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Status of Cross-Border Cattle Ranching Encroachments in the Vaca Forest Reserve and Chiquibul Ecosystem

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Table of Content

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To the Data Analyst, Jorge Pott we are thankful for the compilation of data.

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Friends for Conservation and Development (FCD) is a non-governmental organization dedicated to the protection and sustainable management of the Belize's natural and cultural heritage, with a focus on the Chiquibul National Park (CNP). Based in the Cayo District, FCD works to combat threats such as illegal logging, wildlife trafficking, andcross-border encroachment through forest patrols, biodiversity monitoring, and environmental education. The organization collaborates with government agencies, local communities, and international partners, and is especially known for its conservation efforts involving key species like the Scarlet Macaw and Jaguars.

Global Financial Integrity (GFI) is a Washington, DC-based think-tank focused on illicit financial flows, illicit trade, money laundering and other financial and environmental crimes. GFI publishes research in these areas, conducts journalist training, provides consulting services to governments in Africa, Latin America, and the Caribbean on effective solutions, and promotes pragmatic transparency actions in the international financial system to foster development and security.

The conclusions reached in this report reflect the views of the authors and were arrived at through careful, technical research. The document do not necessarily reflect the opinions of participating organizations.

Abbreviations

Abbreviation	Meaning
AZ	Adjacency Zone
BDF	Belize Defence Force
BFD	Belize Forest Department
CAR	Caracol Archaeological Reserve
CASP	Chiquibul Aerial Surveillance Program
CE	Chiquibul Ecosystem
CNP	Chiquibul National Park
CM3	Chiquibul Maya Mountain Massif
CMMBR	Chiquibul-Montanas Mayas Biosphere Reserve
CFR	Chiquibul Forest Reserve
CONAP	Consejo Nacional de Areas Protegidas
CP	Conservation Posts
DOS	Dark Object Subtraction
DTO	Drug Trafficking Organization
FCD	Friends for Conservation and Development

GFI	Global Financial Integrity
GIS	Geographic Information Systems
MBR	Maya Biosphere Reserve
NGO	Non-Governmental Organization
NNG	Non-native Grasses
NORAD	Norwegian Agency for Development Cooperation
NPAS	National Protected Areas Systems
SI	Statutory Instrument
SMART	Spatial Monitoring and Reporting Tool
VNIR	Visible and Near Infrared
VFR	Vaca Forest Reserve

Summary

As co-managers of the Chiquibul National Park, FCD has realized that deforestation, along the western flank of the park, namely the Belize-Guatemala adjacency line, has been a persistent issue for the past 30 years. What once was dominated by small-scale slash-and-burn peasant farming has now shifted to intensive and expansive illegal cattle ranching operations (Gentle 2022).

Belizean authorities, and FCD, now fear that these ranches may not only contribute significantly to forest loss but may also be tied to broader networks of financial crime, including land laundering and illicit cross-border trade. The scale and organization of these activities have made them increasingly difficult to address, raising concerns about governance, enforcement capacity, and financial integrity in the region.

Remote sensing analysis of a Sentinel-2 imagery dated November 24, 2024, indicate that approximately 1,666.61 acres (674.45 hectares) are being actively encroached for cattle ranching along the western flank of the Vaca Forest Reserve, and 1,894.36 acres (766.62 ha) in the Chiquibul ecosystem (CE) (Guerra 2025). These activities are often linked to Guatemalan communities near the border, many of whom lack sufficient land for their livestock and are thus expanding inside Belizean protected areas.

The expansion of cattle ranching is often linked to wealthy Guatemalan individuals seeking new pasture lands, given the scarcity of available land on their side of the border while using rural villagers to clear the forest inside Belize (Novelo 2023).

Authorities in both countries have concerns that illegal cattle ranching may be connected to narcotic trafficking, with cleared lands potentially serving as clandestine airstrips, and the increased risks of money laundering (Devine et al. 2020). Under the Cattle Ranching Strategy, outlined efforts to combat cattle

ranching in the CE include patrols and collaboration between Friends for Conservation and Development (FCD) and regulatory agencies. Following the strategy, over the past two years, the FCD Rangers engaged on a total of 180 patrols along the Belize-Guatemalan adjacency zone inside the CE which included approximately 1,209 hours of active patrolling and 1,777 km of foot patrols. International cooperation and financial support are essential to enhance monitoring efforts, combat illegal activities and support reforestation initiatives.

[1] The Cattle Ranching Strategy was designed by the Belize Defense Force and FCD with the specific goals of containing and reducing cattle ranching along Belize's western border.

Methodology

A satellite image from November 24, 2024, was downloaded and processed to reduce atmospheric effects. Deforestation was then mapped and analyzed using vegetation data from the image. Although this image was captured in November—outside of Belize's peak dry season when most land clearing and burning for milpa farming occurs—it was selected due to the availability of cloud-free data.

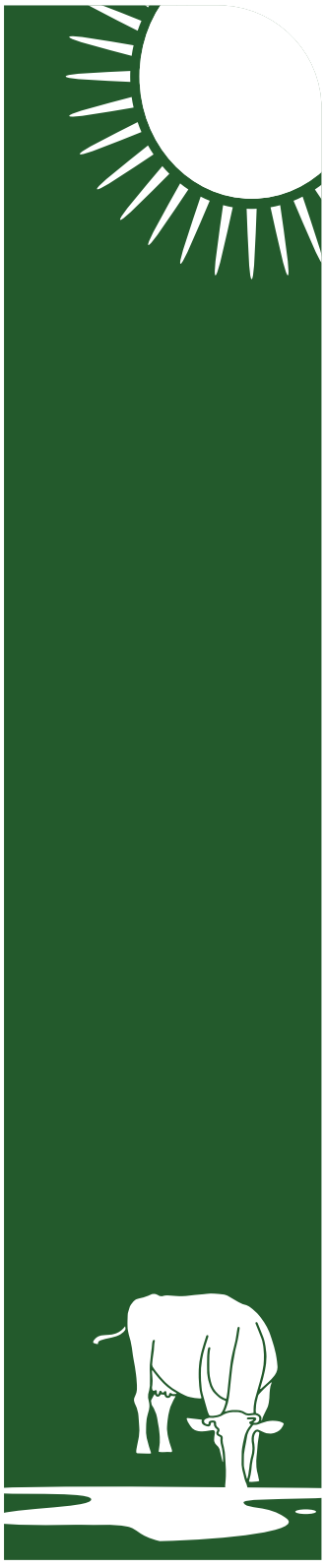
Sentinel-2 is part of the European Commission's Copernicus program, which uses a fleet of Earth observation satellites. Sentinel-2 provides high-resolution multispectral imagery across 13 spectral bands and revisits the same area every 10 days. These capabilities support environmental monitoring, including vegetation health, soil conditions, water bodies, and land use changes due to factors like urbanization, deforestation, and climate change.

To support ground verification, aerial imagery from the Chiquibul Aerial Survey Program (CASP), dated August 30, 2024, was also used. CASP is an internal monitoring program managed by Friends for Conservation and Development (FCD), providing "bird's-eye view" surveillance of the Chiquibul area. It focuses primarily on detecting cattle ranching, illegal agriculture, and forest fires. FCD is the only NGO in Belize using aerial data collection as part of its forest monitoring strategy.

