Rhodolith studies review in Brazil:

The rhodolith forming coralline algae sensitivity and resilience to the impact of oil & gas activities

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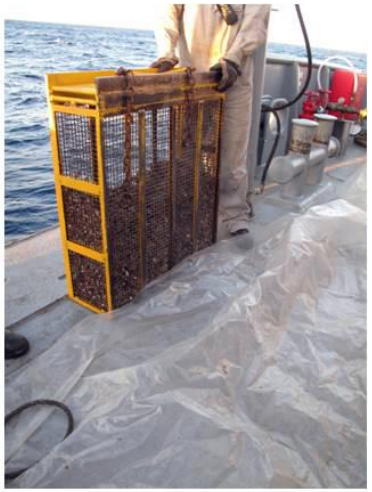
Complex habitat of the rhodolith forming calcareous (coralline) algae

Rhodolith studies review in Brazil:

- Largest known rhodolith bed in the world is at the Abrolhos coral reef, Bahia State: 20,904 km2 of rhodolith habitat (Moura et al., 2013)
- Deepest rhodolith found at 250m offshore Espirito Santo State (Henriques et al, 2014)
- *Lithophyllum corallinae* is widely distributed from the northeast to southeast, nearshore to greatest depth at the central Brazilian shelf

There is an increased number of works on the diversity of rhodolith's algae and fauna

