

SUSTAINABLE DEVELOPMENT GOAL 14: LIFE IN WATER - SUGGESTIONS FOR INDIVIDUAL ACTIONS

DOI: 10.26341/issn.2241-4010-2023-1a-5

Evangelos-Panagiotis N. Bikas

Economist, MSc in Sustainable Development, Harokopio University of Athens

bikasvagelis@gmail.com

Abstract

The paper consists of two parts, the first describes Goal 14 and its targets, records the effects of marine pollution on the oceans, suggests ways to deal with it, presents the problems and dangers that threaten their sustainability, outlines the strategy and UN guidelines for its achievement, as well as actions, policies and planning developed by the European Union, Greece and local authorities.

The second part proposes individual actions that contribute through education, training, awareness-raising, responsible behaviour, social responsibility and active participation in the protection of the marine environment and its resources.

Finally, the conclusions set out proposals for achieving Goal 14 with a view to implementing Agenda 2030 in a policy area that includes individual actions, strengthening and maintaining sustainable ocean use and developing a strategy at global, European, national and regional levels.

Keywords: *Sustainable Development, Goal 14, oceans, Agenda 2030*

Introduction

This paper presents the implementation guide of Sustainable Development Goal 14 "Life in Water", as adopted on 5th of September 2015 by the United Nations (UN) (Agenda 2030), and makes proposals for individual actions to contribute to achieving the goal and the sustainable development of the marine environment. The implementation of the 2030 Agenda for Sustainable Development, the 17 goals and 169 targets, is a commitment of the UN Member States, as they lay the environmental and social foundations of global prosperity.

The first formal conference on sustainability was held in 1987 by the World Commission of Environment and Development, also known as the Brundtland Commission, which formulated the study "Our common future" and derived the definition of Sustainable Development, as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". "In its broadest sense, sustainable development seeks harmony between people themselves and between man and nature" (www.europa.eu).

Agenda 21 emerged from the "Earth Summit" in Rio de Janeiro, a cornerstone of many international environmental agreements, followed by the Kyoto Protocol on Climate Change (1997), the UN Millennium Development Goals (2000), the World Summit (2005), in which the 3 pillars of sustainability were defined: the economic, the environmental and the social. Then in 2012, the Earth Summit on Sustainable Development was held, and in 2015, 193 UN member states adopted the 2030 Agenda for Sustainable Development, which is a historic declaration aimed at economic, social and environmental development, but and in the defense of human rights (www.eea.europa.eu).

Most existing policies and institutions, such as the United Nations Environment Program (UNEP), were adopted because local or national solutions were not sufficient to address the

problems, and global or international coordination was expected to yield better results. UNEP was created after the Stockholm Conference, as participants agreed that some environmental issues could be better addressed globally.

1. Description of Goal 14 of Sustainable Development

Sustainable Development is a global political declaration, a form of development policy, which seeks global economic development through conditions that will ensure social prosperity and environmental protection.

On September 5th 2015, the 193 Member States of the United Nations adopted Agenda 2030, which includes 17 goals and 169 targets, the implementation of which is a commitment of the Member States until 2030. Agenda 2030 is a global action plan for people, the planet and prosperity (UN General Assembly) (www.sustainabledevelopment.un.org).

Sustainable Development Goal 14 on "Life in Water" is one of the 17 goals voted by the UN General Assembly on July 6th 2017 entitled "Conservation and Sustainable Use of Oceans, Seas and Marine Resources for sustainable development", as stated in the Statistical Committee's Work on the 2030 Agenda for Sustainable Development (www.undocs.org).

1.1. Sustainable Development Goal 14: Oceans

The oceans and fisheries that support the economic and environmental needs of people worldwide, are a source of life for the planet, regulate the global climate system and the global ecosystem by absorbing heat and carbon dioxide from the atmosphere.

The oceans are the largest ecosystem in the world, hosting nearly one million known species, covering $\frac{3}{4}$ of the Earth's surface and containing 97% of the planet's water. Rainwater, drinking water and climate are regulated by ocean temperatures and currents. Billions on the planet depend on marine resources for their livelihood, as the oceans provide occupation, survival and benefits from fisheries, tourism and other sectors.

However, oceans are extremely vulnerable to environmental degradation, they are affected by pollution resulting in the occurrence of the phenomenon of eutrophication and acidification, climate change and overfishing.

