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Comparative Taxonomic Assessment of Marine Gobies (Gobiidae) Along the Aegean and Mediterranean Coasts of Turkey

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Abstract

This study performs an analytical comparative taxonomic analysis of marine gobies (the family Gobiidae) scattered along the Aegean and the Mediterranean shores of Turkey. Research study outlines the biodiversity, define regional distribution patterns, and identify ecological trends in these sensitive sea areas. Being one of the most diverse and ecologically important fish groups in shallow offshore settings, the Gobiidae family also contributes a great deal to the monitoring of habitat conditions, biogeographical dynamics as well as environmental shifts. Data collection was done across several coastal locations using consistent sampling intensities based on hand nets, visual underwater surveys, and benthic trawling. Species identification involved traditional morphological keys but natural DNA barcoding was used for distinguishing cryptic or confounding species when necessary. The two study sites recorded 45 gobiid species, demonstrating extreme differences in terms of species composition, populations, and habitat needs. Species richness along the Aegean coast exhibited increased endemism and habitat selectivity based on temperate condition and complex geological structures, and reduced sea salinity. On the contrary, high numbers of Lessepsian migrant and thermophilic species were observed in the Mediterranean coast predominantly. The research indicates that the gobiid biodiversity is heavily influenced by regional oceanographic patterns, climatic changes and human activity, such as habitat disturbance and maritime traffic. The conclusions provide reasons why taxonomic research should become an integral part of coastal management and conservation and should especially focus on early discovery of invasive species and the conservation of habitat-specific endemic gobies. The combined conclusions give us enhanced understanding of gobiid biogeography, and contribute to responsible management of Turkey's coastal marine ecosystems.

Keywords: Comparative Taxonomic (CT), Assessment (AA), Marine Gobies (MG), Mediterranean (MM)

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Introduction

The marine Gobies are one of the most diverse and important families of fishes, which are mostly found in the marine environment. The Aegean and Mediterranean Coasts of Turkey are well known for their unique features. Before discussing the taxonomic classification of Gobies, we are going to understand some unique features of the Aegean and Mediterranean Coasts of Turkey. There is a wide range of various species there, which shows that this region supports rich biodiversity. This region is also well known for its cultural significance because there are many important ancient cities there (Bilecenoğlu et al., 2014). Along it, this area also has economic importance because these is used for trading and fishing as well. These areas support diverse biodiversity because there are diverse habitats here. These important marine habitats are coral reefs, seagrass beds along rocky shores, and others. The important marine diversity in these areas includes fish, invertebrates, mammals, and other kinds of marine life. Because of these features, there were utmost efforts for the identification and classification of species that are found in the Aegean and Mediterranean Coasts of Turkey (Čekovská et al., 2023). Alongside it, there was also a need for comparison of the Taxonomic composition of various species of fish that are found between these two regions of Turkey. Moreover, efforts were made to understand the

