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Contribusion of the knowledge of the malacological of bivalves in the Moroccan Mediteranean coast

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Abstract

This research paper is a contribution to the knowledge of the bivalve fauna of the coastal zones in Moroccan Mediterranean Sea. It presents the biological variety of the bivalve Molluscs from the Kiss River in Saidia beach to Sfiha beach in Al Hoceima city.
The systematic determinations, allowed us to establish a first exhaustive inventory of the biodiversity of bivalves in these coastal housing environments and their specific wealth. Different species belonging to 20 families were described and mapped in a catalogue. Different habitats have been diagnosed as threats to malacological fauna besides the impact of craft fishing pressure on some bivalves of economic interest.
***Key Words**: Biodiversity - Bivalve - Mediterranean Sea - Morocco.*

Introduction

Thanks to its geographical situation and its paleontological story, the Moroccan coast (MATEE, 2006) is endowed with a big variety of ecosystems as well as botanical and animal species, with a remarkable biological wealth. Besides its socioeconomic interest (MATEE, 1999), the biodiversity of Morocco displays a particular ecological importance. The rarity of works and documents and of specific syntheses on the malacological fauna of the Moroccan Mediterranean Sea induced us to carry out some researches on bivalves lamellibranches of the coastal zones from the Moroccan Algerian border up to the beach of Sfiha of Al Hoceima on a coastal shelf space 300 km long.
The various collections, which were carried out over more than 3 years since 2008 at the level of beaches and marine sediments, allowed us to establish the distribution of the species of bivalves onto four sectors of the zone understudy , to collect enough references and to set up a database on bivalves of the Moroccan Mediterranean Sea.

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1. Presentation of the research background

Morocco represents a real crossroads between Europe and Africa, and between the Mediterranean Sea and the Atlantic Ocean. This zone belongs to the sea of Alboran (FAO, 1998) with a sea water temperature which reaches maximums of 24 to 25°c in summer and minimal values as of 14 to 15°c in winters, and a salinity level of 38,5g/l.
The Mediterranean coast of oriental Morocco is approximately 512 km long and represents a very important patrimonial value with its natural diversity (LAOUINA, 2006), panoramic views and its biological diversity in halieutic and floral resources that make of it a region with increased ecological, economic and landscape interest.

* Sector I: The Saidia beach from the Moroccan Algerian border neighbouring Oued Kiss up to the new tourism station at the right bank of Moulouya estuary. It is a sandy 10 km long.
* Sector II: The water stream from the left bank of the mouth of Moulouya up to Ras Kebdana beach. It is a sandy zone of 4 km sheltered by the cliffs of akemkoum el Baz.
* Sector III: The Lagoon of Nador, which is the biggest lagoon of Morocco, called "Marchica", has a surface of 115 Km2 and a depth which does not exceed 8 m with a muddy sandy bottom and extends from the beach of Kariat Arkman up to the beach of Boukana to Béni Ensar.
* Sector IV: Al Hoceima from Souani up to the beach of Sfiha. It is a sandy and rocky zone on more of 2km length.

2. Materials and methods

- Harvests of the bivalves in tide marks and in zones of cleaning of craft fishing nets.
- Harvests of the bivalves made on the sandy beaches by fishing from the shore.
- Harvests by rakes aboard the boats of fishermen.
- Harvests of the sorts fixed to the rocks of the coast.

The systematic determinations were realized by means of specialized works.
This allowed us to establish a first exhaustive inventory of the biodiversity of bivalves in these coastal housing environments and their specific wealth.

3. Results and Discussions

The various samples were identified by species and by families, described and mapped in a catalogue. The study revealed the presence of threatened and rare species presenting an economic or biological interest.
The harvest was carried out during four seasons of the year to obtain a maximum of species which disappear during the period of growth and reproduction. This study also allowed us to list the most exploited species of bivalves by small-scale fishing with the aim of a spot marketing.
The results presented below bring to light 20 families of bivalves, containing 33 kinds and approximately 46 species.
The sampling revealed the presence of 5 families of bivalves with economic interest for instance Veneridae, Donacidae, Cardiidae, Glycymeridae, and Mytilidae (EL OUADAA, 1998; SHAFEE, 1999; LA VALLE, 2005; IDHALLA, 2007).

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Bivalve family	Abundance by site of collection				Number of specie per family
	Sit	Site	Site	Site	
Anomiidae	+	+	+	+	1
Arcidae	+	+	++	++	2
Cardiidae	++	++	++	++	6
Donacidae	++	+++	++	++	2
Glycymeridae	++	++	+++	++	2
Limidae	+	+	+	+	2
Mactridae	+	++	+	++	4
Mytilidae	+	++	++	++	4
Ostreidae	+	+	-	-	2
Pandoridae	+	-	-	+	1
Pectinidae	+	+	+	+	2
Pholadidae	+	+	-	-	1
Pinnidae	-	+	+	-	1
Psammobiidae	+	-	+	+	1
Scrobiculariidae	-	-	+	+	1
Solecurtidae	+	+	+	-	1
Solenidae	+	+	+	+	3
Spondylidae	-	-	+	-	1
Tellinidae	+	++	+	++	3
Veneridae	++	+++	++	+++	6

Table 1: Distribution of families by different collection area

The wealth and abundance of bivalves, used as indicators of biodiversity, have a double quantitative and qualitative purpose namely the study of the biodiversity of the region and which enabled us to determine for example the dominance of a family, the disappearance or the appearance of the species in certain zones, as well as the most threatened species due to excessive exploitation such as: the small clams, the right knife, the hulls, the varnish's, sea bean, sea almonds and sea dates. While the other families as Spondylidae are specific in a sector Nador where Glycymeridae is dominant and which influences other families such as: Donacidae and Veneridae. This sector is characterized by the presence of rare species such as the sea date *Lithophaga lithophaga* (Linné, 1758) and the big gives lustre of the lagoon of Nador *Pina nobilis*(Linné, 1758).

This last species is one of the biggest shells existing in the world. Its size can exceed 1 meter in the lagoon of Nador. It lives in the sand-muddy depths and in the herbariums of Posidonie, buried half in the sediment and hung collided on stones by its byssus. Today, this shell has become rare and fragile.

At the level of the mouth of Moulouya, we notice an inhibition of growth of the species of bivalves over 100 meters both right and left of the estuary banks. We attribute this fact to the offshore evacuation of the polluting wastes of the aqua cultural company of Moulouya and which could be responsible for the disappearance of the fields of clams *Chamelea gallina* (Linné, 1758) in this zone.

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Other species are strongly exploited which represents a real threat to their deposit, for instance *Donax trunculus* (Linné, 1758).

Conclusion

Some species represent a real wealth in terms of malacological biodiversity and enjoy an important economic and biological importance but are strongly exploited, which represents a real threat to their field
The threats which weigh on the biodiversity were identified as follows:

- Threat of extinction of species, and varieties.
- Degradation and loss of the ecological balance of the marine ecosystem.
- Overexploitation of natural resources due to the lack of organization and rising awareness of fishermen.
- Lack of valorisation to the endemic species.
- Disturbance of malacological housing environments by the recent tourist developments of the coast.
- Dilapidated and unsuitable legal arsenal for the protection of the species and the ecosystems, which complicates the protection of this heritage of the marine animal-life.

A cooperation strengthened on an international and regional scale is necessary for the rational exploitation of bivalves, and a quite particular attention should be given to the preservation of the marine biodiversity, the column of water and sea bed beyond the national jurisdictions as well as the biodiversity of the deep sea bed.

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