INDUSTRIAL DEVELOPMENT AND THE ENVIRONMENTAL KUZNETS CURVE: A CASE STUDY EVIDENCE FROM THE ERGENE RIVER BASIN, TURKEY

Rasim YILMAZ[1]

Abstract

The Environmental Kuznets Curve (EKC) hypothesis argues that there is an inverted U-shaped relationship between economic development and environmental damage as such environmental damage increases during the early stages of economic development but then decreases after a certain level of economic development is reached. This study aims to contribute to the discussion of the EKC hypothesis by providing a case study from the Ergene River Basin in Turkey. The case study of industrialization in the Ergene River Basin confirms the inverted U-shape relationship between economic development and environmental degradation suggested by the EKC hypothesis.

Keywords: The Environmental Kuznets Curve Hypothesis, Environment and Development, Environmental Plans, Ergene River Basin

JEL Codes: Q53, Q56, Q58, Q51

ENDÜSTRİYEL KALKINMA VE ÇEVRESEL KUZNETS EĞRİSİ: ERGENE HAVZASI ÜZERİNE BİR VAKA ÇALIŞMASI[2]

Öz

Çevresel Kuznets Eğrisi (ÇKE) hipotezi, ekonomik kalkınma ile çevresel zarar arasında ters U şeklinde bir ilişki olduğunu, diğer bir deyişle çevresel zararın ekonomik kalkınmanın ilk aşamalarında arttığını, ancak daha sonra belirli bir ekonomik kalkınma seviyesine ulaşıldıktan sonra azaldığını öne sürmektedir. Bu çalışma, Türkiye'deki Ergene Nehri Havzası üzerine bir vaka analizi yoluyla ÇKE hipotezi literatürene katkıda bulunmayı amaçlamaktadır. Ergene Nehri Havzası'ndaki sanayileşme konusundaki bu vaka analizi, EKC hipotezinin öne sürdüğü ekonomik kalkınma ile çevresel bozulma arasındaki ters U şeklinde ilişkiyi doğrulamaktadır.

Anahtar Kelimeler: Çevresel Kuznets Eğrisi Hipotezi, Çevre ve Kalkınma, Çevre Planları, Ergene Nehri Havzası

JEL Kodları: Q53, Q56, Q58, Q51

1 **Sorumlu Yazar (Corresponding Author)**, Prof.Dr. Tekirdağ Namık Kemal Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü, Tekirdağ, Türkiye, rasimyilmaz@nku.edu.tr, ORCID: 0000-0002-1084-8705.

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1. Introduction

The Environmental Kuznets Curve (EKC) hypothesis argues that there is an inverted U-shaped relationship between economic development and environmental damage as such environmental damage increases during the early stages of economic development but then decreases after certain level of economic development is reached. It seems that societies response to environmental deterioration is less at the early stages of economic development while call for environmental policy responses increases as the environmental deterioration gets worse and starts affecting people's lives more at the later stages of economic development. This also because society becomes more effective to overcome environmental problems with its high level of income and material sources at these later stages of economic development (Giovanis, 2012).

After being put forward by Grossman & Krueger (1991) and Grossman & Krueger (1995), the EKC hypothesis has become a popular research interest among researchers and has triggered a vast empirical literature on the subject. Accordingly, the EKC hypothesis has been empirically tested for many countries and regions.

