

Multiple Sea Snails: The Uncertain Becoming of an Alien Species

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ABSTRACT

It has become common to consider “invasive alien species” one among the five most important “direct drivers” of change in biodiversity and ecosystems worldwide. However, the sea snail, Rapana venosa, introduced to the Black Sea is not only an “alien” but also a resource and an animal with particular meanings from a Muslim moral standpoint. I employ a relational ontology approach to discuss how the sea snail’s multiplicity interacts with concerns about “biodiversity,” notions of nativeness, and material agency in enacting different sea snails and the relations among them. I demonstrate that the biodiversity perspective has had very little impact on enactments of the sea snail and has not absorbed concerns about “alien species.” [Keywords: Biodiversity, natural resources, fisheries, relational ontology, value, Turkey, Black Sea]

“**I**nvasive alien species” are one among the five most important “direct drivers” of change in biodiversity and ecosystems worldwide. This statement has, in many circles, become a truism in the years after it was first formulated by the Millennium Ecosystem Assessment (see, e.g., Millennium Ecosystem Assessment 2005), and is frequently repeated in academic articles and on posters concerning alien invasive species.

However, in some cases, this truism is partly destabilized when the “alien” species in question is also a commercially significant resource.¹ In this article, I focus on a case in Turkey where the management of the introduced sea snail, *Rapana venosa*, in the Black Sea had to deal with the dilemma of the sea snail being both a commodity and an alien species.

The coupling of biodiversity and a concern with alien species seems to be taking hold in Turkey as in other countries. Turkey has followed the standard official procedures after they ratified the Convention on Biological Diversity (CBD) in 1997. National reports and plans submitted to the CBD include discussion of “invasive alien species,” while a draft of a new law on “Nature and Biological Diversity Protection” formulates additional, more stringent policies relating to “exotic” species. However, the sea snail in Turkey is not a stabilized, single object. For some Turkish marine scientists, the sea snail is an alien invasive species and so its stock should be exploited as much as possible. For other scientists, it is a resource to be managed as such. All are concerned about the supposedly harmful practice of dredging by which the sea snail is fished. Since the Turkish small-boat fishery for sea snails started in the early 1980s, management has wavered between different compromises. Many small boat fishers depend on dredging sea snails for their livelihood and, therefore, are not concerned about the newness of the sea snail to the Black Sea. The fishers and other people in the region consider the sea snail “unclean” for other reasons, namely its classification as *haram* according to Islamic dietary law.

I use this case to examine the extent to which biodiversity “discourse” has been adopted in Turkey and how the biodiversity-inspired “alarmist” view on alien species interacts with the commercial and haram sea snails. One approach would be to consider the snail as a stable object which various groups value differently. However, building on a relational ontology approach, I want to argue that the snail is multiple (Mol 2002) and messy (Law 2004), and that considering it in this way allows us to better understand the peculiarities of how global concerns with biodiversity have resonated in Turkey. This approach also allows me to better account for alternative ontologies and the role of material agency, particularly the role of the sea snail itself in the enactment of its different versions. How are notions of alien species and biodiversity engaged in sea snail enactments? How is this related to notions about nativeness/alienness? To what extent does the biodiversity perspective subsume and absorb concerns about alien

species in Turkey? How have the two models for sea snail management rubbed against each other, changed over time, and perhaps found ways of coexisting and accommodating each other?

In the introduction to this special collection, Richardson and Weszkalnys stress the dialectics between resource ontologies, in which material agency figures prominently, and resource histories/politics in constituting “resource environments.” Thinking in terms of biodiversity can be part of the resource environment of conventional resources (such as extraction of medicine from plants), and also create new ways of constituting “resourceness.” Several studies discuss the close relationship between neoliberalism, the conservation economy, and the biodiversity discourse that in effect take biodiversity to be a resource.²

However, most studies of biodiversity do not consider biodiversity as a resource, but rather account for how biodiversity policies are often caught up in local and, especially, national processes of identity negotiation (Escobar 2008, Lowe 2006, Fairhead and Leach 2003, Helmreich 2009).³ Similarly, studies of introduced species tend to focus on issues related to identity, such as possible links between xenophobia and the negative view of introduced species (Comaroff and Comaroff 2001, Lien 2005, Lavau 2011, O’Brien 2006, Simberloff 2003, Subramaniam 2001, Helmreich 2005, Sagoff 2003).

I consider that the anthropological studies both of biodiversity and of alien species have some limitations. First, they do not include material agency in the analysis. Although some studies of biodiversity claim to account for material agency (see, e.g., Escobar 2008:155, Lowe 2006:10) they fall back on rather mainstream social constructivist explanations. Likewise, while many studies of “alien invasive species” discuss cultural, political, and historical aspects (e.g., Comaroff and Comaroff 2001, Helmreich 2005, Subramaniam 2001, Lavau 2011, Weeks and Packard 2009), almost no ethnographies of introduced species account for material agency, even when they claim to (e.g., Lavau 2011). Studies by Lien (2005) and Franklin (2011) are inspired by relational ontology and do account for material agency in studies of introduced species, further indicating the usefulness of this approach for integrating material agency into analysis.

Second, while studies of both biodiversity and introduced species tend to argue for the “constructed” character of species, they generally do not consider the possible multiplicity of the species in question. Celia Lowe (2006) demonstrates the usefulness of an Actor-Network Theory (ANT)

approach in her analysis of how biodiversity was manipulated for local ends. However, the species in question, a monkey, is shown to be constructed differently only through time, not simultaneously.

A third problem in studies of biodiversity and introduced species concerns global-local interactions. While several anthropological studies of biodiversity attempt a balanced and nuanced analysis of large scale dynamics and situated practice by considering biodiversity as an assemblage (Escobar 2008, Lowe 2006, Fairhead and Leach 2003), they typically assume but do not really explore the impact and force of large-scale processes (such as “neoliberalism,” see Comaroff and Comaroff [2001] and Igoe [2010]).

Like other ANT scholars (e.g., Latour 2005), Mol (2002) insists we should not assume in advance how networks, or aggregates, are organized; she stresses the performative aspect of knowledge—how, that is, objects are “done” or “enacted.” I am inspired by the specificity gained by her effort to identify multiple enactments. However, while Mol provides a “praxiography” of medical practice within a very limited frame (one hospital, one year), I am interested in tracing the enactment of multiple sea snails over longer time spans and over several sites. The “global” relations beyond the Black Sea and Turkey that are enfolded into the constitution of the multiple sea snails are too obvious to ignore. I therefore include an analysis of “global” processes without losing the sense of the sea snail being enacted and multiple.

In accordance with a relational ontology approach, I do not consider variables such as the international institutionalization of concerns with biodiversity, a Far Eastern market for the sea snail, the spread of sea snails to other continents, and other “global” relations as given “contexts,” but as relations to be explored. I think it is fruitful to “...flip back and forth between claiming and refusing context” (Tsing 2010:47). This is well-expressed in John Law’s (1994) concept of “modes of ordering” which are more patterned and “ordered” than Latour’s networks, yet less rigid and more all-encompassing than Foucault’s discourse concept.

The “social life of things” approach (Appadurai 1986) has some affinities with Law’s approach in that the focus is on networks and not structures and in that order is considered contingent. Studies of biodiversity indicate ways in which new “regimes of value” are coming into being for assessing species and nature (Brockington and Duffy 2010, Escobar 2008, Helmreich 2009), increasingly resulting in commodification of biodiversity

(Brockington and Duffy 2010, Igoe 2010) and new opportunities for standardization and governance (Bowker 2005).

However, although useful, a focus on “valuation” would not, even when inserted into a networking approach, sufficiently account for the character of the sea snail(s) since it fails to describe “resource ontologies” (Richardson and Weszkalnys this issue): valuation approaches do not include material agency in the analysis. Conventional approaches to commodities and natural resources may accord importance to the materiality of objects as they circulate through regimes of value, but primarily as given qualities of the resource, e.g., as the undifferentiated, white quality of sugar (Mintz 1985, see also Ferry 2005). Thus, the analytical concept of value, I claim, is primarily useful when exploring the social life of things, when objects are incorporated into human-organized socio-symbolic systems of exchange. An exploration of resource ontologies will require us to go beyond values if we are to be able to discern material agency. A key assumption in the relational ontological approaches discussed above is that the material—such as the sea snail itself—participates in, but is also constructed by, these modes of ordering.

This article proceeds in the following manner. First, I describe enactments of the sea snail as invasive alien species, as resource, and as “forbidden” (haram). I consider how the enactments are distributed over different sites and human actors such as fishers, managers, factory owners, scientists, and NGO members. However, in contrast with a constructivist analysis of multiple, incommensurable realities, I suggest that although messy, the multiple sea snails are not completely incommensurable and independent. Like Mol, I am interested in the coordination and relations between the objects created by multiple enactments and how the boundary relations between modes of ordering are negotiated and constituted (Law 1994:111). Thus, secondly, I explore how the various enactments relate to each other, especially in fishery management and in an experiment with alternative catch technology. Third, I show that there is relatively little concern about species’ “naturalness” in Turkey. Fourth, I discuss the degree to which biodiversity policies have impacted the enactment of the sea snail as alien. The material I present comes from my continuous engagement with Turkish Black Sea fisheries and marine science since 1990, which has involved a year and a half of ethnographic fieldwork. Since 2004, this engagement has occurred within the scope of EU framework funded interdisciplinary projects in support of EU marine and fishery policies.