Deforested patches were manually digitized in ArcGIS, and their size (in hectares) was calculated using its geoprocessing tools. Forests were classified following the Belize Collect Earth/Open Foris Land Use and Land Use Change Assessment Protocol (Forest Department, 2019). According to this, a forest is defined as any area 0.5 hectares or larger, with trees at least 5 meters tall and a canopy cover of 30% or more. In cases where secondary forest regrowth made deforested areas less visible in satellite images, the CASP aerial survey was used for ground-truthing.

Introduction

The Vaca Forest Reserve (VFR) and the Chiquibul Ecosystem (CE) form a continuous forest corridor, part of the larger Maya Mountain Massif, and support high levels of biodiversity, functioning as a critical habitat for wide-ranging species of flora and fauna (Meerman & Sabido 2001).



Geographically, the VFR lies on the eastern edge of the Chiquibul-Mountain Pine Ridge-Vaca complex and is ecologically connected to the Chiquibul Forest Reserve and Chiquibul National Park. Their proximity to the porous Belize-Guatemala adjacency line and the remote, rugged terrain makes these protected prone for clandestine activities. These include illegal milpa farming, cattle ranching, logging, wildlife poaching, looting of archaeological sites, and narcotics trafficking (FCD, 2020; CFEG, 2018).

Forests are often cleared using fire, contributing to land degradation and forest fragmentation. The lack of road infrastructure and limited enforcement presence further exacerbate the region's vulnerability, making it a strategic area for environmental crimes and cross-border incursions (Young & Horwich, 2007). These issues highlight the need for coordinated bi-national conservation and security efforts to safeguard this vital forested region.

The CE, covers an area of 176,999 ha (437,376 acres) and is comprised of three protected areas, namely the Chiquibul National Park (CNP), Chiquibul Forest Reserve (CFR) and the Caracol Archaeological Reserve (Bulridge 2017). The CE has different management

entities that manage the natural resources, through a legally binding agreement with the Belize Forest Department (FD). These entities include Friends for Conservation and Development for co-managing the Chiquibul National Park, the Belize Institute of Archaeology having mandate over the Caracol Archaeological Reserve and Bulridge Logging Company having a long-term concession over sections of the Chiquibul Forest Reserve. The Vaca Forest Reserve (VFR), managed by the Belize Forest Department (BFD) is a 16,314-ha (40,312.77 acre) forest reserve, primarily consisting of tropical evergreen seasonal broad-leaved lowland forest that has an average rainfall of <2,000 mm per year with a distinct dry season and an altitude ranging from 50–250 m above sea level (Meerman and Sabido 2001).

The approximately 58 km of the boundary shared between Belize's CNP, CAR and CFR with Guatemala's Reserva de la Biosfera Montanas Maya-Chiquibul is not clearly demarcated and extends through a contiguous area between both nations. Remote sensing (satellite data analysis) and ground data demonstrate extensive deforestation on the Guatemalan side. The Vaca Forest Reserve, however, due to limited management regimes in the area, has also seen extensive deforestation along its western flank in recent years. In the Chiquibul Ecosystem, deforestation is also pronounced, though not as intense as that in the VFR. There is no permanent human settlement inside the Chiquibul Ecosystem or the VFR but up to eleven Guatemalan communities lie in close proximity to the border. Most of the anthropogenic pressures, including cattle ranching, within these Belizean-protected areas come from across the border (Bridgewater et al. 2006).

This report aims to provide a situational analysis of major cross-boundary cattle ranching activities within the Chiquibul Ecosystem and Vaca Forest Reserve, and to provide the current status of cross-border cattle ranching encroachments occurring within these protected areas.

Legal Framework for Cattle Ranching in Protected Areas

To begin to address Cattle Ranching within Belizean territory, two main Acts are pertinent and applicable, particularly because the activity is occurring within protected areas. These Acts are the National Protected Areas Systems (NPAS) Act and the Forest Act.

NPAS Part VIII, Act No. 17 of 2015 states:

37. (1) Except as may be otherwise provided in this Act- (a) no person shall be entitled to enter any national park except for the purpose of observing the fauna and flora therein and for the purpose of education, recreation and scientific research;

(c) no animal shall be hunted, killed or taken and no plants shall be damaged, collected or destroyed in a national park or nature reserve;

38.- (1) No person shall enter or remain within any national park except under the authority and in accordance with conditions of a permit issued by the "prescribed officer on payment of the prescribed fee.

(2) A permit under subsection (1) shall be issued only for the purpose of enabling the permit holder to study or observe the fauna and flora in a national park.

39. (1) No person shall, within any national park, nature reserve, wildlife sanctuary or natural monument, except with the written authorization of the Chief Forest Officer-

(a) permanently or temporarily reside in or build any structure of whatever nature whether as a shelter or otherwise;

(b) damage, destroy or remove from its place therein any species of flora;
(c) hunt any species of wildlife;
(d) quarry, dig or construct roads or trails;
(e) modify or replace any sign and facilities provided for public use and enjoyment;
(f) introduce organic or chemical pollutants into any water;
(g) clear land for cultivation;
(h) graze domestic livestock

Forest Act (Revised Edition 2000) Part II states:

5.-(1) The Minister may from time to time make regulations, either of general application or confined to particular forest reserves or other areas of national land, or of private land to which it has been decided to apply any of the provisions of this Act in accordance with section 9 for the protection of trees and forest produce being in or upon such reserve or other area, and in particular may prohibit any person as regards such reserve or other area from-

(b) squatting, residing, building huts or cattle enclosures;
(c) setting fire to any grass or undergrowth, or kindling or carrying any fire, or leaving any fire burning in such manner as to endanger trees or forest produce;
(d) grazing or pasturing cattle, or permitting cattle to trespass;
(e) hunting, shooting, fishing, trapping, poisoning water or using explosives to destroy fish, clearing, cultivating or breaking up of land for cultivation or other purposes;
(f) clearing, cultivating or breaking up of land for cultivation or other purposes;

12. Cattle trespassing in or upon any land in contravention of any rules or regulations made under this Act shall be deemed to have been found in a prohibited area for the purposes of section 6 of the Cattle Trespass Act.

Study Site

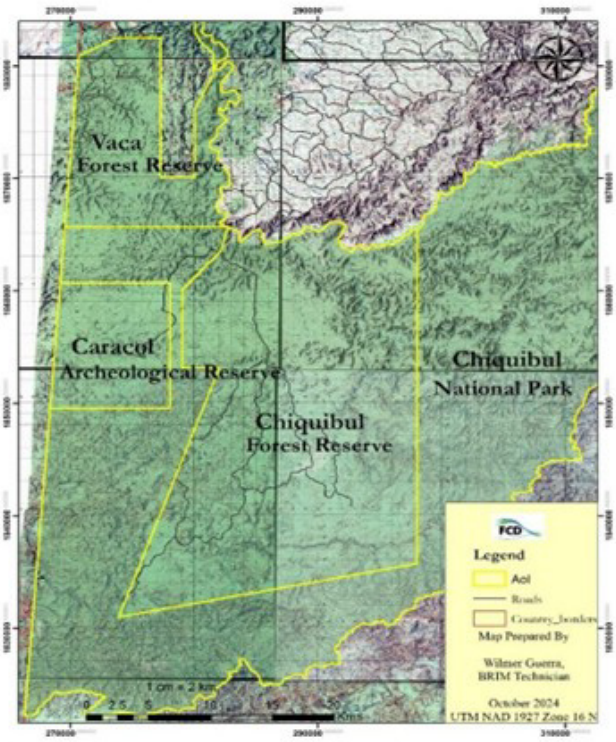


Figure 1: Showing the study site; the Vaca Forest Reserve, the Caracol Archaeological Reserve, The Chiquibul National Park. The study focuses on the western flank of these Protected Areas which border Guatemala.

