

LOSING GROUND:

Fossil Fuel Extraction Threats to Protected Areas around the World

DECEMBER 2023



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Cover Image: (Top) Giraffes, Murchison Falls National Park, Uganda. Image Credit: Courtesy of Gregoire Dubois via Flickr ([CC BY-NC-ND 4.0](#)) **(Middle)** Oil and Gas Exploration Drilling Rig in the middle of Gulf of Thailand, Malaysia. Image Credit: Mekdet via Getty Images **(Bottom)** Aerial picture of the Ishpingo oil platform of state-owned Petroecuador in Yasuni National Park, northeastern Ecuador, taken on June 21, 2023. Image credit: Rodrigo Buendia/AFP via Getty Images

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EXECUTIVE SUMMARY AND KEY FINDINGS

Natural ecosystems play a crucial role in the fight against both climate change and biodiversity loss, with protected areas (PAs)—that is, defined geographies managed by legal or other effective means for conservation—often serving as a best defense for nature.¹ Protected areas remain one of the most effective tools available to conserve natural ecosystems, so long as they are established and governed effectively and equitably, respect the rights of Indigenous peoples and local communities, and are optimally located to protect biodiversity and other ecosystem services.² Protected areas represent an important dedication to conservation in the face of escalating human-driven threats—if their purpose is respected and defended.

Fossil fuels in protected areas

The encroachment³ of fossil fuel extraction in protected areas is particularly alarming. Ongoing and potential fossil fuel extraction within protected areas, incompatible with their conservation objectives, compromises the ability of these areas to effectively preserve biodiversity and fight climate change. Continued burning of oil, gas, and coal contributes significantly to global greenhouse gas emissions, and is particularly egregious when the fossil fuels are extracted from protected areas.⁴ Beyond environmental concerns, the repercussions from fossil fuel activities in protected areas impact human health and local economies as well.



Napo river, Yasuni National Park, Ecuador. Image credit: Peter Prokosch, [GRID-Arsental](#) via Flickr (CC BY-NC-ND 4.0)

Indigenous communities reliant on ecosystems within and around PAs suffer disproportionately from extractive operations, which endanger their sustenance, cultures, and health.⁵ While fossil fuel extraction is not happening in all protected areas around the world, the maps and analysis contained herein document extensive current and potential incursions. Our inability to protect these areas set aside for conservation poses a threat to nature and the Earth's ecological and climate stability that is both real and symbolic.

This report examines ongoing exploitation and threats of further fossil fuel extraction within protected areas, emphasizing what is at stake if we do not take immediate action to halt the exploitation of resources within their borders. Despite the clear contradiction to the conservation mission of these protected areas, ongoing fossil fuel extraction is rife and oil and gas blocks in protected areas are up for auction each year, bringing threats of future extractive activities.

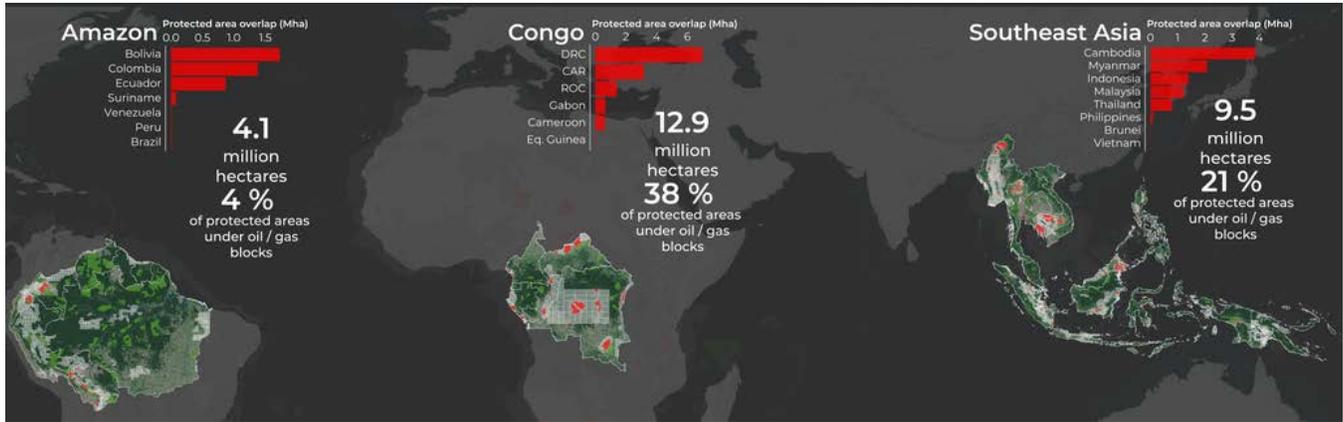
To better understand the scale of these threats, this report describes current and planned extraction around the world, with particular attention to the future threats in the pantropics, focusing on protected areas in the Amazon, Congo basin, and Southeast Asia, given their high biodiversity values and critical contributions of their ecosystems to carbon sequestration and storage.

Global temperatures and biodiversity loss are on track to surpass critical thresholds.⁶ Reducing and eventually eliminating fossil fuel use will reduce greenhouse gas emissions, and halting fossil fuel projects within protected areas will contribute to both climate and biodiversity conservation goals. Recognizing these critical issues and taking decisive action against fossil fuel extraction is a critical step in avoiding far-reaching consequences for biodiversity, climate stability, and human well-being.



Murchison Falls, Uganda. Image credit: Courtesy of Gregoire Dubois via Flickr (CC BY-NC-ND 4.0)

Map 1. Pantropical oil and gas block overlap with protected areas



Key findings

- Globally, at least **918** protected areas have ongoing or planned fossil fuel extraction projects within their boundaries, with a total of **2337** active or proposed oil, gas, and coal extraction projects within legally protected areas.
- At least **50.8 Gt** of potential CO₂ emissions from oil, gas, and coal reserves are on track to be extracted from projects within protected areas over their lifetimes, according to industry projections.⁷ This is more than **three times** the annual emissions from the US and China combined and represents tens of billions of tonnes of potential emissions that could be avoided if protected areas were off limits to fossil fuel extractive industries.
- In the Congo basin, **45** protected areas, and **38%** of their total extent is overlapped by planned oil and gas blocks.
- In the Western Amazon, **26** protected areas and **12%** of their total extent is covered by oil and gas blocks (4% at the level of the entire Amazon).
- In Southeast Asia, an estimated **361** protected areas or **21%** of their combined extent is covered by oil and gas blocks.

Recommendations

- Immediately ban fossil fuel exploration and extraction in protected and conserved areas globally.
- Create and implement new conservation financing schemes to incentivize and promote the safeguarding of protected and conserved areas for climate mitigation, climate resilience, and biodiversity protection, especially in high biodiversity, high carbon ecosystems.
- Establish explicit commitments related to fossil fuels and biodiversity, including non-extraction of fossil fuels from protected areas under relevant existing mechanisms such as the UNFCCC and the Beyond Oil and Gas Alliance and additional mechanisms such as a Fossil Fuel Non-Proliferation Treaty.
- Governments commit to refrain from downgrading, or modifying the boundaries of protected areas to allow for fossil fuel extraction.
- Restrict financing for fossil fuel exploration and extraction in protected areas.
- Ensure that all sourcing of critical minerals for the transition to renewable energy is done in a responsible way that prohibits encroaching on protected areas, does not destroy ecosystems, safeguards biodiversity, and ensures free, prior, and informed consent from Indigenous peoples and local communities.

PART I: THREATENING OUR WORLD'S NATURAL TREASURES: CURRENT FOSSIL FUEL EXTRACTION IN PROTECTED AREAS

Introduction

Protected areas (PAs) stand as key conservation tools for protecting Earth's biodiversity and providing refuge to species and ecosystems in the midst of unprecedented environmental challenges.⁸ As climate change accelerates and nature faces unparalleled threats, well-sited and managed PAs play a pivotal role in preserving biodiversity, safeguarding ecosystem services for local communities, and mitigating the effects of an already changing climate. Safeguarding biodiversity and the ecosystems that sequester and store carbon through effectively managed PAs is not just a matter of biodiversity conservation, but a fundamental strategy in the fight against climate change. Despite their legal status as protected land and seascapes, many PAs are facing continuous encroachment through fossil fuel exploration and extraction within their borders, often against serious opposition by impacted Indigenous peoples and local communities.⁹ In the face of accelerating threats from commercial exploitation, defending PAs against encroachment by the fossil fuel industry requires focused attention.

What is a protected area?

A protected area is a clearly defined geographical space, recognized, dedicated, and managed through legal or other effective means to achieve long-term conservation of nature with associated ecosystem services and cultural values.¹⁰ The definition is expanded by six management categories with an emphasis on strict protection in the first four out of the six categories. PAs are designed and managed to safeguard the natural environment, biodiversity, and cultural heritage from various human activities that can harm them.

Legally designated PAs are recorded in the World Database on Protected Areas (WDPA), a global repository of up-to-date data on PAs and conservation efforts around the world.

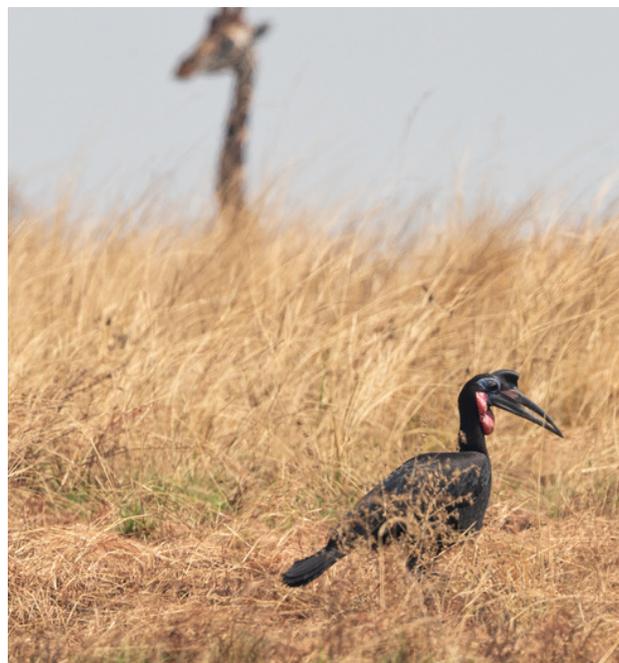
It is imperative to limit warming to 1.5°C to minimize climate-related losses and damages to people and nature.¹¹ However, this requires—first and foremost—the rapid and equitable phase-out of fossil fuels and fossil fuel subsidies without any further delay, and the accelerated and equitable deployment of sustainable clean energy systems worldwide.

An immediate end to fossil fuel extraction in protected areas is necessary to safeguard some of the most important remaining high integrity, biodiverse ecosystems on Earth. This is in line with the 2016 resolution at the IUCN World Conservation Congress, “to prohibit environmentally damaging industrial activities and infrastructure development in all IUCN categories of protected area.”¹² This call further builds on a 2003 decision by the International Council on Mining and Metals that World Heritage sites would be “no-go” areas for its members.¹³ As demonstrated in this report, PAs are not only critically important for biodiversity conservation, but also store significant amounts of carbon beneath the surface, and it is essential that these ecosystem carbon stores remain secured.¹⁴ A commitment to secure PAs from fossil fuel extraction serves as an important testament to global agreements aimed at tackling climate change and biodiversity loss: if we cannot, at a minimum, safeguard the areas already set aside for biodiversity, our overall prospects for success in tackling the climate-biodiversity crisis are grim.

This report brings to focus ongoing threats of fossil fuel extraction in legally protected areas and outlines key recommendations toward the cessation of fossil fuel exploration and extraction in protected and conserved areas globally.

Unprecedented environmental challenges: Protected areas at the climate-biodiversity nexus

Around the world we are facing extraordinary environmental pressures with two of the biggest crises, climate change and biodiversity loss, intersecting in very significant ways. The concept of the climate-biodiversity nexus underscores the intricate and inseparable links between climate change and biodiversity loss, emphasizing the urgency of our response to these challenges.¹⁵ **PAs, securing some of the last refuges for nature on earth, are positioned at the confluence of these two environmental crises.**



Abyssinian ground hornbill (Bucorvus abyssinicus), Murchison falls national park, Uganda. Image credit: Gregoire Dubois via Flickr (CC BY-NC-ND 4.0)

Effective PAs play an important role in maintaining the ecological integrity of natural ecosystems, and are therefore fundamentally important for carbon sequestration as well as adaptation. Rising temperatures, altered precipitation patterns, and extreme weather events caused by climate change directly impact natural ecosystems, leading to shifts in species ranges, altered habitats, and elevated risks of species extinctions, ecosystem collapse, and disruptions to ecological processes.¹⁶ Ecosystem degradation and biodiversity loss decrease ecosystem resilience and capacity for mitigation and adaptation. Understanding the consequential dynamics between biodiversity and climate is both urgent and essential in devising effective strategies for sustainable development, conservation, and climate change mitigation. In this context, PAs play a pivotal role, demonstrating the intricate ways in which preserving biodiversity can bolster our defenses against the challenges posed by a changing climate, and vice versa.