In a similar vein, the validity of the EKC hypothesis for Turkey is also empirically investigated by several researchers at both the national level and the provincial level. The results of empirical studies at the national level are ambiguous. The results of some studies suggest the validity of the EKC hypotheses in Turkey. For example, Tutulmaz (2015) investigated the EKC hypothesis for Turkey for the period 1968-2007 by using CO2 emission series for representing environmental pressure and GDP per capita values for proxying economic development. The result of the econometric estimation indicates the first phases of an inverted-U form EKC relationship for Turkey. Bölük & Mert (2015) searched the relationship between CO2 emissions, electricity generated using renewables and GDP in Turkey for the period between 1961 and 2010 by utilizing Autoregressive Distributed Lag approach and tested the validity of the EKC. Their results indicate that there is an inverted U-shaped relationship between Greenhouse Gas Emissions and per capita GDP in Turkey with turning point at USD 9,920. Pata (2018) scrutinized the dynamic long run relationship between CO2 emissions, economic growth, financial development, trade openness, industrialization, urbanization, coal and noncarbohydrate energy consumption within the framework of the EKC hypothesis for Turkey over the period 1971–2014. The result of the study suggests an inverted U-shaped relationship between per capita income and CO2 emissions with the turning point at USD 14,360. Estimation results of Katircioğlu & Taşpinar (2017) suggest a long-term equilibrium relationship between financial development and the EKC in Turkey. On the other hand, some other studies fail to validate the EKC hypotheses for Turkey. For instance, Ozcan et al. (2018) scrutinized the EKC hypothesis for Turkey during the period of 1961-2013 by using the ecological footprint as a proxy for environmental degradation. Their research findings do not confirm the EKC hypothesis for the Turkish economy. Their results indicate that the impact of economic growth on environmental degradation is positive and has a slowly increasing trend in all subsample periods. Similarly, Katircioğlu and Katircioğlu (2018) analyzed the role of urbanization in the EKC for Turkey whereby urban development have led to an increase in carbon dioxide emissions. Their findings also suggest that the EKC of Turkey is not an inverted U-shape.

There are also some studies examining the EKC hypothesis for Turkey at the provincial level. Using PM10 and SO2 measurements in Turkish provinces, Akbostancı et al. (2009) investigated the relationship between the CO2 emissions and per capita income for the period of 1992-2001. Their panel data analysis results suggest that there is an N-shape relationship for SO2 and PM10 emissions instead of an inverted U-shaped relationship between environmental degradation measured by SO2 and PM10 emissions and per capita income. Utilizing carbon dioxide emissions, wastewater, sulfur dioxide, and particulate matter as a proxy for environmental degradation, Tirgil et al. (2021) test the EKC hypothesis for 81 provinces of Turkey. Depending on environmental degradation measure and econometric method utilized, the result of the study varies. Result of the study suggests an N-shaped relationship between carbon dioxide emissions and economic growth during the period between 1961 and 2014, an N-shaped correlation between wastewater and particulate matter quality indicators and economic growth over the period between 1992 and 2013, and an inverted N-shaped relationship between SO2 and economic growth during the period between 1992 and 2013. Karahasan & Pinar (2021) examine the EKC hypothesis for Turkish provinces during the period of 2004-2009 by using SO2 as a proxy for

