Institut za biologiju mora - Kotor

INVASIVE SPECIES IN ADRIATIC SEA AND THEIR IMPACT ON BIODIVERSITY

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AII-FORA ONLINE SIDE-EVENTS

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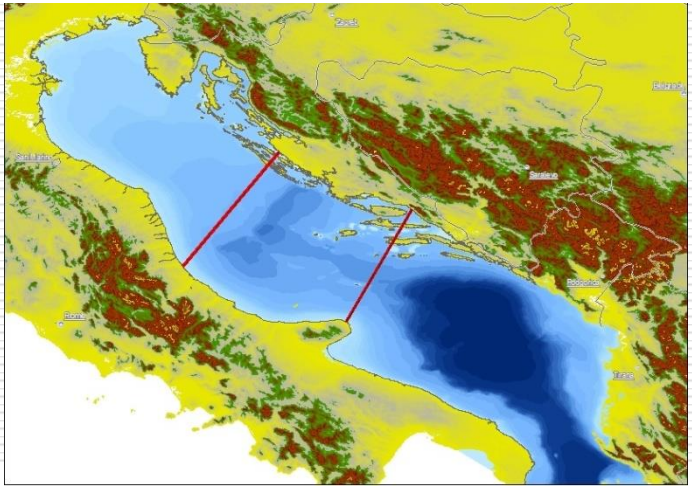
INTRODUCTION

- We are witnessing the changes that have been occurring in the Mediterranean and Adriatic ichthyofauna in qualitative and quantitative terms.
- The opening of Suez Channel in 1869 opened the way for marine species from the Red Sea to the Mediterranean.
- 60 fish species from the Red Sea have been registered in the Mediterranean, “lessepsian migrants”, after the French developer of the Suez Channel, Ferdinand Lesseps.
- Several migrants from the east Atlantic have also been identified.

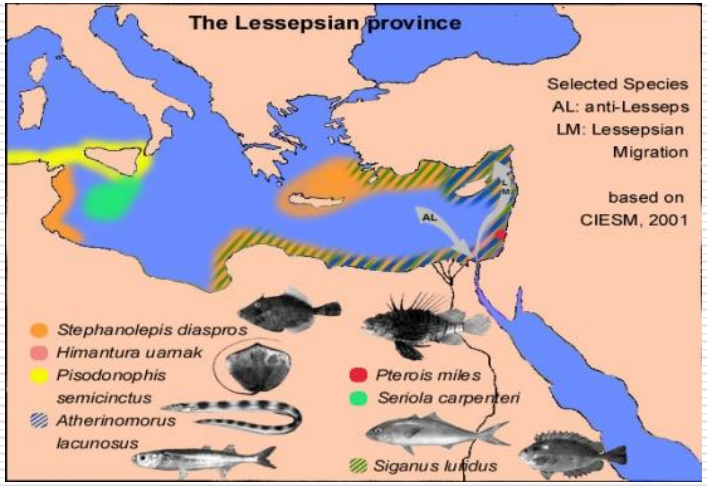


Present distribution of Lessepsian fish species

INTRODUCTION

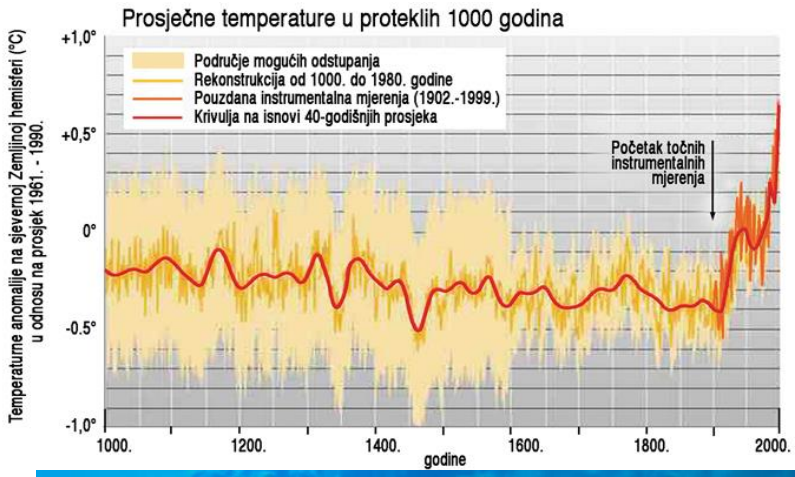
- There are several scientifically justifiable reasons of increasing the number of new species that have been recorded and determined in the Adriatic Sea:

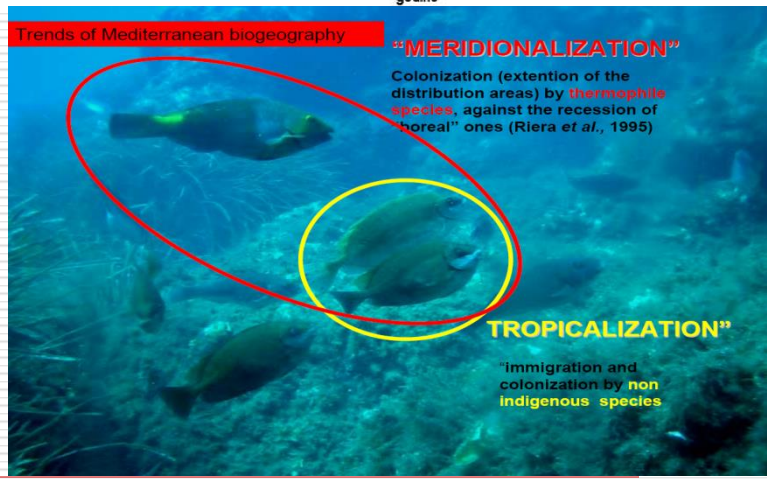
1. insufficiently explored deep-sea Adriatic ichthyofauna,
2. recently resolved systematic and taxonomic status of some species, confirmed earlier findings,
3. new techniques and methods of research,
4. climate changes,
5. actively entering through the escape from aquaculture,
6. ballast water, escapes from tanks.



INTRODUCTION

- The past decade has been marked by significant changes in climate which caused hot, dry summers, cold winters, storms, floods and forest fires.
- Temperature changes have also been identified in the marine ecosystems, with an increase in temperature (tropicalization) in the northern Mediterranean, including the Adriatic.
- This caused the spread of warm–water species northwards, to the areas of the Mediterranean they haven't inhabited before.
- Croatian and Montenegrian ichthyologists identified and described 46 new species in the Adriatic.





MATERIAL AND METHODS

- The educational campaigns and lectures, which are organized with aim to inform the fishermen about the presence of unknown, non-indigenous species in their catches, are followed by the cooperation and very good communication with them.

- Several species have been registered in Montenegrin and Adriatic waters which were previously unknown to fishermen.

- They have informed the Institute about them, and the specimens were brought to the Laboratory of Ichthyology and Marine Fishery where the identification as well as morphometric characteristics analysis were performed in accordance with the certain identification keys.

Local Ecological Knowledge (LEK) monitoring system

- Marine bioinvasions and other rapid biodiversity changes require today integrating existing monitoring tools with other complementary detection strategies to provide a more efficient management.

- Last few years Local Ecological Knowledge (LEK) monitoring system was implemented alongside whole Montenegrin coast, from Ada Bojana to Herceg Novi. Its main goal was to collect historical data about the changes of species distribution, abundance and appereance of new non **-native species.**

- Interviews with more than 80 professional local fishermen and anglers were done in order to get knowledge about the abundance of new species of marine organisms

- Through the answers, it has been concluded that the Blue crab (*Callinectes sapidus*) has been making significant damage to fishing gears, especially nets.

❖ **This type of protocol was used for individual (single) catches, for species which caught only one time.**

SHEET 2: RECORDS — Can you tell us if there are some species that have appeared in the last years but that were not present before? (see target species but ask also for new unidentified species)

INTERVIEW NUMBER.............. DATE [illegible] COMPILER [illegible] LOCATION [illegible] Country

NAME INTERVIEWED LAZAREVIĆ [redacted] Age 1980 SINCE (year)................ PROFESSIONAL X SPORTIVE □

Scuba diver □ Spear fishing □ Trammel nets X Purse seine □ Traps □ Hooks X Trawl □ Others ....