The policy imperative: Situating protected areas within the Paris Agreement and the Global Biodiversity Framework

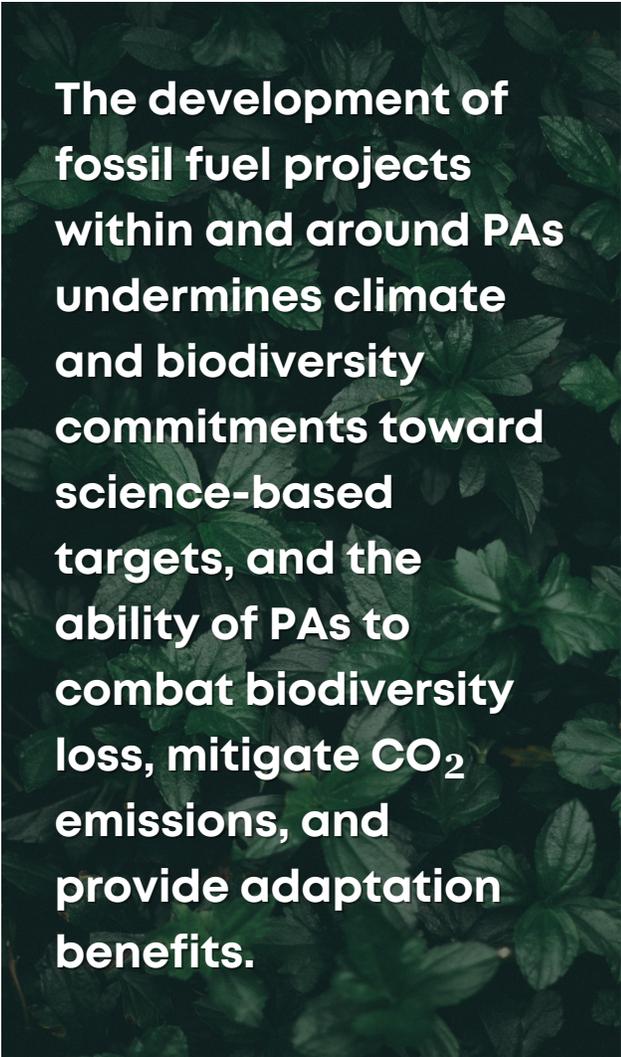
As two of the most significant multilateral agreements in the world, the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC) play a vital role in shaping sustainable and resilient futures for both ecosystems and human societies. With the policy synergies of the climate-biodiversity nexus becoming better understood, the world is beginning to

recognize the complementary role of the CBD and UNFCCC in delivering solutions to the greatest environmental challenges of our time.¹⁷ The climate-biodiversity nexus demands urgent action to align targets and ambitious outcomes from both the CBD Global Biodiversity Framework and the UNFCCC Paris Agreement, and PAs play a critical role at the intersection of these inseparable global agreements. These commitments intersect with other global initiatives, including many elements of the Sustainable Development Goals, the Land Degradation Neutrality target of the UN Convention to Combat Desertification, and the UN Decade on Ecological Restoration.

Delivering on the Paris Agreement and the Global Biodiversity Framework, two of the most important multilateral environmental agreements in the last decade, is not possible if we do not address the critical failing of allowing extraction to continue in protected areas.

Unfortunately, countries around the world are on track to exceed levels of fossil fuels production and use allowable reductions in CO₂ emissions needed to meet their Paris Agreement commitment of limiting global warming to 1.5°C.¹⁸ Climate science confirms that we must phase down and end the expansion of current fossil fuel extraction: PAs could be the ‘floor’ in this effort, as they contain some of the most vulnerable and important ecosystems in the world.

At the same time, Target 3 of the Global Biodiversity Framework is calling for an increase in both area-based conservation and the effectiveness of PAs to safeguard biodiversity. Making measurable progress toward Target 3 of the Global Biodiversity Framework necessitates halting fossil fuels projects within PAs and beyond and ensuring that these high biodiversity areas are secure from detrimental extractive activities. Only through decisive action to keep extraction out of PAs and the broader natural ecosystems that they are situated within can we hope to achieve the ambitious goals set forth in these related international agreements.



The development of fossil fuel projects within and around PAs undermines climate and biodiversity commitments toward science-based targets, and the ability of PAs to combat biodiversity loss, mitigate CO₂ emissions, and provide adaptation benefits.

Beyond targets: The impacts of fossil fuel extraction in protected areas on humans and nature

Given the ecological significance of PAs, ending fossil fuel extraction and explicitly preventing future extractive threats in PAs emerges as a ‘low-hanging fruit’ opportunity in our transition away from fossil fuels. This requires delivering on existing commitments to dedicate these areas to long-term conservation outcomes which will support the protection of biodiversity and contribute toward significant mitigation and adaptation outcomes.

Conversely, failing to enforce the sound management of PAs has tangible environmental consequences. In addition to adding to the carbon emissions enabled by new fossil fuel projects, impacts on the ground cause irreversible damage to some of Earth’s most important ecosystems. Fossil fuel exploration for example, primarily through roads and other access infrastructure, is a gateway to deforestation which destroys critical habitat and opens new access for illegal hunting and logging.¹⁹ Air pollution, water contamination, soil erosion, noise and light pollution, and infrastructure construction further jeopardize the integrity of once-intact ecosystems.²⁰



The 672-kilometer Urucu-Manaus gas pipeline being constructed in the Amazon rainforest, being constructed in an environmentally sensitive area. Image credit: Per-Anders Pettersson via Getty Images

There are also significant implications for human well-being from fossil fuel activities in PAs. Extraction negatively impacts the health, livelihoods, and cultures of the people residing in and around PAs, many of whom rely directly on PAs as their primary source of food, clean water, cultural practices, and spiritual well being. Throughout the world, Indigenous communities in particular have customary relationships with the lands and waters in PAs, actively managing and relying on ecosystems with high ecological integrity for sustenance and cultural survival. Where local communities exist outside of the boundaries of PAs, the PAs provide vital ecosystem services for their livelihoods, and

likewise, Indigenous peoples' contributions to positive conservation outcomes in these areas are critical.²¹ The economic repercussions of extraction for local communities are also substantial. The promise of short-term economic gains from fossil fuel projects seldom translate into long-term benefits for local people directly affected by extraction and once fossil fuel resources are depleted, communities are left with ecological scars, compromised ecosystem services, and diminished economic opportunities.²² **Fossil fuel extraction in PAs presents a significant threat to human well-being, placing millions of people, often the most vulnerable, at risk.**



A woman from the Waorani community speaks via megaphone during a protest against new oil projects in the Amazon. Indigenous groups marched to the Constitutional Court demanding the annulment of a decree that would authorize new oil exploration projects. Photo: Juan Diego Montenegro/dpa via Getty Images

Indigenous and community-based conservation

While PAs represent many crucial ecological regions in the world, a significant number of conservation areas, not formally recognized as PAs, are vulnerable to the threats of fossil fuel extraction. Indigenous territories and Community Conserved Areas (ICCAs) for example are generally not formally recognized as protected areas and are therefore not included in the analyses in this report. However, they cover an equal or greater area than formally designated PAs, and may be home to even more biodiversity, while also holding significant ecosystem carbon stocks.²³ While it is extremely challenging at this stage to do a large global analysis of fossil fuel activities occurring in ICCAs due to data deficiency,²⁴ it is critical to

recognize the human dimensions of fossil fuel activities taking place within those ecosystems that occur within ICCAs. Fossil fuel extraction in Indigenous territories without the explicit free, prior, and informed consent of local communities is a clear violation of the UN Declaration on the Rights of Indigenous Peoples and poses a grave threat to human rights.

In all circumstances, effective conservation and climate action requires acknowledging, respecting, recognizing, and involving Indigenous peoples and local communities who play a significant role in shaping and preserving Earth's biodiversity.

PART II: GLOBAL THREATS FROM FOSSIL FUEL EXTRACTION IN PROTECTED AREAS AROUND THE WORLD

Protected areas are designated to safeguard biodiversity and ecosystems, yet these critical areas are facing escalating threats from fossil fuel exploration and mining. Oil, gas, and coal extraction have been encroaching on PAs around the world, leading to environmental destruction, loss of biodiversity, and impacts on ecosystem carbon stocks and their sink capacities, with far-reaching consequences.

Current fossil fuel extraction in protected areas

While most PAs around the world remain free from oil, gas, and coal extraction, there are a large number of exceptions. The number of fossil fuel projects in PAs is alarming and inconsistent with commitments under both the Global Biodiversity Framework and the Paris Agreement, threatening our ability to safeguard biodiversity and to limit global temperature increase to 1.5°C. In the following section, we outline key findings from recent research conducted by the Leave it in the Ground Initiative (LINGO) with industry data and the World Database on Protected Areas to track current and planned oil, gas, and coal extraction operations in protected areas. Full methods used are outlined in Annex II.

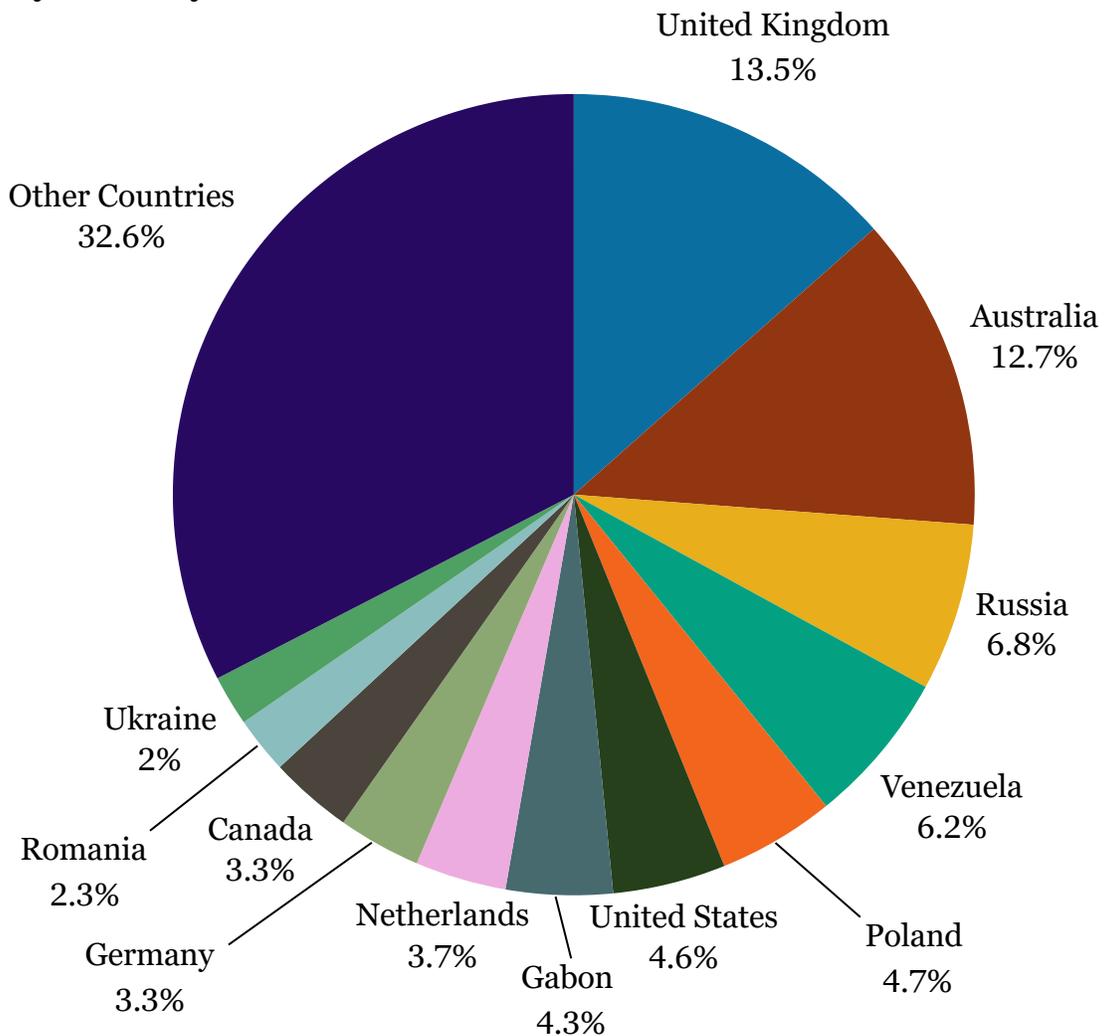
Key findings:

- Around the world there are **918** individual WDPA-reported protected areas (accounting for 5,358,894 km² of protected lands and waters) with ongoing or planned fossil fuel extraction projects within their borders. There are **2,337** oil, gas, and coal extraction projects²⁵ operating and planned within the borders of legally protected areas around the world.
- **1,075** oil, gas, and coal assets²⁶ are in PAs that are also identified as Key Biodiversity Areas.²⁷
- At least **50.8 Gt of potential CO₂ emissions** from oil, gas, and coal reserves are on track to be extracted from projects within protected areas over their lifetimes, according to industry projections.²⁸ This is more than three times the annual emissions from the US and China combined and represents tens of billions of tonnes of potential emissions that could be avoided if protected areas were off limits to fossil fuel extractive industries.
- **Extraction in protected areas is a global problem.** We are failing to safeguard protected areas around the world, not just in the Global South—the largest amount of carbon emissions from extraction in PAs from a single country is projected to come from the U.K.