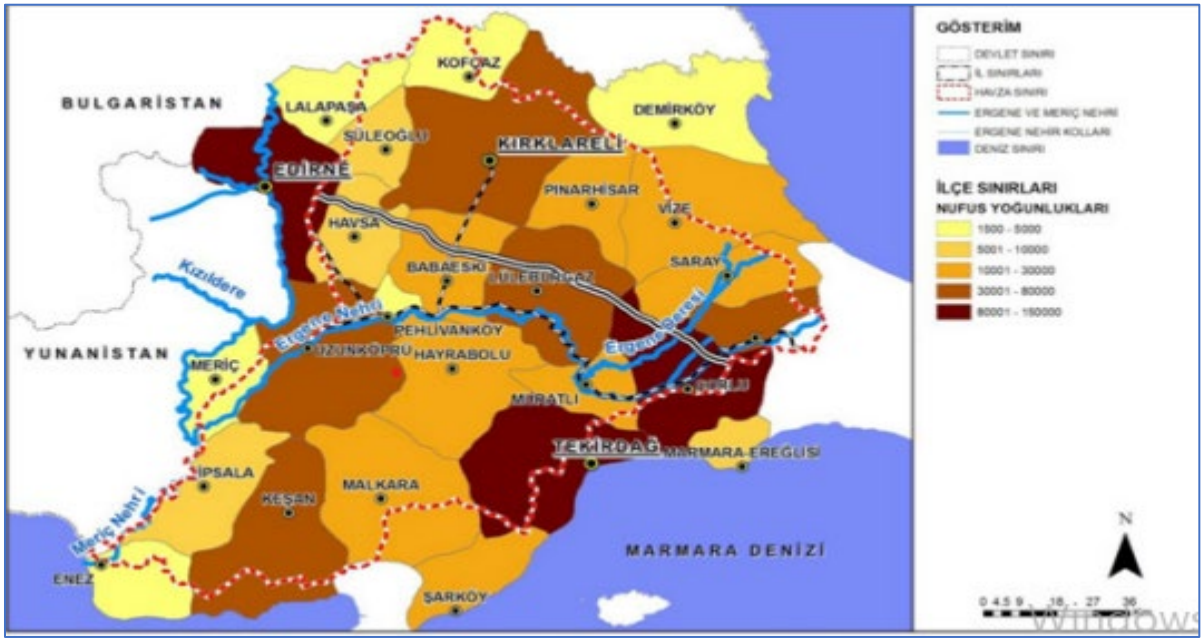
environmental degradation. Their results indicate a U-shaped relationship between economic development and SO2 levels as opposed to the suggestion of the EKC hypothesis.

This study aims to contribute the discussion of the EKC hypothesis by providing a case study from the Ergene Basin in Turkey. A similar pattern suggested by the EKC hypotheses has occurred in the Ergene Basin region of Turkey. The case study of the industrialization in the Ergene River Basin confirms the inverted U-shape relationship between economic development and environmental degradation suggested by the EKC hypothesis.

2. The Ergene River Basin and Pollution

The Ergene River Basin, formed by the Ergene River, is one of Turkey's 25 river basins. The Ergene River Basin covers the provinces of Tekirdağ, Edirne and Kırklareli of the Thrace Sub-Region within the Marmara Region of Turkey and accounts for 1.4% of Turkey. Approximately 1.5 million people live in the Ergene River Basin and many agricultural products such as sunflower, wheat and rice are intensively produced (Kahraman & Özkul, 2018, p. 4; Konukçu et al., 2017, p. 436). The Ergene River is the most important water source in the ecosystem of the East Thrace Region. Having a length of 283 km and 7 tributaries of various sizes, the Ergene River originates from the Istranca (Yıldız) Mountains in Tekirdağ, passes through Saray, Çerkezköy, Çorlu, Muratlı, Babaeski, Pehlivanköy, Hayrabolu, Uzunköprü and Meriç districts, merges with the Meriç River in İpsala district of Edirne city, and flows into the Aegean Sea in the Saros Bay as it can be seen in Figure 1 (Tokatlı & Varol, 2021; Konukçu et al., 2017).

Figure 1: Ergene Basin and Ergene River Administrative Map



Source: Kahraman & Özkul (2018, p. 8).

A significant part of the industrial facilities in the Ergene River Basin are concentrated in the Çorlu and Çerkezköy, and Muratlı districts of Tekirdağ, located at the beginning of the Ergene River. The region's rich underground water resources have attracted industrial facilities based on groundwater consumption such as the textile, leather, paper and chemical sectors to the region. Accordingly, the number of organized industrial zones in Tekirdağ has reached 14. However, the unplanned and uncontrolled industrialization in Tekirdağ brought Tekirdağ from 23rd in 1973 to the 10th place in 2013 in the development ranking among the provinces in Turkey while industrial facilities with high environmental negative externalities have caused many environmental problems in the Ergene River Basin and started to pose a great threat in terms of environmental sustainability.