The degree to which enactments coalesce into objects with clear borders and a solid core is an ethnographic question. I argue that the sea snail as alien species has not been effective in displacing other snails, which indicates that biodiversity organizes nature and practices in Turkey only to a limited extent. Despite the increased international/scientific enactment of the sea snail as “alien invasive,” the sea snail remains as messy, and management as contested, as before. There is a high degree of flux in the way the different enactments of sea snails are coordinated, and the materiality of the sea snail and its environment play no minor role in this.

Sea Snail as Alien Invasive Species and Threat to Biodiversity

In my capacity as leader of the Black Sea work-package within the EU FP7⁴-framework funded project KnowSeas, I organized an international workshop on sea snails in the Black Sea to be held in Istanbul in cooperation with the Black Sea Commission for Protection against Pollution—the first of its kind on this issue. The project had identified “invasive alien species” as a major issue in the Black Sea and had chosen the *Rapana* sea snail as a major case study. The workshop was attended by marine scientists⁵ and representatives from national ministries from all the Black Sea countries, as well as an internationally acknowledged scientific authority on the *Rapana*.

At the workshop, one of the Turkish marine scientists declared, “We will have to remove *Rapana* from the ecosystem...it is not endogenous. We should think about how we can remove it [from the Black Sea].” His words seemed to imply a dramatic change. In the early 1990s, this senior scholar had led a research group in Trabzon that stressed the importance of protecting the sea snail against overfishing. What provoked this change in perspective? What made the workshop possible and “necessary”? Three major developments seem to have brought this about: the expansion of the biodiversity mode of ordering, a spread of the *Rapana* sea snail to new geographies, and the decrease in average sea snail size in many locations in the Black Sea.

Participants at the workshop particularly discussed the last of these developments: the sea snail’s gradual decrease in average size. They argued that because of a lack of data they were unable to decide whether excessive fishing pressure, juvenation,⁶ other factors, or a combination of

all of these were responsible for the change. In any case, the sea snail had become a less stable and a less well-known object. The developments in the sea snail stock could not be grasped with the help of the conventional models used to describe interactions between fishing pressure and stocks of marine resources.

Scientists believe that the sea snail arrived in the Black Sea in the 1940s. It was first described by Soviet scientists, and reported in Turkish waters by a French scientist (Fischer-Piette 1960). Later, the *Rapana* sea snail moved from the Black Sea—sometimes by its own means, sometimes with the unintentional help of humans—to new sites. However, it did not attain commercial importance in these new geographies. The sea snail crept into the Sea of Marmara and the Aegean, subsequently establishing itself in the Adriatic and in South America. Since it was first identified in 1998, it has been considered a ferocious invasive alien in the Chesapeake Bay in the US and has recently been found in the North Sea.

The sea snail is at the heart of the alien species mode of ordering that has come to exist during the last ten years and that is increasingly intertwined with biodiversity policies. The *Rapana* sea snail is the object of a body of international “alarmist” literature and has been included not only in the DAISIE⁷ and EEA⁸ lists of worst alien species in Europe, but also in the Global Invasive Species Database where it is “...considered as one of the most unwelcome invaders worldwide.”⁹ The International Council for the Exploitation of the Sea’s headline about the *Rapana* says “Wanted dead or alive”¹⁰; it has also published an Alien Species Alert report (Mann et al. 2004).

In the last 30 years, a massive international institutional apparatus and associated mode of ordering around “biodiversity” subsumed many already existing conservation agendas and concerns (Farnham 2007) and has come to constitute a new hegemonic “truth system” (Bowker 2005). The issue of “invasive alien species” has increasingly been incorporated into the biodiversity agenda after its inclusion in the Convention on Biological Diversity (CBD) and especially after the Millennium Ecosystem Assessment (MEA) in 2005 (Davis 2006). This mode of ordering gives little weight to the possible biological and economic benefits of moving species to new habitats. This contrasts sharply with colonial and high modernist epochs when the massive movement of species into new environments was seen as extending European civilization or as a progressive approach to economic development (Scott 1998).

Biodiversity policies in Turkey have been shaped by Turkish involvement in four major international organizations or projects: the CBD, the MEA, the European Union, and the Global Environmental Facility (GEF). Turkey signed the CBD in 1992 and became a party (by ratification) in 1997. Responsibility for implementing biodiversity policies and management was vested in the General Directorate for Nature Conservation and National Parks (GD-NCNP) at the Ministry for Environment and Forestry. For the most part, the reports and plans (submitted to CBD) of the GD-NCNP closely follow CBD focus and wording, including Article 8(h) of the CBD on “invasive alien species.” However, both the 2001 and 2007 plans mention positive impacts of new and introduced species: “many alien organisms...have provided important economic and social benefits” (GD-NCNP 2001:18). Yet, they also stress that the sea snail threatens a sea bream species (hence biodiversity) because it feeds on Mediterranean mussels which sea bream also consume (NFP-BD 2008:93).

Only one major environmental NGO in Turkey—the Turkish Marine Research Foundation (TÜDAV) led by a renowned marine biologist—has become concerned with “introduced species.” In their text on “biological diffusion” (*biyolojik yayılım*),¹¹ they avoid the alarmist language used in the media and write about “invasive” (*istilacı*) and “non-native species” (*yerli olmayan türler*). In a book published by the NGO, the authors write, “Seldom can we reveal cases of positive effect of and benefit from accidentally introduced exotics. Export of *Rapana* meat [...] is the only example of this” (Zaitsev and Öztürk 2001:227). Beyond this, TÜDAV has not addressed the sea snail, but they have taken a leading role in the much more high profile fight against *Caulerpa*, the introduced seaweed spreading throughout the Mediterranean. TÜDAV cooperates closely with Turkish authorities on the international stage, has been an observer in several important international programs, and is trying to get Turkey to implement ballast water control in accordance with international agreements. Thus, with its strong links to national government, science, and UN policies, TÜDAV has been instrumental in introducing the biodiversity mode of ordering into Turkey.

It may seem like worries about the sea snail as an “invasive alien species” only emerged as a consequence of its recent establishment in places such as North America where there is more concern about alien species and with the international institutionalization of biodiversity. However, the concern about its invasiveness and disruptiveness has been present in

Turkish scientific and managerial circles for decades and has been one vector when deciding on regulations for its catch. Already in the 1970s, Bilecik and Artüz, two leading and internationally-oriented Turkish marine biologists based in Istanbul, described the sea snail as a new, predatory, and essentially ecologically harmful organism that should be controlled through extensive fishing. Bilecik (1975) stressed the following: the “invasive” (*istilası*) effect of the sea snail results in the consumption and erosion of mussel beds; from a biological standpoint, the spread of the sea snail in the Black Sea is a disaster; it leads to ecological “imbalance” (*dengesizlik*); and instead of being restricted, the catching of sea snails should be encouraged (Bilecik 1990:23-24). Similarly, in popular science articles in Turkish newspapers, Artüz (1989) criticized protective regulations, such as limitations on dredging and banning the catch of small sea snails.

Considering that the global concern with biodiversity and “alien invasive species” only gathered momentum in the late 1980s, it is surprising that Bilecik was already writing about the “invasion de Rapana” in the 1970s.¹² According to Artüz, the sea snail “occupied” (*işgaletmiş*) coastal areas all around the Black Sea (Baykut and Artüz 1979), and was a very “gluttonous” (*obur*) species whose predatory behavior towards mussels and oysters amounted to a “war to extinguish” (*yok etme savaşı*) (Artüz 1980). These are the kind of war metaphors that the ecologist Elton used in his book *The Ecology of Invasions by Animals and Plants* (1958) which is considered “[t]he book that began invasion ecology” (Ricciardi and MacIsaac 2008). Yet, although both Bilecik and Artüz were well acquainted with international science, they had not read Elton. Rather, in preparing for scientific trawl surveys which were designed to explore mussel beds and options for commercial trawling in the Black Sea (Bilecik 2003:53), Bilecik learned from publications by Soviet, Romanian, and Bulgarian scientists that the sea snail constituted a threat to mussels and that it had no competitor in the Black Sea.¹³

While these scientists problematized the species’ invasiveness and harmfulness, their overriding concern seems to have been with “ecological balance” and not “alien species.” Although at the time allied with internationally circulating ideas in biological sciences about the importance of “natural balance,” Artüz and Bilecik’s enactment of the sea snail as harmful was not easy to strengthen by making allies with international science and policy bodies. This has now changed. The new biodiversity mode of ordering has become so successful precisely because it

has incorporated so many previously dispersed conservation concerns (Farnham 2007). Celia Lowe (2006:51) has argued that “[o]nce a ‘species’ has entered into the realm of biodiversity calculation, it hardly ever emerges again as unworthy of protection; transnational biodiversity ideologies inhibit such reversals.” It is likely this holds true for alien species as well—once they become listed as a threat to biodiversity, this enactment is difficult to challenge.

Sea Snail as Commodity and Resource

The other major sea snail enactment—as resource and commodity—has a very different trajectory than sea snail as alien. Like many natural resources cum commodities, the significations and social relations involved in the production and consumption of the Black Sea snail are very disjointed. Yet, although a more diverse set of human actors are involved in the sea snail as resource, science is also an important arena for this enactment.