Table 1. Fossil fuel projects in protected areas, by start date.

| | |
|------|---|
| 974 | Projects already in protected areas (before 2024) |
| 260 | Projects starting in the next decade (2024-2033) |
| 1103 | Projects starting in more than a decade (2034 or later) |
| 2337 | Total projects tasked |

Figure 1. Share of total fossil fuel projects that overlap with protected areas, by country.



Keeping it in the ground: Preventing carbon emissions from fossil fuel extraction within protected areas

Protected areas have a significant role to play in keeping fossil fuels in the ground and averting additional emissions. For the first time, the research team at LINGO has quantified the potential emissions held within PAs around the world, by comparing **more than 85,000 oil and gas fields and licenses**, along with **4,300 coal mines** (idled, currently extracting, and under development), and viable deposits for oil, gas and coal extraction under the world's PAs. The large amount of potential CO₂ emissions held in the ground within PAs highlights the importance of safeguarding these spaces. Unfortunately, despite their legal protections and internationally recognized global biodiversity value, protected areas continue to be subject to fossil fuel extraction.

Key findings:

- Based on fossil fuel reserves that we currently have the means to extract,²⁹ there are at least **252.9 Gt** of potential CO₂ emissions currently held underground in PAs worldwide.
- If all countries committed to not exploiting the fossil fuel deposits held within their protected areas, it would be equivalent to keeping **7 years of annual global CO₂ emissions** in the ground.³⁰

The extraction of fossil fuels from PAs not only introduces new emissions into the atmosphere through the extraction and combustion processes, but also disrupts the capacity of these areas to serve as effective carbon sinks. Without immediate measures to enforce PAs as off-limits to fossil fuel extraction, we are faced with the threat of irreparable damage, leading to the release of stored carbon into the atmosphere and compromising the crucial ecological value of these sites.



Mother holding baby and laying out fish to dry, near oil exploration rig, by shore of Lake Albert, Northern Uganda, E Africa. Image credit: Greenshoots Communications via Alamy Photo

CASE STUDY: MARAWAH BIOSPHERE RESERVE — A COASTAL TREASURE AT RISK

Marawah Marine Protected Area, established in 2001, is one of six MPAs in the Zayed Network of Protected Areas and is the largest multi-use MPA in the Persian/Arabian Gulf. Marawah is also the core PA in the Marawah Biosphere Reserve, the UAE's first UNESCO biosphere reserve. The MPA protects critical coral reefs, mangrove forests, and seagrass, and is one of the most important habitats for the second largest dugong population in the world. According to UAE authorities, Bu Tinah island is home to the densest dugong population in the world.³¹

Despite its national and international recognitions, Marawah has active extraction within its borders and is expected to be subject to further industrial development in the years ahead. Oil extraction facilities are still increasing in capacity and are expected to extract 128.9 million barrels of oil equivalent, producing approximately 54 million tonnes of CO₂.³²

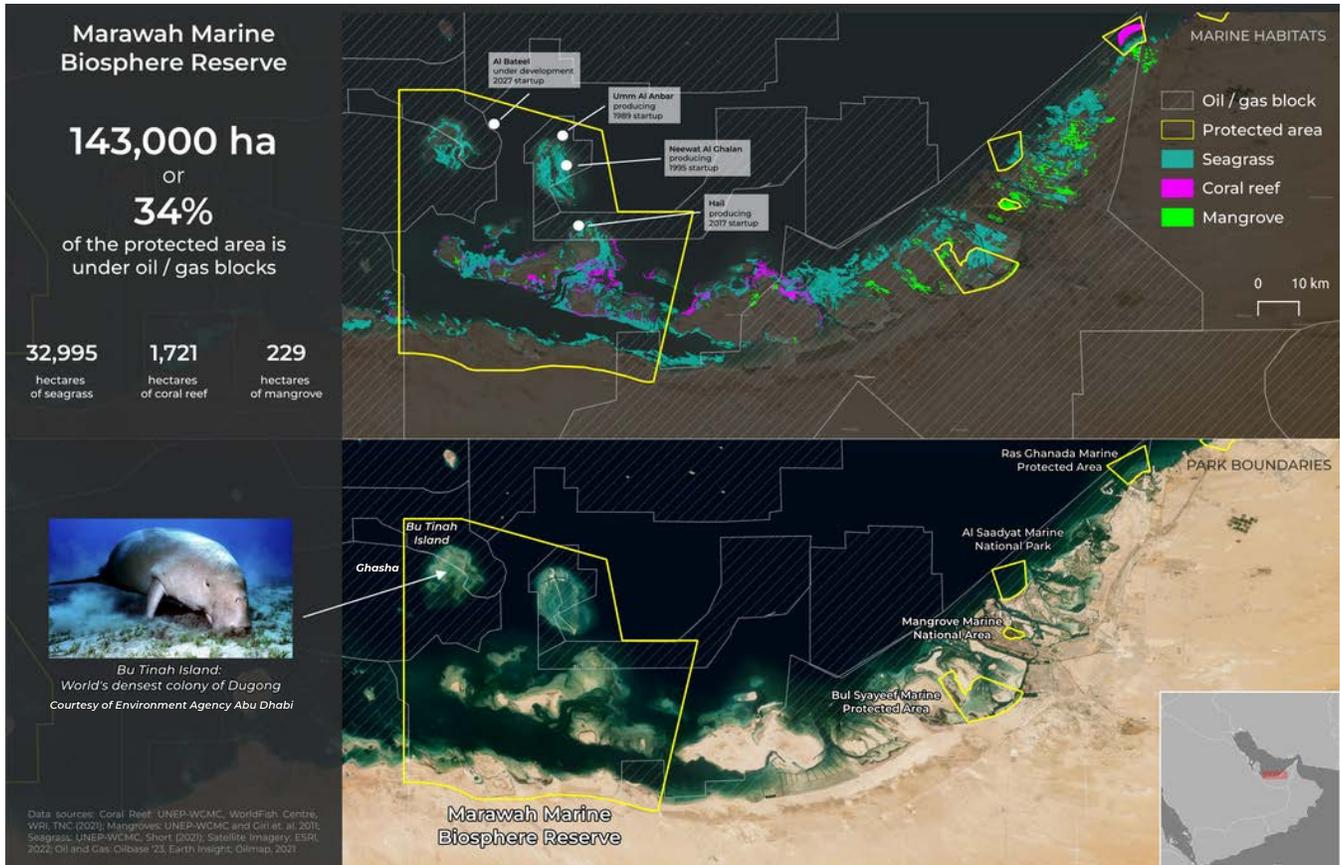
Fossil fuel extraction in Marawah is expected to expand as part of the Ghasha-Hail mega-project, which is among the world's largest offshore gas extraction projects. It targets ultra sour gas, a toxic kind of fossil gas that has high sulfur and CO₂ content. The project is expected to extract over 1.5 billion cubic feet of fossil gas per day, and over 120,000 barrels of oil per day meaning that, once completed, the project would produce over 49.6 million tonnes of CO₂ every year.³³

As of November 2023, the Environmental Impact Assessment of the project has not been made public.



An aerial photo of the Bu Tinah island off the western coastline of Abu Dhabi, a unique wonder of nature, wild and undisturbed by human activity. Image credit: Aenaon via Wikimedia Commons ([CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/))

Map 2. Fossil fuel threats to Marawah



Fossil fuel extraction in Marawah raises several red flags for the health of the marine ecosystem. Pollution from the oil and gas industry has already been identified as a major threat to marine environments in the UAE³⁴ and due to local currents, pollution tends to wash directly into dugong habitat. Dredging and building artificial islands, both associated with the planned oil and gas drilling processes, also pose a great threat to the ecosystem, being especially destructive to seagrass and coral across the MPA.³⁵ There are likely to be more ecological consequences of fossil fuel extraction in Marawah that cannot yet be predicted. Restoration efforts are underway for coral reefs, mangroves and seagrass meadows with the aim of recovering extinction-prone dugong populations.³⁶

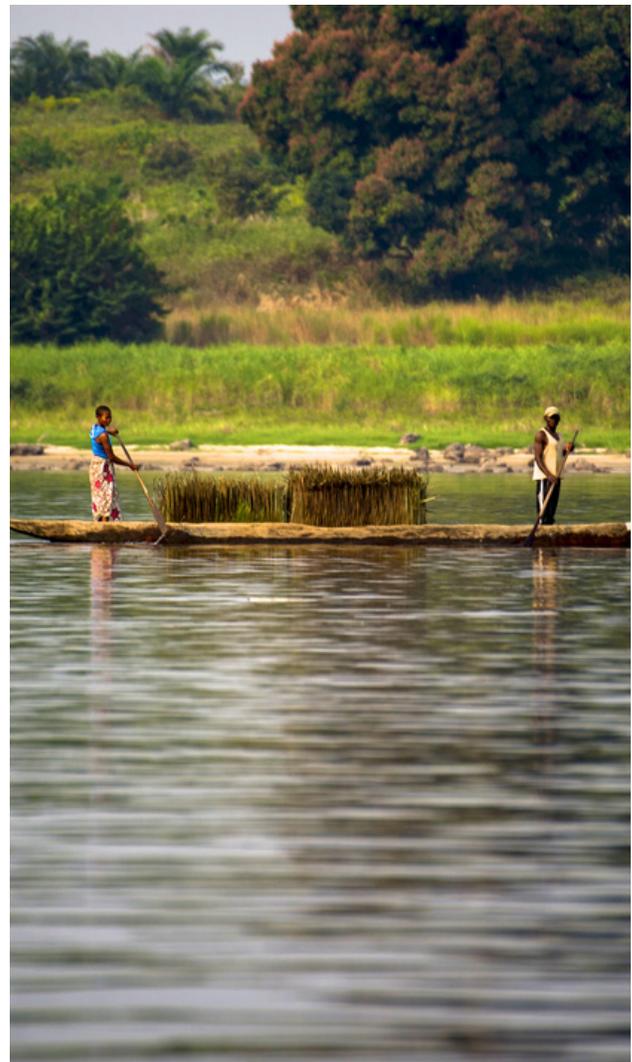
PART III: FUTURE THREATS ASSESSMENT OF OIL AND GAS IN THE PANTROPICS

While fossil fuel extraction in PAs is problematic anywhere in the world, the pantropics are being spotlighted in this analysis given the immense biocultural diversity in these regions and tipping point thresholds that tropical rainforests are facing, as well as their outsized role in global climate regulation. There is currently growing momentum for advancing solutions to maintain the integrity of biodiverse ecosystems within the three globally important basins: Congo basin, the Amazon basin, and the Borneo Mekong Southeast Asia forest basins.³⁷