The foremost environmental problem of the Thrace Sub-Region is the pollution of surface water resources. The surface and groundwater quality of the Ergene River Basin has deteriorated excessively and the groundwater level has decreased due to activities that adversely affect water quality such as unplanned industrialization, unplanned urbanization, insufficient infrastructure, unconscious and uncontrolled use of chemicals in agriculture, domestic waste discharges without treatment (240,000 m3/day), discharge of industrial waste water without being purified properly (460,000 m3) /day), and the unconscious and excessive consumption of underground water reserves. The rapidly increasing industry in Tekirdağ province has brought not only internal migration but also regional migration in the Thrace Sub-Region, as a result of which the population of the districts has increased rapidly, and irregular urbanization has become unavoidable. Moreover, obtaining of water consumption of the industry from the Ergene River Basin groundwater has led to a decrease in groundwater resources and a fall in the dynamic water level on the Basin. The direct delivery of the contaminated water to the surface waters (streams) caused the pollution of the surface waters first and then the pollution of the groundwater aquifers fed by them. Hence, the natural flow mechanism of the river has been disrupted over time. Eventually, the water quality of the Ergene River has over time become 4th Class, that is, very polluted – it cannot be used for any purpose (T.C. Çevre ve Orman Bakanlığı, 2009, p. 12; Sivri, 2014; Dokmeci, 2017; Kahraman & Özkul, 2018, p. 15; Tokatlı, 2020).

3. Efforts to Prevent Pollution in the Ergene River Basin

The pollution problem in the Ergene River attract governmental attention for the first time in 2003. The Parliamentary Research Commission is formed to investigate the pollution in the Ergene River and its effects on the environment, and to determine the measures to be taken in order to overcome the pollution in the Ergene River. Upon the Commission's report on the subject, the issue came to the agenda of the Grand National Assembly for the first time. Hence, the Ergene River pollution has attracted a national level of attention. Afterwards, the Ergene Basin Environmental Management Master Plan was prepared between 2006-2008. In 2009, an Environmental Plan with a scale of 1/100,000 was prepared. In 2010, Meriç – Ergene Basin Industrial Wastewater Management Master Plan was prepared. The Ergene Basin Protection Action Plan was prepared in 2011 by the Ministry of Forestry and Water Affairs. In the following years, the Thrace Development Project (TRAGEP) was prepared in 2013 and the Meriç-Ergene River Basin Management Plan was prepared in 2018 regarding the pollution in the basin (Kahraman & Özkul, 2018: 18).

To prevent pollution and clean the Ergene Basin the following official documents has been prepared:

- The Ergene Report of the 22nd Term Research Commission of the Grand National Assembly of Turkey (2003),
- Ergene Basin Environmental Management Master Plan (2006-2008),
- 1/100,000 scale Environmental Plan (2009),
- Meriç-Ergene Basin Industrial Wastewater Management Master Plan (2010),
- Ergene Basin Protection Action Plan (2011),
- Thrace Development Project (TRAGEP) (2013),
- Meriç-Ergene River Basin Management Plan (2018)

1/100000-scaled the Thrace Sub-Region Ergene Basin Environmental Plan was prepared in 2009 and was approved by the Ministry of Environment and Forest according to the law no 2872 (environmental law) on 24.08.2009. Following this plan, 1 / 25.000 Scale Provincial Environmental Plans and 1/5000 Scale Master Development Plans were also prepared and elaborated in consideration of the Thrace Sub-Region Ergene Basin Environmental Plan.

Among the documents prepared, The Ergene Basin Protection Action Plan is the most important document in terms of implementation. It was announced on 6 May 2011. In addition, the Prime Ministry Circular on the Ergene Basin Protection Action Plan was published in the Official Gazette on 13 June 2013 to ensure that all institutions fulfill their responsibilities and work in coordination for the implementation of the plan (Çankaya, 2017).

