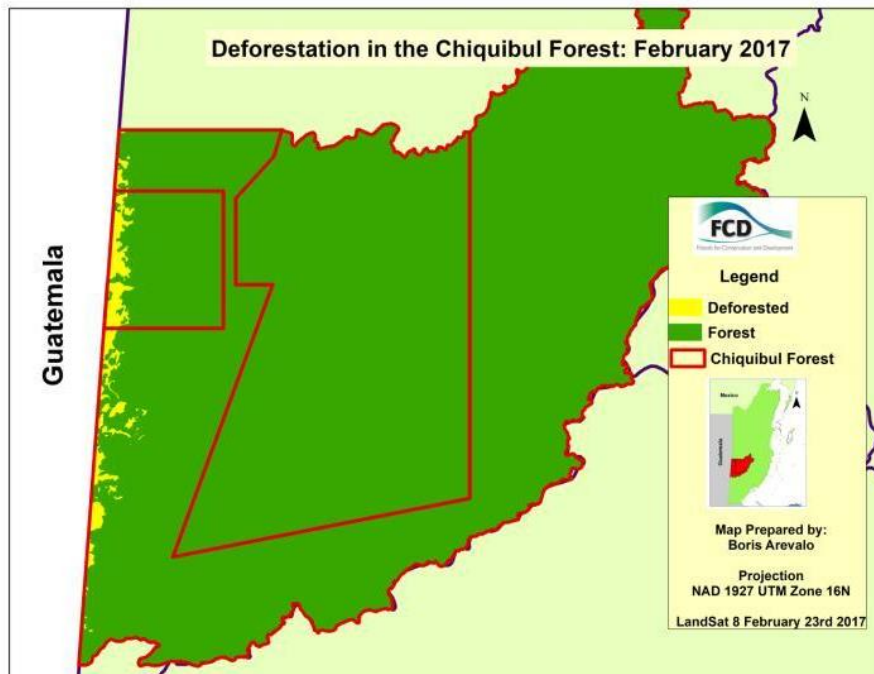
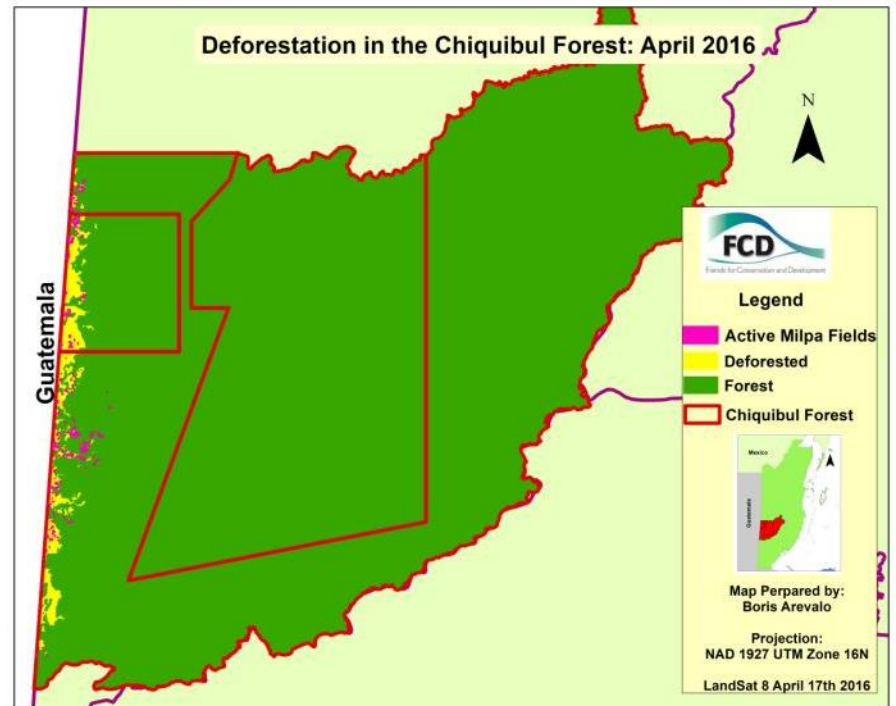
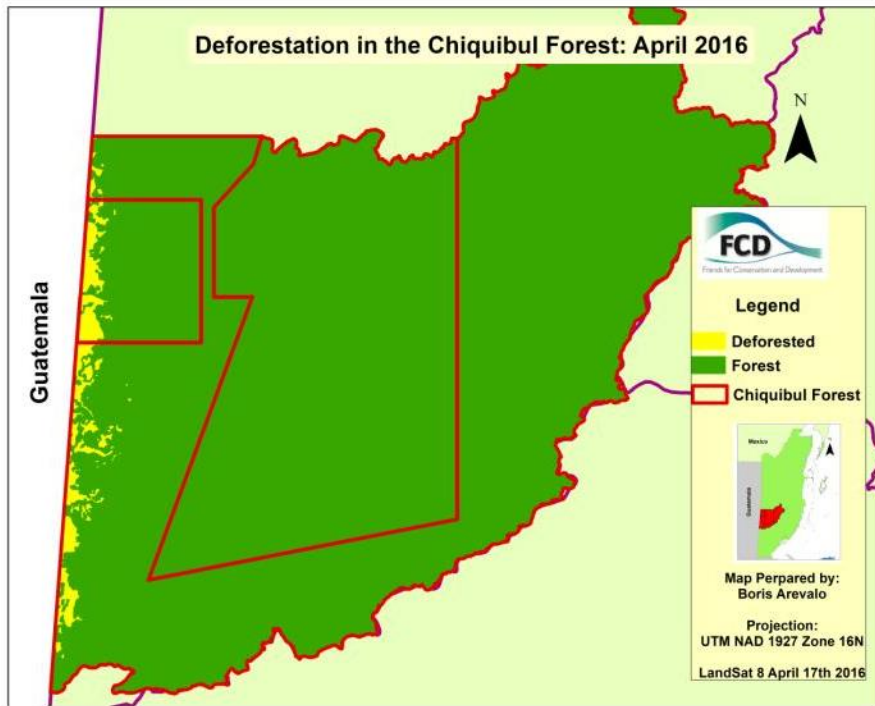
Figure 1: Accumulative deforested area within the Chiquibul Forest for 2016 to 2018