1.2. Goal 14 for Sustainable Development: Targets

Goal 14 identifies 10 targets, with 2020 or 2025 set as year of completion, and non-expiration targets (GGSD Forum Greening the Ocean Economy) that capture the effects of marine pollution, formulate ways to address the issue and develop the design of an environmental management system. The 7 targets represent the global commitment to improving marine waters from pollution, eutrophication, ocean acidification, protection and restoration of marine coastal ecosystems, sustainable fisheries management, and termination of subsidies that contribute to overfishing, conservation of maritime and coastal areas, increasing benefits for small island developing countries and less developed countries.

Through a series of land and maritime policies and active participation in regional conventions (EEA Report, European Environment Agency, 1/2017 Copenhagen) the aim is to: reduce marine pollution, reduce ocean acidification, restore the ecosystems, conserve the coastal areas, terminate subsidies for overfishing and increase of economic benefits from sustainable use for small developing countries (www.eea.europe.eu).

1.3. Reduction of marine pollution and acidification of the oceans

Coastal water protection is affected by land pollution. Pollution from urban wastewater and agriculture threatens marine ecosystems and aquatic life. Excessive nutrient loads transported into the marine environment by agricultural and urban wastewater cause eutrophication, which can lead to problematic algal blooms and oxygen depletion with serious consequences for marine ecosystem biodiversity (European waters - Assessment of status and pressures) (European Environment Agency, 2018, Copenhagen). Accordingly, the increase in carbon dioxide in the atmosphere that ends up in the sea through gaseous pollutants has devastating consequences for the entire food chain (www.noaa.gov).

The UN is committed through the implementation of an environmental policy and the promotion of a global strategic plan to prevent and reduce all forms of marine pollution by 2025. Scientific research and global cooperation seek to minimize and address the impact on environment caused by the phenomenon of acidification.

Acidification has increased by 26% since the industrial revolution due to rising carbon emissions with carbon dioxide emissions being the most worrying. Due to the absorbed carbon, the sea water becomes more acidic, the PH levels drop significantly, endangering the coral reefs and other species that affect the marine food chain and even tourism (<https://el.unionpedia.org>).

1.4. Protection, restoration of marine coastal ecosystems

The lives of societies depend in many ways on marine ecosystems. States have taken multiple measures to combat the loss of aquatic habitats and biodiversity that poses a serious threat to human survival and climate stability, to water and food security (United Nations Environment Programme & International Water Management Institute, Colombo) (Chiramba, Khaka & Boelee, 2011).

1.5. Conservation of coastal areas

A crucial step was to establish a network of marine protected areas in which human activities are subject to strict regulations. The management measures concern the complete prohibition of fishing, the extraction or production of wind energy or the imposition of a protection regime where economic activity is limited (only certain types of fishing are allowed).

1.6. Termination of harmful fishing subsidies

Non-sustainable fisheries are defined as the main threat to habitats and their species. Fair access and sustainable supply (catch limit, total quantity limit, control to prevent damage to marine ecosystems and conservation of fish stocks) put an end to overfishing, catastrophic, unregulated practices and the subsidies that encourage these activities.

1.7. Increasing financial benefits from sustainable use

Marine resources are especially important for people living in small island communities, the oceans provide them with livelihoods and benefits from tourism and fishing. UN Member States are committed through Agenda 2030 to increasing the benefits of small island developing countries and those less developed from the sustainable use of marine resources.

The 3 goals of Goal 14, the so-called 14a, 14b and 14c, integrate the three pillars of sustainable development, the social, the economic and the environmental. In addition, they set

out the legal status of the seas, the rights and obligations of navigation, peace and security, the conservation and management of marine resources, the protection and conservation of the marine environment through scientific research, the development of marine technology, strengthening and maintaining the sustainable use of the oceans and their resources through the application of International Law.

2.Sustainability of the oceans

Oceans and marine resources are increasingly threatened; pressures from climate change and the destruction of marine and coastal habitats, and anthropogenic pressures on their ecosystems are challenging their resilience, as well as their continued ability to provide important goods and services. It is considered necessary, to immediately implement solutions to the problems that present and threaten their sustainability, in order to avoid the environmental, economic and social costs that will be created by their degradation (UN General Assembly, 2015).