Oil and gas expansion across the Congo basin

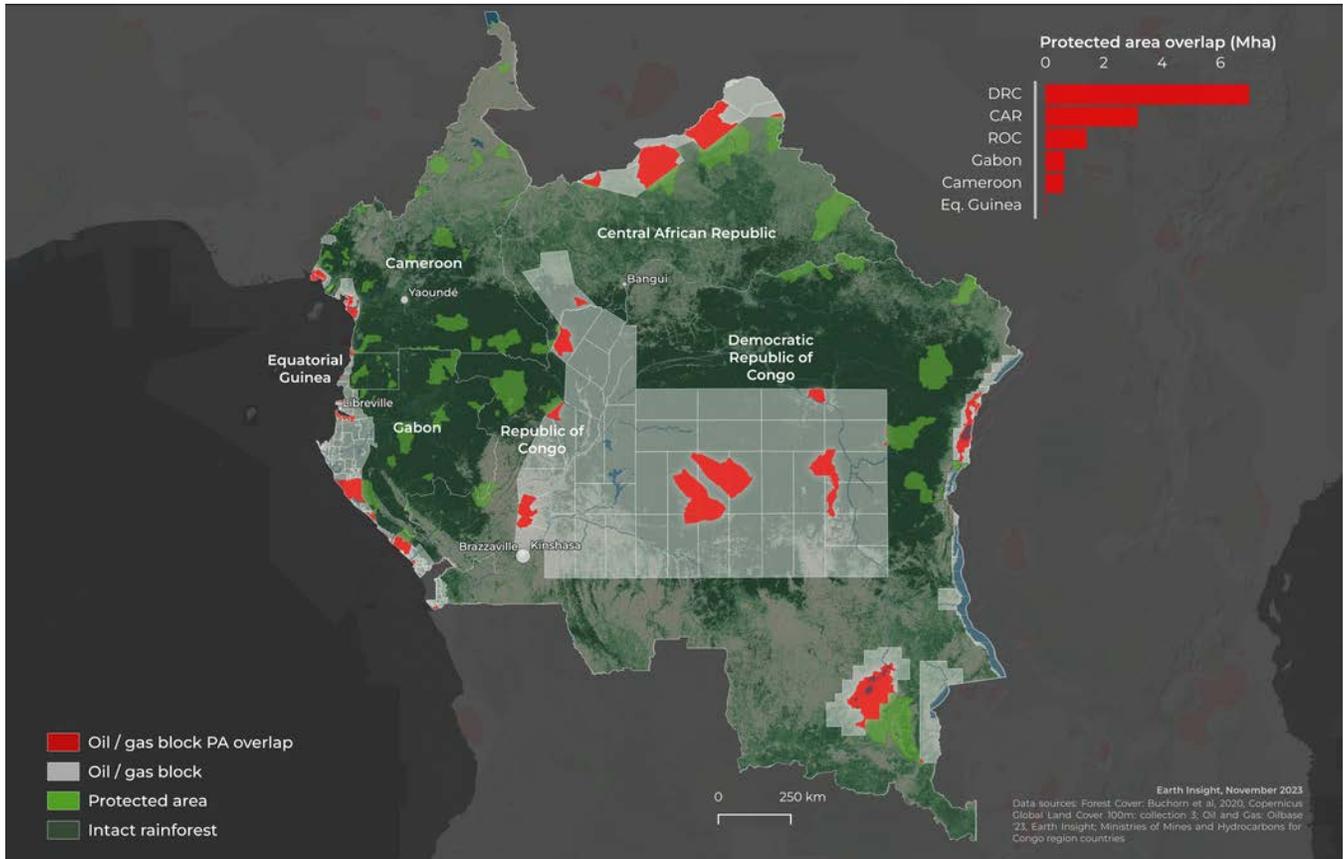
The Congo basin is home to the second largest tropical forest in the world, with ecologically-significant habitat spanning over 3.7 million km². This vast expanse of rainforest is one of few remaining large-scale high-ecological integrity ecosystems in the world and is a global asset critical for protecting biodiversity, stabilizing climate, and sustaining the livelihoods of millions of people. The Congo basin has been targeted as a priority region to expand PA networks, with significant international investment being poured into the country to advance the 30x30 Target of the Global Biodiversity Framework.³⁸ However, creating new PAs in the region will hold little value unless their protection is ensured through legal mechanisms and industrial activities that harm nature are strictly prohibited.³⁹

Despite its global environmental significance, the Congo basin is under imminent threat from a surging global demand for fossil fuels. Some of the most iconic PAs in the Congo basin are threatened by fossil fuel extraction and the ecological, social, economic, and climate ramifications of failing to protect these areas will permeate far beyond the heart of Africa.



Boat on the Congo river in the Democratic Republic of Congo. Image credit: Ollivier Girard, CIFOR (CC BY-NC-ND 4.0)

Map 3. Oil and gas threats in protected areas across the Congo basin

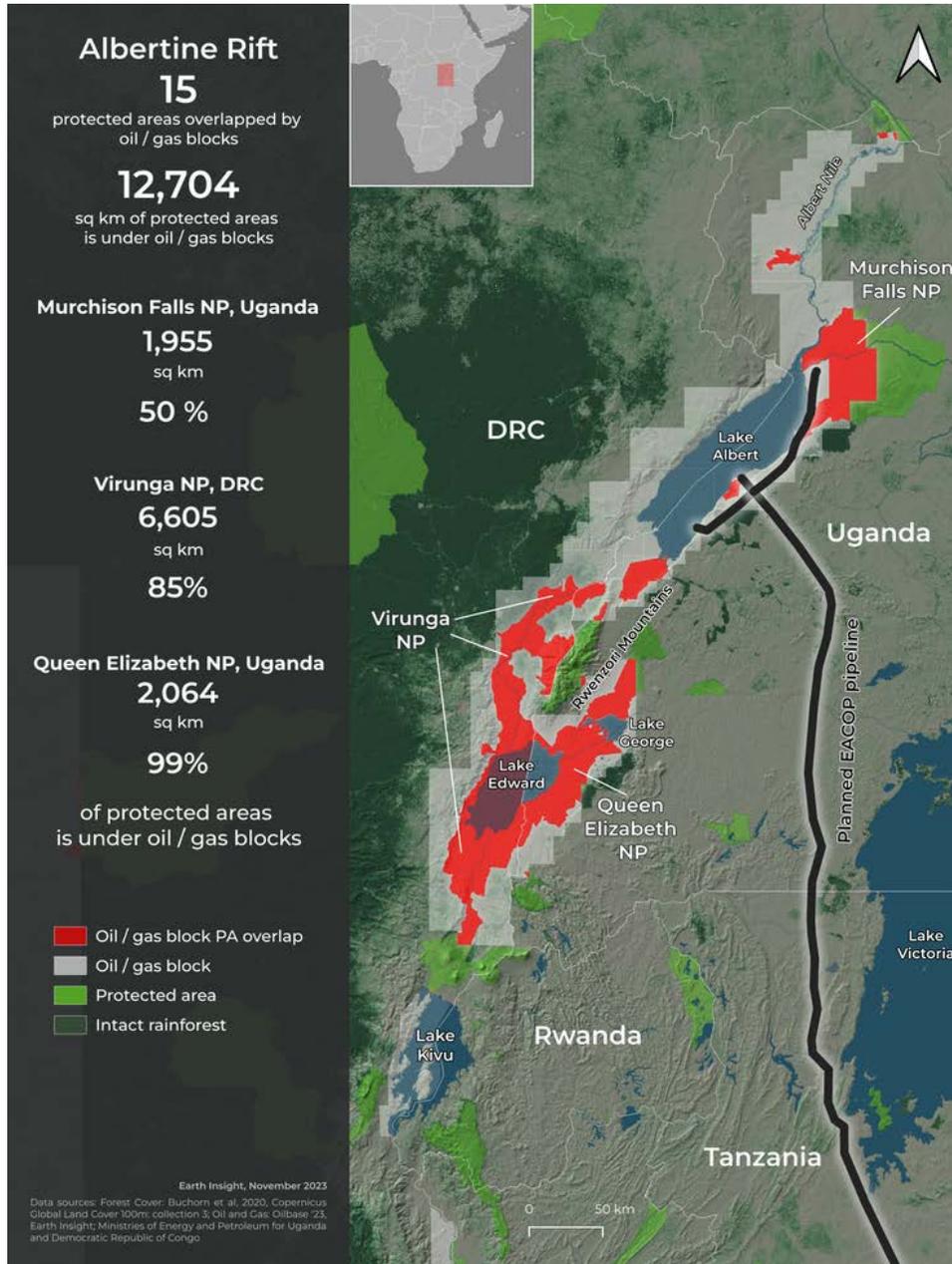


Despite the global interest in protecting high-ecological integrity ecosystems in the Congo Basin, some governments across the region have expressed their intention to prioritize economic growth over nature conservation, with oil and gas expansion, including within PAs, emerging as a next step in their pursuit of growth into global markets.⁴⁰ This threat across the Basin stands as a testament to the critical importance of conservation finance solutions that can support sustainable economic development while defending nature conservation and preserving the integrity of PAs.

Key findings:

- **Nearly 129,000 km²** of protected areas in the Congo Basin are overlapped by oil and gas blocks across **45** individual protected areas.
- **38%** of protected lands and waters in the Congo Basin area overlap with oil and gas blocks.

Map 4. Protected areas across the Albertine Rift in peril



Oil and gas blocks up for auction in a global icon in the Congo Basin: Virunga National Park

The Democratic Republic of Congo, which holds approximately 60% of the Congo Basin rainforest, is currently auctioning off oil and gas blocks in critical, rich forest ecosystems, including within more than a dozen protected areas.⁴¹ These oil blocks include areas that reach deep into the heart of Virunga National Park, an iconic conservation area known for protecting endangered mountain gorillas. Beyond its ecological richness, Virunga National Park plays a vital role in stabilizing climate

patterns, preserving essential water resources, and supporting local communities' livelihoods through community-based sustainable harvesting initiatives and a local tourism economy. Despite its global significance and high profile as a UNESCO World Heritage Site, a Ramsar wetland of international importance, and Africa's oldest and most biologically diverse national park, Virunga is threatened by oil and gas extraction out of line with its conservation mandate.

Licenses for oil and gas exploration are being offered for auction in Virunga National Park, despite the fact that fossil fuel exploration and extraction in protected areas is prohibited by several Congolese laws.⁴²

The park is protected by national and international regulations, and oil and gas activities are incompatible with many of Virunga's designations, including World Heritage status.⁴³ Unfortunately, the DRC government has made various attempts to downsize or downgrade the protected area to allow for oil and gas exploration, despite their responsibility to uphold the strict conservation mandate of the national park.⁴⁴

Virunga is one of several examples within the Albertine Rift where conservation commitments are compromised, with the prioritization of fossil fuel expansion.

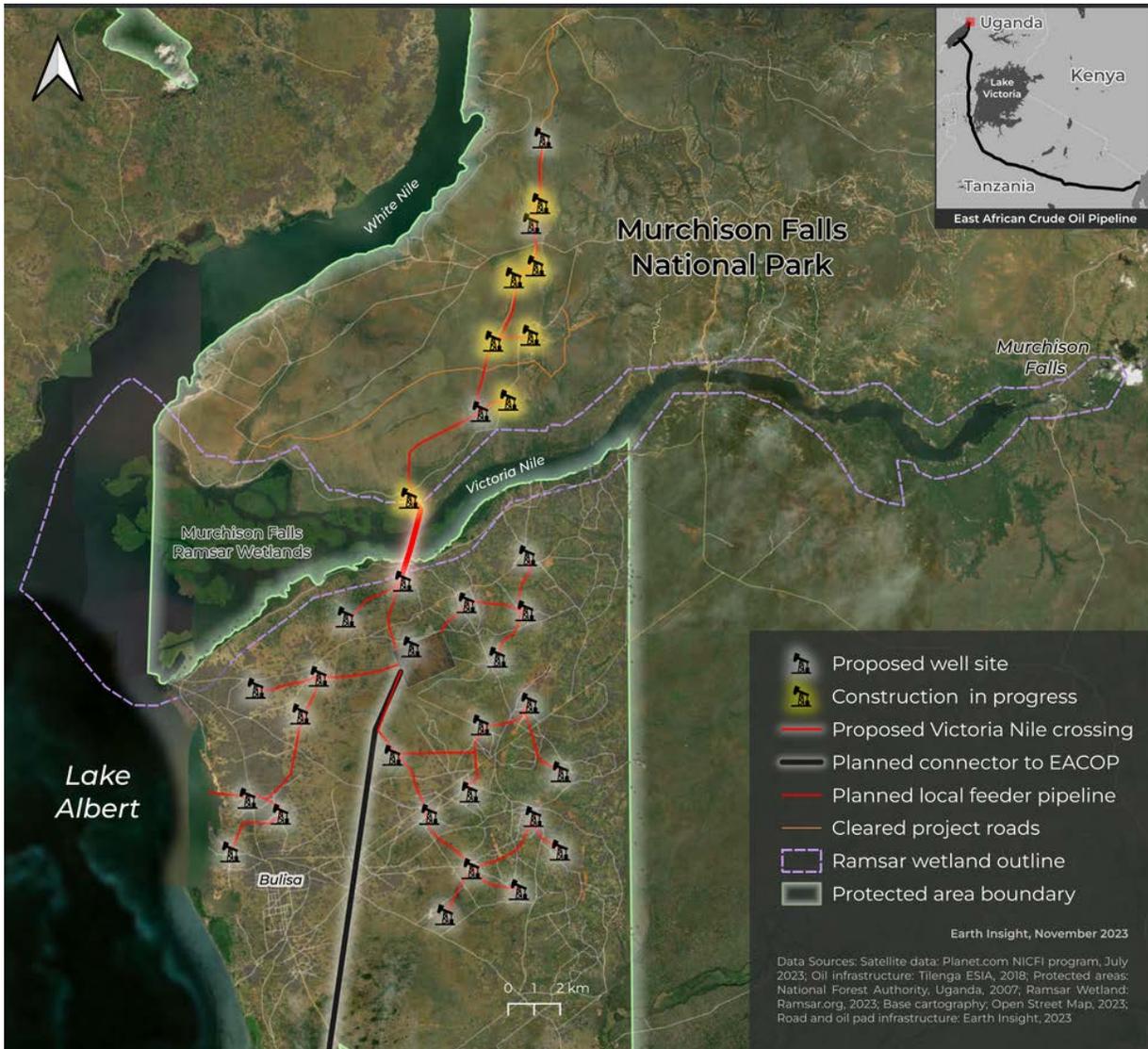


The gorilla sector of Virunga National Park, on August 6, 2013 in Bulima, DR Congo. Image credit: Brent Stirton via Getty Images