The number of active *milpa* fields decreased from 2016 to 2018 (Figure 2 A). During 2016, a total of 143 active fields were recorded compared to 86 in 2018. Although there was a decrease in the abundance of active *milpa* fields, the area covered by these fields show little variation from 2016 (571.78 ha) to 2018 (522.85 ha., Figure 2 B). The reason why the area of active *milpa* fields did not vary much was due to the fact that the mean patch area of the fields increased from an average of 4 ha. (minimum = 0.28 ha., maximum = 37.15 ha.) in 2016 to 6.15 ha. (minimum = 0.35 ha., maximum = 26.36 ha.) in 2018 (Figure 2 C).



C
Figure 2: Abundance (A), area (B) and mean size (C) of active milpa fields recorded from 2016 to 2018 in the Chiquibul Forest.

The spatial distribution of deforested area is concentrated along the Belize-Guatemalan border (Figure 3). The Caracol Archaeological Reserve (CAR) is most impacted by milpa farming, but the western-central region of the Chiquibul, referred to as Cebada is showing an increase in deforestation rate. Spatial distribution of active *milpa* fields, indicate that the activity is very dynamic (Figure 3). In 2016, most of the active *milpa* fields were located on the north Caracol-Caballo area and in the Cebada area as well. During 2017, the pattern changed to mostly along the western boundary of the Caracol Archaeological Reserve and Cebada area. Finally, in 2018, active *milpa* fields were concentrated on the southern Caracol and Cebada area, but closer to the Belize-Guatemalan border in comparison to the previous years where deforested patches were recorded in the Cebada area more than 4 km. from the border into Belizean territory.