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important distribution patterns of these species along the coasts of these regions in Turkey. There were some important expected outcomes for this kind of effort for comparative Taxonomic classification. The first important expected outcome was to update the taxonomy so that we could get new pieces of information through research. Secondly, it aimed to understand various important insights into biodiversity there. It is also pertinent to mention here that these kinds of comparative studies can be proved useful for the aspect of conservation implications as well (Thacker et al., 2019). Now we are going to discuss important characteristics of marine Gobies here to understand their biodiversity and taxonomic classification. These fish are usually small in size compared to other families. The most important characteristic of these fishes is that it is a group of diverse species. These species are diverse in their colors, their patterns, and their behaviors as well. Recent studies have shown that these fishes are bottom dwellers, so these fishes are mostly found near the substrate only. These species have having variety of habitats there. These fish may inhabit coral reefs, so they are mostly found under rocks and in crevices as well. Some important species of this group are found near coastal areas. These fish play having important ecological role because they are a main part of the food chain in the water ecosystem(İŞMEN et al., 2015). These fish may serve as predators and prey as well. Moreover, recent studies have convinced us that these fishes are great indicators of environmental health, which enhances the ecological importance of these fishes. If we discuss reproduction in Marine Gobies, we will come to know that these fishes have complex mating behaviors. For example, some species show courtship behavior while others show territorial defense as well. There is an important aspect of spawning in these fishes where males have to guard the eggs until they hatch(Kovačić & Patzner, 2011). In most cases, this spawning occurs in pairs. It has also been seen that there is an important aspect of parental care in these fishes. This kind of parental care is the most important and unique characteristic of these fishes. Now we are going to discuss nutrition in these fish. Recent studies have shown that there are diverse diets for marine Gobies, for example, they may feed on small invertebrates, any Kind of plankton, or algae. This aspect of the diverse diet of these fishes helps to enhance the population of these fishes in the marine environment. There are a variety of feeding behaviors in these fishes, for example, some species are ambush predators who hide to search and catch prey (Kesici & Dalyan, 2024). While other important fishes of this group are active foragers who actively search for their prey for feeding. As mentioned earlier that these fishes are active dwellers, so we can say that these fishes are ecosystem engineers. These are called ecosystem engineers because they help to modify the environment by dwelling and recycling nutrients. These fishes are known for having territorial behaviors, and such territorial behaviors are usually complex, so difficult to understand. These fishes have complex social interaction that helps them to survive in societies as well. These Taxonomic Assessments are prerequisites because these are having some potential findings. The first important potential finding is that the Aegean and Mediterranean Coasts of Turkey have having diverse assemblage of Gobies there, which indicates that these habitats are quite perfect for them (BILECENOĞLU & YOKEŞ, 2022). The other most important potential finding of this taxonomic assessment is that most of the Species of marine Gobies are Endemic species. It means that these species are found in specific regions of the Aegean and Mediterranean Coasts of Turkey only. This Taxonomic Assessment also helped in revealing some important biogeographical patterns of these fishes. Now we are going to discuss important biogeographical patterns of Marine Gobies. Recent studies have shown that these species show richness gradients. It means that the habitat is responsible for the diversity of these species, so different regions have various diversities of these fishes(Digenis et al., 2024). When we studied about phylogenetic patterns of these fishes, we came to know that these fishes have patterns of dispersal and colonization. While studying biogeographical patterns, we should keep in mind that some important factors may influence the biogeographical patterns of these fishes. One of these important factors is geography; when geographical features change, there is a change in dispersal and distribution of these fishes as well. There are some important ecological factors which influence biogeographical

patterns, such type of substrate, water temperature, and others(Vanhove et al., 2012). Biogeographical patterns are also dependent upon the evolutionary history of species. So, we can say that biogeographical patterns are decided by evolutionary history among species. The understanding of biogeographical patterns is necessary because it helps to understand the biodiversity of that particular group. It also helps regarding conservation implications for the conservation and management of ecosystems. All of these aspects are helpful for comparative Taxonomic Assessment of Marine Gobies in the Aegean and Mediterranean Coasts of Turkey(BİLECENOĞLU, 2024). Detailed taxonomic investigation of marine gobies in the Turkish Aegean and Mediterranean coasts gives a basic picture of diversity, of geographic range, and of ecological attributes of species in geographically distinct regions. Both traditional morphological analysis and modern molecular biology are employed in this study in order to perform accurate species identification in gobiid fishes. The analysis pinpoints a diverse suite of native and non-native gobiid species distributed based on salinity differences, types of substrates, and ecological forces such as coastal construction and marine commerce. Great differences in species richness and genetic character are identifiable across the Aegean and mediterranean coasts as a result of the different hydrological and habitat settings. Because of its complex coastline and the presence of many islands, the Aegean coast presents better microhabitat adaptations against Mediterranean's warmer and saltier conditions that favor thermophilic and Lessepsian migrants. This taxonomic dissection plays a significant role in local documentation of biodiversity and solidifies the importance of continued monitoring activities for detecting early change in the population of gobiids in response to a warming climate, new species introductions, and habitat alterations. Additionally, the detection of several non-native goby species in the Mediterranean can imply the ongoing change of biotic homogenization and diversity caused by global environmental change. Gobies perform significant ecological functions in particular as major prey for upper-level trophic levels and benthic-pelagic interaction enhancers, thereby emphasizing their vital role in the stabilization of the ecosystem. The research supplies vital research baseline data on the Turkish marine biodiversity, and it underlines the suite of taxonomic tracking that needs to be maintained in the context of escalating climate change and biological invasions.

Research Objective

The main objective of this research is to understand comparative Taxonomic Assessment of Marine Gobies along Aegean and Mediterranean Coasts of Turkey. These studies have effectively explained about various aspects of importance of taxonomic assessment of Marine Gobies for understanding biodiversity and distribution.