The Vaca Forest Reserve (VFR) is located in western Belize and forms part of the Chiquibul Maya Mountain Massif (CM3) (Briggs et al. 2013), See figure 1. The VFR is bordered on the east by two protected areas, namely the Mountain Pine Ridge Forest Reserve and the Noj Kaax Meen Elijio Panti National Park, to the south by the Chiquibul National Park and to the west by Guatemala (Friends for Conservation and Development 2013).

To the north, the reserve is bordered by government lands which are primarily being used for agricultural development. The VFR is one of the first five protected areas to be declared in Belize during the early 1930's. In 1991, the total acreage of the reserve amounted to approximately 52,000 acres. However, in 1991, a Statutory Instrument (SI) had a clause that allowed the continuity of leases within the reserve, which had been granted previous to that year.

This meant that some farmers, though a limited number, were legally recognized to be operating within the Reserve. The Belize Forest Department (BFD), in an attempt to prevent any further leasing of land to farmers, conducted a survey inspection in 1995 and noted a total of thirty-three active leased farms within the VFR. The reserve boundaries were then re-defined in 2003, excising approximately 11,625 acres (22% of the total) from the VFR with the objective of providing farmlands to farmers from the buffering

communities of Benque Viejo Del Carmen, San Jose Succotz and Arenal. The excised area is located away from the Macal River in order to ensure adequate watershed protection (Friends for Conservation and Development 2017).

The Chiquibul Ecosystem is contiguous with the forests of Bladen Nature Reserve, Cockscomb Basin Wildlife Sanctuary, the Columbia River Forest Reserve in Belize, and the Chiquibul-Montanas Maya Biosphere Reserve in the Peten region of Guatemala. The Chiquibul Ecosystem of Belize comprises one of the largest remaining tracts of tropical forest in Central America and forms part of the Chiquibul/Maya Mountains Key Biodiversity Area, a priority area for conservation (Bridgewater et al. 2006). The Chiquibul Forest Reserve was established in 1956 under Belize's Forest Act. Its creation aimed to manage the forest's vast resources sustainably, particularly focusing on timber extraction.

Over time, as conservation priorities shifted, the size of the reserve was reduced and in 1991 the Chiquibul National Park was established which protects much of the forest's core and is managed primarily for biodiversity conservation. The Caracol Archaeological Reserve was officially established in 1995. It was created to protect the Caracol Mayan site, one of the largest and most significant Maya cities in Belize, and its surrounding area (Friends for Conservation and Development 2023). These three protected areas constitute the Chiquibul Ecosystem.

Deforestation and Cattle Ranching

In this context, deforestation refers to the purposeful clearing of protected forest for agricultural expansion (Grantham Research Institute 2023). Deforestation for agriculture and cattle ranching has been increasing over the years, a consequence of many issues at a bi-national level. Chicas 2017, illustrates that in 1991, there were three deforested “hotspots” on the Guatemalan side, adjacent to the VFR and CE and only one hotspot in the northernmost part of the Vaca Forest Reserve.

In 1991-1995 a slight expansion occurred with the emergence of small deforested areas in the center region of Peten, Guatemala. However, in the period of 1995-1999, existing deforested areas in Guatemala and Belize expanded and new deforested areas emerged in Guatemala and Belize’s protected areas (CAR, CNP). The VFR remained relatively intact with only one hotspot. From 1999-2003, deforested areas expanded. From 2007-2012, there was relatively no new deforestation patches observed, with expansion mainly occurring near already cleared and deforested areas on both sides of the adjacency line. Then once again in 2012-2014, new deforested areas appeared in the Vaca Forest Reserve, Caracol Archaeological Reserve and in the Chiquibul National Park, See figure 2A.

From analysis by FCD, as of 2023, the deforestation inside the VFR was at 3,736.69 hectares. It was both extensive and intensive. However, compared to 2022 and the previous years, deforestation in 2023 within the eastern section, an area in which FCD has instituted an extension service through assistance to farmers, was actually reduced. In this area, sections that had previously been burnt are regenerating. In the western flank of the reserve, however, there was a significant increase in the expansion of farms, mainly pastures. Furthermore, as of 2023, in the CE, a total of 1,927.38 hectares of tropical broadleaf were being encroached for agricultural purposes, See figure 2B. Although the figure is still quite significant, it has been reduced since

2015, when deforestation was at its peak in the CE. In this regard, the terminology "agricultural encroachments" does not distinguish between crop agriculture, cattle ranching, or abandoned early regenerating crop farms, but rather is a generalized term for any visible plot of land that has been devoid of, or has limited, forest cover. This study, using imagery collated by aerial surveys by FCD, now has the capacity to distinguish between areas being encroached for cattle ranching from other forms of deforestation. The study focuses on the western flank as it is the area considered a hotspot of cattle ranching emanating as a transborder threat.

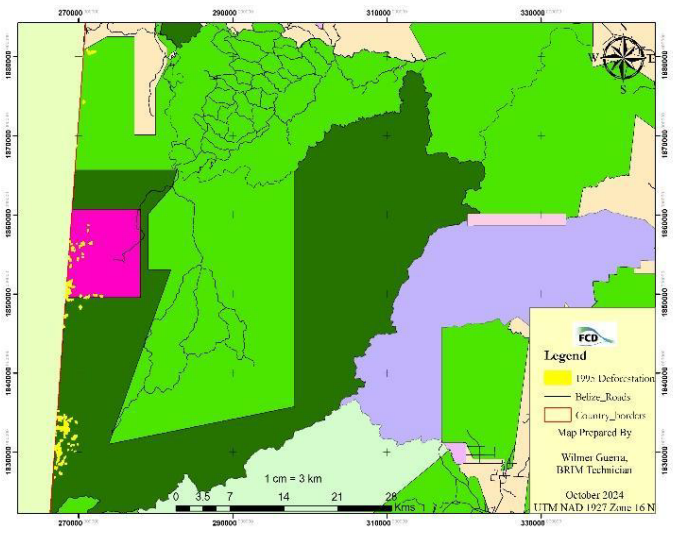


Figure 2: Showing Deforestation in the Chiquibul Forest and the Vaca Forest Reserve in 1995 (A) and 2015 (B).