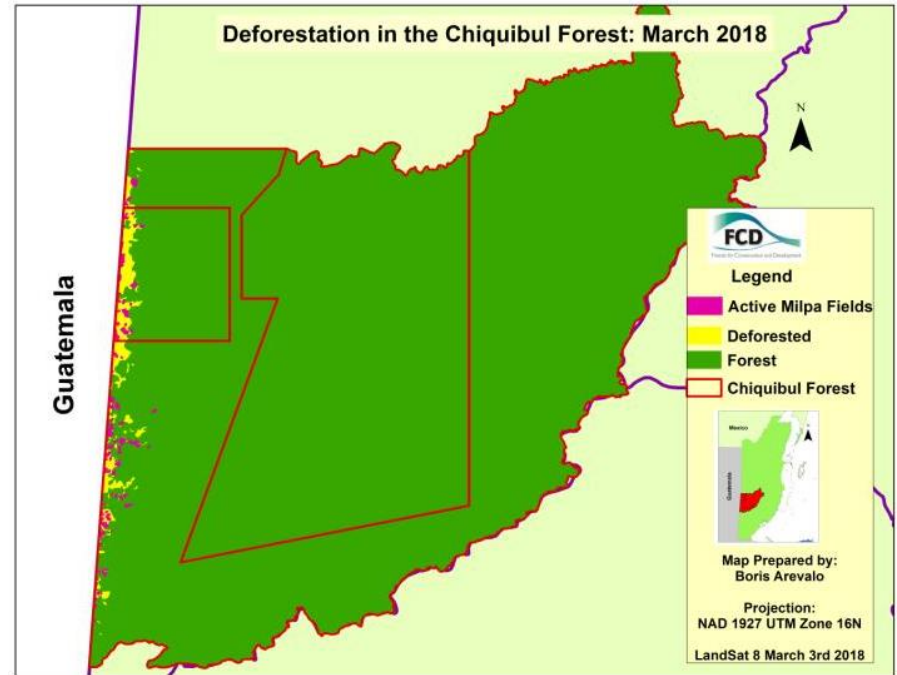
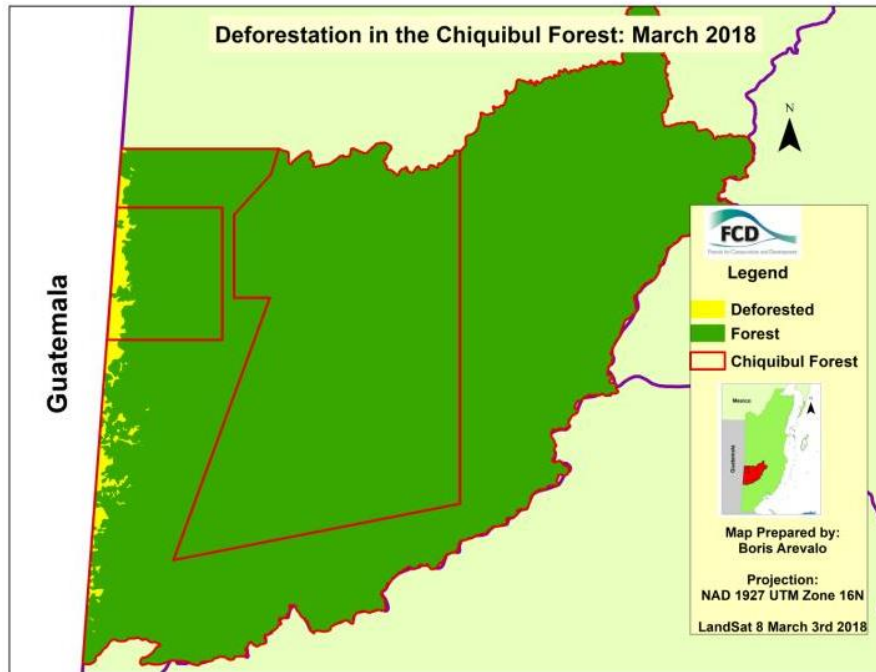


Figure 3: Spatial distribution of deforested areas and active milpa fields in the Chiquibul Forest from 2016 to 2018.