2.1. Problems in the oceans

Factors associated with human activity that threaten the viability of the oceans include: solid waste, nuclear pollution, petroleum hydrocarbons, thermal pollution, acidification and overfishing. Solid waste is materials that come from urban areas, from agricultural, industrial and mining activities (Andreadakis, 2008). They are classified according to their origin in urban, household, commercial, building materials, municipal waste or in industrial, agricultural and metal-quarry (Voutyrakis, 2010).

One problem that concerns the global community is plastic pollution. Millions of tons of plastic end up in the oceans with adverse effects on marine life. Swallowing plastic materials feeds the organisms with toxic substances, which pass through the food chain into the human body. Injuries to marine animal populations from large pieces of plastic are also common (www.europarl.europa.eu).

Excessive increase of nutrients that end up in aquatic places, such as residues of fertilizers, detergents, organic waste from nitrates and phosphates, cause the phenomenon of eutrophication. Bacteria grow on water surfaces causing shading in the water below the surface. Without light, photosynthetic organisms at the bottom die. The number of bacteria increases as well as the consumption of oxygen, while the production decreases, with the result that there is no food for photosynthetic organisms e.g. first the fish die, followed by bacteria, creating a dead ecosystem (Darakas, 2010). A recent example of eutrophication is the amorphous mucus that covered large areas of the Marmara Sea.

Nuclear pollution is created by nuclear waste and the application of nuclear technology (Tsalikis, 2017). The nuclear accident at Fukushima station in Japan in 2011, in addition to a series of catastrophic events for the environment, continues to affect the oceans and aquatic life. Bluefin tuna that swam in the Sea of Japan during the Fukushima Accident then moved to the Pacific Ocean were caught off the coast of California and were found to have low levels of radioactivity. According to experts, the fish were contaminated with radioactive substances released into the sea after the nuclear accident in Fukushima.

Petroleum hydrocarbons are associated with oil spill conditions or maritime activities (oil tanker collisions, cargo loss, oil spills, gas leaks), affect the development and nutrition of aquatic life, pollute food sources, inhibit reproduction and create conditions unsuitable for the survival of living organisms. Major ecological disasters were caused by oil spills, one of the largest oil spills was created in the Gulf of Mexico by the BP Platform on 20/4/2010. Important endangered species were threatened, the Bluefin tuna and the species of brown

pelicans that breed in the area, sea turtles, sharks, whales, dolphins. It has brought billions of dollars in losses to the local communities and economies.

Rising water temperatures from the hot water drain used as plant cooling water, climatic conditions, very high air temperatures for a long period of time and low rainfall cause thermal water pollution. This phenomenon reduces water-soluble oxygen, increases toxicity, and accelerates the rate of normal functions in organisms that often end in death (Albanis, 2009).

Ocean waters are becoming more acidic as they absorb more and more carbon dioxide from the atmosphere. Ocean acidification is the result of seawater reacting with carbon dioxide, producing more chemicals and reducing minerals such as calcium carbonate necessary for the survival of many marine organisms. Mussels, plankton and coral reefs are endangered due to acidification. It also affects the corals of the deep waters of the North Atlantic, biodiversity hotspots, habitats for thousands of species (shrimp, lobsters, crabs, groupers). Over the next 20 years, coral reef degradation could present fundamental challenges in the cost of living for 500 million people regarding their food and income (Mozeli & Thach, 2014).

Overfishing has reduced marine species by 39%, with 11-26 million tonnes of fish worldwide being caught illegally. 75% of the fish population is on the verge of overfishing or overfished. Many species are threatened with extinction, such as Pacific Bluefin tuna and swordfish, whales, dolphins and turtles caught in the hunt for sustainable fish. Overfishing is responsible for polluting the seas with fishing gear lost at sea. With the right tools and technology, fishing contributes to a significant reduction in fish stocks. The trawlers used in the coastal zone, flatten everything that covers the seabed. The disappearance of many marine species is facilitated by fishing methods, the use of chemicals and explosives (Stergiou & Tsikliras, 2015).

3. EU policies and actions for Goal 14

The European Union seeks to ensure the protection of the marine waters of the European continent with long-term planning, developing an integrated policy framework to address the negative effects on the marine environment. It promotes a comprehensive policy for the Sustainable Development of the Marine Environment and establishes a Community framework for the management of coastal areas for navigation, ports, jobs at sea and fisheries. The EU announces guidelines for sustainable aquaculture in its member countries {(com (2013) 0229)}, promotes blue energy {(com (2014) 0008)}, seeks to harness the potential of ocean energy at sea and oceans; and draws up a strategy to stimulate and create jobs in coastal and maritime tourism {(com (2014) 0086)}.