Trans-Border Cattle Ranching and Potential Related Illegal Activities

Trans-border cattle ranching has become a serious threat to the western flank of the CE and the VFR, with Guatemalan incursions clearing land for cattle pastures deep within Belizean territory. These operations are often well-funded and linked to broader criminal networks, including drug trafficking organizations (Novelo, 2023). This trend is part of a regional phenomenon known as "narco-deforestation," where forested areas are cleared to launder drug money and build infrastructure (Novelo, 2023). A Lieutenant Colonel of the Belize Defence Force has indicated that such ranching operations might be connected to narco-illicit activities, with cleared lands potentially serving as sites for clandestine airstrips (Novelo, 2023).

In developing nations, forests outside and within transboundary areas are threatened by complex, interconnected drivers such as agricultural expansion and forest degradation for cattle pastures. While there can be several merits to protecting areas that share borders, such as socio-economic development, the promotion of cooperation, peace and conservation between nations, these PAs oftentimes face many complex threats that can be difficult to control. This is the case, as deforestation drivers might originate in a country where environmental laws, enforcement capabilities and socio-economic pressures are distinct (Chicas et al. 2017).

Deforestation along the Belize-Guatemala adjacency line has been a persistent issue for the past 30 years, but it has shifted from peasant farming through slash and burn to intensive and vast cattle pastures that have become increasingly difficult to address. In Guatemala, population growth, economic development and agricultural expansion have depleted almost all of the forests in the Chiquibul-Montanas Mayas Biosphere Reserve (CMMBR) (Coca et al., 2012), which lies adjacent to the VFR and the CE. Local organizations have partnered with the Guatemalan government through El Consejo Nacional de Areas Protegidas (CONAP) to provide protected areas

management in the Guatemalan border area. However, their efforts have not been able to refrain farmers from illegally entering Belize and cause forest degradation on both sides of the border (Chicas et al. 2017). In Belize, the relative remoteness of the area and insufficient resource allocation for management of the reserves have left Belize's protected areas vulnerable to transboundary incursions (Chicas et al. 2017).

Additionally, in northern Guatemala, parts of the Maya Biosphere Reserve (MBR), have experienced Latin America's highest rates of deforestation, where areas of the reserve have been burnt and converted to pasture at an increasing rate since the mid-2000s (Radachowsky et al., 2012). The timing of deforestation is not a coincidence; a correlation exists between increased cocaine flows and deforestation in Central America.

In order to claim territory, smuggle drugs and launder money, the drug barons began to ranch cattle within the MBR, a phenomenon locally known as narco-ganaderia, namely narco-cattle ranching, which has slowly been creeping along Peten, Guatemala and seemingly into the CMMBR (Sesnie et al. 2017).

In the Chiquibul Ecosystem especially, there has been a shift from what started as peasant farming to large-scale pastures, which, given their characteristics, may be correlated to narco cattle ranching. Such a shift is because, according to a report by the U.N. Office on Drugs and Crime, until the early 2000s, Central America was relatively just a sideshow in the Western Hemisphere's cocaine trade. For the most part, narcotics largely moved from Colombia across the Caribbean into either Mexico or the southern United States.

However, starting around 2002, aggressive U.S. law enforcement and interdiction campaigns closed the Caribbean route. Security forces in Mexico largely shut down direct drug flights into the country. But the drug trade is a 'river' of money; where if it is 'dammed' in one place, and as long as there is a supply demand, it will find another route, namely, Guatemala's MBR and MMBR (Elbein 2016), whilst probably slowly creeping into Belize's CE and VFR.

According to CONAP, over 200 illegal drug trafficking routes approach or cross the Mexican and Belizean borders which indicates a growing interest in Belize's western flank by organized groups (Elbein 2016).

These organized groups take advantage of relaxed regulations in the international cattle industry to use cattle ranching as a front to launder money. However, land on Guatemala's side of the border is increasingly becoming barren and unavailable, which would push them to put an eye on Belizean territory. Belizean officials suspect that the drug cartels might now be shifting their focus to Belize with the help of the Guatemalan *campesinos* (Novelo 2023).

Current Status of Cattle Ranching in VFR

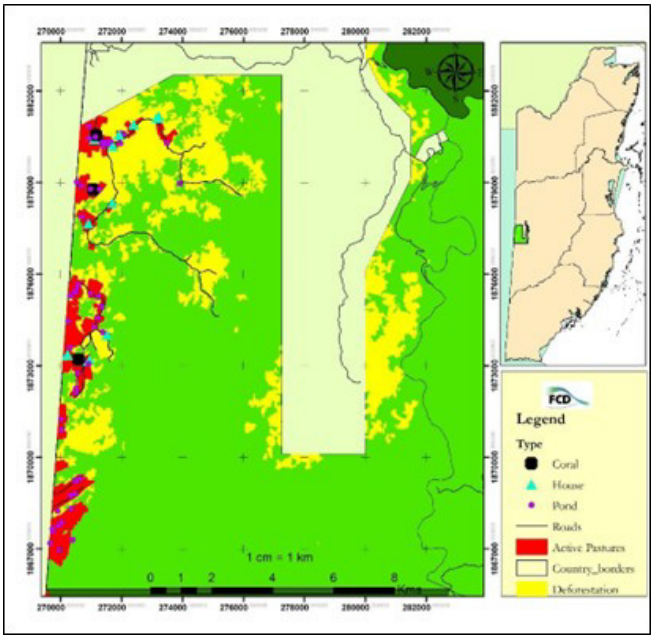


Figure 3: Map showing active cattle pastures along the western flank of the Vaca Forest Reserve. The area highlighted in green is the Vaca Forest Reserve, in western Belize.

For the purpose of this report, FCD conducted an analysis that indicated that as of August 30, 2024, a total of 1,666.61 acres (674.45 hectares) was being actively encroached for cattle ranching along the western flank of the Vaca Forest Reserve, see figure 3. The study focuses on the western flank as it is a shared boundary with Guatemala's MMBR. Relative to the total 2023 deforestation in the VFR, this figure merely represents about 18% of the entire cleared forest.

The expansion of cattle pastures in the southern Vaca Forest Reserve (VFR), particularly along the western border adjoining Guatemala's Maya Biosphere Reserve (MBR), has high probability of being intertwined with transnational organized crime. These cross-border cattle operations, often referred to as narco-ganadería or narco-cattle ranching, serve multiple illicit purposes, including land grabbing, money laundering, and facilitating drug trafficking routes (Devine et al. 2018).

These pastures frequently exhibit signs of substantial financial investment, such as the construction of mechanized ponds, internal road networks, and well-fenced grazing areas, suggesting involvement by actors with access to considerable resources (InSight Crime, 2022).

The cattle industry is particularly vulnerable to misuse because it operates with relatively weak transparency mechanisms. It is one of the few agro-industries that does not require itemized receipts or formal traceability systems. This makes it an ideal front for laundering illicit funds, as drug trafficking organizations (DTOs) can legitimize illegal revenues by investing in cattle and land—assets that are low-risk and yield legal returns (Devine et al., 2018). The result is a financial ecosystem where criminal groups can clean money under the guise of agricultural productivity while expanding their territorial control.