Literature Review

The ongoing research is considered as backbone of discovery and inventions. In recent years, we have realized that the more research about species of fish, the more discoveries of biodiversity will be. In this way, there were many efforts to understand some important families of fish. Marine Gobies is also one of these important families. Recent studies have shown that these fishes are mostly endemic, so they are found in a variety of places on Earth. But most of the diversity of these fishes is found in the Aegean and Mediterranean Coasts of Turkey. There were different efforts for the taxonomic classification of these fishes (Economidis & Miller, 1990). Alongside it, there were also some important efforts related to comparative Taxonomic Assessment of Marine Gobies in the Aegean and Mediterranean Coasts of Turkey. We have selected this region for comparative studies because of some unique characteristics of this region. Such climate and other environmental factors are present in this region, which encourage the population of marine Gobies mostly. For example, these fishes are dwellers by nature, so these fishes find such habitats in these regions, which provide better substrate for dwelling.

Secondly, these fishes have marine habitats for their growth and population, and such a marine environment is possible in the case of the Aegean and Mediterranean Coasts of Turkey(Kovačić et al., 2021). Before understanding the comparative Taxonomic Assessment of Marine Gobies in the Aegean and Mediterranean Coasts of Turkey, we need to understand some important characteristics of these fishes as well. These fishes are usually small in size but have such diversification, which is rarely possible in any other family of species. Such diversification of colours and patterns attracted the attention of researchers towards this family(Özer et al., 2017). Moreover, these fishes are important in the aspect of environmental indication.

For example, we can say that any change in pressure or temperature can easily be indicated by these fish because these fish are sensitive to such environmental factors. Although most of the Species of this family are Marine in nature but some species are found in freshwater. This aspect is responsible for the diversity and distribution of marine Gobies across the world. These fish also have different modes of nutrition because some act as ambush predators while others are active predators. The most important feature is that although these fishes are small size but they are predators mostly in aquatic environments (Thacker & Gkenas, 2019). The reproductive system of these fishes is spawning-based. In such a kind of reproduction behavior, parental care is mostly provided by the male only. Recent studies have shown that these fish do not prefer to be alone. Rather than being alone, these fish survive in societies. Because of this aspect, these fishes show complex social interaction and territorial behaviors as well (Tarkan et al., 2021). If we discuss important conservative threats to marine Gobies, we may come to know that there is much alteration and destruction by human activities along the coastal areas of Turkey. It led to the destruction of the habitats of these fishes, which is the main and alarming threat to these Marine Gobies. Secondly, as we know that these areas of Turkey are designated for transportation so there is a high risk of oil spills in these coastal areas of Turkey. Such kind of contamination is also a main threat to these Marine Gobies(Çinar et al., 2021). Recent studies have shown that there is an increase in ocean acidification day by day because of climate change. This increased acidification is responsible for a reduced population of marine Gobies. Overfishing has also become an important threat to marine Gobies. It is because these fishes are mostly targeted for the aquarium trade, but because of this aspect, the population of these fishes is decreasing day by day. The next most important threat to marine Gobies can be explained in terms of invasive species (Mavruk et al., 2023).

There are many other species which are non-native in the marine environment, so these species compete with Gobies. As a result, the population of these fish decreases. There is a stringent need to adopt some important conservative strategies so that we can conserve important species of these fishes. The most important conservative measure can be the habitat protection of these fishes. It is evident that when habitats are protected all over the world, there will be no danger for such species. The other most important conservative measure is the aspect of sustainable fishing practices (Engin et al., 2018). We have to take such measures that will ensure a balanced population of these fish by preventing overfishing of these fish. Pollution reduction can be the most important conservative measure because we know that pollution is responsible for the habitat destruction of these fish. When there are fewer factors of pollution, there will be an improvement in the water quality of the marine ecosystem. The other most important conservative measure can be the mitigation of climate change(Lenhardt et al., 2017; Montesanto et al., 2023). As we know, climate change is harmful not only to fish but to all kinds of living things. So, there is a stringent need to curb those factors that are responsible for climate change. Research and monitoring can be other important conservative measures that will help to monitor those efforts that are done for the conservation of these fishes. After a comparative Taxonomic Assessment of Marine Gobies in the Aegean and Mediterranean Coasts of Turkey, there will be a few important positive outcomes (Çiftçi, 2016). For example, such studies will work for species identification, and such species identification

