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An alien jellyfish *Rhopilema nomadica* and its impacts to the Eastern Mediterranean part of Turkey

Yabancı denizanası *Rhopilema nomadica* ve Türkiye'nin doğu Akdeniz sahillerine etkileri

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Abstract

An alien scyphomedusa *Rhopilema nomadica* human health, tourism and fisheries Mediterranean coast of Turkey. The painful stings of jellyfish may pose a danger to holiday makers. A monitoring programme is recommended for the impacts on tourism, human health and fisheries to mitigate of the effect of this jellyfish.

Keywords: *Rhopilema nomadica*, Mediterranean coast of Turkey, invasive species.

Introduction

In recent years, more alien jellyfish species has been observed in several coasts of the Mediterranean Sea. The highly invasive species *Mnemiopsis leidyi* is probably the best known of the world. Following its accidental introduction to the Black Sea in the 1980's, *M.leidyi* has spread to the Marmara Sea, Caspian, Aegean Sea, Mediterranean Sea, Baltic and North Seas (Shiganova et al. 2001, Isinibilir et al. 2002, Isinibilir et al. 2004, Faasse and Bayha 2006, Javidpour et al. 2006, Shiganova and Malej 2009).

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A large and stinging jellyfish species, Rhopilema nomadica, entered through the Suez Canal in the 1970s (Galil et al. 1990). Although it is assumed to have arrived via the Suez Canal, *R.nomadica* is rare in the red Sea and is not known from elsewhere (Mills 2001). Galil et al. (2009) also found the tropical scyphomedusan Phyllorhiza punctata, already recorded from the eastern Mediterranean in the past, but absent for many years. These records, together with the expansion of the scyphozoan *Cassiopea andromeda* (Çevik et al. 2006) and of the hydrozoan *Clytia hummelincki* (Gravili et al. 2008), show that the biodiversity of the Mediterranean Sea is changing by the establishment of alien jellyfish species. The mass aggregations of the jellyfishes exert significant impacts on tourism, human health and other socio-economic activities (CIESM 2001).

Jellyfish extension caused severe anxiety among fishermen and tourists in many countries. Even some of the jellyfish species are not harmful and native to the Mediterranean Sea, their distribution has been enlarged. For example, *Chrysaora hysoscella* has never made big blooms in the northern Aegean Sea but in recent years the situation has changed. The large jellyfish school, *Rhopilema nomadica*, has developed excessively on the shores of Lavantine Sea and has created a severe local damage, including injury to holiday makers, and damaged fishing nets and contaminated catches.

In the Turkish coast of the Mediterranean Sea found just two invasive scyphozoan species (*Rhopilema nomadica* and *Cassiopea andromeda*). Upside-down jellyfish *C. andromeda*, is frequently encountered in the eastern Mediterranean Sea (Bilecenoglu 2002). Özgür and Öztürk (2008) reported that the distribution of these stinging species extended from south to further north. Although there has not been any record on hospitalized events of *C. andromeda* stings, this jellyfish stinging cell can possibly cause discomfort on thin or sensitive skin, as well as the eyes and lips.

R. nomadica was first recorded off the coast of Mersin in Turkey in 1995 (Kideys and Gücü 1995), and then in Iskenderun Bay (Avsar et al. 1996). Since then, large aggregations of jellyfish have been observed in specific

localities along the Mediterranean Sea of Turkey, mainly during the summer months. The presence of *R. nomadica* with a higher concentration in the eastern Mediterranean coasts of Turkey could be due to higher productivity and pollution (Kideys and Gücü 1995). During August 1995 on Mersin beaches, many swimmers were stung and sought medical treatment (Kideys and Gücü 1995). Local fishermen claimed that the catch from the gill net fisheries decreased and that the jellyfish entangled in their nets were a major nuisance. In Iskenderun, due to mass jellyfish blooms, fish farmers could not lift their nets to the surface when they wanted to take fish from the cages.

R. nomadica can be recognized at sea by its large umbrella with long filaments and by its long oral lobes (Figure 1).

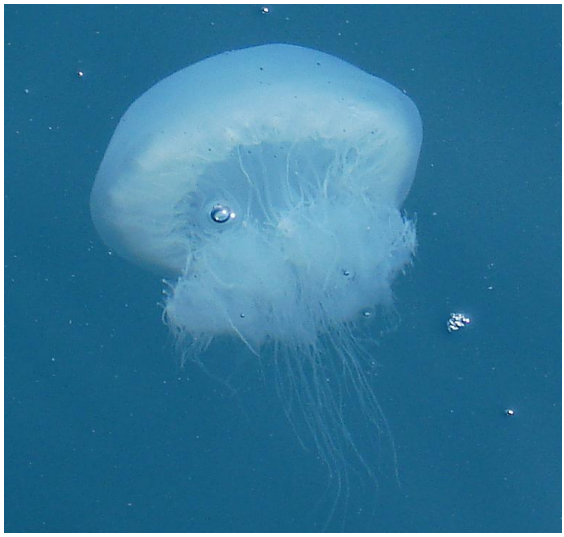

Figure 1. *Rhopilema nomadica* in the northeastern Mediterranean part of Turkey (Photo B. Öztürk).