DISCUSSION

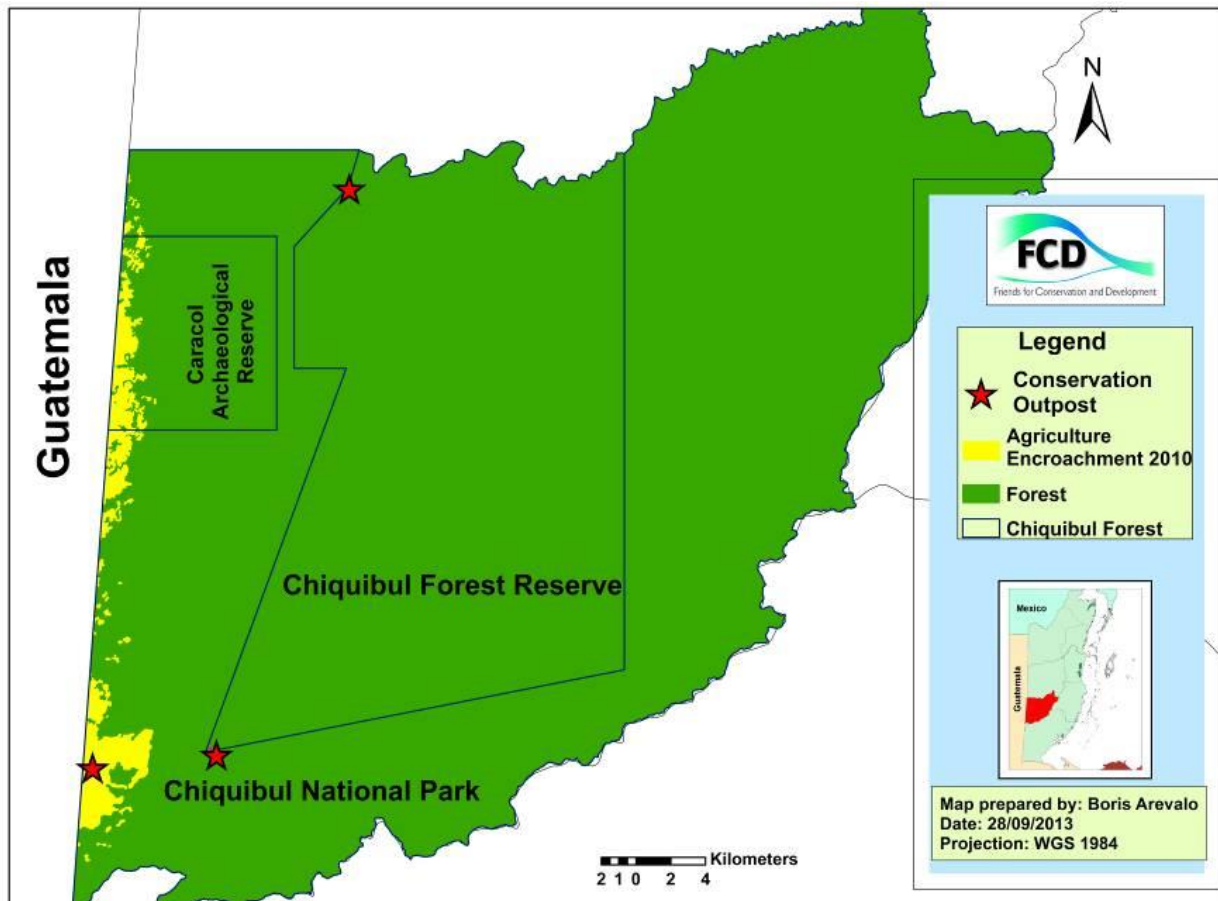
The satellite imagery analysis clearly shows a decrease in the accumulative deforested area from 2016 to 2018 and identifies the Caracol Archaeological Reserve and the Cebada area as being major deforestation hotspots. This analysis also shows that *milpa* farming is very dynamic and active fields tend to shift in both spatial locations and patch size from one year to the other. The number of patches under active *milpa* farms decreased from 2016 to 2018 but the total area occupied by these active *milpa* farms did not vary much during this time period where only a decrease in 49 ha was reported from 2016 to 2018. The reason was that average patched size increased from 4 ha. in 2016 to 6.15 ha. in 2018. One potential explanation to this increase in patch size under cultivation could be that Guatemalans are concentrating their farming activities to more centralized locations, where a farmer instead of clearing more than one plot concentrates in tending to a single but larger plot. The dynamic nature of *milpa* farming within the Chiquibul Forest makes it more difficult to be addressed by law enforcement agencies, as it is always uncertain where *milpas* will be active, and become obvious until these have been established.

The establishment of Conservation Posts (CP) within the Chiquibul Forest, especially those operated to address agricultural encroachments, to this date shows indications of success. It is clear that before the Rio Blanco Conservation Post was installed in late 2008, in southern Chiquibul, this was a major deforestation hot spot (Figure 4 A). Over the last 10 years the presence of joint forces in the Rio Blanco CP has allowed the deforested areas to regenerate naturally becoming early succession secondary forests (Figure 4 B). This is one of the areas where a significant area of forest has been recovered. Following this, the Valentin, Caballo and Cebada CPs have been installed in 2015, 2017 and 2018 respectively with the objective of addressing agricultural encroachments in those areas. At this point in time the impact is difficult to quantify as fields are still in early fallow stage and categorized as deforested areas by using the present satellite imagery resolution.