Alarming precedent in Murchison Falls National Park

Just outside of the Congo basin in western Uganda is Murchison Falls National Park, another iconic PA known for its rich biodiversity and spectacular natural landscapes. One of Uganda's oldest and largest protected areas, Murchison Falls holds immense ecological significance yet is actively being encroached upon by oil and gas expansion fueled by the East African Crude Oil Pipeline (EACOP) project. EACOP, a planned 1443 km pipeline from the shores of Lake Albert to the Indian Ocean through a port in Tanzania, poses a significant risk to nature, climate stability, and local communities. The development of a pipeline of this scale threatens to set off a chain reaction of pipelines and extractive expansion, infiltrating progressively more fragile ecosystems. If governments continue to pursue controversial industrial development and extraction projects that are incompatible with biodiversity conservation within the boundaries of PAs, other jurisdictions may well follow suit.⁴⁵

Map 5. Oil blocks in Murchison Falls National Park, Uganda



Ugandan kobs, Murchison Falls National Park, Uganda. Image credit: Gregoire Dubois via Flickr ([CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/))

Oil and gas threats to protected areas in the Western Amazon

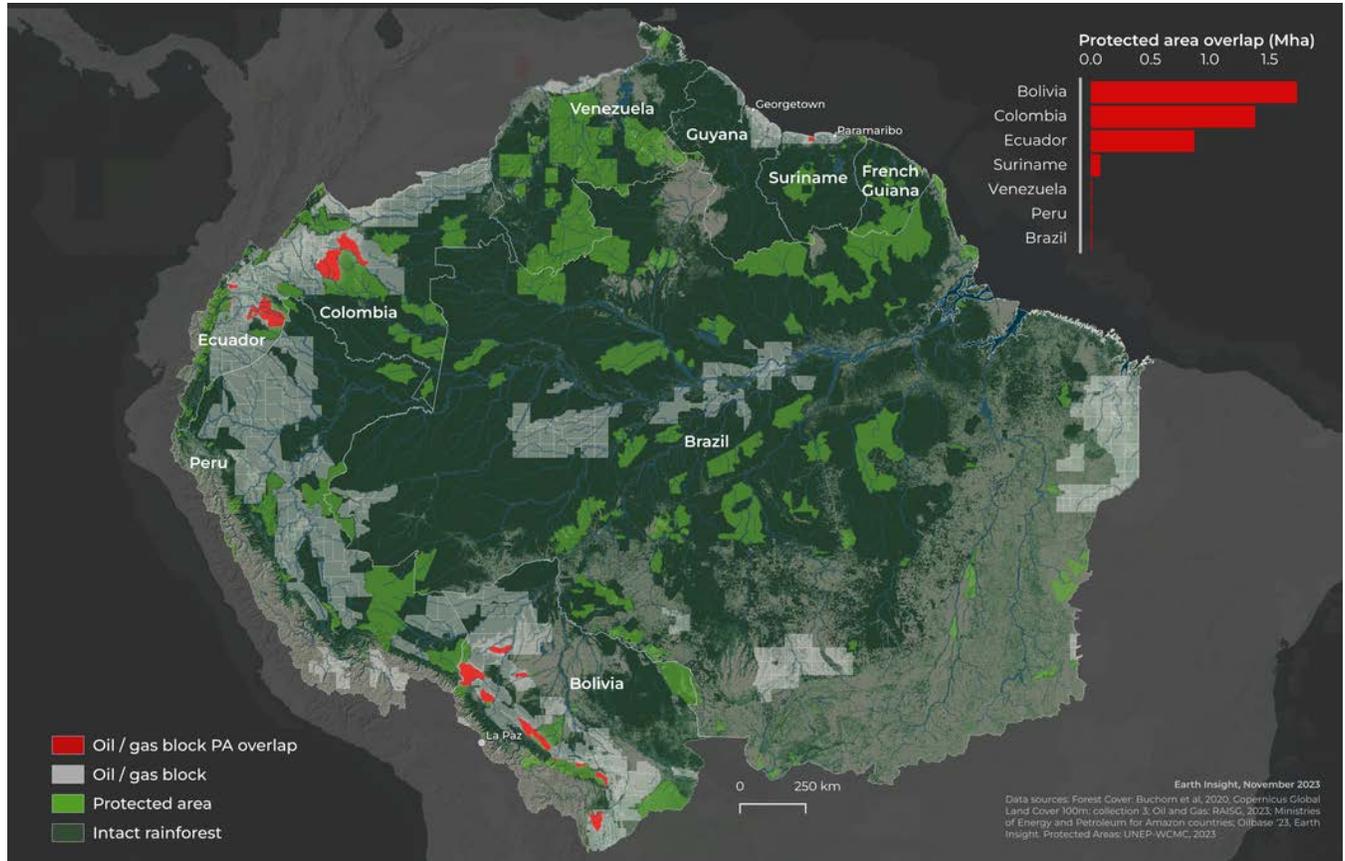
The most biodiverse place on the planet and a crucial carbon sink, the Amazon plays a globally significant role in providing essential ecosystem services, regulating climate patterns, and supporting Indigenous communities who have stewarded Amazonia for millennia. In the face of encroaching development, deforestation, extraction, and large-scale agriculture across the Amazon Basin, PAs in the Amazon have an important role to play in protecting one of the richest, most indispensable ecosystems on the planet.⁴⁶

Many PAs in the Amazon provide refuge for not only an abundance of plant and animal species, but are also the customary territories of the Indigenous peoples who still live within their boundaries. As the global demand for fossil fuels continues to rise and countries across the Amazon receive few financial incentives to preserve their biodiversity, PAs face escalating pressure for fossil fuel development activities.



Ecuadorean activist Donald Moncayo Jimenez (49) chief coordinator of the Union of People Affected by Texaco (UDAPT) stands next to a "mechero" (gas flare) from the refinery operated by Petroecuador in Shushufindi, in the Sucumbíos Province, Ecuador, on January 14, 2023. Image credit: Pedro Pardo / AFP via Getty Images

Map 6. Oil and gas threats in protected areas across the Amazon



Key findings:

- **Over 40,000 km²** of protected areas in the Amazon basin are overlapping with oil and gas blocks across **34** protected areas.
- **98%** of oil and gas blocks within protected areas in the Amazon are in the Western Amazon.
- Bolivia, Colombia, and Ecuador account for nearly all of the oil and gas block overlap in protected areas in the Amazon.

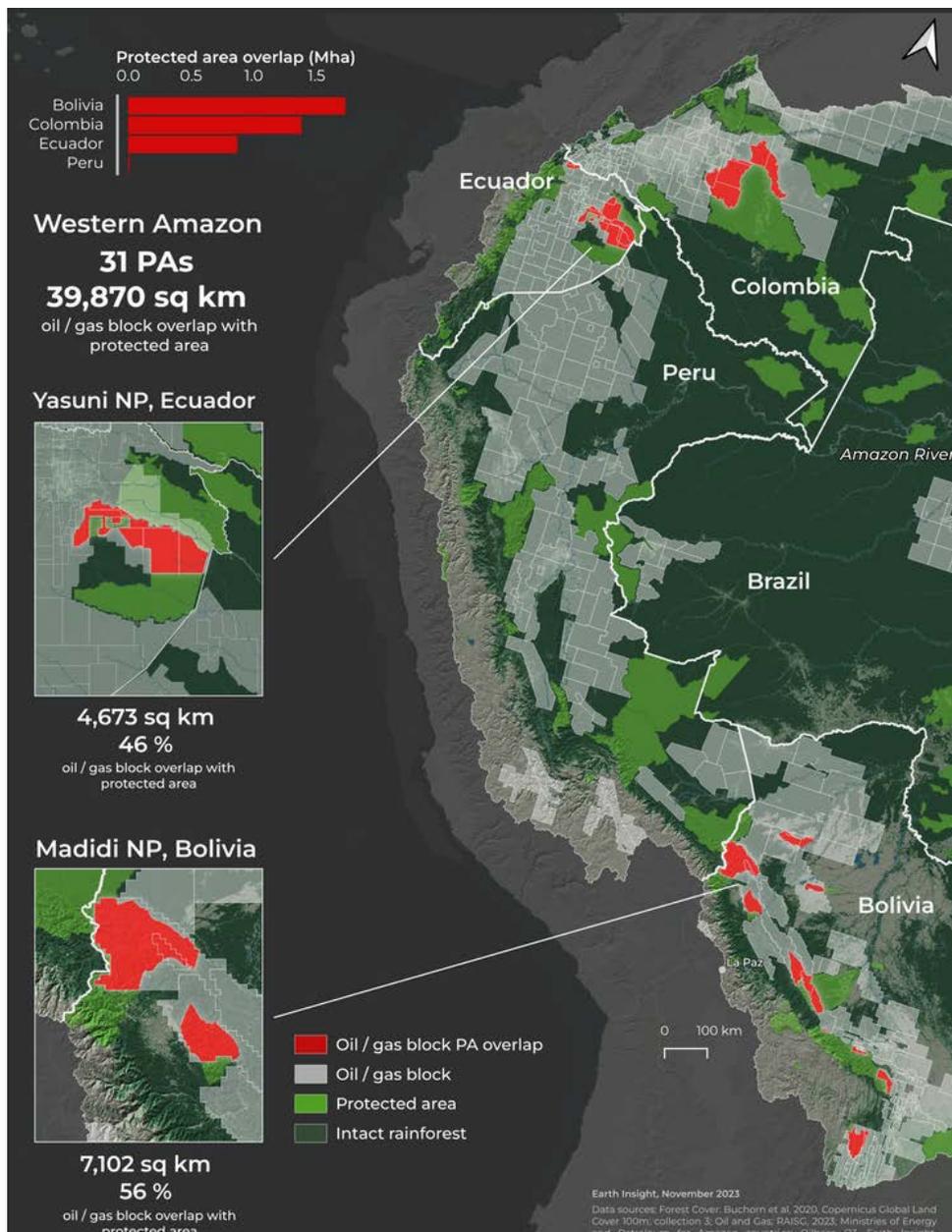


Activist Donald Moncayo Jimenez chief coordinator of the Union of People Affected by Texaco (UDAPT) showing oil from open pits that still contaminate the forest and waterways in the Ecuadorian Amazon, Sucumbíos Province. Image credit: Tyson Miller

Yasuní National Park

Nestled deep in the Amazon rainforest in Ecuador, Yasuní National Park is an astounding reservoir of rich biodiversity and a vital source of sustenance for local Indigenous peoples who have called the Amazon home for millenia. An ecological paradise, Yasuní has been caught in the crossfire of controversial debates surrounding oil extraction within the boundaries of the PA for decades.⁴⁷ Also designated a UNESCO Biosphere Reserve, the park is home to uncontacted Indigenous tribes, numerous endangered species, large carbon sinks, and rich oil and gas reserves, which place the PA at a critical intersection of environmental conservation, economic development, and social justice.

Map 7. Oil blocks in Yasuní and Madidi National Park, Ecuador



Yasuní was designated as a national park in 1979, yet when vast oil and gas reserves were discovered under the heart of the protected landscape, the government of Ecuador continued to promote and pursue extraction within its boundary.⁴⁸ The Yasuní-ITT Initiative was announced in 2007 with the aim of preventing drilling in the Ishpingo-Tambococha-Tiputini (ITT) oil field in Yasuní through donations from the global community and a certificate scheme to provide credits through the European Union's carbon credits market. In 2013 however, after failing to raise funds for the protection of Yasuní from the international community, ITT was opened to oil development in the heart of the PA. After long-standing advocacy efforts led by Indigenous peoples and grassroots environmental campaigners, in 2023 a referendum in Ecuador mandated officials to halt oil and gas activities in the ITT field and withdraw from the oil project within one year.

