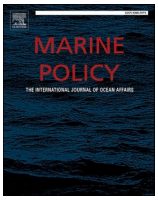
Marine Policy 148 (2023) 105423

Contents lists available at ScienceDirect

Marine Policy

journal homepage: www.elsevier.com/locate/marpol



Short Communication

Brazil fosters fossil fuel exploitation despite climate crises and the environmental vulnerabilities

Paulo Horta [a,b,*], Marina Sissini [a], Carolina Melissa Mueller [a], Fernanda M.M. Soares [a], Paulo Pagliosa [b,j], Leonardo Rörig [a], José Bonomi-Barufi [a], Flavio Berchez [c], Leticia Cotrim da Cunha [d], Rodrigo Kerr [e], Sergio Rossi [f], Marcelo O. Soares [g,l], Jorge L. Rodrigues-Filho [h], Hudson T. Pinheiro [i], Luciano Henning [j], Marcos Aurélio Espindola [j], Nicole Figueiredo de Oliveira [j], Alessandra Larissa Fonseca [k]

[a] Laboratório de Ficologia (LAFIC), Departamento de Botânica, Universidade Federal de Santa Catarina, 88040–970 Florianópolis, Santa Catarina, Brazil
[b] Programa de Pós-Graduação em Ecologia, Universidade Federal de Santa Catarina, 88040–970 Florianópolis, Santa Catarina, Brazil
[c] CienTec Park and Instituto de Biociências, Universidade de São Paulo, 05422–970 São Paulo, Brazil
[d] Faculdade de Oceanografia do Estado do Rio de Janeiro, 20550–900 Rio de Janeiro, Brazil
[e] Instituto de Oceanografia da Universidade Federal do Rio Grande, 96203–900 Rio Grande, Rio Grande do Sul, Brazil
[f] Dipartimento di Scienze e Tecnologie Biologiche ed Ambientali, DiSTeBA, University of Salento, Lecce, Italy
[g] Instituto de Ciências do Mar (Labomar), Universidade Federal do Ceará, 60165–081 Fortaleza, Ceará, Brazil
[h] Laboratório de Ecologia Aplicada e Conservação (LEAC), Departamento de Engenharia de Pesca e Ciências Biológicas, Universidade do Estado de Santa Catarina, 8879000 Laguna, Santa Catarina, Brazil
[i] Center for Marine Biology, University of São Paulo, 11600–000, São Sebastião, São Paulo, Brazil
[j] Instituto Internacional Arayara. Rua Gaspar Carrilho Junior, 73 - Vista Alegre, 80810–210 Curitiba, Paraná, Brazil
[k] Departamento de Oceanografia, Centro de Ciências Físicas e Matemáticas, Universidade Federal de Santa Catarina, 88040900 Florianópolis, Santa Catarina, Brazil
[l] Reef Systems Group, Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany

ARTICLE INFO

Keywords:
Fossil fuel
Climate change
Marine pollution
Coastal management

ABSTRACT

Despite global needs regarding the mitigation of the climatic and biodiversity crisis, Brazilian federal government signalized the bidding of 92 blocks of oil and gas exploitation. The potential production in these marine areas will add to the pre-salt reserves already contracted, multiplying by eight the Brazilian annual fossil fuel emissions by 2030. These potential emissions can reach the double of that currently produced by land uses and other sources. The ongoing governmental actions and omissions regarding deforestation, fostering of thermoelectric generation, and fragilization of the national environmental surveillance system, highlight the need for deeper international and multilateral discussion considering the achievement of global targets, explicit as necessaries in the last IPCC report. Considering the emergency context, the UN should present barriers to exploitation of remaining fossil fuel reserves, and a global orchestration to enable immediate and drastic reductions in our emissions, to avoid further negative impacts on the already fragile sociobiodiversity.