With the aim of saving the Ergene River, 15 targets/actions were determined in the Ergene Basin Protection Action Plan with a cost of approximately 1,1 billion USD (Kahraman & Özkul, 2018, p. 18; Mutaf, 2020):

1) Cleaning the stream beds,

2) Construction of advanced biological treatment plants of domestic wastewater by General Directorate of State Hydraulic Works

3) Establishment of Rehabilitated Organized Industrial Zones,

4) Construction of joint advanced treatment plants of industrial wastewater,

5) Reducing the use of water and polluting raw materials in the industry,

6) Basin afforestation and combating erosion,

7) Implementation of 1/25,000 plans,

8) Establishment of management facilities for solid / hazardous wastes,

9) Control of agricultural pollution,

10) Providing real-time continuous monitoring,

11) Intensification of inspections,

12) Rearrangement of discharge standards,

13) Establishment of flood early warning system,

14) Controlling the use of groundwater,

15) Completion of dams, ponds and irrigation facilities.

Within the framework of the Ergene Basin Protection Action Plan, 15 actions have been planned and most of them have been completed. Within the scope of the Ergene Basin Protection Action Plan;

1) 28 stream reclamation has been completed. In this context, 395 kilometers of stream bed was cleaned and rehabilitated.

2) Biological wastewater treatment plants were built by General Directorate of State Hydraulic Works in 12 settlements with a population over 10 thousand located in the Ergene Basin (Çorlu, Çerkezköy, Muratlı, Malkara, Saray, Hayrabolu, Kırklareli, Pınarhisar, Vize, Babaeski, Uzunköprü, Keşan). Besides, sewerage systems and collector lines were built in 38 settlements with a population of less than 10 thousand.

3) In 2011, by adding the temporary article 8th to the Organized Industrial Zones (OIZ) Law No. 4562 and amending the OIZ regulation, the industrial facilities scattered in the basin were brought together under the legal entities as Rehabilitated OIZs. Within this scope, 10 Rehabilitated OIZs were established. Eight of these OIZs are in Tekirdağ: Ergene 1, Ergene 2, Velimeşe OIZ, Çorlu 1 OIZ, Muratlı OIZ, Veliköy OIZ, Veliköy Yalıboyu OIZ and Kapaklı OIZ. These regions, which were initially received the status of Rehabilitated Organized Industrial Zone, achieved the status of OIZ in the following years.

4) Within the scope of eliminating industrial pollution, 5 joint industrial wastewater treatment plants (Ergene-1 Wastewater Treatment Plant, Ergene-2 WastewaterTreatment Plant, Çorlu-1 Wastewater Treatment Plant, Muratlı Wastewater Treatment Plant and Velimeşe Wastewater Treatment Plant) were built for Ergene 1, Ergene 2, Muratlı, Velimeşe, Veliköy, Kapaklı, Yalıboyu and Çorlu 1 OIZs.

5) Transition to production processes that use less water, less energy and less polluting raw materials in industry have been carried out and measures have been taken. Factories in the Basin started presenting clean production plans. With these methods, it is aimed to save 150,000 m3 of water per day.

6) Efforts have been maintained for afforestation and combating erosion in the Ergene Basin. Within the scope of the Ergene Basin Protection Action Plan, afforestation and combating erosion works and efforts were completed by 2014. Accordingly, 10,676 ha area was afforested, 44,079 ha forest area was rehabilitated, special afforestation permits were provided for 10,720 ha area, nearly 21 thousand saplings were produced, approximately 1,700 ha pasture improvement works were carried out. Roadsides are also included in this program and 912 trees have been planted. Stream rehabilitations corresponding to an area of 245 ha were also completed until 2014. Although the foreseen activities were completed until 2014, afforestation, rehabilitation of forest areas, sapling production and pasture improvement works have been made continuous.

7) 1 / 25.000 Scale Provincial Environmental Plans and 1/5000 Scale Master Development Plans were put into practice. In this context, new facilities that reduce water quality and pollute the environment at a high rate are not allowed.