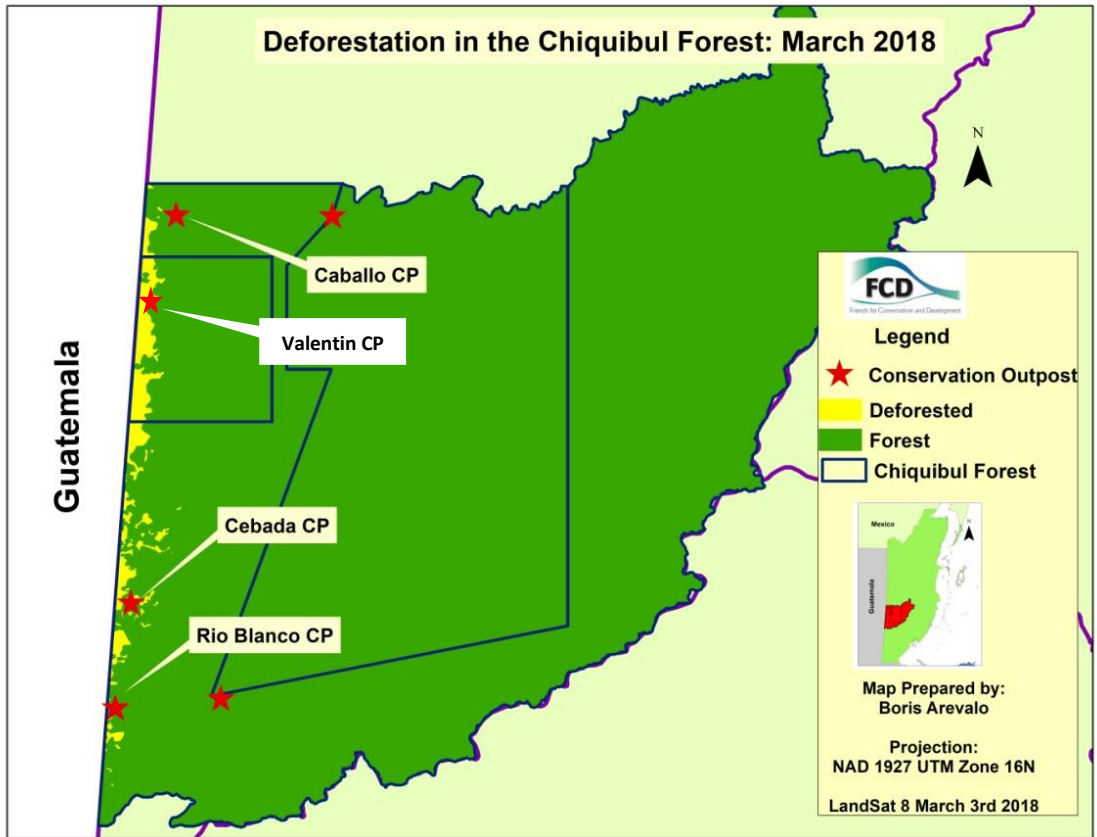
In addition to the Conservation Post effort, Environmental Law and Monitoring (ELAM) patrols launched with security forces and FCD park rangers have been effective in documenting the forest degradation, validating the size of fields, and arresting the situation.

For this year, six operations have been conducted, two in south Cebada, two in Cebada, and two in the Caballo region. As a result, seven persons have been detained (4 in south Cebada, 2 in Cebada and 1 in Caballo). During the arrests in South Cebada, four firearms were also confiscated. At least four large beans plantations were discovered on the ground but these were not destroyed. Aerial recces later discovered that the forest is regenerating to its natural state. In Cebada, at the newly built Conservation Post, two operations led to the arrest of two persons illegally farming and two horses were confiscated. In the area of Caballo, during the arrest the farmer was found planting cannabis.

When comparing the deforested area in 2012 (highest recorded deforested area) to 2018, there has been a marked decrease of 25.37%, which is equal to 982 ha of recovered early secondary growth forest (Figure 5). This is indicative that targeted efforts aimed at addressing deforestation are having positive impacts. It is also important to understand that deforestation is dynamic and if not on guard, it may continue to increase in acreage rather abruptly.



A



B

Figure 4: Accumulative deforested area in the Chiquibul Forest in 2010 (A) and 2018 (B) overlaid with the present Conservation Posts.