The Brazilian National Agency for Petroleum, Natural Gas and Biofuels (ANP) started to auction 92 exploitation blocks of oil and gas in new areas off the Brazilian coast [1], 59 were auctioned last April, and a new round will take place on December 16 (2022), with the prospect of billions of barrels. These grounds are spatially concentrated on the southern, central and northeast Brazilian's exclusive economic zone. Three of them are located at the interface of international waters (Fig. 1). ANP estimates 7 billion barrels in place in the three most productive blocks. Considering the presence of oil in at least 10 % (to 50 %) of the offered blocks and productivity of just 25 % of the most productive ones, this bidding enables the exploitation of at least 22.58 (to 84.88) billion barrels. Adding this volume to official estimates of production to the next decade [2] of 11.9 billion barrels, under contract, Brazil can multiply its historic production (20.8 billion barrels) by 1.66–4.65. This

* Corresponding author at: Laboratório de Ficologia (LAFIC), Departamento de Botânica, Universidade Federal de Santa Catarina, 88040–970 Florianópolis, Santa Catarina, Brazil.
E-mail address: paulo.horta@ufsc.br (P. Horta).

https://doi.org/10.1016/j.marpol.2022.105423
Received 25 August 2021; Received in revised form 7 November 2022; Accepted 26 November 2022
Available online 9 December 2022