Do you regularely fish in the harbour? YES □ NO □ What kind of gear do you use to fish into the harbour? ...Hooks □ NETS □ TRAPS □ OTHER (SPECIFY) □ ....

SPECIES * *do you think is exotic or no?*	Yes/no	year	month	N. Ind.	Depth	Location (and coordinates if available)	Fishing meth	Picture?**	Notes
Siganus rivulatus		2015	novembar	1	25 m	SUKOVICA	MREŽOM	✓	→ da li je dopušten
Callinectes		2013	MAJ	1	10–15 m po površini	ZALIV TRAŠTA	Mreža paland	—	nije znao da je jestiv
Fistularia comers.		2012	Jun	1	10 m	plavi horizonti	mreža paland	—	
Sig. luri.		2014	11	1	20	ŽUKOVICA	mreža		

*If the interviewed has observed/captured something we can not identify write: **No Idendentified** and report general description (length, weight, color, shape...)

**Ask if he/she took pictures of the species (in this case try to get it)

Availability to collaborate: LOW □ MED. □ HIGH □

Trustworthy (quality of the interview): LOW □ MED. □ HIGH □

Results and discussion

- Several species in Montenegro increased abundance:

1. ***Tylosurus acus imperialis*** **– before 10 years**
2. ***Callinectes sapidus*** **– before 5 years**
3. ***Pomatomus saltatrix*****- nativ**
4. ***Sphyrena crisotemia*****- before 3 years**
5. ***Caranx crysos*****- before 8 years**
6. ***Sparisoma cretense*****- nativ**
7. ***Inistiuc pavo*****- before 4 years**
8. ***Ballistes capriscus*****- nativ**

- *Lagocephalus sceleratus (*Tetraodontidae)*, Siganus rivulatus / luridus (*Siganidae*) and Fistularia commersonii (*Fistularidae) are species that are in the entire Montenegrin coast caught several times.

Lagaocephalus sceleratus-Tetraodontidae

Siganus luridus-Siganidae

- Siganidae - caught at Bigova region with trammel and gillnets
- Tetraodontidae – caught in the part of Budva region – Rafailovići first time before few years
- *Farfantepanaeus aztecus*- only one time in the spring of 2016 at great depth, 10 nautical miles from Bar, using trawl net.
- *Epinephelus aenaeus* -caught three times in Montenegro for the last few years
- *Cheliopogon furcatus* was caught only once in 2012 in Perast, in Kotor Bay, at a depth of 25 m.

Controlling the introduction and spread of invasive alien species and reducing their impact on significant species and entire ecosystems is today one of the greatest nature protection challenges in Europe. The alien species can almost never be removed from the habitats to which it has spread, except on islands and in limited parts of the mainland where it has not yet spread widely.

