# [***Blue carbon ecosystems: powerful yet fragile***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:67W3-3YK1-DYMS-S05F-00000-00&context=1516831)

Shenzhen Daily

March 27, 2023 Monday

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**Length:** 778 words

**Body**

Editor’s Note

Shenzhen Daily has partnered with Professor Matteo Convertino to present a monthly column titled “EcoBites.”

It will shed light on ecological unknowns, mysteries, needs and efforts in response to urgent biodiversity and climate issues, as well as broader sustainability goals where Shenzhen might serve as a role model for other cities.

In this column, Convertino will cover such ecological topics as ***blue carbon*** ecosystems, algal blooms, and coral seas through written articles and photos.

Convertino works as an associate professor at the Institute of Environment and Ecology of Tsinghua University, Shenzhen International Graduate School and is the principal investigator (PI) of the school’s Future Ecosystem Lab (TREES).

WALKING along the coastline is a favorite pastime for many in this city — the fragrance of the sea, the sunrise and sunset and the breeze are a few of the infinite things to enjoy. But something unnerving is happening; where are our coasts going?

The bad news for humankind is that both oceans and coasts are under pressure, amid atmospheric and marine warming, habitat destruction, pollution, and the impacts of overfishing and industrial activity. These destructive factors are undermining the roles that marine and riverine ecosystems play in slowing down climate change.

With a projected sea-level rise of 0.5-2.0 meters by 2100 driven by a 4 degrees Celsius rise in temperatures, there is the risk of forced displacement of up to 200 million people (3% of the global population). The Guangdong-Hong Kong-Macao Greater Bay Area (GBA), home to 80 million, is one of the most vulnerable regions on the planet.

The bleak prospects are exacerbated by the subsidence of reclaimed land and destroyed coastal ecosystems.

Certain coastal ecosystems are called “***blue carbon*** ecosystems.” Tidal marshes, ***mangroves*** and seagrass meadows act as deep carbon reservoirs and sequester greenhouse gases with the highest efficiency among all types of ecosystems.

Is there a way to rewind the already tickling clock of ecological decay? I believe the answer is positive, but it must be done with precision and requires a close collaboration of the academia, governments and industries.

Futian ***Mangrove*** Reserve is a perfect example of a healthy ***blue carbon*** ecosystem, where tidal flats and ***mangroves*** are supplied with freshwater inflow from the Shenzhen River and other canals — an essential condition for the optimal function and survival of these ecosystems.

An interesting thing noted in the local coastal ecosystems is an increase in carbon sequestration despite the decreasing coverage of vegetation, which can partly be explained by overstimulation of plants in relation to night-time illumination, higher air temperatures and density of carbon dioxide in the atmosphere. Yet it remains to be seen for how long this trend is durable and whether we are creating a “carbon time bomb” that would someday release all the sequestered carbon, in case ***mangroves*** disappear due to sea level rise or other factors.

Research by the TREES Lab at Tsinghua University, Shenzhen International Graduate School estimates that a tipping point will arrive in 2070, when GBA cities will be threatened by inundation due to sea level rise, if we do nothing about climate change.

Some years from now, we may have to adapt to the rising sea level and live in floating houses, alongside other species next to the ***mangroves***.

One solution is tapping into the potential of ***blue carbon*** ecosystems by expanding ***mangrove*** forests and related habitats that are already in a suboptimal condition.

The healthy functioning of such an ecosystem depends on the equilibrium between species, proper water quantity and quality, and other environmental factors. Here are some aspects we can work on.

First, we can reconnect ***mangroves*** with other habitats via drainage networks to ensure they have the necessary freshwater inflow.

Second, keystone species for ***blue carbon*** habitats such as fish and crustaceans must be preserved for biodiversity balance and ecological functions. For example, crabs provide necessary aeration to ***mangroves*** roots, which facilitates carbon sequestration.

Third, the maximum load of nutrients must be identified and strictly followed for the healthy function of ***blue carbon*** vegetation.

Fourth, we need to keep a close watch on ecosystems for any warning signs.

Finally, everyone has a share in this cause and needs to bear in their mind that acting responsibly benefits not just nature but also humankind.

With these steps, we can leverage climate risks as opportunities to expand ***blue carbon*** habitats for the carbon neutrality goal and climate regulation.

**Classification**

**Language:** ENGLISH

**Publication-Type:** Newspaper

**Subject:** BIODIVERSITY (90%); BLUE ECONOMY (90%); COASTAL AREAS (90%); COLLEGE & UNIVERSITY PROFESSORS (90%); ECOLOGY & ENVIRONMENTAL SCIENCE (90%); FRESHWATER ECOSYSTEMS (90%); NEGATIVE ENVIRONMENTAL NEWS (90%); SALTWATER ECOSYSTEMS (90%); ALLIANCES & PARTNERSHIPS (89%); CLIMATE CHANGE (89%); SEA LEVEL CHANGES (89%); ALGAL BLOOMS (78%); CARBON CAPTURE & STORAGE (78%); CORPORATE SUSTAINABILITY (78%); MENTORS & ROLE MODELS (78%); OCEAN HEALTH (78%); POLLUTION (78%); POLLUTION & ENVIRONMENTAL IMPACTS (78%); SEAWEED & ALGAE (78%); SUSTAINABLE DEVELOPMENT (78%); TRENDS (78%); WETLANDS (78%); WILDLIFE (78%); CLIMATOLOGY (77%); HOBBIES (77%); NEGATIVE NEWS (75%); LAND RECLAMATION (73%); MANUFACTURING OUTPUT (73%); SUSTAINABILITY (73%); GREENHOUSE GASES (72%); GRADUATE & PROFESSIONAL SCHOOLS (70%); POPULATION CHARACTERISTICS (69%)

**Industry:** BLUE ECONOMY (90%); COLLEGE & UNIVERSITY PROFESSORS (90%); SUSTAINABLE DEVELOPMENT (78%); MANUFACTURING OUTPUT (73%); GRADUATE & PROFESSIONAL SCHOOLS (70%)

**Geographic:** SHENZHEN, GUANGDONG, CHINA (92%); GUANGDONG, CHINA (79%); SOUTH CHINA (79%); CHINA (79%); HONG KONG (79%); MACAO (79%); China

**Load-Date:** March 26, 2023

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