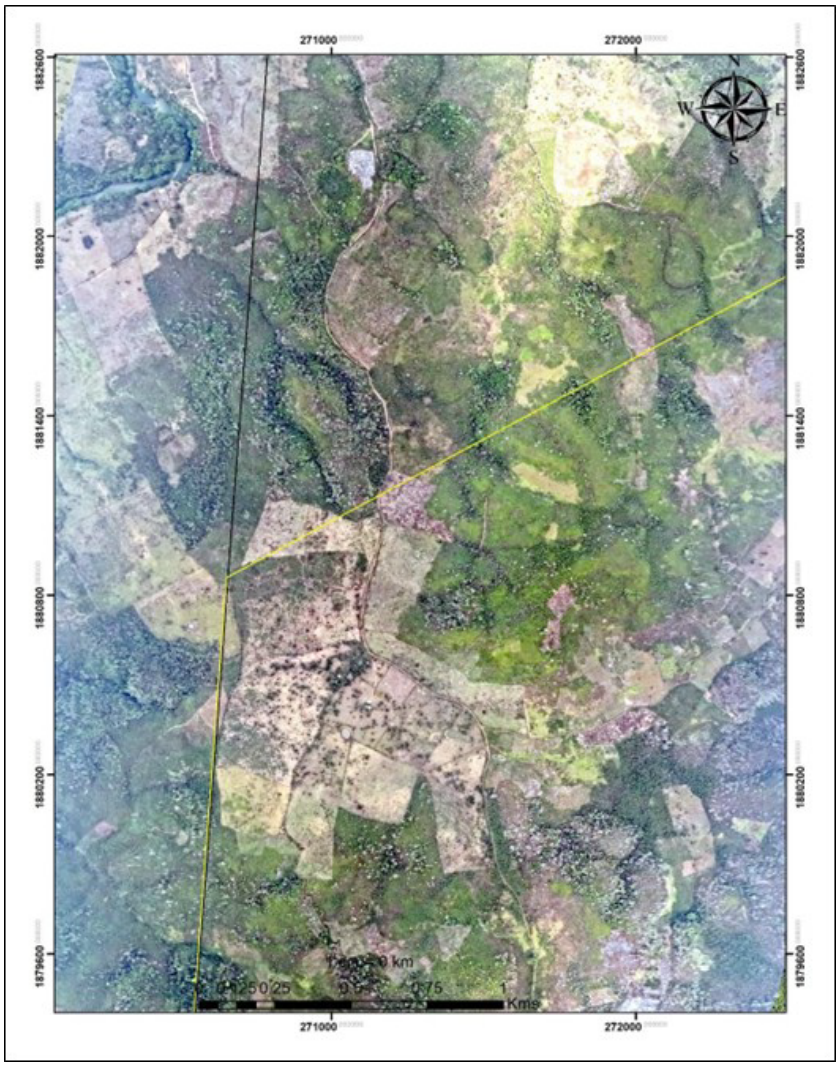


Figure 4: Showing cattle pastures north of the western flank of the Vaca Forest Reserve with intricate connectivity and networks of roads, fences, ponds, corals and house structures. The yellow line indicates the boundary to the reserve with the northern part being private lands and the area to the south being the Vaca Forest Reserve.

Combating this complex challenge requires multi-pronged approach: stronger land-use enforcement, greater transparency in cattle production and trade, and robust cross-border cooperation between Belize and Guatemala.

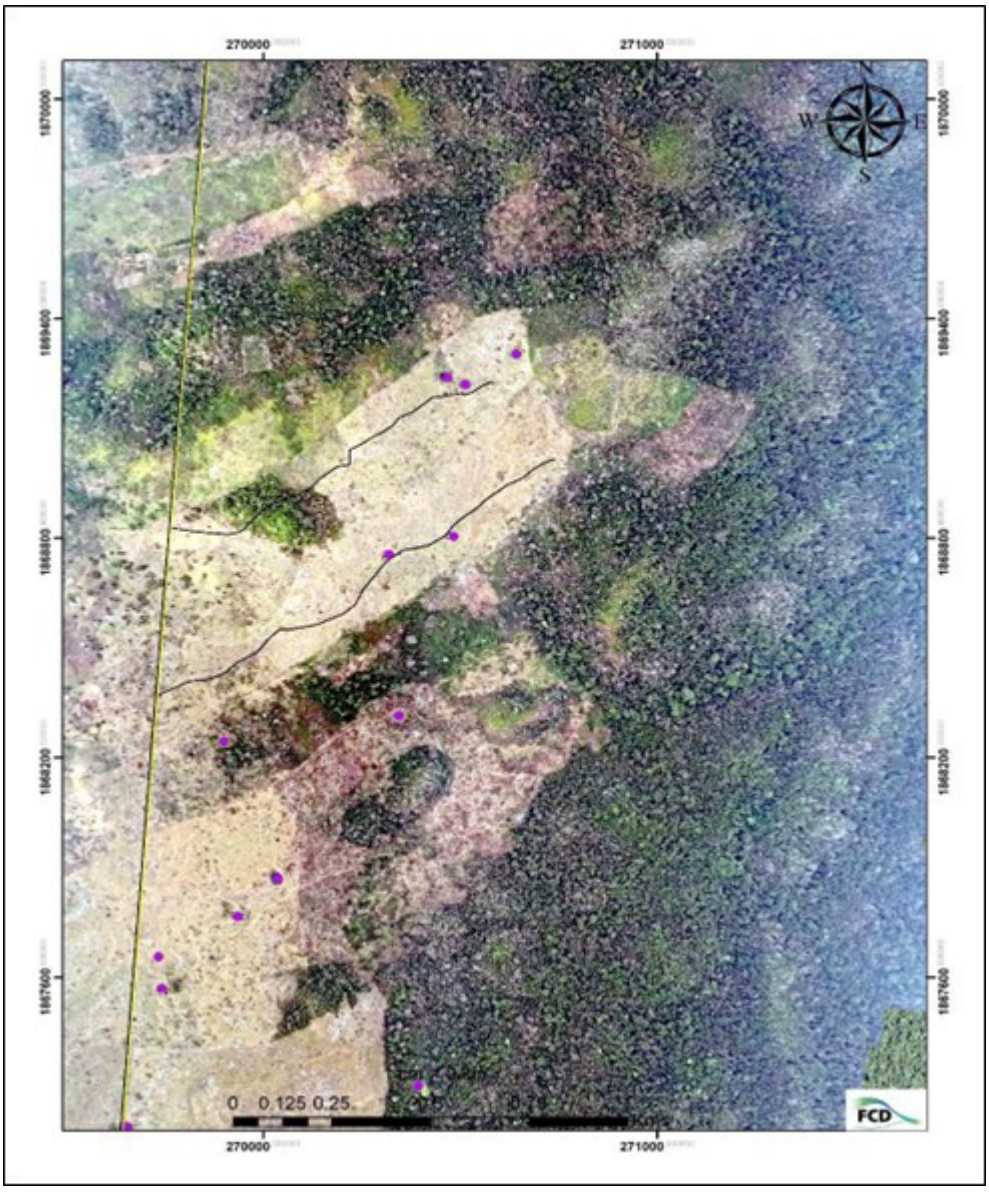


Figure 5: Showing cattle pastures south of the Vaca Forest Reserve with intricate connectivity and networks of roads, fences, ponds, corals and house structures. The purple dots indicate the location of ponds.