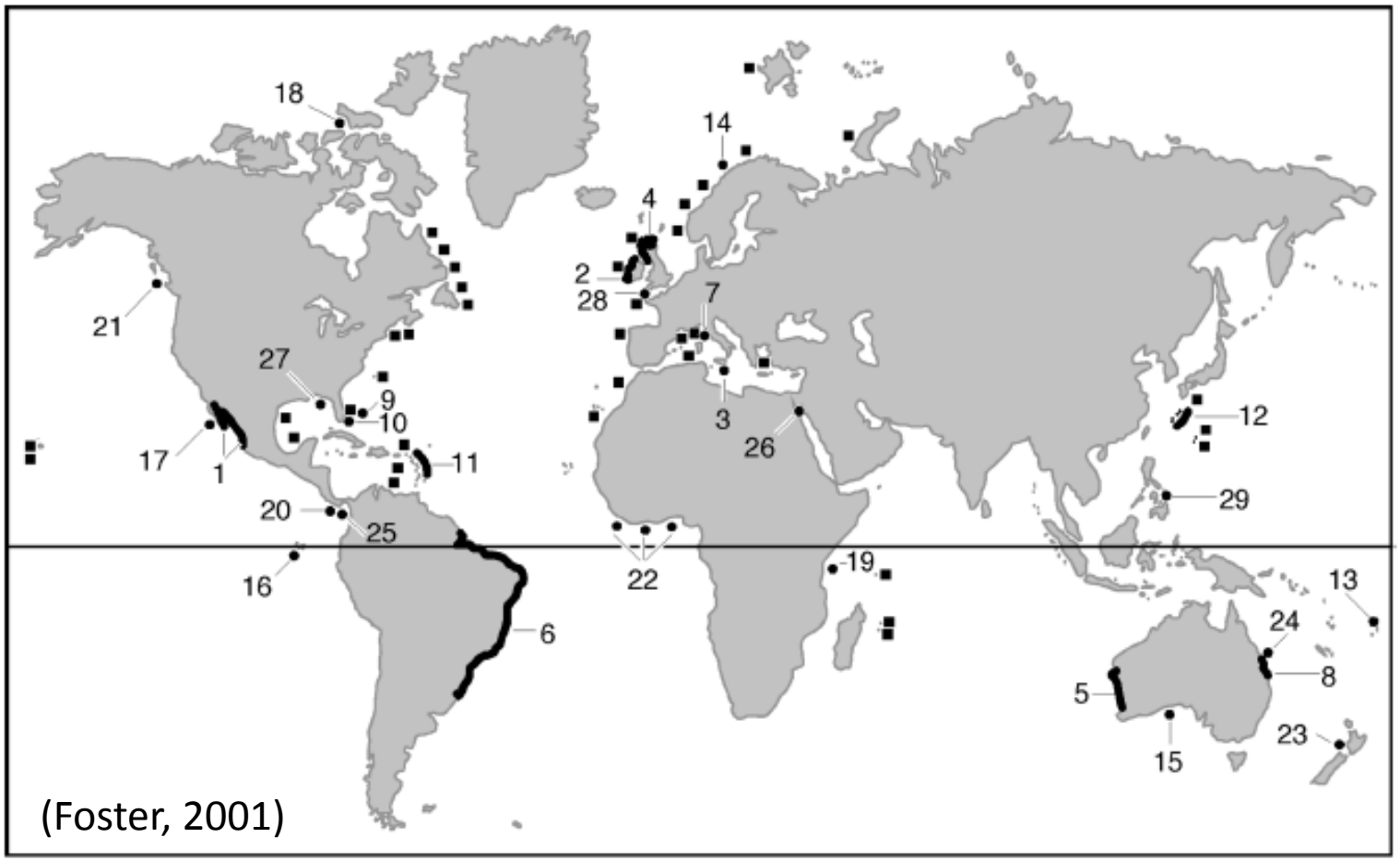


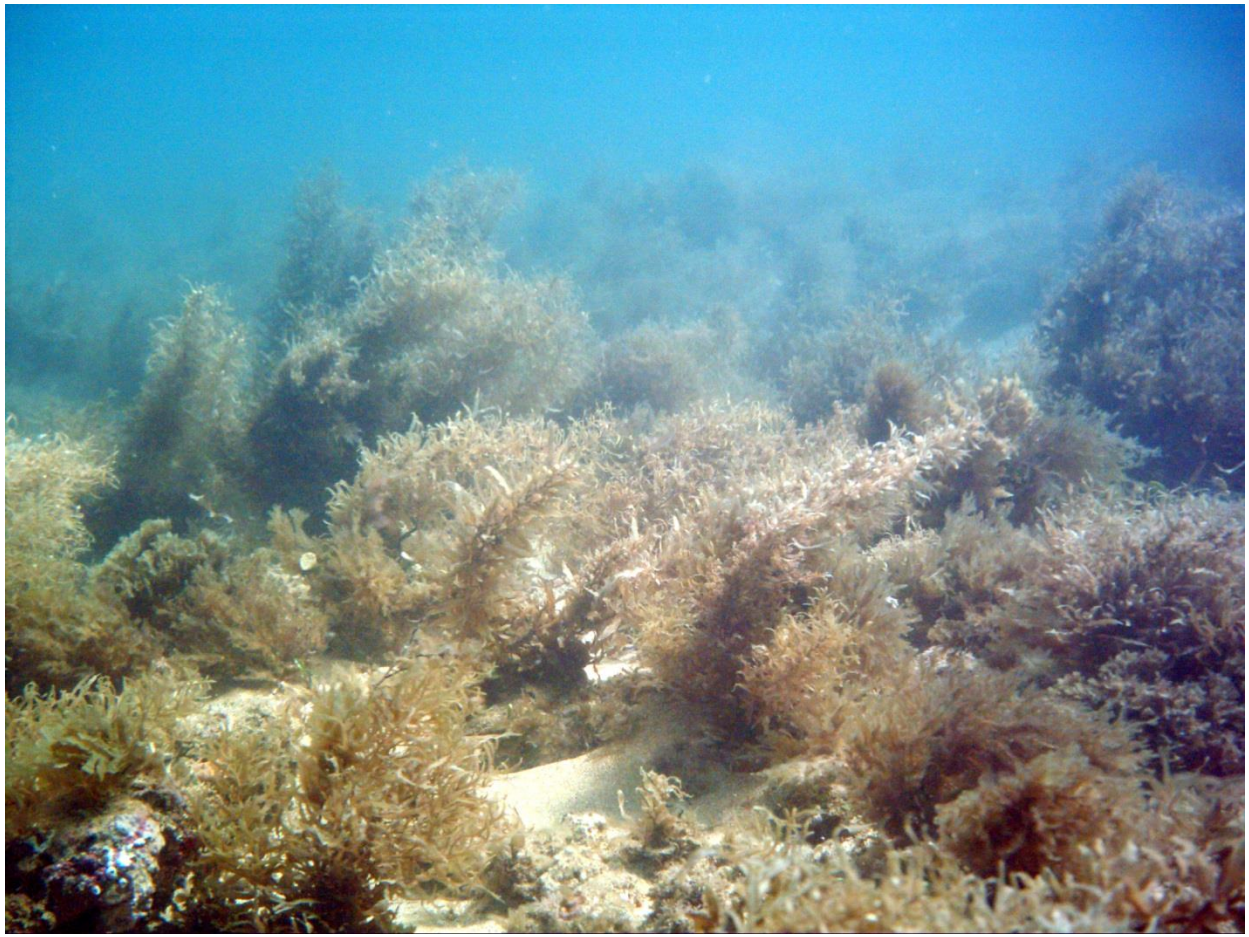
Rhodolith studies review in Brazil:

- COMMUNITY STRUCTURE MORE OFTEN STUDIED
- SEVERAL SPECIES OF CALCAREOUS ALGAE
- ASSOCIATED MACROALGA HIGHLY DIVERSE (Amado et al., 2007, 2010)
- INVERTEBRATES ARE COMMONLY SURVEYED
- FISHES RARELY DESCRIBED ON RHODOLITHS (Pereira Filho et al., 2011; 2012)

- Rhodoliths structure incrusted by bryozoans, sponges and corals forms a complex habitat (Villas-Boas et al. 2014; Berlandi et al. 2012).

Rhodolith beds in Brazil cover the largest extension in the world (Foster, 2001) but limits are uncertain (but see: Gherardi, 2004; Moura et al., 2013)





- Dense rhodolith beds moved away by currents that also drag fleshy macroalgae from top (Dias & Villaça 2011; Pascelli et al., 2013).

Seasonal studies measured rhodolith size, shape, density and chemical composition to understand their functional role and CaCO3 production (Figueiredo et al. 2007; Amado Filho et al., 2010;2012; Pereira-Filho et al. 2012).

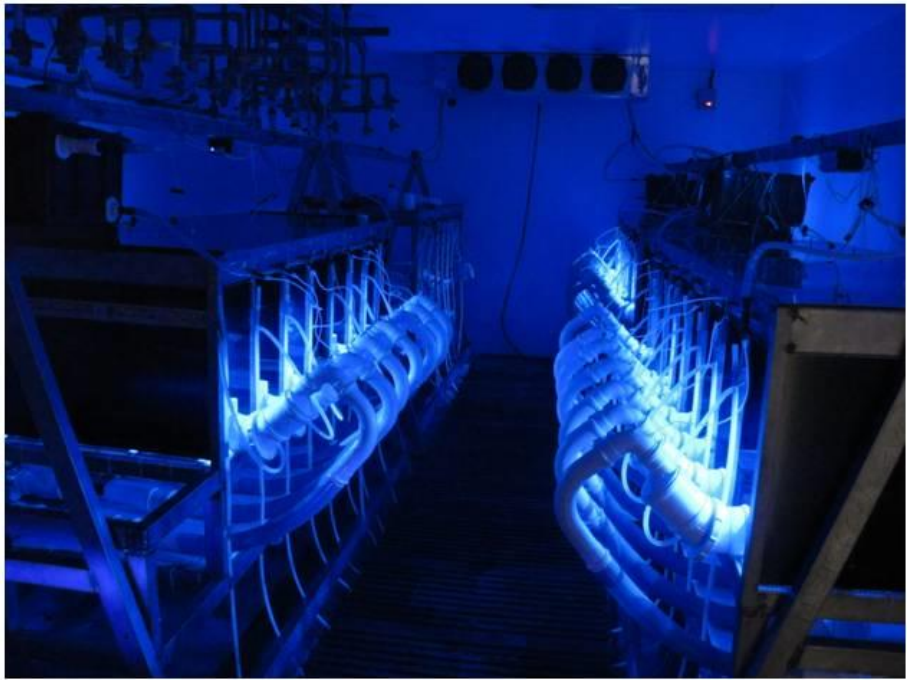
Rhodolith studies review in Brazil:

- Community diversity is quite related to rhodolith features (Figueiredo et al., 2007) and probably more than to the scales of surveys

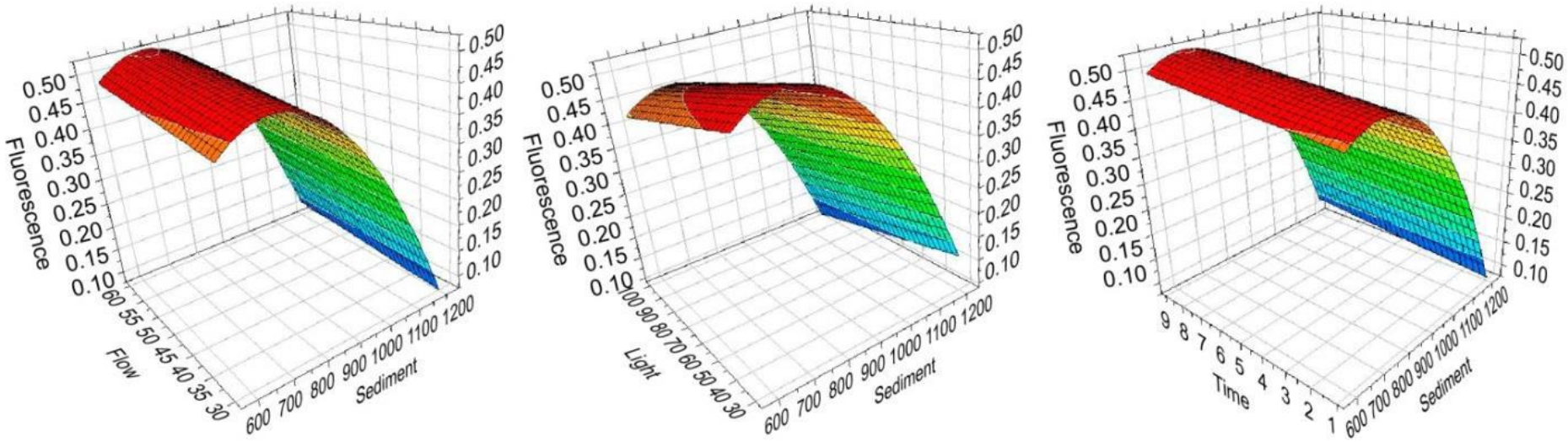
- Spatial heterogeneity of the communities may be related to the depth and latitudinal ranges (e.g., Amado Filho et al., 2007, 2010; Bahia et al., 2010; Moura et al., 2013)

Rhodolith studies review in Brazil:

- Narrow P–I curve of net primary production and photosynthetic peak at 0.5–1.5% surface irradiance (Figueiredo et al. 2012).
- Establish fluorescence exposure–response relationship for photosynthetic efficiency as function of sediment coverage (Figueiredo et al., 2015).



Rhodolith studies review in Brazil:

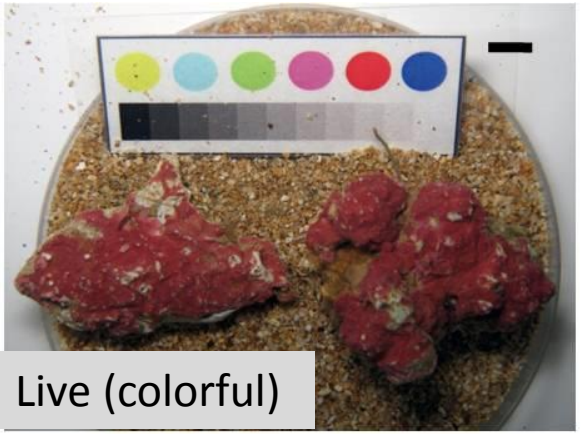


Left: Fluorescence as function of sediment and flow with light 50 %.
Middle: Fluorescence as function of light and sediment with flow 0.7 m/s.
Right: Fluorescence as function of time and sediment with flow and light constant at 0.7 m/s and 50 %, respectively
(Source: Peregrino Marine Calcareous Algae - PEMCA , supported by Statoil and ANP)