Despite the historic vote to keep oil from ITT (Block 43) underground, the fate of Yasuní remains uncertain. While Ecuadorians have voted to close the ITT oil block to further extraction, the government must ultimately enforce the referendum, and the park is expected to take years to recover.⁴⁹ At the same time, the referendum only applied to the ITT oil block and Yasuní remains vulnerable to extraction from other oil blocks within the park boundary.

Key findings:

- 45.67% of Yasuni is overlapping with oil and gas blocks.
- 19% of Indigenous Territories within Yasuní are under oil and gas blocks.

Madidi National Park

Located in the upper Amazon River basin in northwest Bolivia, Madidi National Park has been named one of the most biologically diverse PAs on Earth.⁵⁰ Also home to a range of Indigenous communities, Madidi was established in 1995 with the primary objective of conservation of biological diversity through community participation in benefit of the present and future generations.⁵¹ According to Bolivia's own national park policies, extractive or consumptive use of natural resources within the national park is strictly forbidden.

Despite the important conservation efforts the park represents and the legal mechanisms that are meant to uphold its protection, a sweeping Supreme Decree from Bolivia's president in 2015 opened the door to oil and gas exploration across 24 million hectares of land in Bolivia, including in legally designated PAs like Madidi.⁵² This contradiction with the country's own conservation mandates through their PA system poses a significant threat to the long-term protection of this part of the Amazon basin and raises concerns about the commitment to biodiversity conservation and Indigenous rights in Bolivia.

The environmental, health, and cultural impacts of oil exploration and extraction in Madidi will be devastating unless decisive action is taken to halt fossil fuel extraction in the national park.

Key findings:

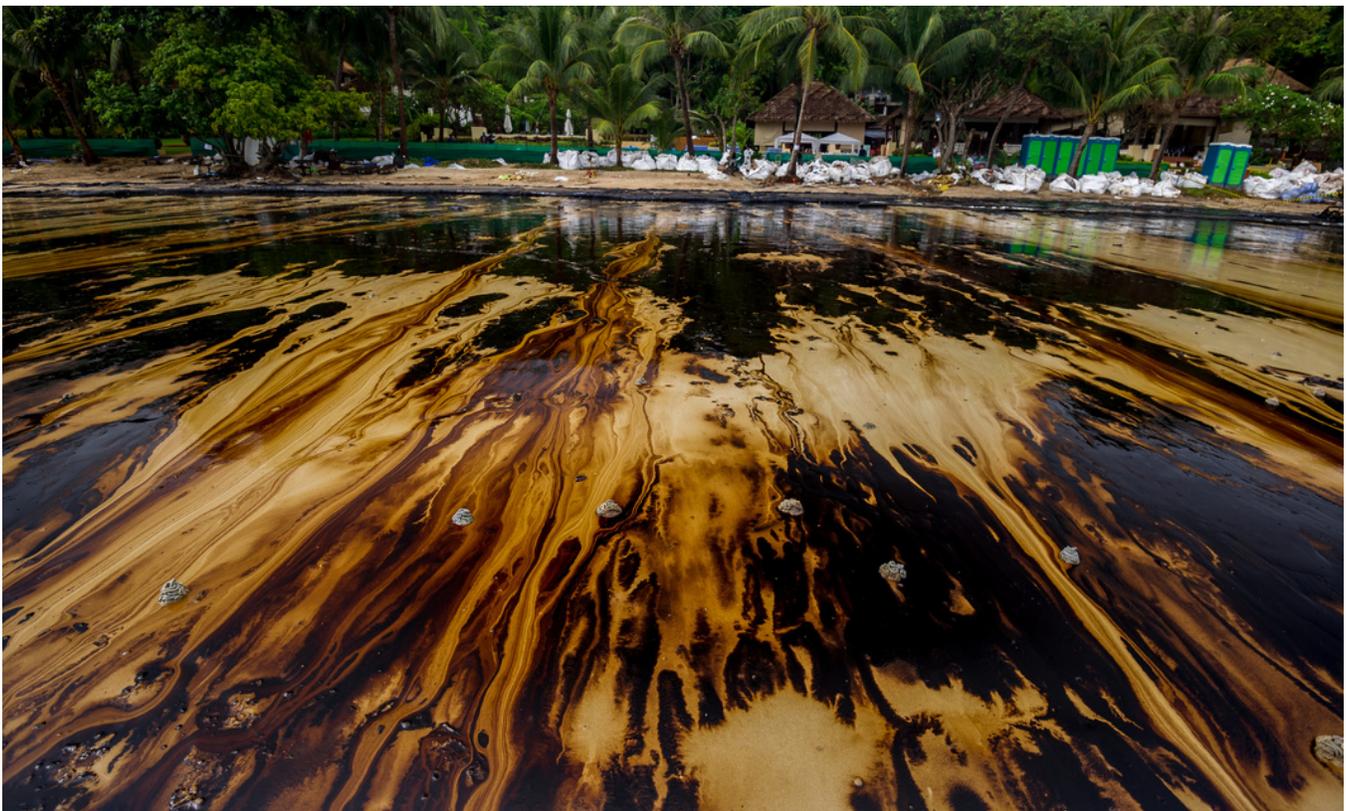
- 56% of Madidi National Park is overlapping with oil and gas blocks.
- 84% of Indigenous Territories within Madidi are under oil and gas blocks.



Madidi National Park. Image credit: Joe Lazarus via Flickr (CC BY-NC-ND 4.0)

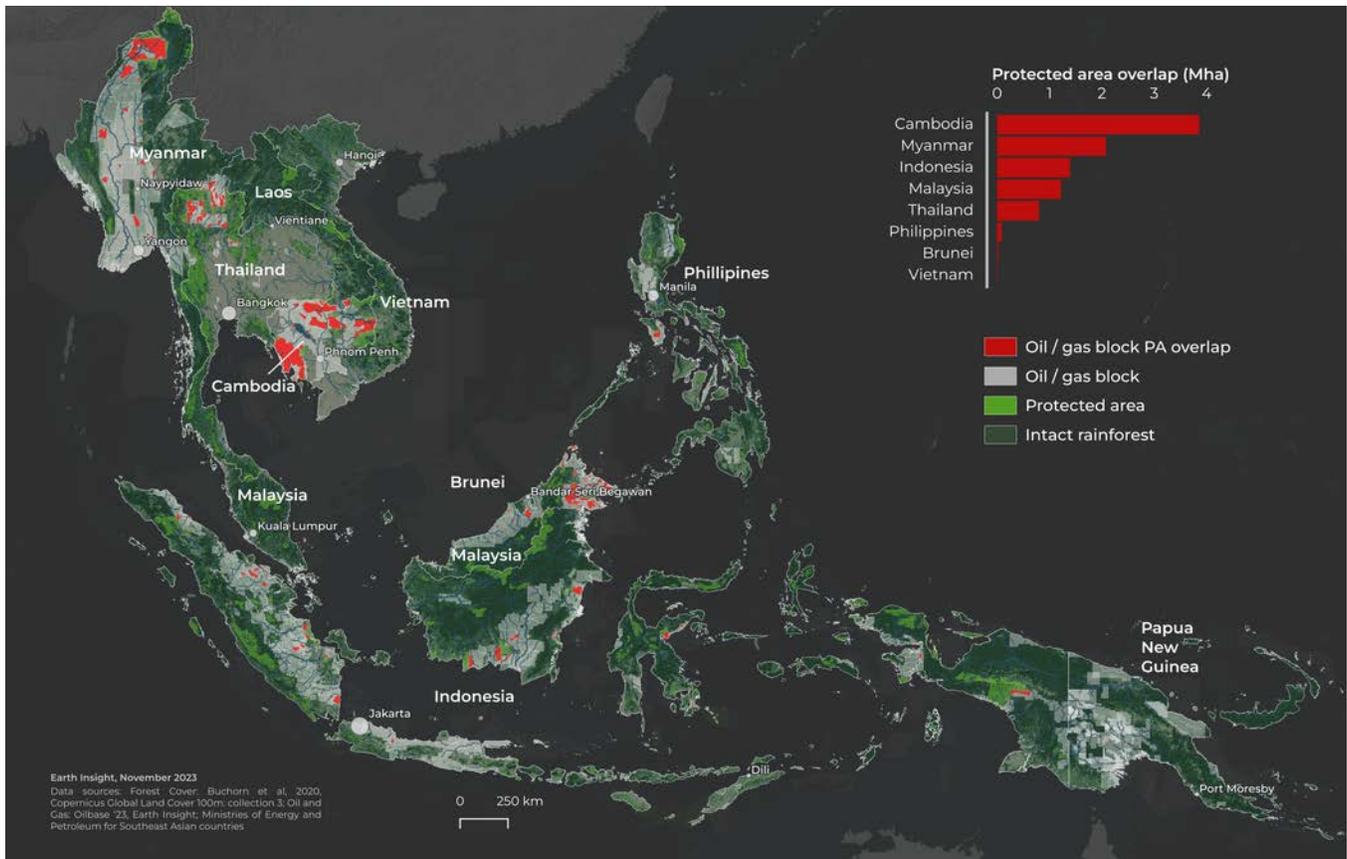
Oil and gas expanding onshore and offshore in Southeast Asia

From the biodiverse rainforests of Borneo to the ecologically-important Mekong River, Southeast Asia is a region renowned for its natural beauty, rich cultures, and species diversity, including: numerous endemic species; some of the richest coral ecosystems in the world; and, some of the last remaining expanses of primary lowland tropical forests. The densely-populated region is one of the most economically fast-growing parts of the world, with immense development pressures being imposed on biodiverse land and seascapes.⁵³ Protected areas in the Association of Southeast Asian Nations (ASEAN) region, already under severe pressures from overexploitation and habitat fragmentation, are additionally threatened by oil and gas concessions.



Petroleum spill mixed with other chemical substances on sea and sand surface in Samet Island, Thailand. Image credit: Arun Roisri via Getty Images

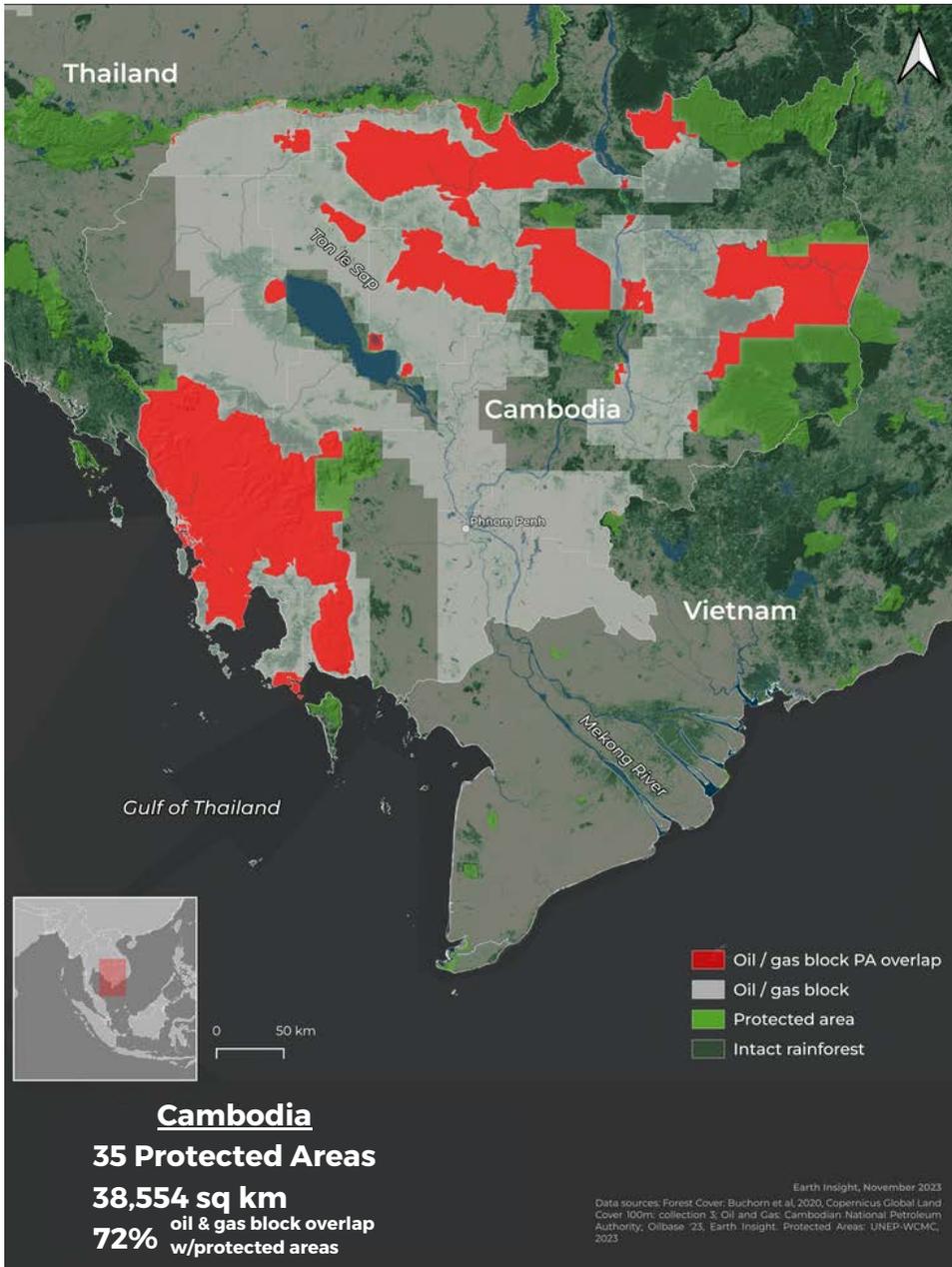
Map 8. Oil blocks overlapping with protected areas in Southeast Asia



Key findings:

- **361** protected areas in the region are overlapping with oil and gas, accounting for nearly **21%** of land in protected areas in Southeast Asia.
- Nearly **95,000 km²** of oil and gas blocks overlapped with protected areas in Southeast Asia.