With a view to integrated ocean management, Parliament and the Council of Europe have adopted the Maritime Spatial Planning Directive (2014/89/EU), which promotes the sustainable development of maritime economies and the use of maritime resources through better conflict management and synergy between the various maritime activities. The Parliament (16/01/2018) approved a resolution on international ocean governance "Agenda for the Future of Our Oceans", in the context of Sustainable Development for 2030, in all marine and maritime activities.

The European Parliament (27/03/2019) adopted a legislative resolution to reduce certain plastic products in the environment. Users of plastic fishing gear must adopt solutions for the reuse of materials. On April 4 it adopted a resolution on the minimum level of training of seafarers to improve the level of maritime safety and tackle marine pollution. Finally, it adopted a resolution of the United Nations Conference on Climate Change (28/11/2019) through international cooperation, solidarity and commitment to joint action, to achieve the preservation of the planet (<https://europarl.europa.eu>).

4. EU funding for Goal 14

The European Maritime, Fisheries and Aquaculture Fund is the main financial instrument of the common fisheries policy, as well as of the EU's maritime policy and international obligations for the conservation of the oceans. It provides assistance to fishermen and funds actions aimed at managing marine resources, as well as developing a sustainable blue economy. For the years 2021-2027 it focuses on the promotion of sustainable fisheries, the strengthening of sustainable aquaculture practices, processing and promotion of fishery products, promotes the blue economy and contributes to the prosperity of coastal areas, subsidizes sustainable fisheries, the international governance of oceans and secures marine protected areas to combat overfishing (<https://www.eea.europa.eu>).

The new European Maritime Fisheries and Aquaculture Fund is funding Member States with 6.1 billion for investments to strengthen competitiveness in the fisheries and aquaculture sectors, to protect and restore biodiversity. 15% of national resources should be allocated to actions to strengthen fisheries control and data collection on fisheries and the fight against illegal and unregulated fishing (<https://europa.eu/Greece/el>).

The Blue Economy Program through the platform "Blue invest" will finance from 2021 to 2027 financial institutions and organizations in order to develop actions for the sustainable use of the oceans and marine resources (<https://www.eea.europa.eu/commission>).

The LIFE 2020 program is the only financial tool dedicated exclusively to climate change actions, aimed at protecting, restoring and improving the environment, air, water and soil quality, tackling ecosystem degradation, stagnation and the reversal of biodiversity loss (www.prasinotameio.gr).

The Cohesion Fund provides grants through calls for proposals. Each Member State with S.A.E. less than 50% of the Community average can be supported by the Cohesion Fund, which promotes proposals to reduce carbon emissions in all areas, to protect the environment, to promote resource efficiency and adaptation to climate change (<https://www.greenw.efa.eu>).

4.1. Greek policies for Goal 14

Greece, with priority given to the implementation of Agenda 2030 and the implementation of the Sustainable Development Goals, has set up an institutional mechanism, the Office of Coordination, Institutional, International and European Affairs of the General Secretariat of the Government with responsibility for coordinating and monitoring the implementation process of the UN 17 Sustainable Development Goals at national level, aiming to ensure economic development in balance with social prosperity and environmental protection (General Secretariat of Government, 13/10/17). For its implementation, the country integrates the 17 goals of Sustainable Development in its social, environmental, economic policy with a legislative framework and promotes action plans for their implementation.

4.2. Actions and projects of Greece for goal 14

At the World Congress of the International Union for the Conservation of Nature - IUCN (03/09/2021, Marseille), it was announced by the Prime Minister of Greece Mr. Mitsotakis, that in 2023 Greece will assume the Presidency for the implementation of the Action Plan "The Mediterranean: a model sea by 2030". The Prime Minister listed the measures taken by the government to address the effects of climate change, and the ambitious commitments it undertakes for the Greek seas in the framework of the initiative for the Mediterranean for 2030 (<https://primeminister.gr>).