Consumers

Processes of value-formation which produce the sea snail as a resource in the Black Sea take place in East Asia. The dynamics and meanings entailed in this valuation are almost completely unknown in Turkey, and the mediation among consumption, catch, and production occurs through the international market whereby demand is articulated as monetary value, as well as size and quality standards. While Japanese and Korean companies are involved in managing processing standards, the sea snail that travels from the Black Sea to East Asia is primarily “material.” In Japan, the Black sea snail seems to be enacted as another species as it is consumed as the cheap or fake substitute for *Turbo cornutus*/Horned turban/Turban shell/Sazae’s.¹⁴

Factory Owners

Medium-sized and large Turkish marine and food produce corporations operate most of the sea snail factories along the Turkish Black Sea coast. The companies usually trade directly with overseas importers and depend upon employed or contracted technicians with higher education in dealing with the strict hygienic standards required by the EU and importers

in eastern Asia. The factories typically employ 100 to 200 workers, the majority of whom are poor village women, during the three to four month summer high season for sea snail fishing. Middlemen arrange the acquisition of sea snails to the factories, and since factories distribute advances (credits) to fishers through the middlemen before the start of the season fishers become “bonded” to certain factories.

Factory owners’ major concerns are the prices paid for the sea snails, the size distribution of shells (prices vary significantly with size), prices obtained in Far East markets (in 2008, medium-sized snails sold for \$6-7 USD/kg of meat, small snails for \$5 USD/kg), and the importance of securing a steady supply of sea snails. This has involved ensuring that dredging for sea snails continues during the summer when it is more effective, resulting in factories being able to buy sea snails at the lowest possible price. In the factories, the sea snail is first and foremost enacted as a commodity. It is of little or no concern to factory owners and workers whether or not it is a new species. Rather, the sensitive and contested issues for factory owners are sea snail regulation and management.

The factories are not neutral conveyors between fishers and the market. Through factory processing, the sea snails are transformed and standardized. When visiting sea snail processing factories, the factory managers or owners will usually take me on a tour of the facilities. They begin where sea snails are received, then show where they are boiled before they are transferred to refrigerated rooms where they are cleaned, sorted into ten kilogram packages, and kept until they leave the factories by container lorries. The infrastructure layout of the different sea snail factories (also in Bulgaria) is remarkably similar, most likely as a result of the confluence of material qualities of the sea snails and the hygienic and consumption preferences in a far away market.

Fishers

In the early 1980s, sea snail fishing became economically important for fishers. In my primary fieldwork location, the coastal village of Keremköy in Çarşıbaşı, the number of medium-sized multi-purpose boats boomed in the 1990s. During these years, similar developments occurred in many fishing communities along the Turkish Black Sea coast, especially around Trabzon. After 2000, sea snail fishing increased particularly in the province of Samsun (Knudsen, Zengin, and Koçak 2010). The district of Terme

provides a striking example: while there were hardly any fishers in the mid-1980s, by the early 1990s there were 80 small boats and many men working as crew (though there were no owners of large boats). With the construction of a harbor in 1994 and the increase in sea snail catches since 2000, Terme has developed into an important fishing center with 19 trawlers and 331 small boats in 2005 (see Knudsen and Koçak 2011).

The sea snail sector has helped to provide employment, rural settlement, and business opportunities. Involvement in the fisheries has helped raise many poor fishermen's standard of living, and some of the more successful ones have been able to invest in trawlers. Many have built their own houses on income earned in sea snail fisheries. Yet, the sea snail fishery remains, to some extent, controversial even among fishers who have benefitted from it since some consider dredging to be harmful. Some fisher communities actively oppose dredging, and in at least one region (Sinop-Gerze) fishers convinced the authorities to ban it altogether (Denge Gazetesi 2008). Fishers' concerns also include the high operational costs, especially fuel prices, and their relations with buyers and factories. What most angers many fishers are the increasingly stringent official inspections and an increase in fines since the mid-2000s.

Fishers generally do not consider the sea snail a new species. For them, this is as an unimportant detail. Their experience of the sea snail is different from that of the scientists. They are more likely to talk about the sea snail as an "animal" (*hayvan*). Their ideas about it seem to be shaped by their hands-on experience with the sea snail's behavior and action—the way they bury themselves when the water is cold, how fast they can "walk," their seasonal movement, etc.—observations which also directly influence prevalent patterns of fishing.

Science

Researchers at the Marine Research faculty at the Karadeniz Technical University in Trabzon (on the Black Sea coast) started research on the sea snail in 1982. Due to their proximity to the fisheries sector and their close relations to the Ministry of Agriculture and Rural Affairs (MARA) (which is also responsible for fisheries), researchers at this newly established institution approached the sea snail primarily as a marine resource. They were also concerned about the harmful effect of dredge fishing on both sea snail stocks and on other species and habitats.

A report produced jointly by the Faculty in Trabzon and MARA underlines the need for protection against overfishing through appropriate regulations in terms of the size of the sea snails that may be fished, gear, area, and season limitations (Düzgüneş et al. 1992). The authors argue that the long-term sustainability of this economically important fishery depends on knowledge about certain quantitative and qualitative aspects of the sea snail, and that excessive fishing pressure with dredges has resulted in a small average size and decreasing economic profitability. Therefore, dredge fishing should be prohibited, sea snails smaller than six centimeters should not be caught, and diving should be encouraged.

The sea snail is portrayed, here, not as an invasive predator but as comparable to any other economically important marine species. Based on their research on reproductive activities of the sea snail, the authors suggest guidelines regarding the length and timing of dredging (see also Düzgüneş and Feyzioğlu 1994). A similar position was later adopted by other marine scientists based in the Black Sea region (Karayücel et al. 2001). Surprisingly, then, it was one of these scholars who, at the Istanbul *Rapana* workshop, claimed that *Rapana* should be removed from the Black Sea. Rather than a resource to be exploited rationally, he now enacted it as an unclean species.

While the resource sea snail enactment is made possible by the valuation in the Far East, the routines and practices of its fishing and processing are, to a large extent, predicated upon the physical properties of the sea snail, and are also very sensitive to changes in the sea snail stock composition. Overall, however, the resource sea snail has been more coherent and stable than the alien sea snail.

Other Sea Snails

Alien invasive and resource sea snails are the major sea snail enactments in Turkey. But there are also other sea snails. Like scientists, managers and environmentalists, fishers consider the sea snail unclean. However, for them, it is unclean not because it is a new species but because it is haram—unclean and inedible—among Muslim Turks, which means there is no demand for it in Turkey. Sea snails are not generically haram in all Muslim populations. Its classification as haram in Turkey is primarily connected to the culinary cultures of seafood in Turkey, which must be understood in their particular historical and national context. The sea

snail is associated with the consumption of seafood, with alcohol, and with (former) eastern Greek (*Rum*) infidels' immoral consumption behavior (Knudsen 2006). This ambiguity is also indicated by the local names fishers give to the sea snail: *midye* (mussel), *tokalak* (local term for "snail"), *sülük* (leech). Most Turks, particularly the religiously devout in the Black Sea region, consider mussels, snails, and leeches unclean, inedible, or suspect. The more generic name "sea snail" (*deniz salyangozu*) is primarily used in interaction with factories and managers. Some fishers provide another interpretation claiming that it is *günah* (a sin) to boil living sea snails. The sea snails cry out in pain, fishers claim, when they are lowered into hot water in the factories, and because of this sin many of the sea snail factories have gone bankrupt. A small number of fishers do not catch sea snails during Ramadan because of its classification as haram. Yet, the understanding of sea snail within the Muslim moral universe largely does not interfere with the sea snail as a catch and commodity nor facilitates an understanding of it as ecologically harmful.

Sea snails are deemed unclean in another way as well. During the early 1990s, the sea snail factory in Çarşıbaşı disposed of empty shells at the seafront close to the city center. Many people complained about the bad smell emanating from the open site, especially on hot summer days, comparing it to the smell of "a dead man" or "a carcass." A factory in Görele, another city in the region, allegedly had to close down because of the problems created by the smell. When the factory in Çarşıbaşı was relocated and modernized in the mid-1990s, the empty shells were dumped in the sea at some distance from the coast to avoid the problem. In Samsun, female workers who clean the sea snails in factories believe that "they remain at home because they smell bad"—i.e., they are unable to marry because of the smell they carry from the sea snails.¹⁵

Thus, there seem to exist several alternative ontologies around the resource enactment of the sea snail, such as the sea snail being haram, smelly, etc. These may be considered part of the "resource environment" of the sea snail as resource since they are primarily realized and articulated in the context of the sea snail's resourceness and processing technology.

Friction and Dilemmas Among Multiple Enactments

I could end my analysis with this outline of the multiple sea snails. However, like Mol (2002), I am concerned to show that the modes of ordering that

organize these different enactments do not exist independently, but rub up against and interfere with each other. I want to ask about the boundary relations between different modes of ordering, and the ways that “biodiversity” is involved in their enactments and coordination.

For example, the smelly sea snail and the sea snail as haram seem unconnected; they are very different kinds of uncleanness. These enactments are neutral relative to sea snail as alien and sea snail as resource and there is no friction or conflict. In some contexts—e.g., in the Turkish media—the enactments of the sea snail as resource and alien rarely impact one another. In newspapers with national distribution, the sea snail is mostly represented as a commodity (with fishers or businesses as sources) (20 articles in my archive). On rare occasions (four articles), it is depicted as an “alien” (with scientists as sources), invoking dramatic metaphors such as “parasite” (*parazit*) and “monster” (*canavar*). Local newspapers write almost exclusively about the sea snail as a commodity and resource (19 of 20 articles), typically reporting on export figures and conflicts regarding dredging and management. In the popular press, the enactment of sea snail is either-or; it is almost never enacted as both an alien and a commodity.