Map 9. Oil blocks overlapping with protected areas in Cambodia



Key finding:

- **72%** of terrestrial protected lands and waters in Cambodia overlap with oil and gas blocks in Southeast Asia.

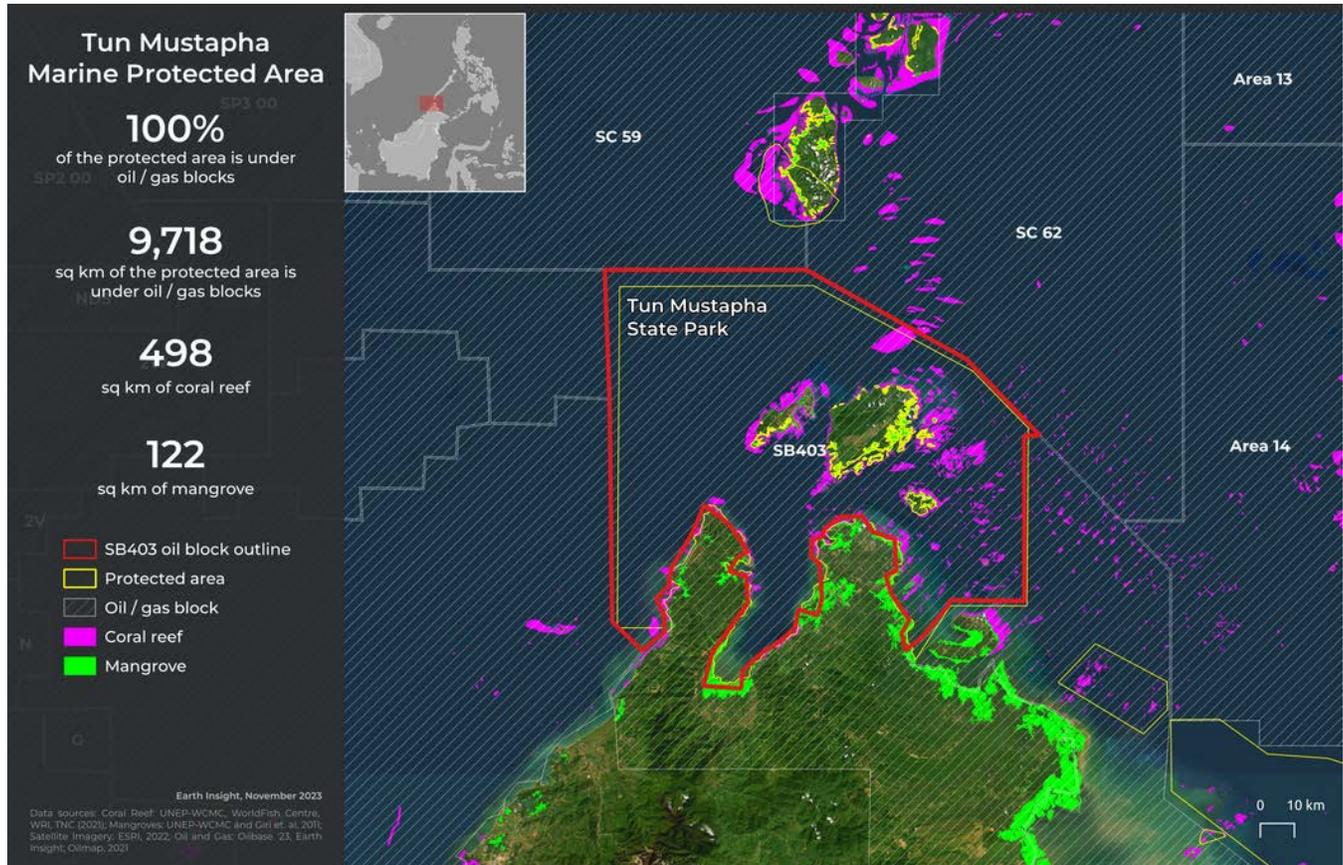
Tun Mustapha Marine Protected Area

As the third largest island on earth, Borneo's environmental significance includes important coastal ecosystems, where mangrove forests mitigate climate change through blue carbon sinks and coral reefs provide habitat for an immense amount of marine biodiversity. However, in the northern state of Sabah, Malaysia on Borneo, the vast majority of PAs are overlapped by oil and gas blocks being auctioned for exploitation.

Malaysia boasts an abundance of oil and gas and the country's foray into fossil fuel extraction has played an important role in shaping its economy, propelling Malaysia into the ranks of the world's leading energy and gas exporters. As a key player in the fossil fuels sector in the ASEAN region, Sabah is rapidly expanding its exploration and extraction projects, primarily in the South China Sea.⁵⁴ Along the southeast edge of the South China Sea, northwest Borneo and its offshore region are among the least investigated basins for fossil fuel reserves remaining, with vast geological features that are drawing increased attention from oil and gas developers worldwide. The government of Sabah has sent clear signals of an intent to continue developing oil and gas infrastructure despite the contradictions to their climate and biodiversity goals.⁵⁵

In the most recent auction of oil blocks in Malaysia, Sabah put oil block SB-403 up for auction, overlapping entirely with Tun Mustapha Marine Protected Area (TMP).⁵⁶ Off the northern tip of Borneo, TMP is the largest MPA in Malaysia and one of the richest marine biodiversity hotspots in the world. TMP was established to maintain the integrity of the globally significant marine life in the region and to ensure that marine resources can continue to support local communities through sustainable use. The pursuit of offshore fossil fuel extraction within the PA would contradict the mission of the MPA and could have disastrous consequences for the rich marine biodiversity in the area. **As of early 2023, there have already been 4 steel platforms built for exploratory drilling within the boundaries of the MPA.**⁵⁷ It has yet to be seen what will come of the latest auctioning of oil blocks offshore but Sabah stands at an urgent crossroads. With a frenzy of offshore activities, Sabah has an important opportunity to publicly commit to protecting ecologically sensitive zones from fossil fuel extraction.

Map 10. Oil and gas threats in Tun Mustapha MPA, Malaysia



Key findings:

- **100%** of Tun Mustapha MPA, the largest MPA in Sabah, Malaysia, overlaps with an oil and gas block that was up for auction in 2023.
- At least **122km² of mangroves and 498km² of coral reef** are contained within the protected area—and the oil and gas block.



Underwater marine life in Tun Mustapha Park. Image Credit: WWF Malaysia/Eric Madeja via USAID Asia Flickr (CC BY-NC 4.0 DEED)

PART IV: CONCLUSIONS AND RECOMMENDATIONS

Ongoing and future fossil fuel extraction in PAs paints a striking picture of how, as a global community, we are failing to defend the areas of the world that are meant to be afforded the strictest protections available for nature. At the same time, the future threats assessment presented here provides a glimpse into how many more of our PAs could be at risk if governments do not urgently prohibit fossil fuel extraction in PAs. Keeping fossil fuel deposits in the ground in PAs is essential for safeguarding the environment, conserving biodiversity, mitigating climate change, and respecting the rights of Indigenous communities. It requires a collective effort from governments, financial institutions and corporate actors, and civil society to prioritize the protection of these invaluable areas.

The impacts of extractive activities on biodiversity can be catastrophic, including deforestation concomitant to exploration access, soil and groundwater contamination, cleared habitat for infrastructure, disruption to wildlife movement, seismic disturbance, oil spills, and more.⁵⁸ The importance of PAs extends far beyond their immediate boundaries. They are critical for global conservation efforts and it is imperative that we protect them for generations yet to come.

Nature beyond the boundaries of protected areas

In many cases, PAs are the best conservation tool in our toolbox, with

proven biodiversity conservation outcomes and important legal frameworks through which nature is meant to be protected. While these areas are essential for tackling the climate and biodiversity crises, relying solely on PAs is insufficient to safeguard the planet's natural resources. Focusing our conservation efforts exclusively on PAs neglects the interconnectedness of all ecosystems, and fails to address the potential threats just beyond their borders.⁵⁹ Fossil fuel and other industrial extraction activities outside of PAs can also have tremendous consequences for the high-ecological integrity nature “protected” within their boundaries. Even where PAs themselves remain untouched by extractive industries within their geographic boundaries, whole ecosystems can be compromised, and PAs may be unable to safeguard the natural environments, habitats, and species they were designated to protect.⁶⁰ Implementing measures to advance ecosystem integrity and safeguard nature outside the boundaries of PAs is imperative in ensuring the long-term health and viability of ecosystems.⁶¹ The Global Biodiversity Framework's highlighting of other effective area-based conservation measures (OECMs), defined as areas beyond protected areas that are important for biodiversity values, provides a mechanism for expanding the areas of land and sea outside of PAs that should be also off limits to fossil fuel and other industrial expansion.

It is important to note that this report focuses on fossil fuel extraction threats within PAs currently recorded in the WDPA. However, we know that around the world PAs are being degazetted or reduced in size to accommodate extractive industry expansion, and these recently-unprotected areas are not captured in the numbers presented here.⁶² Moreover, fossil fuel development is only one extractive industry that threatens PA integrity—a variety of mining, industrial and infrastructure development plans are also destroying habitat in PAs around the world.⁶³

Degazettement and size reduction of PAs (PA Downgrading, Downsizing and Degazettement or PADDD) undermines years of conservation efforts and provides an important reminder of the need to both vigorously defend PAs and to take a comprehensive approach to conservation that includes safeguarding nature outside of these areas.⁶⁴ Ultimately, PAs are constructs of legal and policy frameworks that recognize nature of high ecological integrity as an invaluable asset, a home for countless species and the source of Indigenous and local community livelihoods, that provide valuable ecosystem services including carbon sequestration and storage. It takes well-resourced, effectively managed, and vigorously defended PAs to safeguard nature.

Global commitments to addressing the biodiversity and climate crises require transformative action along many dimensions. However the world should take immediate action to reduce emissions, phase out fossil fuel consumption, and

prohibit further fossil fuel extraction starting with protected areas, if we are to limit global warming and the worst impacts of climate change, and maximize the benefits of protecting nature, for the benefit of all life on Earth.

RECOMMENDATIONS

- Immediately ban fossil fuel exploration and extraction in protected and conserved areas globally.
- Create and implement new conservation financing schemes to incentivize and promote the safeguarding of protected and conserved areas for climate mitigation, climate resilience, and biodiversity protection, especially in high biodiversity, high carbon ecosystems.
- Establish explicit commitments related to fossil fuels and biodiversity, including non-extraction of fossil fuels from protected areas under relevant existing mechanisms such as the UNFCCC and the Beyond Oil and Gas Alliance and additional mechanisms such as a Fossil Fuel Non-Proliferation Treaty.
- Governments commit to refrain from downgrading, or modifying the boundaries of protected areas to allow for fossil fuel extraction.
- Restrict financing for fossil fuel exploration and extraction in protected areas
- Ensure that all sourcing of critical minerals for the transition to renewable energy is done in a responsible way that prohibits encroaching on protected areas, does not destroy ecosystems, safeguards biodiversity, and ensures free, prior, and informed consent from Indigenous peoples and local communities.

