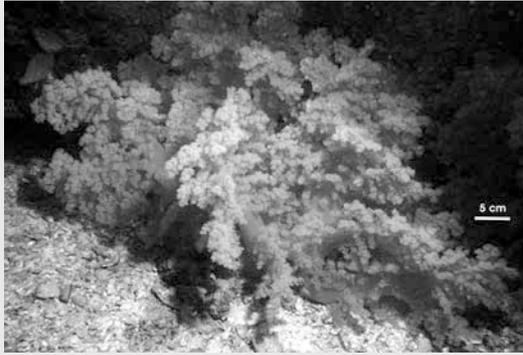


## Non-indigenous corals at marginal sites

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**Fig. 1** Soft coral (*Stereonephthya* aff. *curvata*) over sand and rubble at Arraial do Cabo



**Fig. 2** *Tubastraea coccinea* sharing space with native benthic organisms

Marginal reef environments that function close to the thresholds of coral reef development often sustain a relatively low species diversity. As a result, these systems are likely to be particularly susceptible to environmental disturbance (including introduction of exotics) and climatic change (Bellwood and Wainwright 2002). By contrast, species-rich communities should be less susceptible to invasion because of a more complete utilization of resources. However, the only support for such theories comes from studies of terrestrial grasslands and aquatic microbial communities in laboratory microcosms (Stachowicz et al. 1999).

The Arraial do Cabo region, southeast Brazil (23°44'S–42° W), sustains unique reef systems characterized by different hydrodynamic regimes. In sheltered, shallow (maximum 15 m) embayments, rocky shores are characterized by tropical reef communities and exhibit comparatively high coral cover (60%). The benthic community is dominated by zoanthids (mainly *Paulythoa caribbaeum*), one hydrocoral (*Millepora alcicornis*) and six scleractinian coral species (*Siderastrea stellata*, *Mussismilia hispida*, *Porites branneri*, *Madracis decactis*, *Phyllangia americana*, and *Astrangia rathbuni*). The associated ichthyofauna includes over 150 fish species (Ferreira et al. 2001). By contrast, at nearby sites (often as little as a few hundred meters away), exposed rocky shores are bathed by local upwelling and exhibit a characteristic subtropical fauna and flora. Due to this small-scale spatial gradient in temperature, the region displays a high diversity of reef-associated organisms and thus serves as a recipient of both tropical and subtropical invasive species.

During the last 10 years, two non-indigenous tropical coral species have been detected on the sheltered rocky shores. They include a soft coral, *Stereonephthya* aff. *curvata* (Kükenthal 1911), and a scleractinian, *Tubastraea coccinea* Lesson 1829 (Figs. 1, 2). Both species were probably introduced by oil platforms via fouling, because at least *T. coccinea* has been frequently detected on platforms and ships monitored by the author. The soft coral was detected in Arraial do Cabo about eight years ago in a shallow embayment, occurring as a colony of eight individuals. The individuals, varying from 20 to 50 cm in height, were established in a sandy, 10-m<sup>2</sup> area near a rocky shore (8–10 m deep). One-year monitoring and transplant experiments showed clear

evidence of successful asexual reproduction and potential chemical activity, the latter evidenced by transplant experiments with direct contact with local coral species. Replicated experiments detected active chemical competition against the native octocoral *Phyllogorgia dilatata*, the dominant species in the habitat where the soft coral had established. The *Tubastraea* species was detected four years ago as six colonies 3 to 5 cm in diameter, in shallow areas (6 m) under rocky boulders. After one year, the colonies had tripled in number and size. Reportedly, this species dominates intertidal and subtidal habitats of rocky shores at Ilha Grande point, 300 km south of Arraial do Cabo (Creed, personal communication). While *T. coccinea* rapidly (five years) expanded its distribution on the rocky shores of Ilha Grande, colonization and population expansion seem to be comparatively slow in Arraial do Cabo. Despite the fact that Arraial do Cabo apparently sustains higher species diversity than Ilha Grande, and this may restrict exotic species expansion, the processes governing rates of exotic species colonization and expansion at these sites remain complex.

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