A single specimen of *R. nomadica* was observed off the coast of Finike, Turkey in August 2006 (Figure. 2). The jellyfish umbrella was almost 60 cm in diameter. It was not collected because of bad weather and sea condition. In summer 2009, several blooms of *R. nomadica* were observed and some people were hospitalized in Antalya, Mersin,

Iskenderun and Adana Provinces in the Turkish part of the Mediterranean Sea. In December 2009 three specimens were observed off Kaş, southwestern part of Turkey (pers. comm. with Mr. Volkan Demir) (Figure 2). Lotan et al. (1994), however, reported that this jellyfish has intolerance of low temperature. Therefore we may expect that *R. nomadica* has begun to adapt to low winter temperatures. This spread pattern follows the Levantine current as Lebanon and Syria, and then Turkish eastern Mediterranean coasts (Avsar 1999).

Alien jellyfish species is also a threat for the tourism as some hospitalized events occurred in the eastern Mediterranean Sea countries. Jellyfish can be dangerous for people due to their allergic impacts. The most important factor is the amount of the poison put into blood. Death rarely occurs, but other effects are seen on all people. These can be itching, severe poisoning, muscle cramps, abdominal rigidity, and decrease in touch sensation, nausea, vomiting, serious back pain, speech difficulties, involuntary muscle contractions, and breathing difficulty. Certainly venomous jellyfish makes negative impacts on tourism (Spanier and Galil 1991). Table 1 summarizes the impacts of the alien species to the tourism and human health. In five areas hospitalized events in Turkey were recorded with 815 events (See Figure 2).

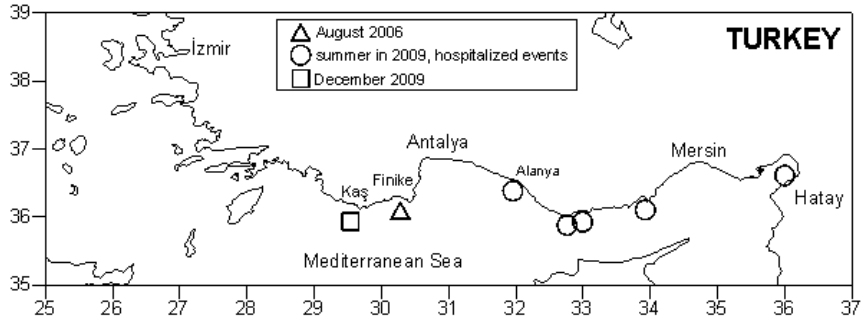

Figure 2. Distribution of *Rhopilema nomadica* in southern part of Turkey.

Adverse impact to the native biodiversity is also notable. In recent year *Rhizostoma pulma* has been replaced with *R. nomadica* in the eastern Mediterranean Sea (Boudouresque 1999).

Table 1. Harmful alien species and impacts on tourism and human health in the Mediterranean Sea.

Alien species	Target groups	Results
Rhopilema nomadica	Tourists, fishermen, divers, sailors, yatchman	Injury, hospitalized
Cassiopea andromeda	Tourists, fishermen, divers, sailors, yatchman	Injury, hospitalized

Although jellyfishes have usually been considered as a dead end in the pelagic food web, sea turtles and some marine organisms (e.g. sea birds, sea mammals, and some fishes) are reported to feed either occasionally or predominately on jellyfish (Harrison 1984, Ates 1991, Arai 2005).

After jellyfish sting, initial local treatment consists of rinsing the affected area with salt water; rinsing with fresh water can further activate the nematocysts and increase the pain (Silfen et al. 2003). Protective gloves or forceps are used to remove any tentacles still in contact with the skin. Applying acetic acid 5% (white vinegar) will inactivate undischarged nematocysts and the toxin; analgesics (acetaminophen or ibuprofen) may be necessary in some cases (Silfen et al. 2003).

One of the reasons of the alien jellyfish invasion is rise in sea water temperature due to climate change and this phenomenon needs to be monitor in the eastern Mediterranean Sea. Besides, impacts of the alien jellyfish outbreak need to be reported properly to better understanding the real impacts ton the human health and tourism. It is well known that Turkey is one of the favorite tourism destinations in the Mediterranean Sea and stinging jellyfish invasion may pose threat for the sustainability of the regional tourism. Thus it may have negative impacts on the regional economy as a whole.

To mitigate the adverse impacts of the stinging jellyfish damage, it is advised to establish a regional jellyfish watch programme, with fishermen as well.

Özet

Süveyş Kanalı'ndan Akdeniz'e giren *Rhopilema nomadica* Türkiye'nin güney sahillerinde balıkçılık, turizm ve insan sağlığı açısından tehdit oluşturmaya başlamıştır. Bu çalışmada, denizanalarının bu etkilerini azaltmak amacıyla bir izleme programının oluşturulması önerilmektedir.

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