ANNEX I: METHODS

LINGO Global Analysis Methodology

Methodology:

This project has encompassed two complementary methodologies.

The first involves processing Rystad and Global Energy Monitor data to track current and planned extraction operations in protected areas.

The second focuses on the area-based analysis of oil, gas, and coal deposits with overlapping protected areas to estimate how much potential CO₂ emissions are under each country's protected areas.

Data Collection

Where possible, LINGO has relied on publicly accessible authoritative data sources. For oil and gas data, the United States Geological Survey's (USGS) domestic and international maps of deposits, along with the Peace Research Institute of Oslo's "Petrodata", were used for area-based calculations. Coal data was carefully collected and combined by LINGO, utilizing diverse sources, including by the European Commission, USGS, national academic institutes, and even declassified CIA reports (for North Korea).

Oil and gas extraction information was calculated from a subset of Rystad Energy's "U Cube" upstream asset database, clipped to include only details inside protected areas as part of a data partnership with Oil Change International. Coal extraction data was sourced from the Global Energy Monitor's Global Coal Mine dataset. Like the oil and gas extraction data, information was clipped to include only protected areas.

A comprehensive map of the world's government-protected natural areas was sourced from Protected Planet's World Database of Protected Areas. This dataset was used to define the boundaries of protected areas and calculate area-based statistics.

Creating national summaries required an authoritative source of land and marine borders. The Flanders Marine Institute's "union" shape file was used to normalize differing borders and establish sovereignty over protected areas and fossil fuel deposits.

Geoprocessing

Area-based calculations began by creating polygon sets representing overlapping areas between coal/oil/gas deposits and protected areas. Both the original deposit polygons and these "overlapping deposits" polygons were further processed in a six-step workflow: (1) Polygons of the same type (oil/gas or coal) were merged using ArcGIS's "dissolve" geo-processing tool to avoid double counting areas.

(2) Transnational deposits were split at national borders using the Flanders Institute's map of national borders and economic exclusive zones. This normalized border lines across different sources and ensured that each country's statistics only included deposits within their borders. (3) Each resulting polygon's area in square kilometers was calculated and appended to the polygon's attribute data. (4) ISO three-letter country codes were added to each polygon's attribute table to identify which country they are located in. (5) Country stats were summarized by summing the area attribute values for all the polygons with the same country code. (6) Each country's coal and oil/gas deposits under protected areas were calculated as a percentage of the national total coal and oil/gas area. These percentages were then used as factors for BGR's energy statistics to estimate the amount of each fossil fuel under protected areas.

Processing of current and planned extraction data from Rystad Energy (oil and gas) and Global Energy Monitor (coal) started with clipping the respective data sets to include only protected areas. Duplicate, abandoned, canceled, and spurious assets were removed utilizing OpenRefine before summing values for each three-letter ISO country code, creating the final per-country statistics.

All processing was performed with ArcGIS Pro Advanced. Microsoft Excel was used to prepare spreadsheets and collate data.

Using LINGO's "Keep it in the Ground" (KING) conversion metrics, equivalent potential carbon dioxide emissions have been provided.

Publishing

The resultant spreadsheets have been enhanced to provide equivalent CO₂ values, further summaries, and easy-to-read formatting. This same data was re-imported into ArcGIS Pro Advanced and used to create the data package for a publicly available map with interactive elements. This map was developed in cooperation with FracTracker Alliance using the ArcGIS Online toolset.

Shortcomings

Source Data

Developing a global-scale model has involved accepting several deficiencies in the source material gathered from various government and academic sources. Differences in source methodologies, definitions of what counts as a legitimate deposit, and funding and technical resources can create discrepancies in data between countries or regions.

This effect may be especially pronounced in the coal deposits area dataset, for which sources range from official high-resolution geospatial data from government bureaus to hand-digitized scans of de-classified printed intelligence reports. Coal data for the European Union included some point, rather than polygonal, data which was expanded into polygon form by adding a 25-kilometer buffer around each point.

Oil and gas data from the United States Geological Survey is limited to conventionally recoverable deposits. This dataset is the product of many separate assessments and is very conservative in labeling areas containing oil and gas deposits. Notable missing regions occur within the Southeastern cape of South Africa, the Democratic Republic of Congo along with neighboring areas, Central and Eastern Europe, the Australian interior, and Brazil. Statistics for South Sudan's oil and gas are not listed separately from Sudan. As better data becomes available, LINGO will prioritize updating these regions.

Extraction projects in protected areas are tracked using Rystad Energy (for oil and gas) and Global Energy Monitor (for coal) data. Each organization collected data from diverse sources: including local governments, industry news, and proprietary data. Along with different methodologies, each originating source may have reasons to inflate recoverable resources (boosted company valuations, attracting investment to an area) or to under-report, or not report, the importance of an asset (avoiding scrutiny). Global Energy Monitor provides limited coverage of coal mines producing less than 1 million tons per year. Similarly, Rystad does not track many small oil and gas assets that do not participate in international markets. Therefore, many extraction projects, otherwise impacting protected areas, are not included in the source data used to derive this study's statistics.

Fossil fuel-bearing areas were overlaid with a map of legally protected areas of conservation, introducing other shortcomings to consider. Sites of other effective conservation measures (OECM) are excluded from consideration since the power to stop or prevent fossil fuel extraction is not clearly delineated to government bodies. This source is rapidly refining- constant improvements to the protected area dataset are published monthly, yet this project relies on a July 2022 snapshot (when data was processed).

In computing estimates of fossil fuel deposits under protected areas, national resource and reserve data from the German Federal Institute for Geosciences and Natural Resources (Bundesanstalt für Geowissenschaften und Rohstoffe) was used. Inconsistencies and errors in their dataset may be evident and amplified. Natural gas values have been converted to BOE (barrels of oil equivalent) using BP's conversion factors.

Due to these shortcomings, one must consider the estimates produced by this project to be minimum values. LINGO will revise values as better datasets become available.

Geoprocessing

Data were processed using methods that may generate edge-case or localized irregularities to create a global yet consistent output product. Area-based calculations determined the percentage of fossil fuel deposits under protected areas. This method assumes equal distribution of deposits. Due to each dataset's slightly differing national borders, polygons were split, creating occasional "slivers" of protected areas and deposits in the wrong country.

Presentation

Developing a public resource involves creating easy-to-understand statistics, visual products, and written material. This goal has necessitated simplifying the values presented. Actions taken include reducing decimal precision to avoid long numbers, making assumptions of what data categories are pertinent to the audience, and removing proprietary data not licensed for public distribution. A high degree of manual work was involved in calculating and formatting final outputs, introducing an avenue for human-caused errors despite LINGO's peer-proofing workflow.

Acknowledgements

This global project was only possible with a worldwide support network. The author and team wish to thank the German Postcode Lottery's grant funding. Technical and data partners include Nordend, FracTracker Alliance, and Oil Change International. The Middlebury Institute of International Studies provided software and support for much of the initial geospatial analysis. The author would like to gratefully acknowledge the support of her husband and family during the development of this project. Without quality data created by a global community of professionals, this project would not have been possible. The author and team acknowledge the combined efforts of the European Commission, US Geological Survey, Global Energy Monitor, Rystad Energy, International Union for the Conservation of Nature, German Federal Institute for Geosciences and Natural Resources, plus other government and academic organizations and the thousands of researchers they represent.

Links to Data

The website "protected-carbon.org" contains supporting data, case studies, and an interactive world map for users to explore.

Earth Insight Pantropical Analysis Methodology

Data Disclaimer:

The geospatial analyses in this report are an attempt to capture threats to protected areas using the most recently available, most accurate and precise data and methods available. As such, the results of these analyses may change between reports as data and/or methods are updated. The World Database on Protected Areas (WDPA) has known data inconsistencies due to national government data reporting. We have accounted for these inconsistencies wherever possible.

Earth Insight takes a precautionary approach to estimating the potential area under oil and gas threats. Oil and gas data used in the analyses in this report include active production blocks as well as areas under multiple stages of exploration and permitting. This approach provides the most expansive view of areas under threat of oil and gas.

Protected Areas

The protected areas data used in this analysis is from the World Database of Protected Areas (UNEP-WCMC and IUCN, 2023). Protected areas with IUCN categories I - IV were selected based on IUCN recommendations that no oil and gas extraction should occur in these protected areas. Protected areas that did not have a IUCN category but were designated 'National Parks' were recategorized as IUCN category II to account for the gaps in reported attribute data for certain countries. Duplicate and overlapping protected area features were removed before running the area-based analysis. Marine Protected Areas were removed using `Marine != 2` to preserve protected areas in coastal and tidal landscapes as well as terrestrial protected areas. .

Oil and Gas Block Overlap with Protected Areas

The extent of oil and gas blocks was compiled by Earth Insight based on recent official publications by the Ministries of Natural Resources or Energy of Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname, Democratic Republic of Congo, Republic of Congo, Central African Republic, Gabon, Cameroon, Equatorial Guinea, Uganda, Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, and Vietnam. The oil and gas database was intersected with the cleaned WDPA dataset to identify oil and gas blocks within protected areas. The intersected layer was converted to single parts and features smaller than 0.1 km² were removed. The global ESA Tree Cover fraction was used for visualization purposes.

Oil Expansion into Murchison Falls National Park and Ramsar Wetland

The well sites where construction is currently in progress as well as cleared roads were digitized from June 2023 Planet satellite imagery. Proposed well site locations and planned pipeline routes were digitized from the Tilenga Environmental and Social Impact Assessment. June 2023 Planet satellite imagery was used for visualization.

Oil and Gas Block Overlap with Marine Protected Areas

The extent of oil and gas blocks was compiled by Earth Insight based on recent official publications from the Ministries of Energy or Petroleum of Malaysia, Indonesia, and United Arab Emirates. The oil and gas database was overlaid with the WDPA dataset. Global datasets on coral reefs, mangroves, and seagrass from UNEP-WCMC were used to highlight possible threats of marine ecosystems.

Data sources:

Oil and gas blocks: Amazon: RAISG oil and gas block database (2023), [Bolivian Ministry of Hydrocarbons and Energy](#), [Brazilian National Agency of Petroleum and Natural Gas and Biofuels](#), [Colombian National Hydrocarbon Agency](#), [Ecuadorian Ministry of Energy and Non-Renewable Resources](#), [Guyanese Ministry of Natural Resources](#), [PerúPetro](#), [Staatsolie](#), Venezuela's [Ministry of Energy and Petroleum](#). Congo: Ministry of Mines, Industry and Technological Development of Cameroon, Ministry of Energy, Mines, Geology and Water Resources of the Central African Republic, [Ministry of Hydrocarbons](#) of the Democratic Republic of Congo, Ministry of Mines and Hydrocarbons of Equatorial Guinea, [Ministry of Hydrocarbons](#) of the Republic of Congo, the Ministry of Oil, Gas and Hydrocarbons of Gabon. Southeast Asia: [Cambodian National Petroleum Authority](#), Indonesian Ministry of Energy and Mineral Resources, [Department of Energy](#) of the Philippines, [PetroVietnam Exploration and Production Company \(PVEP\)](#), Thai [Ministry of Energy](#), [Petronas](#) (Malaysia), [Ministry of Energy](#) of Myanmar, Papua New Guinea [Department of Petroleum and Energy](#).

Protected Areas: The [World Database of Protected Areas](#) built by UNEP-WCMC and IUCN.

Indigenous Territories: Indigenous territories for the Amazon Region were derived from the RAISG (Amazonian Network of Georeferenced Socio-Environmental Information) database on Indigenous Territories.

Tree Cover Fraction: The [Global Tree Cover Fraction](#) was derived from the PROBA-V satellite observations and ancillary datasets.

Coral reefs: The subtropical and tropical [distribution of coral reefs](#) dataset compiled by UNEP-WCMC, WorldFish Centre, WRI, TNC (2021)

Mangroves: The [Global Mangrove Watch](#) dataset is a global baseline of mangroves based on ALOS PALSAR and Landsat data

Sea grass: The [global distribution of seagrasses](#) dataset is compiled by UNEP-WCMC (2021)

Populated places: The populated places database was derived from the [Geographic Names Server](#) maintained by the US National Geospatial-Intelligence Agency.

Murchison Falls Oil Infrastructure: Tilenga [Environmental and Social Impact Assessment](#)

Country outlines: The [geoBoundaries](#) Global Database of Political Administrative Boundaries Database built by William and Mary geoLab provides national boundaries.

Satellite Imagery: Satellite imagery from [Planet.com](#), [NICFI](#) program.

ANNEX II: END NOTES

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