However, in fishery management, different enactments of the sea snail meet head-on. Actual management rules during the 1980s and 1990s can be considered a compromise between two scientific positions, with the “resource” enactment having the upper hand. However, “resource biologists” were concerned about the harmful effect of dredging, and between the early 1980s and the late 1990s, management oscillated in summer dredging bans as short as one and a half months and as long as four months. However, diving was only banned for a month and a half during this period since it was considered less harmful to the demersal ecology.

Management did not rest on scientific advice alone, but was also directly impacted by the fishery sector. In 1990, the head of the “water produce” section of MARA stressed that the summer ban had recently been shortened to allow for “socio-economic” considerations. This decision angered “resource” scientists since snails could be caught well into what they considered to be its reproductive season. Already in 1983 and 1984, these scientists had called for size limitation on sea snails, which was never implemented.

Protecting the sea snail stock, socio-economic considerations, and the effect of dredging on habitats are all vectors within the mode of ordering where sea snails are enacted as a resource. These are common concerns

in the management of marine resources. Until recently, there has been little explicit concern among managers about the sea snail being a new species. However, for decades, managers have been aware of the claim about the sea snail's harmful effect on marine ecology. In 1990, when arguing for shortening the closed season, the head of the Water Produce Section referred to Bilecik's then recent report (Bilecik 1990). (This was also when I first learned that the sea snail was a new species. Neither fishers, managers, nor scientists in Trabzon had mentioned this previously.) Yet, the concern about the sea snail as "invasive" was not the primary reason for the change in regulation in 1990. An MP from a Black Sea town with many sea snail fishers and a sea snail processing plant had played an important role in arguing for the sea snail's "socio-economic" importance. Towards the end of the 1990s, concerns about alien invasiveness began to influence management more directly as the seasonal prohibition of diving during summer was gradually lifted. In other words, there was less concern about sea snail stock and more about controlling an invasive alien species.

Although current sea snail management can be viewed as a compromise between the concerns mentioned above, the local administrative interpretation largely disregards the "new species" issue and instead stresses the importance of protecting stocks. A Black Sea Province branch of the Control and Protection Department writes on their website: "Diving is the most ideal method for catching sea snails. In this way fish species that share the same ecosystem with the sea snail will not be damaged, and since this catch method is selective small snails will not be caught and there will not be any pressure on the population."¹⁶

Although sustainable management and bio-economic models are the primary frameworks within which sea snail management has been negotiated, enactments of the sea snail as harmful and unwanted also played a role, though they are not equivalent to concerns with biodiversity.

Tentative Correlation: Trap Projects

In sea snail fishery management, there have been multiple sea snails. Yet, these different objects hang together, linked by different "modes of coordination" (cf. Mol 2002:84). Above, I outlined how accommodation has been reached by conflict and compromise. Certain developments have recently led scientists, fish factory owners, and fishers to, together, enact the sea snail in new ways. Since 2000, the average size of sea snails

caught by fishers, mainly through dredging, has decreased significantly,¹⁷ especially east of the Province of Samsun (Knudsen, Zengin, and Koçak 2010). Because the market prefers large sea snails, sea snail processing plants have stopped operating and fishers have almost completely stopped dredging for sea snails around Trabzon. Thus it was not the decrease of the sea snail stock *per se*, but rather the lack of large sea snails and decrease in average size that halted sea snail fishing.

This experience led researchers in Trabzon to undertake new studies of the sea snail and its environment. They found that predation by sea snails has resulted in a near disappearance of mussel stocks in the region between the Turkey-Georgia border and Terme (Dalgıç and Karayücel 2007). In 1995, the mussel populations in this region were still “healthy” (Zengin and Polat 2001). The researchers in Trabzon hold that the lack of natural predators in the Black Sea has made possible a very rapid increase of the sea snail population (Sağlam and Düzgüneş 2007), and suggest that the predation pressure this exerts on mussels has conversely had an impact on the structure of the sea snail population itself resulting, especially, in decreasing average size (Knudsen, Zengin, and Koçak 2010). Thus, local scientists now increasingly tend to enact the sea snail as a species that has caused important changes in the interaction between fishing and habitat in the coastal waters of the south eastern Black Sea, and as a species that is still evolving and not in balance with its environment. Yet, the reasons for the decrease in average size—including fishing pressure on the sea snail, lack of prey, internal processes of juvenation—are, if not contested, certainly open to discussion among scientists in Turkey and beyond, as demonstrated by the Istanbul *Rapana* workshop. While both the “resource sea snail” and the “alien sea snail” have become less stabilized, there was, temporarily, convergence in their enactments. For the factory owners who considered the sea snail a resource and for the scientists who considered it an alien invasive species, it became logical to experiment with traps.

The legislation against dredging, together with the stepping up of inspections and fines, has led to tension and uncertainty that both factory owner and fishers would prefer to avoid and has made them open to looking for alternatives. While diving was seen as the realistic alternative to dredging, experience showed it to be a dangerous technique that may be inappropriate in certain types of waters. Having learned about the successful use of traps for sea snail fishing in East Asia, researchers in Trabzon and elsewhere in Turkey began to explore this as an option (Altınağaç et al.

2004, Kideys et al. 2007, Sağlam et al. 2008). Following experiments with traps in the early 2000s, researchers at the University of Trabzon began to cooperate with the Fishery Research Institute, a sea snail factory, and a few fishery cooperatives in order to develop a project that would assess the option of using this technology further. The factory owner promised financial support, and the fishers committed themselves to contributions in kind. In this context, I was invited to an evening at a restaurant alongside two researchers from the Trabzon Marine Research Institute, several men involved in the sea snail sector, and the factory owner himself where he told us about experiments he was organizing with three different kinds of traps. He offered to finance 5,000 traps to be distributed among fishers, on the condition that dredging became prohibited. When the party broke up after two hours, the factory owner paid the bill straightaway, bypassing the common symbolic negotiations (restaurant bills are never split). This was part of a longer series of interactions between the factory owner and scientists. Although the scientists were unable or unwilling to answer all of the factory owner's requests (see Knudsen 2009), a memorandum of agreement was signed shortly after the restaurant visit in which the factory promised to contribute \$5,000 USD to the project.

The trap fieldwork and experiments undertaken during 2006 and 2007 yielded disappointing results, as did the other trap projects. While in Trabzon some snails crawled into the traps, in Samsun catches were close to nil. In other words, the sea snails refused to cooperate. Cooperation with fishers went well, but the factory owner failed to honor his obligation: he paid nothing. However, the failure of the trap projects had little effect on regulations. From 2004, the use of traps was officially permitted year round. During a conversation with me in his office, the (new) head of the "water produce" section in the ministry argued "let us not interfere yet—we should take into consideration the important social dimension. It is not right to implement a total ban on dredging before we see the results of the trap project." Currently, small boat fishers usually display a trap or two on the deck of their boats and continue dredging during the summer.

It might, nevertheless, be too simplistic to claim that the factory owner only played a clever game and that he never really wanted the trap project to succeed. Several factories had taken the initiative, at their own expense, and had imported, constructed, and experimented with various trap designs before the universities grew interested. Yet, poor catches resulted in the factory owners losing interest. Overall, factory owners and managers

seem to be uncertain about how the sea snail will respond to different catch and management schemes and thus the industry's prospects. One factory owner thought that either the fishing grounds should rest or the capture of small sea snails should be made illegal, in order to allow for the regeneration of stocks, especially of the larger, more valuable type.

The sea snail is still enacted differently in different sites. In the offices and publications of scientists, the sea snail is increasingly a dangerous predator. In the factories, it is a marine resource and commodity. However, in certain contexts and for a limited period perhaps, the enactments became more coordinated than before. This happened as the actions sought by each enactment we juxtaposed: stimulate catch, but with less harmful technology. Interestingly, "biodiversity" played no role whatsoever in this new coordination, even though the trap projects clearly aimed at reducing harm to the environment. But these projects failed, an outcome in which material agency played a decisive role. When the coordination was undone, the sea snail became at least as multiple as before, and factory owners, fishers, and scientists are all unsure how to gauge the effect of dredging and the relationship between the sea snail and its environment.

There are some intriguing similarities and differences between my analysis of the trap project and Callon's (1986) study of a research project aimed at developing scallop aquaculture in France. Both studies show, using a network approach, how previously unaligned actors are drawn together for a common purpose; and like Callon, I have sought to "abandon all a priori distinctions between natural and social events" (1986:200) and thus include material agency. The differences stem from my adoption of Mol's and Law's theoretical approach. Callon brilliantly shows how the scallop becomes a well-coordinated and stabilized object, which subsequently disintegrates as various actors betray the "spokesmen." However, he does not consider the possibility of there being competing objects. This might be related to the fact that he sees a small group of scientists as the primary agents who draw together things by crafting an "obligatory passage point" which in turn creates a stabilized object. In my case, factory owners are as prominent actors as scientists.

Finally, similar to most relational ontologists, Callon refrains from relating objects to broader discourses. He describes how these scientists developed novel ideas about scallop cultivation inspired by their observations in Japan, but he does not consider how or to what extent they might have been influenced by *changing* discourses. That several trap projects

were started almost simultaneously in Turkey is indicative of a confluence of factors making it the “right time” for such experiments. It was not simply an effect of some researchers and factory owners becoming aware of the use of traps to catch sea snails in East Asia. I claim that even without “bio-diversity,” the alarmist perspective on “alien invasive species” became an underlying concern, especially among scientists. Ideas about “naturalness” is another cultural domain that may have impact on the enactment of “alien invasive species.”

Concern About Species’ “Naturalness”?