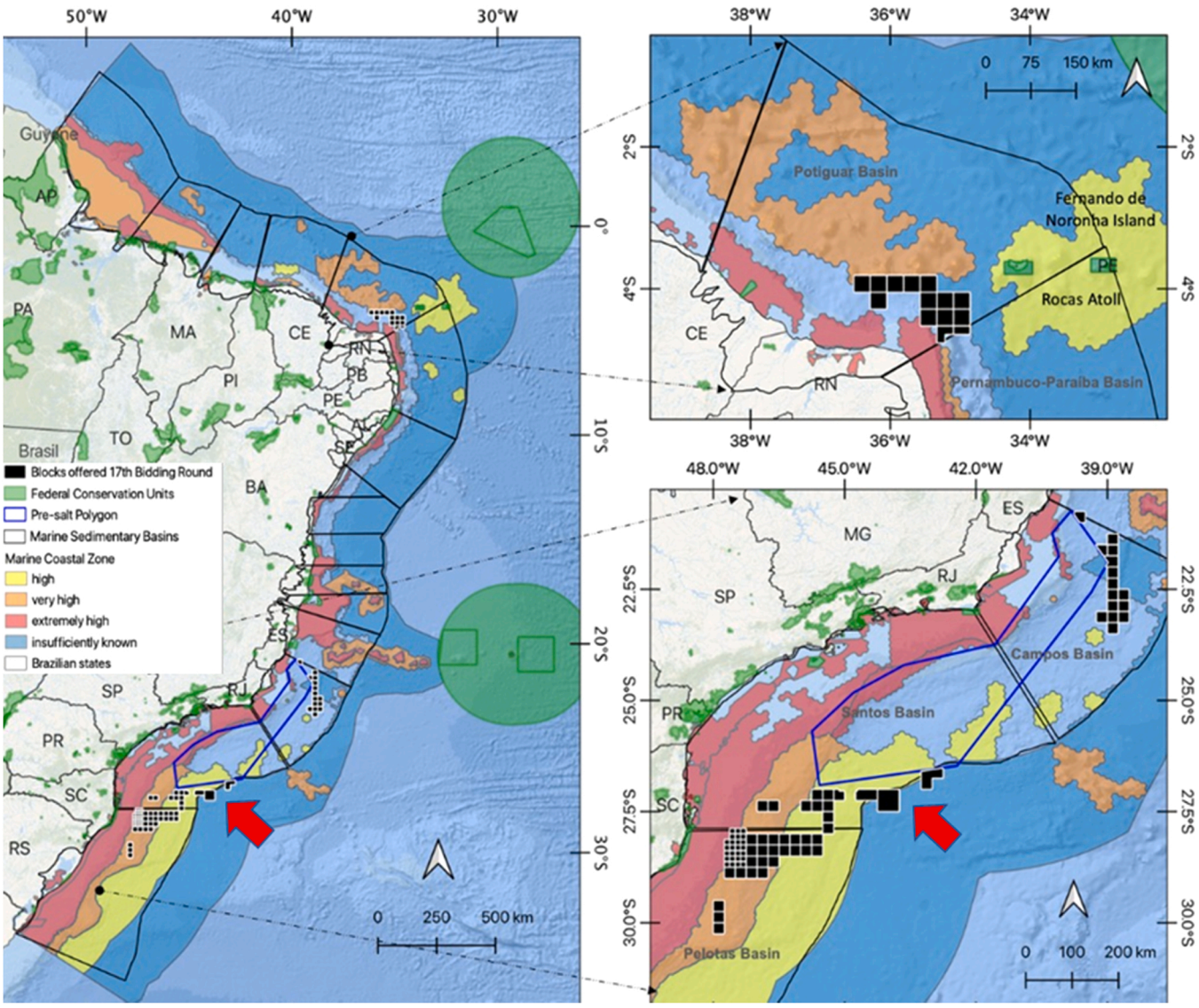


Fig. 1. Blocks (black color) offered in the 17th bidding round interposed with Brazilian conservation priority areas high: yellow, very high: orange, extremely high: red, insufficiently known: blue) and Federal Conservation Unities (green) (where: arrow: block in the interface of international waters; geographical projection system: Datum SIRGAS 2000/EPSG4674, Source IBGE, ANP. ICMBio).

production growth will increase annual greenhouse gas (GHG) emission up to 2030, undermining our Nationally Determined Contribution (iNDC) of reduced emissions to 43 % of its 2005 level [3], as assumed in Paris 2015. This scenario can be regarded as an opportunity for the questionable maintenance of the fossil fuel industry with global scale and relevance. The pandemic tragedy, the climate emergency with the eminence of multiple tipping points, the setback in achieving the sustainable development goals proposed by the ONU, the targets related to the Paris Agreement [4], Ocean and Ecosystem Restoration UN Decade (2021-2030), and the COP-27 commitments and pledges must be enough arguments to start a broader discussion about the consistency of these policies regarding the licensing and exploitation of remaining fossil fuel reserves in ocean basins.

The negationist and negligent posture of the current Brazilian government sustains equivocal decisions in front of environmental issues and the global effort to mitigate climate change [4]. The Brazilian ex-minister of environment said in an inter-ministerial meeting, in April 2020, that the pandemic offers an opportunity to "pass the cattle" (Brazilian slag that means do things you usually cannot) in several environmental-related issues. Besides the growing deforestation [5] and its related carbon emission, the approval of the new program to sustain coal mining (PORTARIA Nº 540/GM/MME, of October 5, 2021) and the destatization of ELETROBRAS (Brazilian electrical energy generation company), with the law Nº 14.182, with the public compromise to maintain thousands of Mw from thermoelectric up to 2032, foster the use of more fossil fuels, compromising largely the Brazilian international compromises regarding clime.

The law reforms and interference in environmental management agencies by the Federal administration, with more than 400 government acts in the last four years [6], deregulation also observed in regional and local stakeholders, fines were forgiven, surveillance was reduced, favouring the occurrence of environmental disasters, pushing socio-biodiversities through their tipping points [7]. Besides wildfires, deforestation and mining growing runoff, a pedagogic example must be revisited, the most catastrophic oil spill that reached more than 3 thousand km of tropical coastline during 2019. The government's action to put down the contingency plan to deal with the management of these giant environmental disasters represents and exposed important vulnerabilities to deal with increases in oil exploitation areas and volume [8].