Current Status of Cattle Ranching in the Chiquibul Ecosystem (CNP & CAR)

Illegal cattle ranching in the Chiquibul Ecosystem remains a critical issue, primarily due to incursions from Guatemala. This practice has intensified, with herds observed grazing in areas such as Valentin Camp in the Caracol Archaeological Reserve (CAR), the southern flank of the Caballo Conservation Post (CP), and the northern flank of the Rio Blanco CP. By 2024, approximately 1,894.36 acres (766.62 hectares) were occupied for active cattle pasturelands.

These activities are often linked to Guatemalan communities near the adjacency line, many of which lack sufficient land for their livestock and are thus expanding into the Chiquibul Ecosystem (CE). The situation is exacerbated by newly constructed roads on the Guatemalan side, believed to have been built with heavy machinery by affluent interests, facilitating easier access for ranchers (Channel 5 Belize, 2024).

Within the CE—a sensitive ecosystem—cattle ranching has evolved from an emerging threat to the dominant form of agricultural encroachment along its western flank. Significant financial investments, including the construction of fences, troughs, corrals, and mechanized ponds, suggest a perceived permanency of these pastures by the ranchers. Due to limited land availability in Guatemala, cattle pastures are developed adjacent to, and often within, the margins of the Chiquibul Ecosystem, leading to increased fragmentation and deforestation within Belizean protected areas (FCD, 2018).

Typically, these pastures are managed by rural Guatemalan settlements near the protected area but are owned by wealthy and influential individuals who use financially disadvantaged families as proxies to advance into new lands. Reports indicate that some impoverished villagers in southern Petén are relinquishing their lands due to pressure from powerful individuals (FCD, 2018).

Cattle ranching near the Chiquibul border has become pronounced and formidable, placing significant pressure on the ecosystem's integrity. While

cattle ranching is spatially distributed throughout the western flank of the Chiquibul Ecosystem, it is particularly pronounced in the CAR, where up to 860 acres (348 hectares) of forest are actively encroached upon for cattle pastures.

The North Rio Blanco zone, locally known as the Jimenez Farm, is also a major hotspot, with up to 386 acres (156 hectares) converted into cattle pastures. Another identified hotspot is the Caballo area, where up to 224 acres (90 hectares) are actively occupied for cattle pastures. In these areas—especially in Valentin and the Jimenez Farm—considerable financial investments have been made, including the installation of fences, troughs, corrals, and mechanized ponds (Guerra 2023).

Friends for Conservation and Development (FCD) Rangers, through joint support units, provide a foundation for addressing illegal activities such as cattle ranching. However, in recent times, limited action has been taken on the ground, and cattle pastures remain entrenched and permanent. In areas known to have a presence of organized crime, enforcement efforts become complicated, making evictions and law enforcement dangerous andresource-intensive (Novelo 2023).

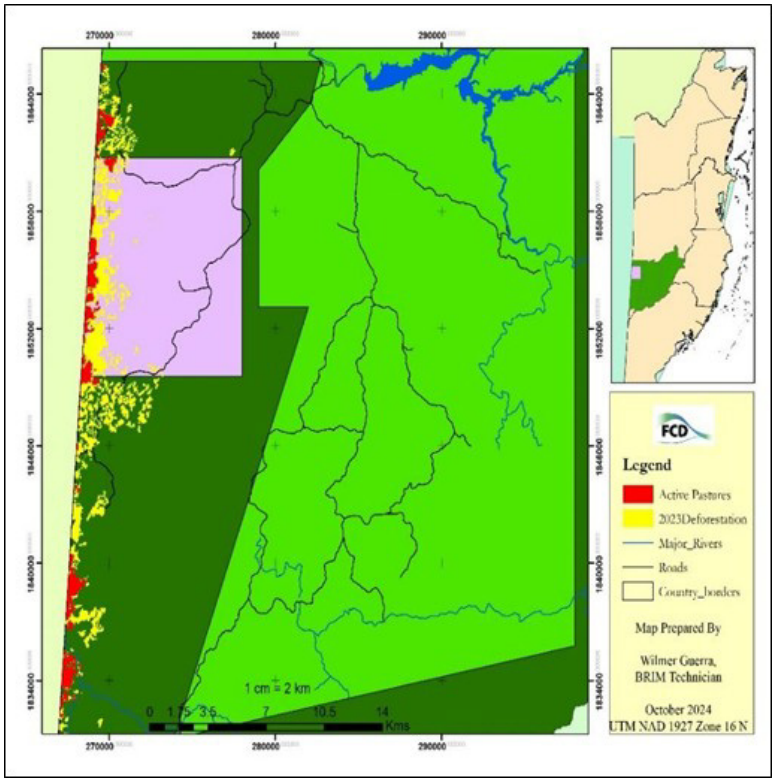


Figure 6: Showing active cattle pastures compared to total deforestation in the Chiquibul Ecosystem.

