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## Madagascar: Mangrove importance and threats

Located to the East of Africa, Madagascar is the largest island in the Indian Ocean and its fauna and flora are highly endemic. Mangrove forests cover an area of 327,000 hectares, composed of seven tree species accompanied by an extremely diverse fauna.

The Baly Bay case is useful to understand the situation of mangroves in this country. The Baly Bay is located to the west coast of Madagascar. In 1997, 69,350 hectares were classified as a National Park, but including less than 500 hectares of mangroves, which in the region comprise a total of 7,200 hectares. Many species of animals use this habitat as nesting, roosting and feeding areas. Among the nine threatened and endemic Madagascar waterbirds species, five are recorded inside the mangrove (*Ardea humbloti*, *Anas bernieri*, *Threskiornis bernieri*, *Haliaeetus vociferoides* and *Charadrius thoracicus*). For mammals, two species are recorded inside the bay as the Madagascar bat *Pteropus rufus*, roosting on mangrove trees and *Delphinus* sp. In addition, mangroves constitute an important habitat for invertebrates. The most economically important is the crab *Scylla serrata* and two shrimp species: *Penaeus indicus* and *P. monodon*.

Those mangroves are an important source of income, not only for the country but also for the local population. The mangrove trees are used in building and to a lesser extent as firewood. The traditional and industrial fishing activities are practised inside the bay mainly based on the two shrimp species. The collection of crabs is carried out all year round to feed the local needs. The local population has for many years been involved in these activities, which have resulted in very low impacts on the ecosystem.

In recent years, shrimp has become one of Madagascar's main exported sea products. As a result, the Baly Bay region has become involved in this new tendency by establishing 600 hectares of a semi-intensive shrimp farming industry since 1998.

Compared to others ecosystem types (e.g. forests, lakes), mangroves are one of the less studied habitats in Madagascar, while the increase of the communities' needs and especially the development of shrimp farming are at a critical level. Although the impacts of these activities on mangroves are still difficult to identify due to lack of information, fishermen using traditional methods recorded that the proportion of catches of the two shrimp species (*Penaeus monodon* and *P. indicus*) jumped from less than 1/ 10 before 1998 to 1/ 4 in 2000. The causes of this change and other unexpected effects need to be identified and addressed to limit their impacts on biodiversity.

In Madagascar, the exploitation of mangroves for shrimp farming has increased considerably during the last ten years. At the same time, the strong demographic growth in the Malagasy western area may accentuate the ecosystem's degradation, thus simultaneously threatening biodiversity and the riparian community's livelihoods. Studies should be conducted to improve understanding of the relationship between exploitation and biodiversity conservation in order to avoid ecological disasters. Actions such as the ecological monitoring carried out in the Baly Bay region in 2000, require strong collaboration between the company, local communities, academia and relevant authorities, in order to achieve the conservation and sustainable use of resources. The reinforcement of the applied

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Malagasy decree related to the compatibility of investments with the environment (MECIE), followed by the implementation of ecological monitoring in areas under strong exploitation are essential. In addition, the prioritisation of research programmes should be focused on understanding the ecosystem's functioning as the starting point to achieve conservation.