8) Solid waste management associations were established within the scope of establishment of management facilities for solid/hazardous wastes: Edirne Solid Waste Management Association, Orta Edirne Solid Waste Management Association, Güney Edirne Solid Waste Management Association, Tekirdağ Province Environmental Services Association, Kırklareli 1st Group and Kırklareli 2nd Group Management Associations were formed in this context.

9) Within the scope of control of agricultural pollution, inspection of plant protection product and fertilizer dealers, training and awareness of farmers on good agricultural practices, inspection of "Soil Protection Projects" in places allowed for non-agricultural use were carried out.

10) Activities affecting the water quality of the Ergene River started to be monitored in real time manner. In order to determine the impact of the activities carried out within the scope of the Ergene Basin Protection Action Plan on the Ergene River, online monitoring stations that allow data to be obtained at 30-minute intervals have been established. The stations are located at points that are representative of the quality and hydraulic load of the river water.

11) Inspections of industrial facilities in the basin have been tightened. In this framework, inspections were carried out across the Basin, administrative penalties were imposed, and the activities of some industrial facilities were suspended.

12) Wastewater discharge standards have been rearranged. Accordingly, a color parameter has been added to the criteria in order to combat the color problem caused by the intense discharge of textile industry wastewater. Especially in the leather processing industry and textile industry, the limits in the discharge water have been reduced by an average of 1/3.

13) In order to prevent floods in the basin, the Flood Early Warning System was established and activated by the General Directorate of State Hydraulic Works and the General Directorate of Meteorology. In addition, 11 Flow Observation Stations and 30 Meteorology Observation Stations were established within the scope of the Ergene Basin Protection Action Plan.

14) The use of groundwater has been brought under control. In this regard, drilling a water well becomes subject to permission and front-loading remote-controlled water meters were installed in permitted wells.

15) 24 irrigation projects that will irrigate a total area of 1 million 238 thousand decares have been put into service.

The most important pillars of the Action Plan is the construction of joint advanced wastewater treatment plants for Organized Industrial Zones and the Marmara Deep Sea Discharge System.

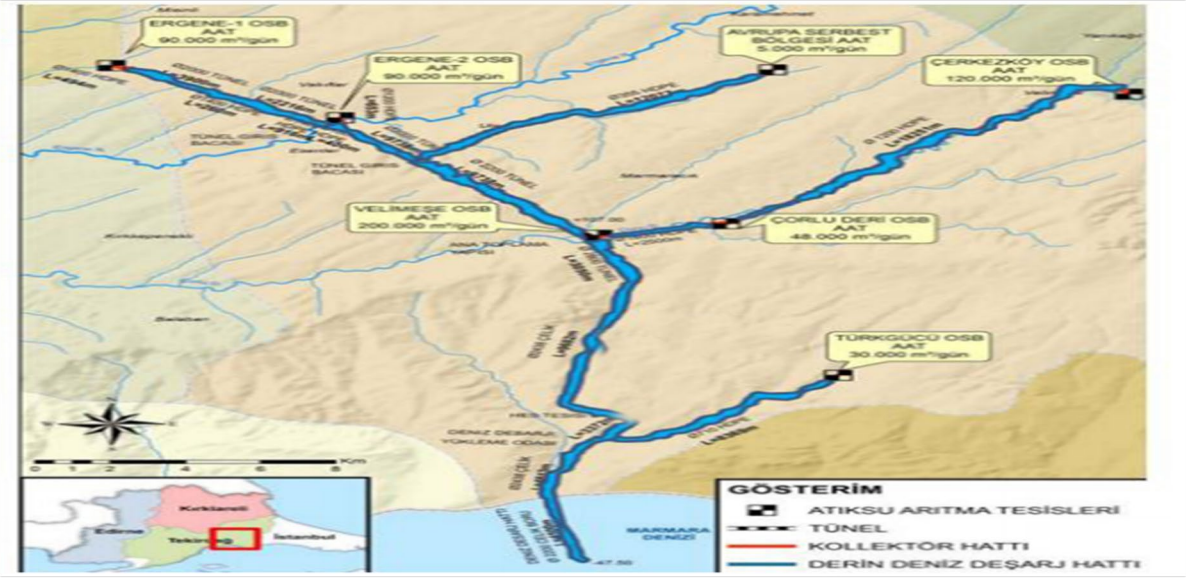
In the Ergene River Basin, there are of around 350 individual wastewater treatment plants belonging to more than a thousand companies. Within the scope of eliminating industrial pollution, 5 joint industrial wastewater treatment plants (Ergene-1 Wastewater Treatment Plant, Ergene-2 WastewaterTreatment Plant, Çorlu-1 Wastewater Treatment Plant, Muratlı Wastewater Treatment Plant and Velimeşe Wastewater Treatment Plant) were built for Ergene 1, Ergene 2, Muratlı, Velimeşe, Veliköy, Kapaklı, Yalıboyu and Çorlu 1 OIZs which were gained Rehabilitated OIZs status with the