Rhodolith studies <u>needed</u> in Brazil:

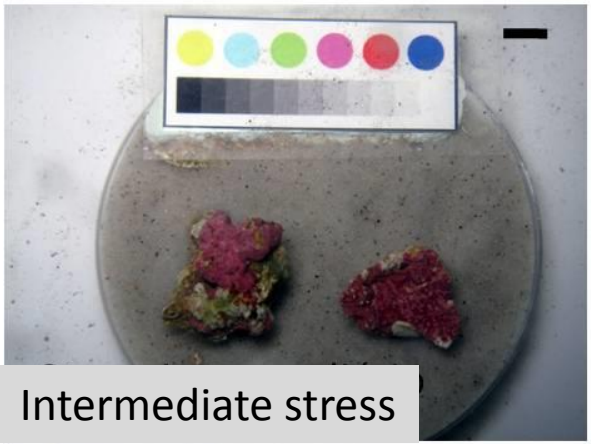
- Recruitment: fertility and output of recruits
- Thresholds: establish biological limits for survival
- Sensitivity: responses to environmental stresses tested by experimental work and modelling (e.g., Figueiredo et al, 2015)
- Recovery: the living layer may take months to grow and thousands of years to build structures based on slow growth rates of 1-1.5mm/year and datation of 8.000 years (e. g., Amado-Filho et al. 2012)

Sensitivity and resilience of rhodoliths to stresses by experimental work and modelling (Villas-Boas et al., 2014; Figueiredo et al, 2015)

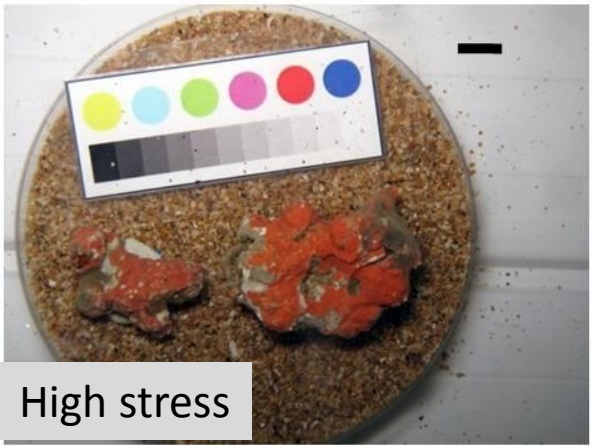


Live (colorful)