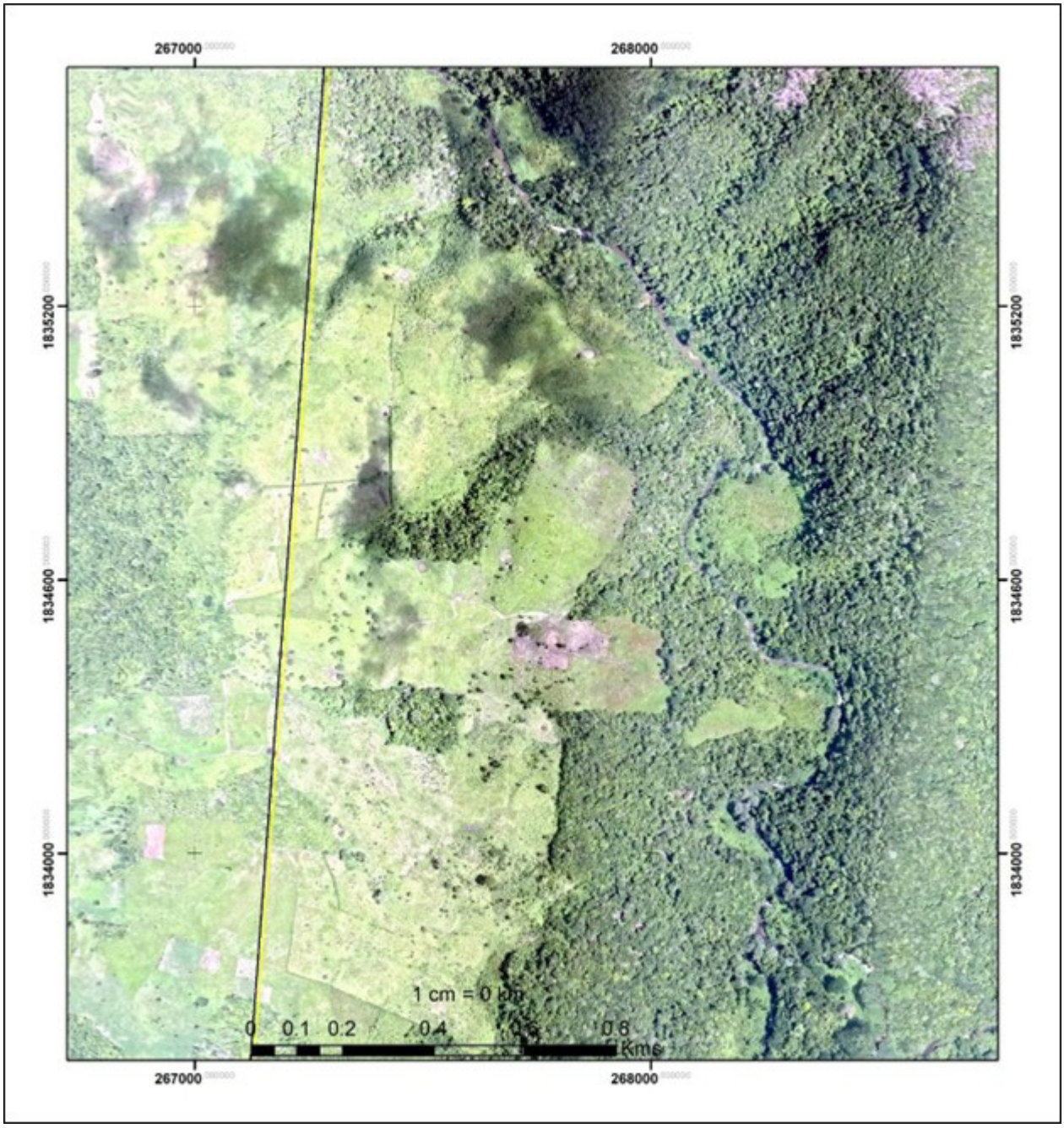


Figure 7: Showing cattle pastures north of the Rio Blanco CP in the CNP with intricate connectivity and networks of roads, fences, and ponds.

Illegal and Environmental Implications to the Ecosystem

It is understood that the expansion of cattle ranching is often linked to wealthy Guatemalan individuals seeking new pasturelands, given the scarcity of available land on their side of the border, while using rural villagers to clear the forest (Novelo 2023). Authorities in both Belize and Guatemala have expressed concerns that illegal cattle ranching may be connected to narcotics trafficking (Bridgewater et al. 2006). While these socio-economic factors are important to understand, the ecological threats of such lucrative activities must also be considered.

The eradication of native forests for monoculture grasslands for cattle grazing has devastating effects on biodiversity. The invasion of new habitats by non-native grasses can have profound implications for community dynamics, abiotic–biotic interactions, and the structure and provision of ecosystem processes and services (Godfree et al. 2017). Native plants and animals are displaced or eradicated, while non-native grass species dominate the cleared land.

This shift reduces the variety of life forms in the ecosystem and weakens its resilience to environmental changes. The loss of biodiversity also disrupts essential ecological services such as pollination, seed dispersal, and predator-prey dynamics, which are critical for maintaining the health of the forest (Sutherland et al. 2009).

The environmental implications of cattle ranching extend beyond the reserve, contributing to global climate change. Cattle are significant emitters of methane, a potent greenhouse gas released during their digestion process (FAO 2013). Furthermore, deforestation to create pastures reduces the carbon sequestration capacity of the forest. Tropical forests are vital carbon sinks, and their destruction releases stored carbon dioxide into the atmosphere, exacerbating global warming (Miles & Kapos 2008; IPCC 2021). The combination of methane emissions from cattle and carbon dioxide from

clearing fires makes cattle ranching a major contributor to greenhouse gas emissions in the region. Additionally, the conversion of forests into pastures has severe consequences for soil health. Continuous trampling by cattle compacts the soil, reducing its porosity and fertility. This compaction impairs water infiltration, leading to increased surface runoff and soil erosion.

Without the protective cover of forest vegetation, topsoil is easily washed away during rains, resulting in sedimentation of rivers and streams. This is especially evident in the Rio Blanco area of the CNP, where pastures lie within the headwaters of the Chiquibul and Mopan Rivers, which eventually flow through Belize to the Caribbean Sea (Bridgewater et al. 2006). Over time, the degraded soil becomes less productive, necessitating the clearing of additional forest areas to sustain cattle ranching, perpetuating a destructive cycle.

Added to this is the threat of screwworm, which appears to be spreading and is located near Belize in the Petén area of Guatemala. This can have huge implications on the wildlife population, as it can easily transmit to wild mammals. Local information indicates that the last screwworm infections that occurred in the region had damaging effects on deer and other mammalian species (USDA 2016).

Cattle Ranching & Possible Connection to Illicit Financial Flows (IFFs)

Cattle ranching, a significant economic activity, has emerged as a potential conduit for illicit financial flows (IFFs), with regions like the Chiquibul Ecosystem and the western flank of the Vaca Forest Reserve in Belize facing high risks of encroachment for such activities. While direct evidence is limited, the proximity to Guatemala and the extent of these pastures raise questions about possible connections to illicit trade. The high cash flow, valuation ambiguity, and opaque supply chains can make cattle ranching an attractive avenue for money laundering.

Cattle sales often involve substantial amounts of cash, which can be easily integrated with illicit funds. The complexity and lack of transparency in the cattle supply chain make it difficult to track the origins of finances (CFATF 2025). The Chiquibul Ecosystem, located near the Guatemalan border, is particularly vulnerable due to its remote location and limited law enforcement presence, making it a hotspot for narco-ranching activities (Novelo 2023).

Criminal organizations are known to exploit ranching to legitimize illicit funds by integrating them into cattle sales and operations (Rodriguez Lancheros & Miranda 2022). Additionally, narco-ranching—where drug cartels use cattle to launder proceeds and assert territorial control—leads to deforestation, land appropriation, and violence (Rodriguez Lancheros & Miranda 2022).

In Belize, the porous Belize-Guatemala border further facilitates the illicit trade of cattle, undermining legitimate markets, harming ecosystems, and destabilizing local economies (Burns 2022). Addressing these issues requires stricter regulations, robust border security, consistent patrol efforts, regional collaboration, community support for sustainable livelihoods, and the use of technology.

Considerations

In the Chiquibul Ecosystem and further north and south, monitoring has been ongoing by FCD for the last 9-10 years and the following facts should be borne in mind:

a. Cattle ranching is taking place within the 1 – 1.5 km stretch known as the Adjacency Zone (AZ);
b. Agricultural farmlands found in the AZ are undergoing land use change and conversion to cattle ranching;
c. There are areas outside the AZ where cattle ranching is expanding;
d. Local people from nearby communities provide the land and labor;
e. In the Chiquibul Ecosystem which includes Caracol A.R, these illicit cattle ranching activities are being conducted by Guatemalans alone;
f. In the Vaca Forest Reserve there may be Belizeans involved in these illicit cattle ranching activities, either directly or indirectly;
g. Most of the cattle pastures have not been reached or documented from the ground.
h. Through CASP, cattle ranching can be observed in 4 protected areas, namely Vaca, Chiquibul, Caracol and Columbia River.
i. Areas where encroachments have continued undeterred in the Chiquibul Ecosystem include Valentin, Caballo, South Cebada, North Rio Blanco, and in Vaca.
j. In the area of South Cebada and North Rio Blanco in particular, cattle ranching has been interrupted but not effectively to contain it.
k. Cattle ranching is now a primary threat to deforestation and gas emissions in protected areas located on Belize's western boundary.