Some scholars have, as I indicated above, pointed to an association between discourses of biodiversity and “alien invasive species” and xenophobia and cultural models of “aliens.” In Australia, North America, and South Africa there is considerable public concern about “aliens,” “pests,” “invasive immigrants,” and “vigilante” groups trying to eradicate unwanted species. Can the sea snail as alien enactment in Turkey make similar alliances with popular sentiment concerning alien species and people, for example, by considering both new species and immigrant people as similar kinds of “matter out of place?” The sea snail is certainly considered “dirty” among fishers and the Turkish population more generally, but for very different reasons. That species’ alien-ness is not an overriding concern is demonstrated by the two following examples.

Around 1990, a new grey mullet, the Pacific mullet (*Mugil soyiu*), was observed along the Turkish Black Sea coast and soon became an economically significant fishery. Fishers considered this species less agile and tastier than the native grey mullet. Twenty years later, fishers believe that this new mullet has adapted to its new environment (*uyum sađadı*). In this view, a new species can be seen to transform itself and become assimilated. Behavior, not origin, defines whether a species is native or alien.

Hardly any scientist or manager would consider the Pacific mullet a problem even though it is a new species. There are no calls for extensive fishing or for its control. This may indicate that what is problematic about the sea snail, even for many Turkish scientists, is not that it is an introduced species. Rather, they worry about its role in the ecological system and the technology that is used to catch it. What concerned Artüz and Bilecik about the sea snail was its ecological impact and its disturbance of the ecological balance, not the fact that it was new or alien. They were not

even opposed to the idea of introducing species. In the late 1960s, Artüz contemplated “[e]xperiments to introduce ‘Japanese shrimp’ into the Sea of Marmara for commercial exploitation” (Costlow 1967:3). The shrimp were eventually introduced and live today in the Sea of Marmara, although it is not particularly abundant.¹⁸ Bilecik suggested introducing a new species that would act as predator of the sea snail, thereby helping to restore ecological balance (Bilecik 1990:26).

It has been perfectly legitimate and sensible to import and introduce new species in Turkey to facilitate economic development. The anadromous salmon (*Salmo labrax*) is endogenous to the Black Sea and could potentially be developed for aquaculture. Yet around 1990, when the Fisheries Research Institute in Trabzon started to promote fish farming in the region, they chose to experiment with and encourage the farming of imported salmonide species. Private ventures received generous subsidies in the form of state tax exemptions. The Atlantic salmon did not survive the hot summer waters of the Black Sea, but rainbow trout were later imported and are now reared in many medium scale operations along the coast and in rivers. Unlike in Australia (Lien 2005, Lavau 2011, Franklin 2011), neither the alien-ness of the species to the Black Sea nor the possible ecological effect of the Atlantic salmon and rainbow trout experiments have been discussed. The initiative fits well into the “agricultural engineering” or “agriculturalist”¹⁹ approach that prevailed in the MARA.

The only institution that seems to be concerned about the “naturalness” of species is the National Focal Point of CBD within the Ministry of Environment and Forestry. For instance, their 2007 national report on biodiversity considers the Pacific mullet a problem because it “is about to invade the domestic mullets on the Black Sea coasts” (NFP-BD 2008:93). In 1997, the Ministry of Environment established a facility near Trabzon for the cultivation of endogenous trout; and in 2004, it started a larger project aimed at restocking Turkish rivers and lakes with native trout species. The Ministry is also considering promoting conservation policies concerning the native salmon (*Salmo labrax*) in order to secure the survival of the species and adapt it for commercial cage cultivation in the Black Sea. The Marine Research Institute in Trabzon, representing the MARA, has experimented for some years with rearing this species in cages, but for other reasons. Articulating more of the “agriculturalist” approach, they are concerned with finding a salmon species that can be successfully cultivated in the Black Sea. As the nativist concern seems to be gaining a foothold in Turkish

bureaucracy and science, the MARA and the Ministry for Environment (with the National Focal Point) are now the arenas for two very different enactments of new species that are part of different modes of ordering.

Despite a strong nationalist discourse regarding the potential “defilement” of the nation, the biodiversity-alarmist view seems to find little resonance among a population that shows relatively little concern about species’ “naturalness.”

Extending the Biodiversity Mode of Ordering?

The strongest association in the emerging biodiversity and invasive species network is developing in the National Focal Point for Biodiversity. But how extensive and solid is this emerging network? When I met with civil servants in the Nature Protection and National Parks General Directorate, many referred to consultations and to joint projects with the leader of TÜDAV. It is at the fuzzy interface between some individual, entrepreneurial marine scientists, the marine NGO, and civil servants in the Environment Ministry that a new trope about “harmful invasive species” is beginning to take hold, but it is not always coupled with concerns about biodiversity. In 2010, the Ministry of Environment and Forestry submitted a law proposal on “Nature and Biological Diversity Protection” to the parliament. The proposal, which is informed by the CBD and other international agreements, notes that harmful practices should be discontinued (such as the establishment of monocultures of “exotic” species in agriculture), while efforts to protect original species should be expanded (GNAT 2010:22). The first draft of the law suggested that a “National Biodiversity Council” should have the authority to decide about the permissibility of introducing new species (GNAT 2010).²⁰

Although the biodiversity perspective has not been adopted by the MARA, the draft of the new Fisheries Law, designed to conform to EU legislation, includes a new paragraph which focuses on the protection of biodiversity. It contains the following statement: “It is prohibited to release into water bodies any kind of aquatic organism with changed genetic structure, to introduce an alien species or undertake restocking activities without permission from the Ministry” (GNAT 2006:6, translated by the author).²¹

In texts produced by Trabzon researchers, the sea snail is tentatively described as “invasive” (*iştilacı*) (Sağlam 2008). However, the main shift in Turkish publications, including in trap project reports, is towards writing

about the sea snail as a problematic predator of mussels, but with no mention of biodiversity issues or the alien-ness of the sea snail. The main emphasis is on finding an alternative to the dredge. Yet, privately, the project leader voiced concern about the sea snail as being an “occupier” (*işgalcı*), and made it clear that since it has no predator in the Black Sea, it must be caught. She thought that the situation that has been observed in Trabzon since 2003—where only non-marketable sea snails and no mussels remain—would have occurred earlier if there had been no fishery.

Whereas Turkish researchers almost never mention the “invasive” or “new species” dimension of the sea snail in Turkish publications, in international publications they stress that the sea snail is an “invader species” (Sağlam and Düzgüneş 2007, see also Seyhan et al. 2003). When acting on an international stage, it seems to have become necessary to invoke “invasive alien species.” This may be why the Trabzon scientist at the Istanbul workshop claimed that *Rapana* should be removed from the Black Sea. I think that this change, together with proposed changes in legislation and in the wording of scientific reports, suggests a shift in the relation between modes of ordering whereby the “alien invasive species” agenda is becoming gradually more visible, although not the sole nor dominant mode of ordering. The “invasive alien sea snail” has become embedded in a stronger mode of ordering for the following reasons: changes in international policy, increased attention in certain scientific fields, and the extension of institutional and legal structures that focus on the threat of introduced species to biodiversity. This should, however, not be interpreted as being a result only of the international biodiversity and alien alarmist perspectives gaining more influence in Turkey. Rather, material changes, such as the spread of the *Rapana* sea snail to new geographical regions more sensitive to the native versus alien issue (North America), and the changes in the sea snail stock and its environment, have made it easier to build stronger networks in support of the alien, invasive sea snail.

Is the “alarmist” enactment of the sea snail and the concern about biodiversity gaining ground also among fishers? When the trap project results were clear, the institute leadership organized an open meeting where many fishers first encountered the sea snail as a new and harmful species. Many more fishers are now familiar with the claim that the sea snail is a new species in the Black Sea than when I began my fieldwork in the early 1990s. This new enactment of the sea snail as “unwanted” is, however, not analogous to the snail circulating in international scientific circles.

In the autumn of 2011, I arranged a second KnowSeas workshop on the sea snail in Samsun on the Turkish Black Sea coast, which provided a rare occasion for bringing together the official European and the fishers' enactments of the sea snail and its role in the Black Sea ecology. Using the method of a multi criteria analysis (MCA) approach, managers, scientists, fishers, and a factory owner were invited to score criteria for and effects of different management alternatives (ranging from free access to severe restrictions on dredging) (Janssen et al. in press). In this process, participants were also asked to rank the different indicators ("descriptors") used to assess the alternatives. The "biology" indicators, based on the new EU Marine Strategy Framework Directive criteria for Good Environmental Status, included "biodiversity" and concern about "non-indigenous species," "seafloor integrity," and "preservation of marine food webs." The fishers and factory owner argued strongly for ranking concern with non-indigenous species above other indicators. To the MCA expert supervising the method and process during the meeting (who did not know Turkish and relied on an interpreter), it seemed like the fishers articulated a real concern about alien species. However, judging by how they expressed their ideas and by the small talk between the factory owner and fishers, they realized that this ranking would result in a higher score for the management alternatives they preferred—those giving more opportunities for dredging.