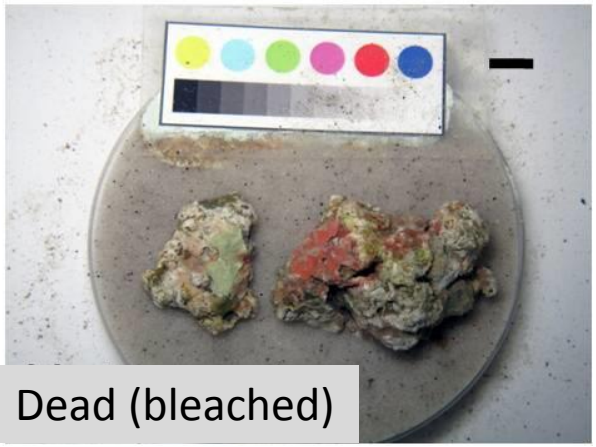
Low stress



Intermediate stress



High stress

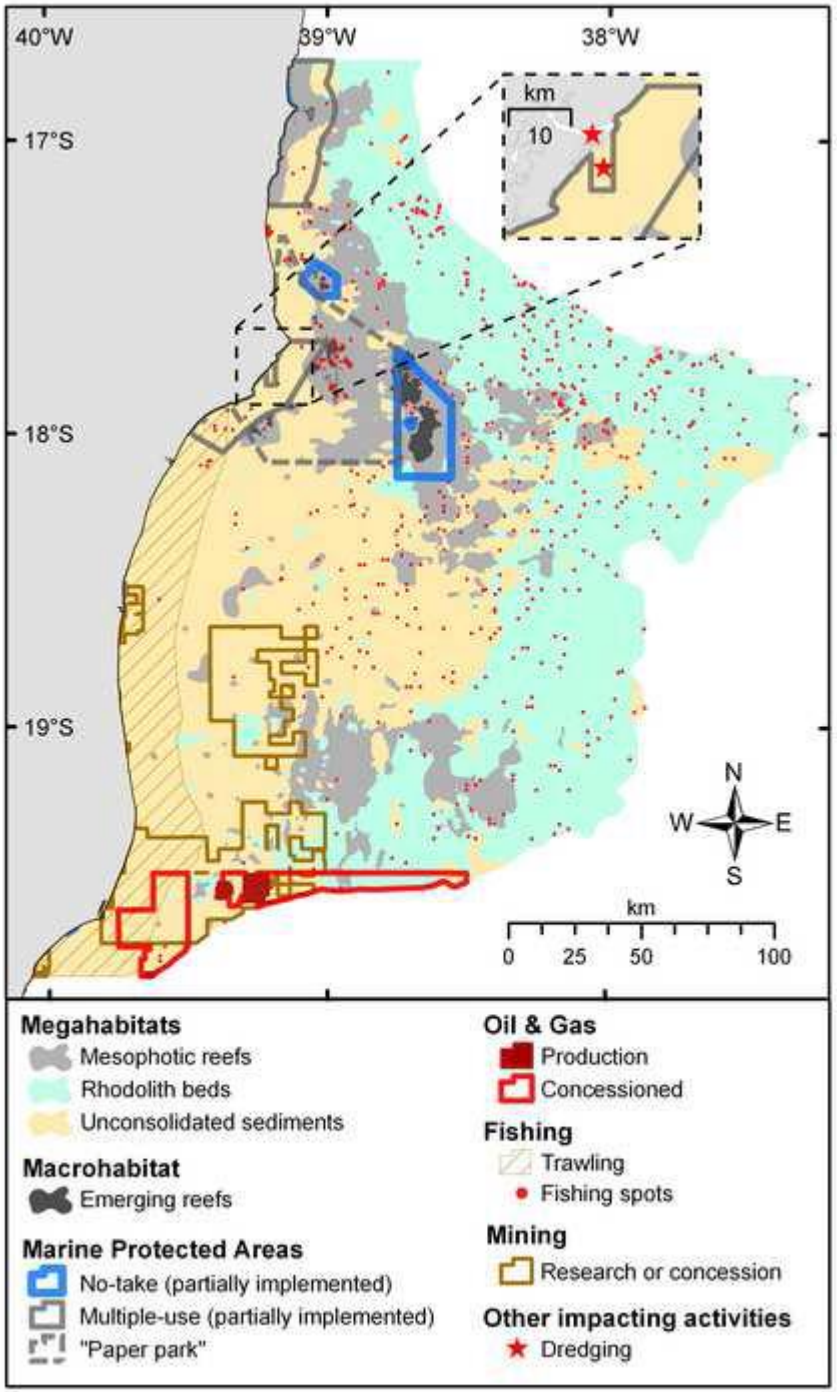


Dead (bleached)