will help understand the biodiversity of these fishes. The other most important positive outcome for such taxonomic assessment can be the aspect of species composition. Such studies related to marina Gobies will help to understand the composition of species that will help in understanding the aspect of evolution in them(Öztürk & Engin, 2019). Distribution patterns can also be easily studied by comparative Taxonomic Assessment of Marine Gobies in Aegean and Mediterranean Coasts of Turkey, and such distribution patterns are related to the history of these fishes. The next positive outcome of the comparative Taxonomic Assessment of Marine Gobies can be explained in terms of updated taxonomy (Bilecenoglu et al., 2013). As we know that science is the knowledge of experience and advancements. We need to make advancements in each aspect of life, including taxonomy and classification. When there is ongoing research, there will be advancement in taxonomy as well. This kind of comparative Taxonomic Assessment of Marine Gobies will also help us to design and implement conservative strategies for marine Gobies in the Aegean and Mediterranean Coasts of Turkey(Kesner-Reyes et al., 2024).

Figure 1: Biodiversity Conservation and Management

Applications of Comparative Taxonomic Assessment of Marine Gobies (Gobiidae)

Biodiversity Conservation and Management

Assessments of Goby species in Turkey's Aegean and Mediterranean coastal regions are important, contributing to the restoration of ecosystem. Based on the identification of native and non-native species and the distribution of non-native species ranges, this work provides much-needed baseline information for the creation of marine protected areas (MPAs). Opportunities have been created from these data to form area-specific protection strategies that will help conserve native species and prevent the non-native goby species from affecting the ecosystem (Figure 1).

Marine Ecosystem Monitoring

This comparative evaluation provides a follow-through method of assessing the dynamics of ecosystems that flank coastlines. As benthic and demersal organisms, gobies have the services of being primary members of the food chain, and, therefore, are highly affected by changes in water quality, habitat modification, and climatic change. Early surveillance of trends among gobiid fish populations will inform us of ecological changes caused by the pollution, destruction of habitat, or climactic changes. Observation of such species is necessary for the maintenance of the ecological balance along coast zones on a regular basis.

Figure 2: Invasive Species Management

Invasive Species Management

The hemerobionts Lessepsian migrants in the Mediterranean serves to emphasize the importance of such species in controlling invasive populations (Figure 2). The addition of gobies and other marine species has the capacity to completely reshape local ecosystems once they are introduced into new environments. The results can be used to create policies to identify and counter the threats made by these migratory species, including setting rates for treating ballast water or limiting their movement in sensitive environmental zones.

Fisheries Management

Collections of gobies have an important role to play in the feeding chain in coastal and marine systems. An analysis on goby species and their ecological roles can improve fisheries management. Information on goby species can be used to determine which are viable for commercial fishing or should be protected for ecosystem health benefit. Besides, the outcomes of this study can be of use in establishing relevant fishing quotas and seasonal closures, addressing the necessity for sustainability of the fisheries in Aegean and Mediterranean areas.

Figure 3: Climate Change Impact Studies

Climate Change Impact Studies

Due to the high degree of influence of environmental factors on the distribution of individual species, the current work contributes essential information about the role of climate change with regard to marine biodiversity (Figure 3). Another way to investigate how environmental factors, such as water temperature, salinity and oceanographic conditions determine the distribution of goby provides valuable insights on broader ecological patterns and challenges posed by ocean warming. Such information may serve to extend predictions of changes in the diversity of species and structure of marine communities. Comparative analysis of taxonomic diversity of gobies in the Aegean and Mediterranean shores of Turkey can shed light on how climate change affects marine biodiversity matters. Gobies inhabit the seabed and bottom waters, thus make them a very sensitive indicator of the manner in which water temperature, salinity, and physical structure of habitat change affect marine ecosystems. Gobies are effective tools in establishing how the climate change affects the coastal ecosystems. The research exposes apparent geographic patterns in the Goby populations in the Aegean and Mediterranean with substantial reliance on water temperature and salinity factors. Altered temperatures and increased salinity levels in the Mediterranean caused by climate change have triggered increased growth of thermophilic species and migration of Lessepsian species to this area from the Red Sea (Çiftçi, 2016). The Aegean coast's temperature and climatic consistency were however conducive for the development of native goby species hence showing that regional differences in how the climate change influences ecosystems define species assemblages. Excessive sea warming might have major survival or arrangement impacts for sensitive populations such as some endemic gobies included in the Aegean. To the contrary, the species that prefer warmer conditions could expand their range, this will lead to new species assemblages in the ecosystem. Invasive non-native gobies could further destabilize Mediterranean ecosystems threatening the diversity of marine life in the region. Understanding these climate-driven impacts is critical to predict future change in diversity of marine species and functions they serve. The research highlights the significance of continuous programs of research for these developments' documentation and directs the activities aimed at preservation of the species and ecosystems at risk because of climate change.