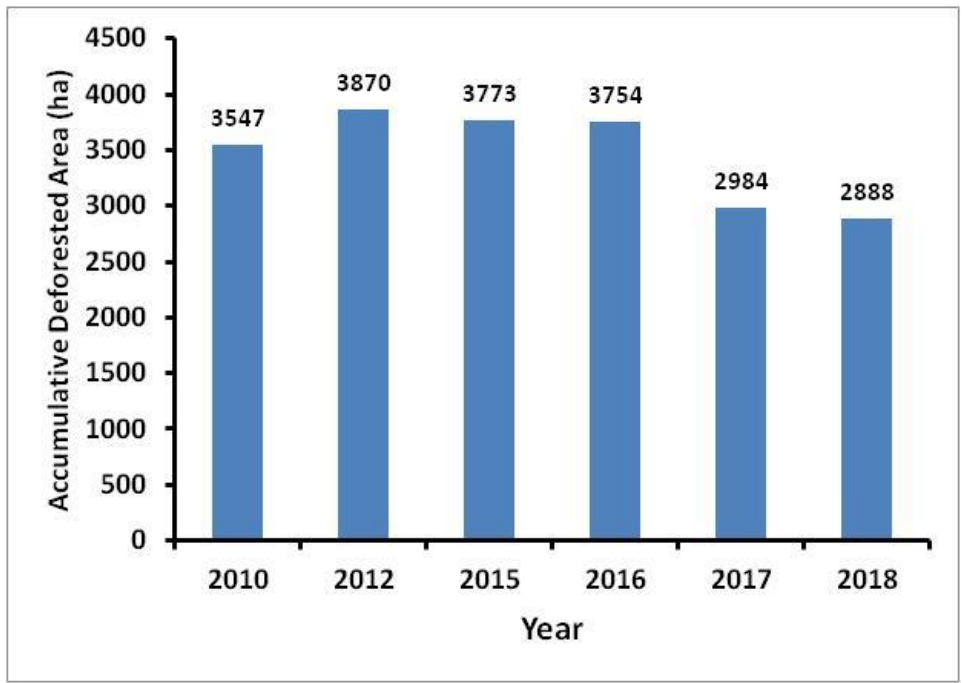


Figure 5: Accumulative deforested area in the Chiquibul Forest from 2010 to 2018

Agricultural encroachment by Guatemalans is the major agent of deforestation in the Chiquibul Forest. Once cleared it gives way to slash-and-burn farming. Main crops being cultivated are corn, beans, and pumpkin. Recently a trend of establishing cattle pastures has been observed, this is more a permanent activity that requires immediate attention. If left unchecked, this could lead to serious governance issues as observed in northern Chiquibul, in the Vaca Forest Reserve, where illicit activities are out of hand. It has also been observed that marijuana plantations are becoming more common. These plantations are mostly located in isolated deforested patches or grown among the corn. Observations of both cattle pastures and marijuana plantations have been made through aerial reconnaissance, thus quantifying the area covered by these activities is difficult. The 30-meter resolution images used on this study also makes it impossible to distinguish these land use types.

RECOMMENDATIONS

- With the installation of Conservation Posts in hotspots areas, an effective, robust and consistent patrol system is necessary to be conducted particularly from the months to November to May with the aim of dissuading any farmers in the area to remove forest cover and conduct slash and burn farming.
- Maintain a public outreach campaign (in Spanish and ketchki) using Guatemalan radio stations to inform the community members of southern Peten about the fines imposed on persons found degrading Belize's protected areas.
- Instill and maintain the practice of destroying crops once found within the protected areas, and prosecute persons found. Many fields are large but multi-day operations can be effective in eradicating these fields such as those in Caracol and South Cebada.
- Promote the conduction of link-ups between the two armed forces (Belize-Guatemala), in areas where Guatemalan communities are located, primarily those nearest to the Adjacency Line. The frequency of these can help dissuade farmers from planting crops in the Chiquibul Forest.
- Encourage and support Asociacion Balam and other institutions in Guatemala with the development of alternative livelihoods among those communities located nearest to the Adjacency Line with the aim of supporting a local economy and reduce agricultural incursions.
- Develop a plan of action that addresses cattle ranching with the intention of containing and controlling increase of cattle pastures inside and beyond the Adjacency Zone. This is an evolving trend, but one that will be extremely difficult to control once left unchecked.

- Maintain aerial reconnaissance expeditions from November to March of every year aimed at documenting any human activity along the western flank of Belize's protected areas.
- Conduct a finer forest change dynamic analysis to identify areas where the forest is being lost and where it is being recovered.