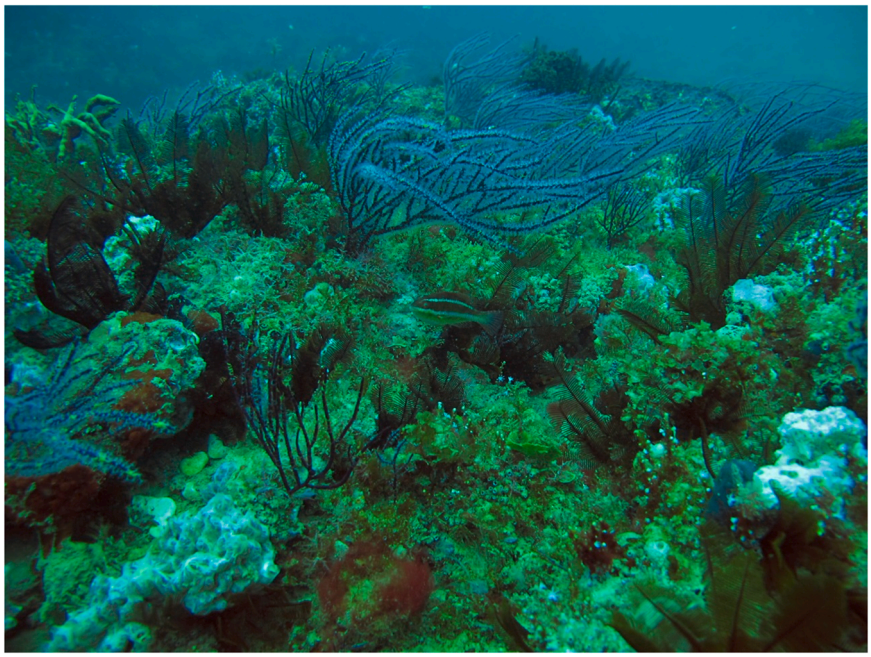


Fig. 2. Seascape nearby proposed blocks with fishes, corals, other invertebrates and different algal groups under the direct and undirect impact of fossil fuel exploitation off southwest Brazilian coast.

Despite the warnings regarding the maintenance of business as usual, and open criticism to the model of societies based on fossil fuel energy [9], the Brazilian federal government is insisting on fostering the exploration of the remaining reserves. However, the target areas overlap grounds for both artisanal and industrial fishing fleets, which can lead to losses to the livelihood and income of thousands of fishermen and their families along the Brazilian coastline [10]. Moreover, the target areas conflict with vulnerable ecosystems [11], most of which are marine protected areas or considered high priorities to conservation. The own Brazilian governmental Institute of Environment and Renewable Natural Resources (IBAMA) warned, reporting the occurrence of dozens of species threatened with extinction and many environmental vulnerabilities, besides the absence of oil spill plum modeling to the respective regions [12]. Ignoring all academic and institutional warnings, supported by a bureaucratic interministerial agreement, the bidding has been maintained by the government.

It is important to clarify that besides endangered charismatic flagship species, such as whales, sharks, birds and turtles, the direct and indirect impact of exploitation activities will also threaten environments such as mangroves, coral reefs and mesophotic ecosystems (Fig. 2), rhodolith and seagrass beds of the western South Atlantic [13], which present high levels of endemism and are blue carbon ecosystem [7]. Considering that these environments are already threatened by polluted coastal runoff, ocean warming, deoxygenation and acidification, the destructive effect of eventual spills [5,14], will accelerate the climatic changes and their negative consequences to the conservation of marine biodiversity and to the maintenance of their goods and services.

As observed in Europe among other regions worldwide [15], Brazil is suffering from extreme events, such as storms, floods, droughts, hail, typhoons and hurricanes the Catarina, the first recorded in the South Atlantic in 2004 [13]. The atmospheric-ocean extreme condition and their socioecological impacts highlights how wrong and dangerous can be continuing or expand oil exploitation in this region. The southern blocks and the necessary infrastructure will be exposed to the meteorological/oceanographic conditions that can produce seasonally, mainly during spring and winter, winds more than 150 km/h and waves with more than 7 m, the highest waves of the Brazilian coast, which impose risks that grow during extreme events related with climate change [16].

This scenario in Brazil raises questions about how and when countries will fight against climate change and will work in a true shift to renewable energy. While governments and companies insist on the 20th-century development models and energy sources, the awakening of different countries promoting new green deals reinforces the need for policy discussions to foster alternative and renewable energy regarding global environmental change mitigation. A broad transnational discussion supported by studies regarding environmental socioeconomical roles and vulnerabilities can pavemented the avenues for the prompt and necessary ecological transition. Population's lack of knowledge about offshore marine habitats and the enormous risks related to their degradation delay a possible public reaction.

Despite Brazilian current omissions to avoid the worst climate scenario, the countries that are less wrong are not on the right way. Emissions projections suggest several G20 members, countries with socioeconomic alternatives to support cleaner ways to foster development, are also still moving towards a temperature increase far beyond the targets of the Paris Agreement [17]. The IPCC AR6 Report [18] warns society and stakeholders about a necessary ethical and moral alignment to the building of global policy to recognize the responsibility of the current generation to avoid further deterioration of planetary health, with unprecedented ecocide in human history.