While the fishers' strategic concern about "non-indigenous" species disrupted the logic of the MCA method, this episode also demonstrates that many fishers are now familiar with the version of the sea snail as a dangerous species that should be removed. But were there one or more sea snails in the workshop? It may appear that the fishers' and scientists' enactments of the sea snail were aligned within the same mode of ordering. Yet, there is also discontinuity. The fishers' enactment of the sea snail is not the same as its enactment within the European/global technocratic view on biodiversity. There are distinct differences between the EEA's enactment of the sea snail ("worst alien species in Europe") and the fishers' assertion that the sea snail is a *canavar* (monster). The fishers' "monster" snail is partially connected to scientists' version of the snail and partially based on their own experiential knowledge of what kind of prey they find in the sea snails' mouths. But alien-ness plays no role in this "monstrosity." Not only are the fishers not concerned about the sea snail's newness, they also argue that the snails have always been around and that its fishery only emerged in conjunction with the opportunity to export to Japan in the early

1980s. One middle aged skipper familiar with the “new species snail” had, somewhat exceptionally, read Artüz’s article. However, he dismissed this “tale” (*hikaye*), and explained that his father, born in 1936, had told him that sea snails had been around since the “age of our grandfathers.” Other fishers told me how they find the empty snail shells when they dig the foundations for their houses, suggesting they have been around hundreds of years. I, therefore, argue that there is not sufficient coherence in the various enactments of “dangerous” sea snails for them to be considered part of a single mode of ordering. The fishers’ ability to communicate with managers and scientists about the sea snail being “dangerous” is not evidence that the “biodiversity discourse” or the alarmist view on introduced species has been adopted by fishers.

Conclusion

I argue that the biodiversity mode of ordering has only been adopted to a very limited extent in Turkey. This is admittedly based on the examination of only one particular domain of this mode of ordering—that of alien species. However, other factors suggest limited impact. Turkey has not yet produced a “red list” for endangered species (they allegedly do not have the necessary overview and resources) while the draft law on “Nature and Biological Diversity Protection” has been under negotiation in the parliament for several years. Yet, the trope of “biodiversity” has entered the language of the larger Turkish environmental NGOs.

This case study resembles others in terms of the role of NGOs and state bureaucracy as “vectors” for introducing new ideas. Further, although some studies have shown how local enactments of species are independent of the “global” discourse on biodiversity (Tsing 2005, Lowe 2006), they have not addressed the relations between the biodiversity and alien species modes of ordering. Although the biodiversity framework has some indirect influence on the enactment of the sea snail as alien invasive through stimulating the international negative image of the *Rapana* sea snail, I demonstrate that in practice the biodiversity mode of ordering has not been as successful in subsuming “alien species” concerns as it might seem at first sight.

Even for scientists and marine NGOs, it is common to consider the sea snail an “invasive alien” without relating it to biodiversity. While these two issues became strongly aligned with the CBD and the MEA in the

international scientific, UN, and NGO circles, they are only weakly coordinated in Turkey. Bilecik (1975, 1990) and Artüz (1980, 1989; Baykut and Artüz 1979) did not embed their thinking about new species in a biodiversity framework because that framework simply did not exist at that time. Yet, although older and newer Turkish scientific enactments of the sea snail display similarities, they are not identical. Bilecik and Artüz warned about the sea snail's role in the ecosystem while simultaneously promoting other species introductions. Scientists are now more wary about new introductions. Whereas fishers and managers are not concerned with species' newness, scientists increasingly are, especially in international settings. But in their "Turkish" practice as scientists, bureaucrats, or NGO members, they employ more nuanced understandings of the environment than the simplifying framework of biodiversity conservation. The biodiversity mode of ordering has had little impact on the enactment and management of new species in Turkey not because it is resisted, but rather because few feel the need to engage "biodiversity" when arguing for the harmfulness of alien species. The lack of concern about species' nativeness further inhibits the spread of the biodiversity-inspired alarmist view on introduced species.

Given that the enactment of the "alien invasive sea snail" is so strongly embedded in a global network increasingly connected to the biodiversity mode of ordering, I think there are good reasons for arguing that the "alien invasive sea snail" is not *in toto* part of the "sea snail resource environment." However, that does not mean that these two enactments are completely independent and compromises between them are found in management. In the trap projects, the enactments came together for a limited period, to produce a synchronized effect, while in the "stakeholder" workshop all parties engaged the sea snail as "non-native" species. Yet, these strategic coordinations belie more fundamental differences between different sea snails. It is particularly intriguing that the sea snail that is unclean according to Muslim moral sensibilities and the sea snail that is unclean according to scientific ideas about nature's purity are not cross-fertilizing each other. The "other" sea snails—the haram and smelly one, the one it is a sin to boil—are, instead, mainly actualized around the resource sea snail.

The physical and biological *properties* of the sea snail clearly help explain continuities in the way it is caught and how processing is organized. However, it is more difficult to identify how the sea snail's *agency* may impact dredge functioning or factory processing. While material properties

help hold stabilized objects in place (i.e., the propensity of steel to be rigid yet flexible makes it suitable for bridges), material “agency” is more easily identifiable when shifts occur or initiatives fail. That the sea snail emerged as a particularly foul smelling object was not prescribed by the way in which it was incorporated into systems of categorization—the sea snail itself contributed to making this a reality as it decomposed in factories and in tips where empty shells were left to rot in the heat of the sun. Further, that the sea snail managed to make a place for itself in the Black Sea ecology contributed to its initial emergence as an object of concern and commerce in Turkey. In conjunction with the biodiversity perspective, *Rapana* sea snails worked to enact the sea snail as a dangerous “alien species” internationally by spreading to new geographies. Importantly, the lack of cooperation by the sea snail was decisive in the failure of the trap projects.

I want to stress, however, that I do not consider these observations to be arguments for returning to some kind of old-fashioned “materialism.” “Pure” material might never be identifiable. The material both produces and is produced within modes of ordering, and things hang together and break up in such complex and unexpected ways that lines of causality are never linear (Bennett 2010). It was only the politics and social relations of fishing and science, the material and design of the traps and the prey, the weather and sea currents, ideas about sea snails being aliens, a faraway market in the East—and much more—that actualized the “non-cooperation” of the sea snails.

Engaging a relational ontology approach has enabled me not only to explore nuances in the networks constituting the different enactments of the sea snail; it also has helped me to see that materiality takes part in constituting “resource environments” (the resource sea snail), and other “environments” or modes of ordering, such as the invasive alien sea snail. Material agency may even affect the way in which different enactments are coordinated, and how one may be strengthened rather than another. The *Rapana* sea snail would hardly have become “one of the most unwelcome invaders worldwide” had it not managed to successfully establish itself in North America. And without this new strong international network to back the alien invasive sea snail, the Turkish scientists would probably not have stated that the *Rapana* sea snail should be removed from the Black Sea. The *Rapana* workshop might not even have taken place at all.

However, as the comparisons with Callon’s study showed, there are different relational ontologies. It is not only a question of incorporating

material agency; it is also a question of how we assume the networks are constituted. I believe that Mol's (2002) attention to how objects may be multiple, yet related, better accounts for the heterogeneity of the sea snail, and Law's (1994) "modes of ordering" better takes account of larger scale and cultural dimensions. Law has himself written that modes of ordering are like Foucault's discourses, except that "a mode of ordering is always limited" (1994:22). That does not imply, however, that we can say that there are three competing discourses about the sea snail. The discourse perspective, as it is most commonly used (not in Foucault's usage), 1) ignores the material, 2) too easily reads from macro to micro (e.g., "biodiversity results in increased concern about species alienness in Turkey"), and 3) is not sensitive to the nuances in the way that the different sea snails relate to each other (e.g., need not be incommensurable).

The different modes of ordering that enact the sea snail as "resource and commodity" and as "alien" have very different properties. The spatial scales for both are global, but the mechanisms of circulation in each are very different. Biodiversity is primarily mediated by scientific-bureaucratic processes, whereas monetary value is the medium of circulation of sea snail as commodity. However, there are now attempts to base the circulation of biodiversity on similar principles and dynamics as those of market commodities. The assessment of "ecosystem goods and services" emanating from biodiversity is key in this process (Bowker 2005), and is especially pronounced in the MEA. While this approach is also elaborated in the EU-systems for research and management, it is still not visible in official policy in Turkey—not even in the National Focal Point's reports to the CBD. Yet, civil servants at the National Focal Point did use this vocabulary when talking with me about introduced species. This indicates another incremental, but not insignificant, shift in the biodiversity and alien species modes of ordering in Turkey. In addition, the KnowSeas project, the context in which the research for this article was conducted, promises in its project abstract to deliver to the European Commission "[n]ew research [which] will examine and model economic and social impacts of changes to ecosystems goods and services and costs and benefits of various management options..." (KnowSeas 2009). In this article, I have tried not to be an agent of this agenda, but rather to clarify how valuations and enactments have made different sea snails that are not totally incommensurable, but hang together to a greater or lesser extent. It is messy, but not indescribable. ■

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Endnotes:

¹The resulting management dilemmas seem to be particularly pronounced for species in marine and other aquatic environments, perhaps because of the difficulty of containing the flow of biotic material in water, and because the sea figures as a symbol of the ultimate other, the pristine and pure "nature," at least in Western society (Helmreich 2009, Abram and Lien 2011).

²This can be in the form of bioprospecting (Escobar 2008) and biotechnology (Helmreich 2009). For a summary of these studies, see Brockington and Duffy (2010).

³There seems to be significant empirical variation in the extent to which local and national actors have been able to influence and shape ideas of biodiversity (range exemplified by Escobar 2008, Fairhead and Leach 2003, Lowe 2006). Anna Tsing (2005) stresses the space of maneuver that the new cultural form of biodiversity creates (see also Büscher and Wolmer 2007). There is also a strong tradition in anthropology, tracing its genealogy back to Posey's (1985) influential study, for relating biodiversity to indigeneity and indigenous/local knowledge, and sometimes efforts to argue the association between cultural, linguistic, and biological diversity (Nazarea 2006, Pretty et al. 2009). In this tradition, typically focusing on "Southern" situations, biodiversity is discussed in context of poverty alleviation, participation, local knowledge, etc. (Agrawal and Redford 2006, Mathews 2006, Orlove and Brush 1996). However, some (especially Lowe 2006) challenge the association with indigeneity and indigenous knowledge, and the related romantic association between wild nature and indigenous people ("noble savages").

