

On the use and recycling of novel materials and energy by biodiversity in urbanized mangroves of the neotropic.

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Introduction

Among a diverse set of transformations, the urban expansion in coastal regions is bringing new materials (e.g. plastics, concrete, metals) and energy related to fossil fuels into ecosystems.



Fig. 1 Urban mangrove in Tumaco - Colombia

The second, the Urabá Gulf, is a delthaic system where mangrove forests are influenced by Turbo city [3]. In these areas we are registering biodiversity, the new materials and sources of energy being used by humans and the type of use by indigenous and non indigenous biota. Furthermore, we plan to sample some mangrove areas in Ecuador (Fig 2).

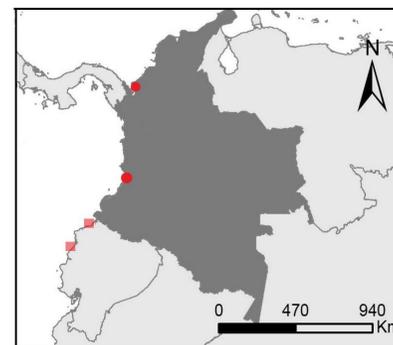


Fig.2. Map of study area. Samples taken (red points). Possible areas to study (square light red)

Since estuarine systems and mangrove forests are in the interphase between land and sea, they experience strong direct and indirect influences from humans, such as eutrophication and hydrologic regime shifts. This, and the architectural properties of mangrove trees, are turning them into waste traps [1]. Therefore, mangrove ecosystem provide a unique opportunity to assess i) species able to cope with strong alterations, ii) how are new energy and materials being used by native/non-indigenous species and iii) what new biotic relationships are taking place

Materials and methods

The study is being performed in several locations of the Pacific and Caribbean coasts of Colombia (Fig. 2). The first, Buenaventura Bay, is bordered by mangroves once considered the most luxuriant mangrove forests in the world. However, the influence of Buenaventura city has turned them in one of the most polluted places in the world [2]

Preliminary Results

1. Species thriving in urban mangroves.

Species diversity did not differ between urban and wild mangrove forests (Fig. 3.) Indigenous biota and even endangered mangrove species (e.g. *Cardisoma guanhumii*) are proliferating in heavily transformed environments

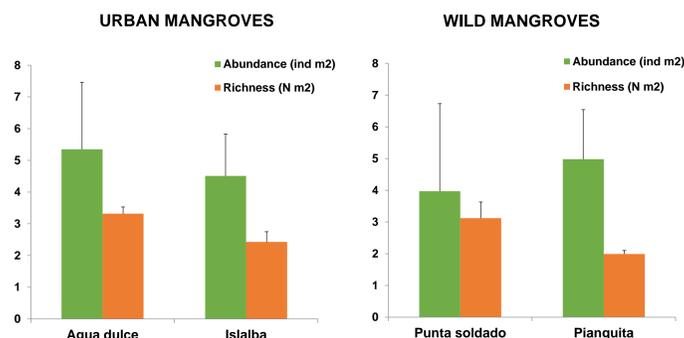


Fig 3. Species diversity of macro benthic biota between Urban mangroves and Wild mangroves in different places of Buenaventura Bay, Colombia. Bars are estándar errors.

2. How are new materials/energy sources being used.

Novel materials, particularly plastics are used by a diverse biotic assemblage of indigenous and non-indigenous species, mainly as settlement surface and as suitable microhabitat by sessile mollusks (Table 1).

Table 1. Use of novel materials in urbanized mangroves by indigenous/non-indigenous biota

Materials	Biota	Type of use
Concrete	Algae, snails (<i>Littoraria angulifera</i>)	Microhabitat/refuge/
Rigid plastic materials	Crabs, shrimps, polychaetes, slipper shells, oyster shells, barnacles	Microhabitat, settlement surface
Plastic bags	Snails (<i>Littorinidae</i>)	Refuge, recruitment surfaces
Glass	Oyster shells, polychaetes	Microhabitat
Metals	slipper shells, oyster shells, barnacles	Settlement surfaces

3. What new biotic/abiotic interactions are taking place.

Urban mangroves are promoting the assemblage (and interactions) of entirely new biological communities composed humans, their commensals, indigenous biota adapted to urban conditions and non-indigenous biota profiting on altered environments (Fig. 4).

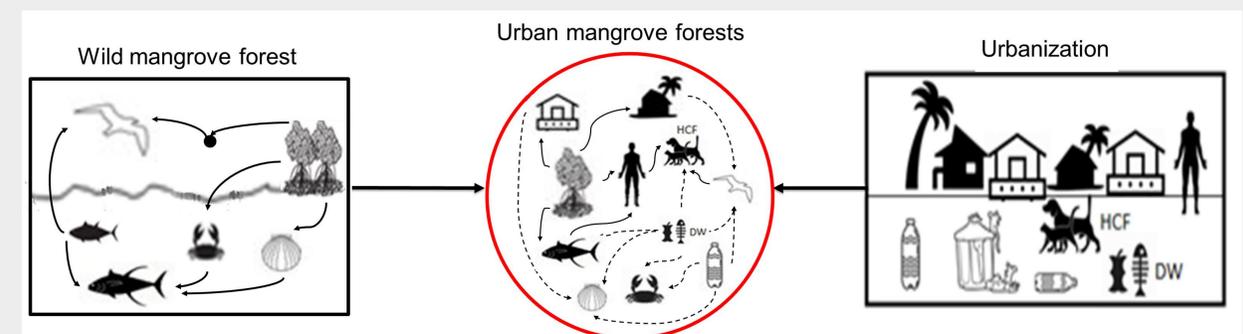


Fig 4. Conceptual diagram. **Human settlement**, human comensal fauna (HCF) and domestic waste (DW). **Wild mangrove forest** and its trophic web, point (insects). And **Urban mangroves** (red circle), know relationships (solid line) and unknow relationships (dashed line).

References

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