Cattle Ranching Strategy

The cattle ranching strategy, launched by FCD, in collaboration with the BDF, are relevant. The strategy is aimed at a 5-pronged approach to eliminating illegal cattle ranching from within Belize's protected areas as follows:

1. **Taskforce management**

   - Over the last years the main two institutions addressing the matter of cattle ranching have been the BDF and FCD. But the matter is complex and deserves to have a broader consortium of agencies involved for both planning and performance evaluation.

2. **Update data**

   - Various hotspots have been well documented over the last five years for the Chiquibul/Caracol area, and a good understanding of the prevailing conditions prevailing exists. However, in the areas of Vaca and Columbia, the information needs to be validated and an updated database is necessary. This data primarily can be updated through the efforts of the BDF and BDF which are located at key conservation posts.

3. **Inform target groups**

   - There are different tier groups and target audiences that need to be informed of the actual situation and gain leverage for support. The Ministry of Foreign Affairs can play a pivotal role in diplomatic relations with the men on the ground to address it; these are all critical stakeholders in reducing any geo-political conflict.

4. **Remove fences and posts**

   - Key hotspot areas should be targeted and serve as emblematic cases to document impact over time. For the Chiquibul, where hotspot areas are known, the Joint patrol units should focus on Caballo, South Cebada and North Rio Blanco with the removal of fences and posts. A protocol needs to be developed to clarify what to do with cattle confiscated or people found in the area.

5. **Sustain patrols to prevent resurgence**

   - Conservation Post Units conduct frequent North-South patrols from each conservation post to detect and control any resurgence of cattle ranching. Monitoring of the actual situation is maintained and reported to the Ministry of Border Security and NSC.

   - Based on this plan, there have been targeted operations to dismantle fences and destroy other infrastructure.

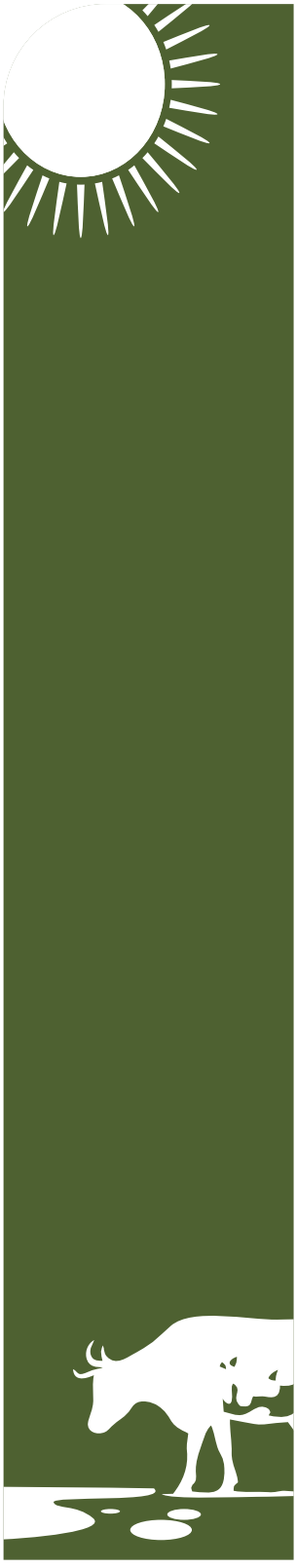
Path Forward: Solutions and Strategies

Efforts to reclaim or protect lands often involve complex socio-political challenges, including resistance from ranchers and organized groups. Thus, addressing the environmental impacts of cattle pastures along the Belize/Guatemala adjacency zone requires a multifaceted approach. Strengthening enforcement mechanisms to prevent illegal deforestation and land clearing is crucial.

Conservation organizations must work closely with local communities to promote sustainable land-use practices and provide economic alternatives to cattle ranching, such as agroforestry, and sustainable agriculture. International cooperation and financial support are also essential to enhance monitoring efforts, combat illegal activities, and support reforestation initiatives.

Public awareness campaigns can further highlight the importance of preserving the Chiquibul and Vaca ecosystems and the consequences of its degradation. Proposals must include stricter border monitoring and the destruction of unauthorized roads.

Key Recommendations



1. **Enhance Strategic Coordination with Security Forces**

    - Revisit the cattle ranching strategy, which was developed between the Government of Belize, the Belize Defense Force, and FCD; the Joint Forces Unit, to strengthen enforcement efforts and secure additional technical assistance.

    - Promote a good working coordination among joint forces to ensure continued "operational support.

2. **Expand Surveillance and Reconnaissance Efforts**

    - Maintain aerial reconnaissance expeditions at the beginning, middle, and end of the dry season, incorporating Guatemalan counter-parts (Asociacion Balam and CONAP).

    - Expand aerial surveillance deeper inside Belize, beyond the 1 km Adjacency Zone.

3. **Strengthen Enforcement and Removal Strategies**

    - Establish and implement a clear protocol for confiscation and removal of cattle from the Adjacency Zone.

    - Implement a continuous and targeted approach for the destruction of illegal structures and the removal of cattle.

4. **Leverage Technology for Improved Monitoring**

   - Modify patrol operations by integrating camera traps and Audiomoths to monitor illegal trail systems within the Chiquibul ecosystem.

   - Explore blockchain technology for tracking and verifying cattle origins to curb illegal ranching.

5. **Enhance Training and Capacity Building**

   - Continue to develop and implement an environmental protection training module for BDF and the Belize Police Department to build conservation awareness within security forces.

   - Sensitize the justice sector on illegal cattle ranching and advocate for improved prosecution of offenders.

6. **Strengthen Bilateral Cooperation with Guatemalan Authorities**

   - Work with Guatemalan authorities to monitor and regulate the cross-border cattle trade, ensuring compliance with taxation and AML standards.

   - Liaise with Guatemalan counterparts to understand illegal networks and their operational structures.

7. **Engage and Educate Local Stakeholders**

   - Conduct public outreach in hotspot communities in Guatemala to reduce wildfires and strengthen conservation awareness.

   - Educate local stakeholders, including enforcement agencies and communities, on the financial links between cattle ranching and illicit financial flows.

   - Re-engage the Belize Producers Livestock Association and other

relevant authorities to devise practical solutions to the cross-border cattle ranching issue.

8. **Improve Fire Prevention and Community Engagement**

   - Continue supporting the establishment of community fire commissions in at-risk Guatemalan communities to prevent wildfires linked to land clearing for illegal ranching.

9. **Advance Research and Policy Development**

   - Conduct studies on the ecological and socio-economic impacts of illegal cattle ranching to inform enforcement and conservation strategies.

10. **Foster Regional and International Partnerships**

    - Collaborate with GFI, INL, UNDP, Open Ownership, and other international organizations to strengthen enforcement mechanisms, resource mobilization, and policy development.

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