⁴European Union Seventh Framework Programme for Research and Technological Development.

⁵Although a couple of additional social scientists participated, I was the only one with experience and expertise concerning the Rapana.

⁶Internal dynamic towards younger age at reproduction, and smaller average size considered typical of introduced invasive species.

⁷Accessed from <http://www.europe-aliens.org/speciesTheWorst.do> on May 10, 2012.

⁸Accessed from http://www.eea.europa.eu/publications/technical_report_2007_11 on May 10, 2012.

⁹Accessed from <http://www.issg.org/database/species/ecology.asp?si=691&fr=1&sts=sss&lang=EN> on May 10, 2012.

¹⁰Accessed from <http://www.ices.dk/marineworld/whelks.asp> on May 10, 2012.

¹¹Accessed from http://www.tudav.org/index.php?option=com_content&view=article&id=89%3Abyoloji-yayim&catid=37%3Abyoloji-yayim&Itemid=48&lang=tr May 10, 2012.

¹²The 1990 publication reprints the early 1970s report where the word *istila* is used. Like its English equivalent, this concept has military connotations.

¹³Personal communication with Bilecik (May 12, 2011; September 19, 2011).

¹⁴Personal communication with Ayşe Gündüz (March 30, 2010).

¹⁵Personal communication with Ayşe Gündüz (2010).

¹⁶Originally accessed from <http://www.ordutarim.gov.tr/subeler/kontrol/suurleri/uyarilar%20su%20urunleri.htm> on Feb 4, 2009, web content translated by author. Now accessible from <http://www.ordutarim.gov.tr/subeler/kontrol/index.htm>.

¹⁷Mean size 47 mm in 2005 (Knudsen, Zengin, and Kocak 2006), 62 mm in 1991 (Düzgüneş and Feyzioğlu 1994).

¹⁸Personal communication with Bilecik (November 9, 2011).

¹⁹An approach from 1971 that subsumed fisheries within agricultural policies and perspectives, resulting in a vocabulary of "water produce" and "production" in place of "fisheries" and "catch." Most positions within fishery bureaucracy and marine science came to be filled with agricultural engineers, and a disproportionate amount of attention was paid to the development of fish farming (see Knudsen 2009,

especially pages 60-61). To this day, introduction and adaption of new species has been a major strategy in agricultural policy.

²⁰This was later changed to an "advisory board" to strengthen Ministerial control over decisions.

²¹The draft Fishery Law did not pass the parliament before it was dissolved and reconstituted after parliamentary elections in 2011. A new law on Nature and Biological Diversity Protection was close to passing parliament in 2013, but the law proposal was withdrawn in relation with the widespread protests and demonstrations in Turkey in June 2013. The future fate of these new laws is very difficult to predict because the law-making procedure will have to start anew from scratch, the prospect of EU-membership is diminished, and the major focus of lawmakers is on drafting a new constitution.

References:

- Abram, Simone and Marianne Elisabeth Lien. 2011. "Performing Nature at World's End." *Ethnos* 76(1):3-18.
- Agrawal, Arun and Kent Redford. 2006. *Poverty, Development, and Biodiversity Conservation: Shooting in the Dark?* Wildlife Conservation Society Working Paper.
- Altınağaç, U., A. Ayaz, and A. Kara. 2004. "Farklı Boyutlardaki Çemberli Kaldırma Ağları ile Deniz Salyangozu [*Rapana venosa* (Valenciennes, 1846)] Avcılığı Üzerinde Bir Ön Çalışma." *Ege University Journal of Fisheries and Aquatic Sciences* 21:295-299.
- Appadurai, Arjun. 1986. *The Social Life of Things: Commodities in Cultural Perspective*. Cambridge: Cambridge University Press.
- Artüz, İ. 1980. "Deniz ürünleri neden tükeniyor." *Milliyet*, June 1.
- _____. 1989. "'Rapana,' Son İstilacı." *Cumhuriyet Bilim Teknik*, December 30:147.
- Baykut, F. and Artüz, İ. 1979. "Karadeniz'in Doğal Dengesi Tehlikede." *Milliyet*, March 8.
- Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham: Duke University Press.
- Bilecik, N. 1975. "La Repartition de *Rapana thomasiana thomasiana* (Grosse) sur le Littoral Turc de la Mer Noire s'étendant d'Ileada jusqu'à Çaltı Burnu." *Rapports et Proces-Verbaux des Reunions* 23:168-171.
- _____. 1990. "Deniz Salyangozu '*Rapana Venosa(V)*' nın Türkiye'nin Karadeniz Sahillerinde Dağılışı ve Karadeniz Balıkçılığındaki etkisi." Bodrum: T.C. Tarım Orman ve Köyişler Bakanlığı, Su Ürünleri Araştırma Enstitüsü Müdürlüğü.
- _____. 2003. *Herkes Yerine. Denizler çölleşmeden, balıklar yok olmadan*. İzmir: Final Ofset Matbaacılık.
- Bowker, G. C. 2005. "Time, Money, and Biodiversity." In Aihwa Ong and Stephen J. Collier, eds. *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems*, 107-123. Oxford: Blackwell.
- Brockington, Dan and Rosaleen Duffy. 2010. "Capitalism and Conservation: The Production and Reproduction of Biodiversity Conservation." *Antipode* 42(3):469-484.
- Büscher, Bram and William Wolmer. 2007. "Introduction: The Politics of Engagement between Biodiversity Conservation and the Social Sciences." *Conservation and Society* 5(1):1-21.
- Callon, Michel 1986. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay." In John Law, ed. *Power, Action and Belief: A New Sociology of Knowledge?*, 196-223. London: Routledge and Kegan Paul.
- Comaroff, Jean and John L. Comaroff. 2001. "Naturing the Nation: Aliens, Apocalypse and the Postcolonial State." *Journal of Southern African Studies* 27:627-651.
- Costlow, J. D. 1967. "Marine Sciences in Turkey." London: USA Office of Naval Research, Branch Office London.
- Dalgıç, G. and S. Karayücel. 2006. "Investigations on the Stocks of the Striped Venus (*Chamelea gallina* L., 1758) in Ordu's Coastal Zone of the Eastern Black Sea." *Journal of Fisheries International* 2:12-16.
- Davis, Mark A. 2006. "Invasion Biology 1958-2005: The Pursuit of Science and Conservation." In M.W. Cadotte, S.M. McMahon, and T. Fukami, eds. *Conceptual Ecology and Invasion Biology: Reciprocal Approaches to Nature*, 35-64. Dordrecht, Netherlands: Springer.

- Denge Gazetesi. 2008. Accessed from http://www.dengegazetesi.com.tr/news_print.php?id=5853 on Jan 4, 2011.
- Düzgüneş, E. and A. M. Feyzioğlu. 1994. "Trabzon Sahil Şeridinde Yaşayan Deniz Salyangozunun *Rapana thomasiana* Gross.1861 Populasyon ve Büyüme Özelliklerinin Araştırılması." *Ege Üniversitesi Fen Fakültesi Dergisi, Seri B* 16:1579-1592.
- Düzgüneş, E., S. Ünsal, M. Feyzioğlu, and T. Şahin. 1992. "Doğu Karadeni'deki Deniz salyangozu *Rapana thomasiana* GROSS.1861 Stoklarının Tahmini." Trabzon: Tarım ve Köyişleri Bakanlığı Proje ve Uygulama Genel Müdürlüğü, Karadeniz Teknik Üniversitesi Sürmene Deniz Bilimleri Fakültesi.
- Elton, Charles S. 1958. *The Ecology of Invasions by Animals and Plants*. London: Methuen.
- Escobar, Arturo. 2008. *Territories of Difference: Place, Movement, Life, Redes*. Durham: Duke University Press.
- Fairhead, James and Melissa Leach. 2003. "Practicing 'Biodiversity' in Guinea: Nature, Nation and an International Convention." *Oxford Development Studies* 31(4):427-439.
- Farnham, Timothy J. 2007. *Saving Nature's Legacy: Origins of the Idea of Biological Diversity*. New Haven: Yale University Press.
- Ferry, Elizabeth Emma. 2005. "Geologies of Power: Value Transformations of Mineral Specimens from Guanajuto, Mexico." *American Ethnologist* 32:420-436.
- Fischer-Piette, E. 1960. "*Rapana bezoar* I. sur la cote Turquie de la mer Noire." *Hydrobiologie Serie B* 5(1-2):51.
- Franklin, Adrian Stephen. 2011. "Performing Acclimatisation: The Agency of Trout Fishing in Postcolonial Australia." *Ethnos* 76(1):19-40.
- GD-NCNP. 2001. "The National Strategy and Action Plan for Biodiversity in Turkey 2001." Ankara: Republic of Turkey Ministry of Environment and Forestry, General Directorate of Nature Conservation and National Parks.
- GNAT. 2006. "Su ürünleri kanunda değişiklik yapılmasına dair kanun tasarısı [Law Proposal for Amendments to the Water Produce Law]." Ankara: Grand National Assembly of Turkey.
- _____. 2010. "Tabiatı ve Biyolojik Çeşitliliği Koruma Kanunu [Nature and Biological Diversity Protection of Law Proposal]." Ankara: Grand National Assembly of Turkey.
- Helmreich, Stefan. 2005. "How Scientists Think; About 'Natives', For Example. A Problem of Taxonomy among Biologists of Alien Species in Hawaii." *Journal of Royal Anthropological Institute* 11:107-128.
- _____. 2009. *Alien Ocean*. Berkeley: University of California Press.
- Igoe, Jim. 2010. "The Spectacle of Nature in the Global Economy of Appearances: Anthropological Engagements with the Spectacular Mediations of Transnational Conservation." *Critique of Anthropology* 30(4):375-397.
- Janssen, R., S. Knudsen, V. Todorova, and A. G. Hoşgör. In press. "Managing *Rapana* in the Black Sea: Stakeholder Workshops on Both Sides." *Ocean & Coastal Management*.
- Karayücel, S., M. Kalma, İ. Karayücel, and B. Baki. 2001. "Deniz salyangozunun (*Rapana venosa* Valenciennes, 1846) Sinop yöresinde mevsimsel göçleri, yumurtlama zamanı ve yumurta verimi üzerine bir araştırma." *O.M.Ü. Ziraat Fakültesi Dergisi* 16:1-4.
- Kideys, A. et al. 2007. "Karadeniz'de Ekonomik Öneme Sahip Deniz Salyangozunun (*Rapana thomasiana*) Optimun Avcılığı için Uygun Av Aracı Geliştirilmesi ve Temel Biyolojik Özelliklerinin Belirlenmesi." Mersin: Mersin Marine Research Institute, Middle East Technical University.
- KnowSeas. 2009. "Annex I—Description of Work." Knowledge-based Sustainable Management for Europe's Seas, European Community's Seventh Framework Programme [FP7/2007-2013] under grant agreement number 226675.
- Knudsen, Ståle. 2006. "Between Life Giver and Leisure: Identity Negotiation through Seafood in Turkey." *International Journal of Middle East Studies* 38:395-415.
- _____. 2009. *Fishers and Scientists in Modern Turkey: The Management of Resources, Knowledge and Identity on the Eastern Black Sea Coast*. Oxford: Berghahn Books.
- Knudsen, Ståle and H. Koçak. 2011. "Through Boom and Bust: Coping with Poverty in Sea Snail Fisheries on the Turkish Black Sea Coast." In Svein Jentoft and Arne Eide, eds. *Poverty Mosaics: Global Experiences and Opportunities in Small-Scale Fishing*, 221-249. Netherlands: Springer.