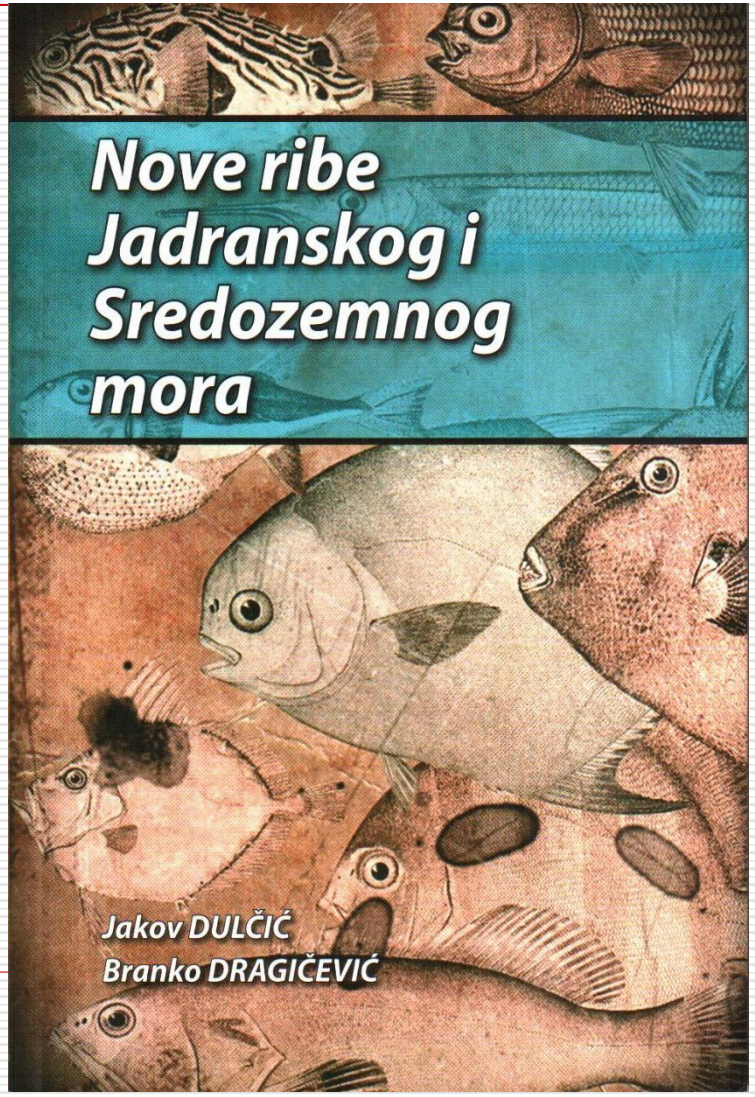
Callinctes sapidus **(blue crab) is commercially interesting species in other parts of the world, especially in the United States and Montenegrin fisheries are informed that this species can be used in the human diet, so information of comsupting of this species will be collected as well as the opportunity to sell this species and establish a market.**

These species will start to hunting more and therefore the fishing pressure on local populations of autochthonous crabs will be reduced.

Delikates, važan ribarstveni resurs zbog kvalitetnog mesa bogatog proteinima a siromašnog mastima

RESULTS AND DISCUSION

- Any changes that occur in the marine ecosystem, have resulted in changes in its living world. Biological diversity of Adriatic ichthyofauna at the moment is under the influence of rapid and visible changes
- Studies that have been carried out in the last decade have shown that 46 new fish species have been recorded in the Adriatic Sea, so the total number of species in the Adriatic is now above the 450, compared to the previous checklist which listed 407 species.



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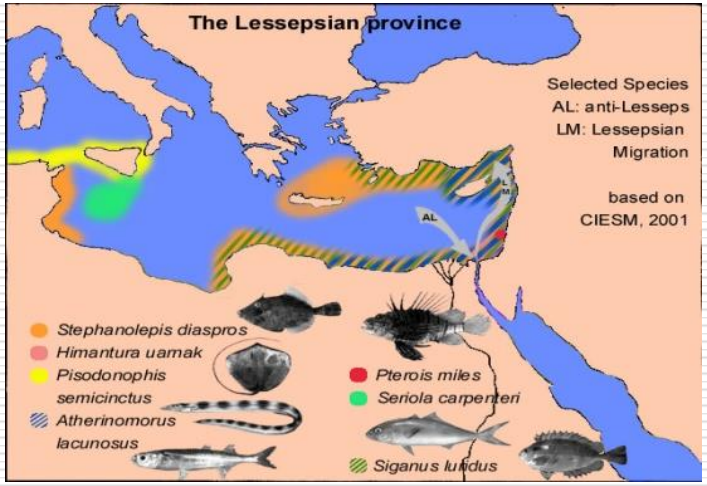

RESULTS AND DISCUSION

- As a signal of
  spreading of thermo
  northern parts of th
  observed, as well a
  as its northern par
  southern Adriatic
  Pomatomus saltatri
  part of Adriatic was
- Their arrival and occupation of ecological niches, certainly affects the local, indigenous species
- Increased biomass of P. saltatrix threatens the catches of mullet species at the mouth of the Neretva River, thus creating socio-economic problems for the fishermen in the area.

Acknowledgments

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