The Prime Minister announced, among other things, that Greece's goals are: a) the reduction of plastic waste by 50% and micro plastic waste by 30% by 2030, b) the prohibition of fishing in 10% of the seas with the aim of recovering ecosystems affected by overfishing, c) the promotion of sustainable maritime transport practices to protect the environment and tackle climate change, d) the development of maritime spatial planning for all Greek seas through the implementation of strategies that will protect the ecosystem, e) the protection of all NATURA 2000 sites through practices that will be completed by 2022, f) the commitment to turn 30% of the Mediterranean to Marine Protected Area by 2030 and g) the need to establish a sustainable aquaculture action plan, facing key challenges such as spatial planning, potential friction with other uses of the sea and the coast -including tourism- and environmental pollution (<https://primeminister.gr>).

With the coordination of the Ministry of Environment and Energy in the framework of the LIFE-114 NATURA program, action plans are promoted concerning the protection of the sea turtle *Caretta-caretta* and the protection of the native trout species. The action plans describe measures for the protection, conservation or restoration of a species or habitat and aim to improve their condition. The projects are based on research and collective participation of government agencies, scientists of various specialties, local agencies.

Greece has established the National Waste Management Plan (2020) and the National Strategic Waste Prevention Plan. The Ministry of Commercial Shipping in collaboration with Regional Waste Management Plans promotes a series of actions and measures aiming at achieving environmental, economic, social benefits through public awareness and participation in prevention, production, separate collection and recycling of waste (<https://www.ypen.gov.gr>).

With Law 4736/2020, all public bodies have the obligation to stop procuring 10 categories of disposable plastics.

5. Policies of the Local Authorities for Goal 14

The planning and implementation of actions by the Local Authorities can contribute to the recovery of the marine environment. By developing a management strategy to prevent and take action to reduce the serious effects of environmental pollution and to deal with the effects immediately, they will make a positive contribution to the protection of life and its continuation in the marine environment.

5.1. Actions and projects of Local Authorities for Goal 14

Through the financing of the NSRF (2021-2027) it is designated to develop actions by the Regions and the Local Authorities, for the more effective governance and management of the protected areas NATURA 2000 and the support of the marine spatial planning (NSRF 2021-2027).

The Municipality of Kalamata placed environmental awareness signs in busy areas of the city for marine pollution, proceeded to the recycling of disposable plastics by placing an automatic sea waste collector and a special "trap" in the estuary of the river Mendon at the city's beach, for retaining debris and waste before ending up in the sea.

The Municipality of Thira, which participates in the "Blue Network of Municipalities with Marine Litter Collection Stations" in collaboration with the Municipal Port Fund of Thira, carried out actions for the protection of the marine environment for litter collection from the seabed and coastal cleaning on the beaches.

The "Sea change Greek Island" Program is developed in ten islands of the Cyclades (Serifos, Sikinos, Amorgos, Folegandros, Kimolos, Anafi, Donoussa, Schinoussa, Herakleia

and Koufonisia) under the auspices of local Municipalities, includes information and awareness actions, cleaning of coasts and seabeds and training programs.

The Municipality of Ermoupolis, with the action "gopafree" of Cigarecycle, organized recycling of cigarette butts and e-cigarette filters to raise awareness in the local community regarding the risks of environmental pollution from cigarette butts, which were collected in special bins, separated and processed into new industrial products.

The Municipality of Alonissos, which has won national and international awards for environmental innovation issues and deservedly won the title of Green Island, has organized actions for the removal of plastic bags. It presented the model Development Plan "Ano Magniton Nisoi" for the protection of the Mediterranean monk seal in the protected area NATURA, in the National Marine Park of Alonissos, at Northern Sporades.

6. Proposals for individual actions to achieve Goal 14

Man's relationship with the environment is a relationship of interaction and interdependence, as what happens in the environment has an impact on human life and vice versa, human daily action has an impact on the environment. Man is the core of the evolution and changes that the environment has undergone over the centuries. The burden on the environment proves that man has not realized that he is a vital part of it. The protection of the environment is the responsibility and privilege of man, to protect the planet and preserve it for future generations.

Individual participation in actions and activities to protect the common living space and the environment is the most effective form of volunteering, it is a way of life and commitment to actions that will promote a sustainable management of natural resources. Man participates, is active, experiences, acquires empathy and becomes a potential "protector" of the environment.

Participating in information campaigns, raising awareness of the situation and raising awareness about the problems caused by pollution in the marine environment, the adoption of ecological behavior by everyone, especially children, will shape an ecological perception with a vision of a better management of fisheries and marine resources.