Therefore, considering that the exploitation of the remaining fossil fuel reserves will for sure contribute to the acceleration of the global biodiversity and climate crisis, that is already accelerating, regarding the evidence of current global difficulties in dealing with oil spill events in deeper areas [2,9], considering that these biddings are offering blocks with potential reserves in international waters or with potential cross-border impacts, as those relatives with eventual exploitation in the Amazon mouth [19], we argue that international institutions and national governments and stakeholders, may intercede with the Brazilian institutions and governors to stop rounds of oil and gas concession made by the ANP, until a broad multilateral discussion about of the fate of remaining reserves. Studies of the potential impacts of these new exploration areas on the functioning of regional and global biodiversity as in the global CO2 balance are urgent to support further decisions. That COP27 represents the roundtable for these discussions and agreements regarding new ponderations in the dialectic related to fossil fuel

and the necessary climate change and ocean acidification adaptation and mitigation plans.

Funding

Boticário Foundation; FAPESC-Foundation support research and innovation in the State of Santa Catarina; Capes-Higher Education Personnel Improvement Coordination; CNPq-National Council for Scientific and Technological Development; Petrobras Ambiental, REBENTOS-Habitat monitoring network coastal Benthic and ProspecMar-Islands-Sustainable prospecting in Ocean Islands: Biodiversity, Chemistry, Ecology and Biotechnology; Rede Coral Vivo and REDEALGAS. Dr. Paulo A. Horta thanks CAPES- Senior Visitor, CAPES-PrInt 310793/2018–01, CNPq-PVE 407365/2013–3, CNPq-Universal 426215/2016–8 and CNPq-PQ- 308537/2019–0. H. Pinheiro thanks FAPESP (2019/24215–2). M. Soares thanks CNPq (313518/2020-3, 442337/2020-5), CAPES PRINT, CAPES/AVH, FUNCAP (Chief-Scientist Program and PELD CSB), and Alexander von Humboldt Stiftung.

Data availability

No data was used for the research described in the article.

Acknowledgments

We thanks Luciano A. Hening for reading and help with figure construction and Instituto Internacional Arayara for all discussions and to foster public hearings.

References

[1] ⟨http://rodadas.anp.gov.br/en/17th-bidding-round⟩.
[2] ⟨https://presalpetroleo.gov.br/ppsa/conteudo/EBOOK_PORTUGUES%20NOVO.pdf⟩.
[3] SEEG. Observatório do clima. Sistema de estimativas de emissões de gases de efeito estufa, ⟨http://seeg.eco.br/⟩ (2021).
[4] J. Tollefson, What a new president in Brazil could mean for science, Nature 610 (7930) (2022) 17–18.
[5] M. Soares et al., Mar. Policy 115, 103879, 2020.
[6] TALANOA, 2022 - Reconstrução: 401 atos do Poder Executivo Federal (2019 - 222) a serem revogados ou revisados para a reconstituição da agenda climática e ambiental brasileira. Instituto Talanoa, 2022. 169 pag.
[7] D.I. Armstrong McKay, A. Staal, J.F. Abrams, R. Winkelmann, B. Sakschewski, S. Loriani, T.M. Lenton, Exceeding 1.5° C global warming could trigger multiple climate tipping points, Science 377 (6611) (2022) eabn7950.
[8] G.A. Mataveli, Perspectives in Ecology and Conservation, 19(1), 33–36, 2021.
[9] W.J. Ripple et al. BioScience, biab079, 2021.
[10] MINISTÉRIO D.A. PESCA E. AQUICULTURA – M.P.A. 2010 Produção pesqueira e aquícola: estatística 2008 e 2009. Brasília (DF), 30p.
[11] R. Kerr et al., Environmental Management 57, 740–752, 2016.
[12] Despacho nº 6581934/2019-DILIC, technical information nº 2/2019-CGMAC/DILIC, nº 70/2020-GABIN/ICMBio).
[13] P.A. Horta et al., Sustainability in Debate, 11(3,) 2020.
[14] D.L. Felder et al., BioScience 64, 808–819, 2014.
[15] W. Cornwall. Science 373, 372–373, 2021.
[16] Pianca et al. Brazilian Journal of Oceanography, 58(1), 53–70, 2010.
[17] United Nations Environment Programme, Emissions Gap Report, 2020.
[18] IPCC, Cambridge University Press. In Press. 2021.
[19] ⟨https://noticias.uol.com.br/ultimas-noticias/reuters/2022/11/04/petrobras-preve-receber-licenca-para-perfurar-na-foz-do-amazonas-neste-ano.htm⟩.