

Unburnable Carbon in Protected Areas

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Background

A climate emergency is upon us on planet Earth, and the Paris Agreement with its 1.5°C target is humanity's best bet to avoid runaway climate change that could turn our home planet into a hothouse.¹

Protected areas are an important safety mechanism during the climate emergency, because they conserve ecosystems which provide essential services for humans and other species. In a time with so many uncertainties about the evolution and consequences of our future climate, natural systems harbored within them may determine the fate of many species and potentially even humankind's survival prospects.

The conversation about biodiversity and climate change has mainly focused on three aspects so far: Firstly, *the impacts of climate change on biodiversity*. Biodiversity is at risk due to global heating, as many species struggle to adapt to a hotter planet.

Secondly, biodiversity fosters resilience, as a greater variety of life forms harbors greater options to deal with shocks such as the fast heating which fossil-fuel addicted human societies are currently causing. Biodiversity is thus an important element of *adapting to climate change*. Thirdly, the possibility of different *ecosystems to absorb and store carbon*, and thus contribute to climate change mitigation. In this perspective, protected areas are important because they avoid emissions, e.g. through deforestation and forest degradation and may even take up carbon in some cases.

A fourth aspect has received less attention: the potential of protected areas to contribute to *climate change mitigation by avoiding the extraction and burning of fossil fuels*, via their essential function of protecting natural spaces from destructive human interference. The intention of the current analysis is to quantify this mitigation potential and point to areas for intervention by the climate and biodiversity communities.

¹ *Steffen et al. (2018) Trajectories of the Earth System in the Anthropocene. PNAS.*

The Paris targets require a swift phase down of fossil fuel burning in the 2020s decade. It is clear that the vast majority of fossil fuels must stay unburned.² The International Energy Agency has pointed to the incompatibility of new fossil fuel extraction projects with the Paris targets³ and keeping fossil fuels in the ground has been described as the “next big step in climate policy”⁴. Increasing numbers of actors are looking for ways of operationalizing the exit from fossil fuels.

In this context, ending the extraction of fossil fuels from protected areas can be considered a low-hanging fruit for operationalizing the end of fossil fuel extraction in a first, priority step with important biodiversity co-benefits. This would furthermore implement existing pledges by governments and others at World Conservation Congresses to outlaw extraction from protected areas.^{5,6}

The climate emergency and the extinction crisis are unfolding at the same time. Ending fossil fuel extraction from protected areas addresses both and avoids what would be the tragic destruction of natural heritage and biodiversity in the last years of the fossil age.

Maps are a powerful tool to communicate and unveil a large amount of information in an intuitive and fast way. We conducted the following analysis to map the issue on a global level.

The corresponding map is accessible online at protected-carbon.org. Here we present some overview statistics.

Method

We mapped coal mines contained in Global Energy Monitor’s [Global Coal Mine Tracker](#), coal deposits in a new database assembled bottom-up and oil and gas assets assembled in [Rystad Energy](#)’s database against protected areas contained in the [World Database on Protected Areas](#) maintained by the UNEP World Conservation Monitoring Centre, in all countries around the world. This geospatial data was used to identify the number of protected areas affected, and to calculate the overlapping area between protected zones and fossil fuel industry activities. Fossil fuel activities are understood as coal mines and oil and gas fields or licenses (named “assets” in the Rystad database).

We estimated the potential CO₂ emissions from the oil, gas and coal reserves in the identified projects, assuming their full extraction and burning, using average global emissions factors.⁷

Results

We identified 2933 fossil fuel activities in 835 protected areas in 91 countries. Table 1 gives the countries with the highest number of activities and the largest potential CO₂ emissions from the fossil fuels under protected areas.

2 [Welsby et al. \(2021\) *Unextractable fossil fuels in a 1.5 °C world*. Nature.](#)

3 [International Energy Agency \(2021\) *Net Zero by 2050. A Roadmap for the Global Energy Sector*. Flagship Report.](#)

4 [Erickson et al. \(2018\) *Limiting fossil fuel production as the next big step in climate policy*. Nature Climate Change.](#)

5 [World Conservation Congress Amman \(2000\) *Protection and conservation of biological diversity of protected areas from the negative impacts of mining and exploration*. Resolution 2.82.](#)

6 [World Conservation Congress Hawai’i \(2016\) *Protected areas and other areas important for biodiversity in relation to environmentally damaging industrial activities and infrastructure development*. Recommendation 102.](#)

7 [Kühne \(2021\) *Big numbers for bold activists: A quick method for estimating potential emissions of fossil fuel projects*. Energy Research & Social Science.](#)

Among the companies most involved in activities inside protected areas are oil and gas companies Santos, Perenco, Shell, PGNiG, TotalEnergies, Rosneft, Neptune Energy, Spirit Energy and Wintershall Dea.

We found 9 protected areas that have more than a gigaton of potential CO2 emissions underneath (see Table 2) and 49 protected areas which harbor over 100 Million tons of potential CO2 emissions.