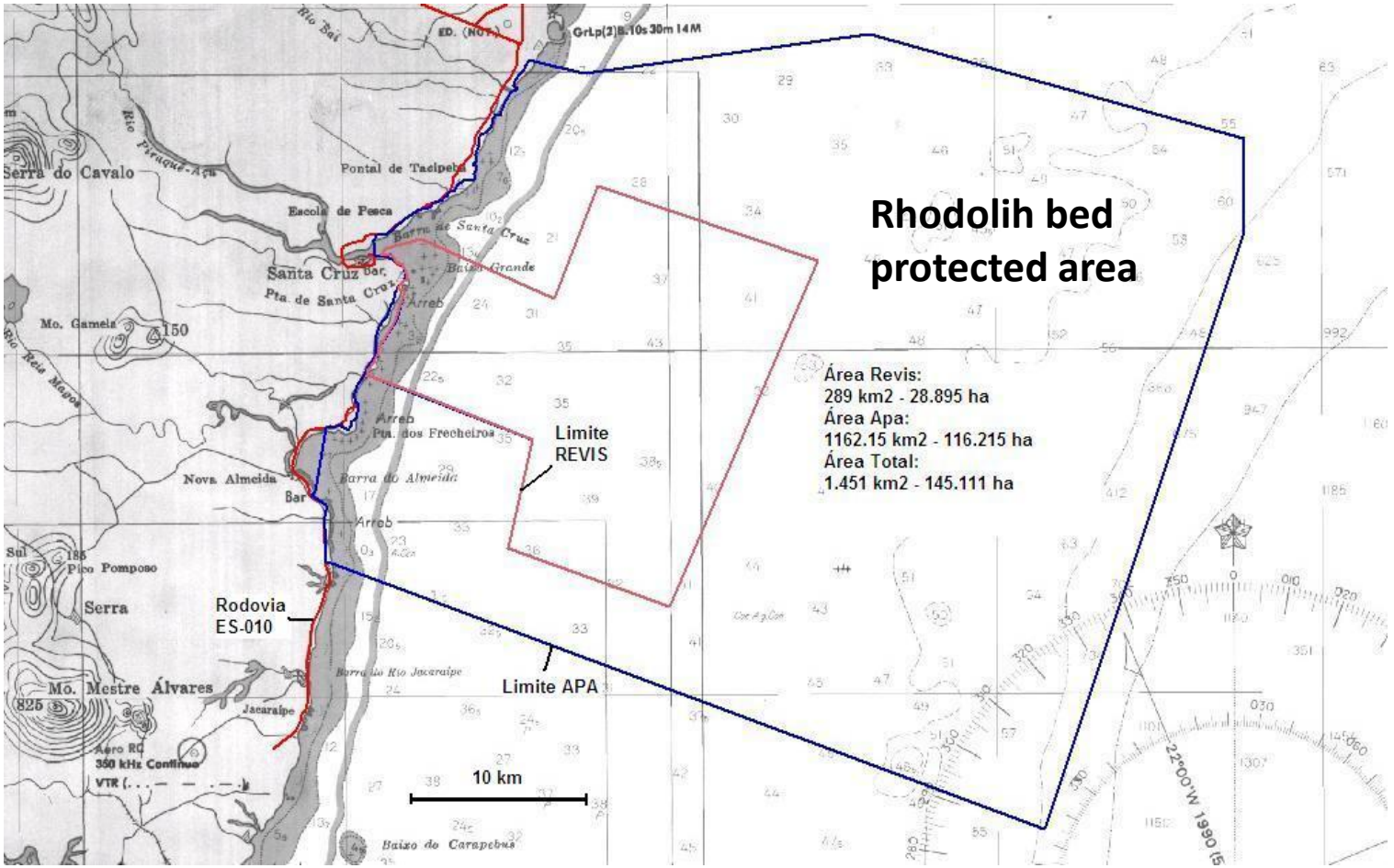
Rhodolith studies needed in Brazil

- Compare the impacts from oil & gas activities on rhodolith beds to other economic activities
- Monitoring and mitigation of the potential impacts of drilling discharges from O&G activities
- Monitoring and mitigation of the potential impacts of other economic activities, such as harbour dredging, aquarium collection, soil-fertilizers, fishing and sea-mining, etc

Mapping potential impacts of humans by oil & gas drilling, fish dredging, mining, and marine protected areas in the Abrolhos (Moura et al., 2013)



Rhodolith beds at priority areas for conservation: APA Costa das Algas & REVIS de Santa Cruz.(ES)



Rhodolith environmental policy in Brazil

- (ICMBio) – marine protected areas for rhodoliths
- (IBAMA, IN nº 89, 02/02/2006) – considers that the extraction of rhodoliths from algae beds may affect biodiversity, mainly at trophic levels.
- Retrieve up to 18 tons per year restricted to the living top layer of the rhodolith deposit
- (DNPM) – consider mining activities underneath the live layer preserving 80% of total area
- Reserves estimate 1 billion tons for sea-mining