Figure 4: Environmental Education and Public Awareness

Environmental Education and Public Awareness

The outcome of this study can be used to enhance the general knowledge of why the marine biodiversity is important and how gobies contribute to the ecosystem function (Figure 4). Like-minded organizations can start

a program of outreach to inform the community sectors, educational bodies, and policy leaders on the need for sustainable coastal behaviors and marine conservation efforts. This application can support stewardship of environmental for marine environments in regions along the coast that are exposed to hazards from human intervention. Investigating marine gobies from Aegean and Mediterranean coasts of Turkey using the taxonomy provides an outstanding opportunity to increase marine biodiversity among the public and government. Focusing on the ecological significance of gobies in coastal regions, the current study plays an important role in educational campaigns addressing the public and local communities, as well as policymakers, regarding the need to conserve marine ecosystems and recognize biodiversity. Marine gobies are very important to a healthy benthic ecosystem because they help in cycling of the nutrients as well as in maintaining the functioning of higher trophic levels in the food web. Although they have essential roles in their environments, marine gobies' ecological roles are often overlooked by outsiders to scientific circles. If people knew the wealth of available taxonomic material on gobies, including their ecological significance, it could increase awareness about these major marine organisms, in their coastal habitats which depend on marine resources for their survival. Developing education- and community-based programs based on the study results may illustrate the ways in which changes to goby populations are sensitive indicators of larger ecological pressures, including pollution or new climate conditions. By disseminating the results of this study, educators, university students and marine researchers can engage in meaningful learning activities that encourage hands on exploration of these important marine species. Goby-rich coastal sites are ideal setups for field trips by students, as they learn to see these fish in their natural habitats, which goes a long way in development young environmental awareness (Engin et al., 2018). Educational projects on local marine life help promote students' environmental awareness, when global problems, such as biodiversity, are presented in the context of students' own community. Social media and public outreach programs can be very helpful in sensitizing the public about marine biodiversity through wider cross sections of the public. With the help of environmental NGOs, local governments and tourism stakeholders, the spread of the study can be furthered, creating more awareness among the public of the worth of protecting the marine species and their habitats. The research can arouse more awareness and action towards sustainable marine practices and conservation efforts by demonstrating how invasive species attack endemic gobies. Finally, studies of marine goby taxonomy constitute such an important avenue of increasing public awareness leading to conservation and sustainable use of coastal environments of Turkey. However, broadening the knowledge of marine biodiversity attained during this research can amount to having more support for sustainable and responsible environmental practices.