Action Plan (Mutaf ve Karaduman, 2020). Thus, both the operation and control of individual wastewater treatment plants become easier with the construction of 5 joint wastewater treatment plants.

Joint industrial wastewater treatment plants have been built with the credit facilities provided by the government. When all the treatment plants are put into operation, more than 350 individual wastewater treatment plants belonging to more than 1000 industrial plants will be out of service. Hence, as in the Çerkezköy OIZ Wastewater Treatment Facility and Çorlu Deri OIZ Wastewater Treatment Plants, which were previously established in the region, industrialists can manage their environmental investments more collectively. Thus, both the operation and control of individual wastewater treatment plants become easier with the construction of 5 joint wastewater treatment plants. Joint treatment plants will also be operated more professionally and healthily. Moreover, the industrialists also become more profitable due to reduction in the cost and workload of operating the individual treatment plants (Haber Trak Gazetesi, 2017). Based on the fact that the calorific value of the treatment sludge obtained from the treatment plants is equal to the calorific value of the lignite coal, a project has been prepared in cooperation with the Ministry of Environment and Urbanization and Tekirdağ Namık Kemal University in order to convert the treatment sludge to be generated during waste cleaning in the region into energy and to bring it into the economy (Haber Trak Gazetesi, 2019).

Within the scope of the Ergene Basin Protection Action Plan, the Deep Sea Discharge Project has been implemented as a complementary project to the construction of joint industrial wastewater treatment plants (see Figure 2). With this project, industrial wastewater (approximately 460,000 m3/day), that is refined in the wastewater treatment plants of OIZs, is discharged to a depth of 47 meters and 4.5 kilometers off the Marmara Sea through channels and tunnels. The project consists of 4.5 kilometers of offshore pipeline, 46 kilometers of land pipeline and 20 kilometers of tunnel lines (Velimeşe Tunnel, Ergene-1 Tunnel and Ergene-2 Tunnel). It is the largest deep discharge project in Turkey and Europe in current scales (Karaduman and Ural, 2018).

Figure 2: Marmara Deep Sea Discharge Project



Source: Akça et al. (2022, p. 35).

In order to carry out the project, under the coordination of Tekirdağ Governorship, non-profit Tekirdağ Ergene Sea Discharge Corporation was created by founding partners including Tekirdağ Education and Environment Association, Çerkezköy Organized Industrial Zone, Velimeşe Islah Organized Industry, Ergene I Rehabilitated Organized Industrial Zone, Ergene II Rehabilitated Organized Industrial Zone, Çorlu Leather Organized Industrial Zone, Türkgücü Rehabilitated Organized Industrial Zone, Veliköy Islah Organized Industrial Zone, European Free Zone, and Karaağaç Rehabilitated Organized Industrial Zone.