- Knudsen, Ståle, M. Zengin, and M.H. Koçak. 2006. "A Detailed Report on the Social and Economic Driving Forces for each Fishery to Identify Commonality in Driving Forces for the Main Fisheries in the Regional Seas of Europe." *ELME Project Deliverable 5.2*. Plymouth: ELME (EU FP6 project 505576 2006).
- _____. 2010. "Identifying Drivers for Fishing Pressure: A Multidisciplinary Study of Trawl and Sea Snail Fisheries in Samsun, Black Sea Coast of Turkey." *Ocean & Coastal Management* 53:252-269.
- Latour, Bruno. 2004. *Politics of Nature: How to Bring the Sciences into Democracy*. Cambridge: Harvard University Press.
- _____. 2005. *Reassembling the Social: An Introduction to Actor-Network Theory*. Oxford: Oxford University Press.
- Lavau, Stephanie. 2011. "The Nature/s of Belonging: Performing an Authentic Australian River." *Ethnos* 76(1):41-64.
- Law, John. 1994. *Organizing Modernity*. Oxford: Blackwell.
- _____. 2004. *After Method: Mess in Social Science Research*. London: Routledge.
- Lien, Marianne. E. 2005. "'King of Fish' or 'Feral Peril': Tasmanian Atlantic Salmon and the Politics of Belonging." *Environment and Planning D: Society and Space* 23:659-671.
- Lowe, Celia. 2006. *Wild Profusion: Biodiversity Conservation in an Indonesian Archipelago*. Princeton: Princeton University Press.
- Mann, Roger, Anna Occhipinti, and Juliana M. Harding. 2004. *Alien Species Alert: Rapana venosa (Veined Whelk)*. ICES Cooperative Research Report No. 264. Copenhagen: International Council for the Exploration of the Sea.
- Mathews, Andrew S. 2006. "Building the Town in the Country: Official Understanding of Fire, Logging and Biodiversity in Oaxaca, Mexico, 1926-2004." *Social Anthropology* 14(3):335-359.
- Millennium Ecosystem Assessment. 2005. "Ecosystems and Human Well-Being: Biodiversity Synthesis." A Report of the Millennium Ecosystem Assessment, World Resources Institute.
- Mintz, Sidney W. 1985. *Sweetness and Power: The Place of Sugar in Modern History*. Harmondsworth: Penguin Books.
- Mol, Annemarie. 2002. *The Body Multiple: Ontology in Medical Practice*. Durham: Duke University Press.
- Nazarea, Virginia D. 2006. "Local Knowledge and Memory in Biodiversity Conservation." *Annual Review of Anthropology* 35:317-335.
- NFP-BD. 2008. "The National Biodiversity Strategy and Action Plan 2007." Ankara: Republic of Turkey Ministry of Environment and Forestry, General Directorate of Nature Conservation and National Parks, Department of Nature Conservation National Focal Point of Conservation on Biological Diversity.
- O'Brien, William. 2006. "Exotic Invasions, Nativism, and Ecological Restoration: On the Persistence of a Contentious Debate." *Ethics, Place and Environment* 9:63-77.
- Orlove, Benjamin S. and Stephen B. Brush. 1996. "Anthropology and the Conservation of Biodiversity." *Annual Review of Anthropology* 25:329-352.
- Posey, Darrell Addison. 1985. "Indigenous Management of Tropical Forest Ecosystems: The Case of the Kayapó Indians of the Brazilian Amazon." *Agroforestry Systems* 3(2):139-158.
- Pretty, Jules, et al. 2009. "The Intersection of Biological Diversity and Cultural Diversity: Towards Integration." *Conservation and Society* 7(2):100-112.
- Ricciardi, Anthony and Hugh J. MacIsaac. 2008. "In Retrospect: The Book that Began Invasion Ecology." *Nature* 452:34.
- Sağlam, H. and E. Düzgüneş. 2007. "Deposition of Egg Capsule and Larval Development of *Rapana venosa* (Gastropoda: Muricidae) from the South-Eastern Black Sea." *Journal of the Marine Biological Association of the United Kingdom* 85:953-957.
- Sağlam, H., et al. 2008. "Deniz Salyangozu Açılışında Direce Alternatif Farklı Tuzak Modellerin Geliştirilmesi." Trabzon: Ministry for Agriculture and Rural Affairs, General Directorate for Aricultural Research, Fisheries Research Institute Trabzon.
- Sagoff, Mark. 2003. "Native to a Place, or What's Wrong with Exotic Species?" In D.G. Dallmeyer, ed. *Values at Sea: Ethics for the Marine Environment*, 93-110. Athens: The University of Georgia Press.

- Scott, James C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press.
- Seyhan, K. et al. 2003. "Diet Feeding Periodicity, Gastric Emptying, and Estimated Daily Food Consumption of Whelk (*Rapana venosa*) in the South-eastern Black Sea (Turkey) Marine Ecosystem." *Indian Journal of Marine Sciences* 32:249-251.
- Simberloff, D. 2003. "Confronting Introduced Species: A Form of Xenophobia?" *Biological Invasions* 5:179-192.
- Subramaniam, Banu. 2001. "The Aliens Have Landed! Reflections on the Rhetoric of Biological Invasions." *Meridians* 2(1):26-40.
- Tsing, Anna Lowenhaupt. 2005. *Friction: An Ethnography of Global Connection*. Princeton: Princeton University Press.
- _____. 2010. "Worlding the Matsutake Diaspora. Or, Can Actor-Network Theory Experiment with Holism?" In T. Otto and N. Bubandt, eds. *Experiments in Holism*, 47-66. Chichester: Wiley-Blackwell.
- Weeks, Priscilla and Jane Packard. 2009. "Feral Hogs: Invasive Species or Nature's Bounty?" *Human Organization* 68(3):280-292.
- Zaitsev, Y. and B. Öztürk, eds. 2001. *Exotic Species in the Aegean, Marmara, Black, Azov and Caspian Seas*. Istanbul: Turkish Marine Research Foundation.
- Zengin, M. and H. Polat. 2001. "Doğu Karadeniz'deki Kıyı Balıkçılığının Makrofauna Üzerine Olan Etkilerinin Belirlenmesi." In E. Özhan and Y. Yüksel, eds. *Türkiye'nin Kıyı ve Deniz Alanları III. Ulusal Konferansı, 26-29 June 2001*, 357-371. Istanbul: Yıldız Teknik Üniversitesi.

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Múltiplos Caracóis do Mar: A Emergência Incerta de uma Espécie Alienígena

[**Palavras-chave:** Biodiversidade, recursos naturais, pescas, ontologia relacional, valor, Turquia, Mar Negro]

多重样态的海螺：外来物种不可预测的生成史

关键词：生物多样性，自然资源，渔业，关系本体论，价值，土耳其，黑海

Распространение морских улиток: Шаткое становление чужого биологического вида.

[**Ключевые слова:** биоразнообразие, природные ресурсы, места рыболовства, относительная онтология, ценность, Турция, Черное море]

قواقع البحر المتعددة: الخليق غير المؤكد لأنواع غريبة

كلمات البحث: التنوع البيولوجي، الموارد الطبيعية، مصائد الأسماك، الأنطولوجيا، القيم، تركيا، البحر الأسود

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