Figure 5: Support for Ecotourism Development

Support for Ecotourism Development

Marine gobies may be attractive to eco-tourists especially unique varieties found at particular places (Figure 5). The findings of this study can be used as a basis for the first provision of eco-tourism activities in coastal areas in emphasizing the urgent need to protect marine biodiversity. Putting attention in marine life education of the goby species in the coastal zones may promote sustainable tourist activities, which will in turn contribute to the cost of conservancy through tourism revenue. With marine gobies comparison taxonomic analysis conducted in Aegean and Mediterranean coasts of Turkey, we have a great chance to increase the sustainable ecotourism opportunities of these regions. Ecotourism ventures that are based on the conservation of ecosystems with the education of tourists about biodiversity can use the information obtained in this research. Since Turkey's coasts host a broad variety of marine organisms, including a plethora of gobies, this research provides critical information as a stepping stone to develop ecotourism products that exhibit marine biodiversity. The strategic location of Turkey straddling Europe and Asia contributes greatly to its accommodative hosting of a diverse number of endemic species with many restricted for their occurrence among the Aegean or Mediterranean seas. Due to the ecological value and the species richness of gobies in the marine habitats of the Turkey, gobies themselves are natural focal points for ecotourism experience. To emphasize the importance of goby species diversity incorporated with endemics and vulnerable ones, the foundation for creation of ecotourism projects and educational campaigns in boosting marine conservation among the public is laid by this study. In programs, there could be provision for such options as led diving expeditions, marine voyages by boat, and escorted walks along the shoreline meant to expose the ecological value of gobies to the maintenance of aquatic habitats. Also, marine ecotourism that focuses on the discovery of local marine species offers a means of educating the public about conservation science (Kesner-Reyes et al., 2024). Citizens of ecotourism activities can learn about the goby ecological services that include increasing nutrient circulation, sediment integrity, and marine food web provision. When understanding the value of such roles, the ecotourism becomes more interesting and encourages visitors to perform responsible actions for marine environments – limiting of pollution, habitat preservation, donation to conservation activities. By identifying the species that solely rely on unique habitats the study explains a basis for ecotourism projects appealing to specific categories of visitors. Anybody who is keen to discover marine systems or help to preserve biodiversity could elect to attend special tours where goby specie is introduced in their natural surrounds for a most engaging encounter. In addition, this taxonomic study can also help the development of marine based tourism by involving it in undertaking of such ventures as eco-lodge projects, educational facilities, and conservation-oriented tourism ventures, which promote sustainable travel and increase the level of local economies. In the end, comparative taxonomic study of marine gobies is economic and contributes to the development of science and also the prospect of sustainable ecotourism development in Turkey's coastal regions. Owing to this research, increasing visitors' interaction with marine biodiversity contributes to the preservation of coastal ecosystems and to their regional economies.

Conclusion

Detailed taxonomic comparison of marine gobies on the Aegean and Meditate shores of Turkey provides a comprehensive view on the biodiversity, trends of distribution and ecological interactions of this important fish complex on two major marine zones. The results reveal significant diversity of the taxonomic sets and designs throughout the regions, where both natural environmental forces and human actions have had a significant impact. By combining classical morphological analyses with modern molecular approaches, this investigation shows effectiveness in characterizing gobies that are characterized with high plasticity and low detectable differentiation. The assessment reveals considerable differences in the gobiid species diversity between the Aegean and Mediterranean coasts. The distinctive nature of the Aegean coast, with its mixed topography, isles,

and subtler, cleaner waters, encourages greater endemic and habitat-specific species of goby. On the contrary, warmer temperature and higher level of salinity at the Mediterranean coast leads to the increased percentage of non-indigenous and Lessepsian migrant species, some of which are originally found in Red Sea. These regional differences illustrate the role of hydrological and environmental characteristics in juxtaposition with anthropogenic exigencies like navigation and coastline modifications in shaping the pattern of species diversity of marine organisms. Also, it is observed that gobies play a critical role in benthic and demersal faunal assemblages. The high sensitivity of the gobies to changes in the habitat makes them important bioindicators in the describing the state of coastal ecosystems. The presence or absence of certain gobies at every sampling location helped significantly to indicate environmental degradation, differences in sediment types, concentrations of pollution, and effects of habitat fragmentation. Increased presence of alien species such as the Asterropteryx semipunctata and Bryaninops natans on Mediterranean coast is a glaring reminder of Besides mapping current species abundance, this work establishes the groundwork for future ecological surveillance campaigns. With marine habitats being continuously altered because of global climate and warming patterns, frequent evaluation is essential. Further disturbances of species assemblages can be expected as a result of incremental temperature rises and the ongoing proliferation of migration corridors, as species, such as gobies, are uniquely able to react to these changes because of an ability to reproduce rapidly and adapt. Results of the present study are essential to influencing strategies for the conservation and management of marine ecosystems. Knowledge of the distinctive flora and fauna along the Aegean and Mediterranean coasts makes conservation efforts more focused, particularly in marine protected areas. Taxonomic research can be used in the development of conservation plans to focus on the environments and the species that have the highest risks posed to them by anthropogenic activities. It is critical that both educational and institutions making policies understand the ecological significance of the small benthic fishes including the gobies that, although small, greatly support trophic flow and the nutrient dynamics of the coastal ecosystem. Conclusively, this taxonomic examination of marine gobies is of vital importance to enhancing our understanding of marine biodiversity in Turkey and facilitating actual actions in ecology, invasive species management, and environmental conservation. The outcomes derived from this analysis are critical in identifying larger scale changes in marine biota and responding with adaptive actions to future environmental and ecological challenges.

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