The business area of the company is determined as the construction and operation of sewerage, tunnel, collector systems and wastewater treatment plants. The area of responsibility of the company has been determined as the planning, infrastructure, control, operation and maintenance services of the project. The company is tasked with supervising the execution of the works and transactions to be carried out within the scope of the plan in the most appropriate technical way and providing technical support. In this context, the company is actively involved in all stages from the planning of the Ergene Deep Sea Discharge project to the manufacturing process. The company is also responsible for the control of deep sea discharge of wastewater treated in Joint Wastewater Treatment Plants (Tekirdağ Yeni Haber Gazetesi, 2020).

With the project, the wastewater from the industrial and domestic treatment facilities will be transported to the joint wastewater treatment plants with closed pipes without touching the soil. After being purified in these joint industrial wastewater treatment plants, purified wastewater will be will be sent to the deep sea discharge loading room and then will be discharged into the sea 4.5 km off the shore. All process will be continuously monitored online. Thus, industrial and domestic wastewater will not be poured into the Ergene River, these wastes will no longer pose a threat to the health of the people, nature and animals in the basin, the clean flow of water in the basin will be ensured, the flow rate and point load to the Ergene River and its tributaries will be reduced, and the industry, agriculture, livestock and animal husbandry, and tourism will develop together in an environment friendly manner in the basin (Haber Trak Gazetesi, 2017).

When the project is completed, it is predicted that the water quality of the Ergene River will achieve to higher class and the "Chemical oxygen demand" parameter, which was measured as 800 milligrams/liter in 2011 in the Ergene Basin, decreased to 200 - 250 milligrams/liter (Karaduman ve Ural, 2018) while the total pollution load to the Marmara Sea will increase and this increase will have a limited impact on the water quality of the Marmara Sea (Akça et al., 2022). When the project is finalized, Turkey's first basin protection project will be completed and will set an example for other basins.

5. Conclusion

The environmental Kuznets curve hypothesis argues that there is an inverted U-shaped relationship between economic development and environmental damage as such environmental damage increases during the early stages of economic development but then decreases after certain level of economic development is reached.

This study aims to contribute the discussion of the EKC hypothesis by providing a case study from the Ergene Basin in Turkey. The case study of the industrialization in the Ergene River Basin confirms the inverted U-shape relationship between economic development and environmental degradation suggested by the EKC hypothesis.

A significant part of the industrial facilities in the Ergene River Basin are concentrated in the Çorlu and Çerkezköy, and Muratlı districts of Tekirdağ, located at the beginning of the Ergene River. The region's rich underground water resources have attracted industrial facilities based on groundwater consumption such as the textile, leather, paper and chemical sectors to the region. Accordingly, the number of organized industrial zones in Tekirdağ has reached 14. However, the unplanned and uncontrolled industrialization in Tekirdağ brought Tekirdağ from 23rd in 1973 to the 10th place in 2013 in the development ranking among the provinces in Turkey while industrial facilities with high environmental negative externalities have caused many environmental problems in the Ergene River Basin and started to pose a great threat in terms of environmental sustainability.

Especially after the 2008 global financial crisis, environmental sensitivity has gained an international dimension. It has been envisaged at the governmental level that the current production order in the world is unsustainable since it has led to an increase in water scarcity, resource bottlenecks, air and water pollution, climate change and irreversible loss of biodiversity. In a similar vein, upon the pollution in the Ergene River Basin received governmental attention, the Ergene River Basin Environmental Management Master Plan was prepared in 2008 and 1/100000-scaled the Thrace Sub-Region Ergene Basin Environmental Plan was prepared in 2009 and was approved on 24.08.2009.

Among the actions taken, The Ergene Basin Protection Action Plan is the most important document in terms of implementation. Within the framework of the Ergene Basin Protection Action Plan, 15 actions have been planned and most of them have been completed. The most important pillars of the Action Plan are the construction of joint advanced wastewater treatment plants for Organized Industrial Zones and the Marmara Deep Sea Discharge System. With the implementation of the actions mention in the Action Plan, a decrease in pollution in the Ergene River have also started to be observed.

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