Table 1. Number of Fossil Fuel Activities and Potential Emissions from Fossil Fuels under Protected Areas

Country	#Oil& Gas Assets	#Coal Mines	Potential Emissions (MiotCO2)
China	13	6	12,063
Venezuela	198	3	7,699
Saudi Arabia	8	0	3,936
Kazakhstan	36	0	3,483
Germany	108	1	2,800
Canada	76	1	2,673
United States	53	2	2,673
Zimbabwe	0	2	2,600
Russia	171	0	1,439
United Kingdom	509	0	832
United Arab Emirates	23	0	800
Australia	442	0	641
Nigeria	47	1	567
Kuwait	4	0	511
<i>Other countries</i>	1,217	12	4,759
Total	2,905	28	47,475

Among notable examples of important natural heritage that are affected are the Arabian Oryx Protected Area and Marawah Biosphere Reserve in the United Arab Emirates (an important refuge for dugongs, sea turtles and heat-resistant corals), the Arctic National Wildlife Refuge in the US, Canadian Rocky Mountain Parks, the Australian Coongie Lakes, Red Sea Islands in Egypt, Murchison Falls National Park in Uganda, Appennino Lucano National Park in Italy and the Wadden Sea National Parks in Germany (an important resting area for migratory birds). Half of the identified protected areas only contain small amounts of fossil fuels (<1 mboe) and must be considered of marginal commercial interest - making them good candidates for ensuring that the areas remain undisturbed by fossil fuel industry activity.

Keeping it in the ground

While global biodiversity and climate targets should make non-extraction in protected areas the obvious choice, reality tells a different story: Protected Areas are getting downgraded, downsized or even degazetted.⁸

Just one example is the Arabian Oryx Sanctuary in Oman, which was deleted from the World Heritage List in a context where the country pursued oil & gas drilling in the area⁹ and the Virunga National Park in DR Congo which was downgraded to allow for oil exploration.

⁸ See the *PADDTracker* for information on Protected Areas Downgrading, Downsizing and Degazettement.

⁹ *World Heritage Convention (2007) Arabian Oryx Sanctuary.*

Table 2. Protected Areas with largest potential fossil fuel CO2 emissions

Protected Area	Country	# of Fossil Fuel Activities	Potential Emissions (Mio t CO2)
Xilin Gol Natural Steppe Protected Area	China	10	11,732
Lago de Maracaibo	Venezuela	68	4,232
Jubail Marine Wildlife Sanctuary	Saudi Arabia	6	3,913
State Reserved Zone North Caspian Sea	Kazakhstan	29	3,460
LSG Hambacher Forst	Germany	1	2,700
Mesa de Guanipa	Venezuela	98	2,694
Nabiri B	Zimbabwe	1	2,600
Denali	United States	1	1,400
Willmore Wilderness Park	Canada	1	1,376

Our analysis only shines a light on one part of the threats of fossil fuel extraction to biodiversity.

Additionally, protected areas are also threatened by fossil fuel activities happening outside of their boundaries, such as oil spills and mining disasters with polluting consequences that travel many kilometers. The pollution from fossil fuel burning travels globally and some pollutants accumulate in the food chain.

Biodiversity is not limited to protected areas and of course the many biodiverse areas that do not currently enjoy legal protection also need to be safeguarded from harmful impacts.

Besides biodiversity, there are many other good reasons for non-extraction, such as cultural, touristic value, incompatible economic activities, economic risks of marginal projects and in times of the climate emergency, of course the imperative to end fossil fuel burning as soon as possible.

Our results indicate that there are huge amounts of potential emissions from inside protected areas - and a huge mitigation potential if these fossil fuels are kept in the ground.

The Paris Agreement foresees that countries increase their mitigation ambition every 5 years, and including non-extraction commitments of fossil fuels could be a low-hanging fruit to complement targets to reduce annual emissions with a new kind of commitment. Many countries have legally prohibited mineral extraction in at least some protected areas. These countries could spearhead efforts to commit towards the global community that those fossil fuels will be kept in the ground. Given the stringency of the Paris Agreement, the vast majority of fossil fuel reserves must stay unburned anyway.

Implications of our analysis are that on top of the question of carbon and biodiversity above the ground or in the soil,^{10,11}

¹⁰ UNEP World Conservation Monitoring Centre (2008) *Carbon and biodiversity. A demonstration atlas.*

¹¹ WWF Canada (2022) *Mapping Canada's Carbon Landscape.*

the conservation community should consider the element of fossil carbon underground when looking at climate change mitigation options.

Some financial institutions such as insurance company Hannover Re¹² are starting to monitor the impact of their business on protected areas and excluding transactions that put biodiversity at risk.

New finance mechanisms for supporting efforts to effectively protect fossil carbon from being extracted, especially in the Global South, would be helpful for realizing the win-win of biodiversity conservation and climate change mitigation. When considering the climate-related damages of CO₂ emissions,¹³ keeping all fossil fuels under protected areas in the ground globally, would avoid climate damages of USD 19.8 trillion and save 10.7 million lives of people at risk of death from heat-related stress, due to the deadly impact of CO₂ emissions.¹⁴

Our interactive global map can be accessed at: protected-carbon.org

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The Leave it in the Ground Initiative (LINGO) is a German-based non-profit, working on accelerating the transformation into a world with 100% renewable energy.

Oil Change International is a research, communications, and advocacy organization focused on exposing the true costs of fossil fuels and facilitating the ongoing transition to clean energy.

¹² Hannover Re (2022) *Annual Report 2021. Impact of our operations.*

¹³ Ricke et al. (2018) *Country-level social cost of carbon.* Nature.

¹⁴ Bressler (2021) *The mortality cost of carbon.* Nature.