Supporting environmental action at local, regional and national level in waste management will lead to a reduction in waste packaging and an increase in recycling, the cornerstone of sustainable development.

The demystification of consumerism and the protection of the environment are incompatible concepts; we all need to change our mentality concerning our consumer choices, the strengthening of companies that use recyclable materials in the manufacturing of their products. The "Fish Guide" fish consumption guide informs us about catching fish, the appropriate fishing season, and using appropriate fishing gear.

Alternative transport (buses, train, bicycle, walking) helps to reduce toxic gaseous pollutants that end up in the sea through acid rain.

The rational use of products that contain chemicals and toxic substances such as detergent bars that are easily degraded in the environment, leave no residues, bleach with oxygen compounds, green detergents that decompose easily.

Saving water requires changing habits and using technologies with reasonable water consumption in domestic use and control of plumbing leaks.

Marine litter and plastics pose a threat to the sustainability of the seas, coasts and consequently the economy. Plastic waste such as water bottles, soft drinks, coffee cups, disposable plastic packaging, is the largest volume of garbage found on shores and seas, as well as damaged fishing nets, ropes, fishing gear that are lost or abandoned.

Individual participation in activities with frequent cleaning of the shores, the use of environmentally friendly materials and "fishing for litter", form an ecological consciousness

by eliminating the use of plastic products (cutlery, disposable dishes, bottles, straws, bags) and selection products that do not pollute the environment (biodegradable bags, reusable disposable glasses, canvas bags, biodegradable straws).

Energy from a power plant pollutes the environment with carbon dioxide that is attracted to the atmosphere and ends up in the sea through gaseous pollutants. The energy saving possibilities are unlimited, the use of compact low-consumption fluorescent lamps and the use of natural cooling, by installing automation in the air conditioner can reduce energy consumption. Utilizing new mild forms of energy, such as solar or wind, can reduce the waste of natural resources by installing a solar water heater and using photovoltaics in homes, which convert solar energy into electricity without polluting it.

Conclusions

The United Nations guiding principles for achieving Goal 14 and implementing Agenda 2030 can set a policy line for responsible behavior and social responsibility. The role of the Member States of the European Union in the education, training, information and awareness-raising of young scientists in the actions and axes of its policy is paramount for the integration of the Sustainable Development Goals, with a vision of implementing the 2030 Agenda.

With innovative ideas and a lever for the sustainability of the marine environment, a dialogue should begin on strategic planning and the redefinition of priorities to ensure climate and environmental protection. In this direction, it is proposed to build equal social, environmental and economic conditions, without exclusions, with respect for human rights and peace.

At the same time, Goal 14 of Sustainable Development will be achieved through individual commitment and action. As conscious citizens, living in the global arena and with a developed sense of responsibility, we must all contribute together, beyond political, cultural, spatial constraints, beyond linguistic, racial and religious determinations, to the protection, preservation, restoration of this global good, the marine environment, as well as its vast biodiversity which is a heritage that must be preserved for the life of the planet today, but also for future generations. Coordinated action is the most important factor in managing the sustainable development of oceans and seas.

References

- Brundtland, G. H. (1987). *Our common future*.
- Mozzeli, M. R., Thach, L. (2014) The impact of climate change on the global wine industry. *Challenges & solutions wine economies and policy* (p.81-89).
- Αλμπάνης Τ.(2009). *Ρύπανση και Τεχνολογίες Προστασίας Περιβάλλοντος*. Εκδόσεις Τζιόλα.
- Ανδρεαδάκης, Α., Πανταζίδου, Μ., Σταθόπουλος, Α. (2008). *Περιβαλλοντική Τεχνολογία*. Εκδόσεις Συμμετρία.
- Βουτυράκης, Μ. (2007). Ο υπερκαταναλωτισμός βασική αιτία υποβάθμισης του περιβάλλοντος. *Ηλεκτρονικό περιοδικό του Π.Π.Σ. Τμ. Πολιτικών Μηχανικών. Τεύχος 18*.
- Chiramba, T., Khaka, E., Boelee, E. (2011). *Μια προσέγγιση υπηρεσιών οικοσυστήματος για την ασφάλεια του νερού και των τροφίμων (Συνθετική Έκθεση)*. Ναϊρόμπι. Κέννα. Περιβαλλοντικό Πρόγραμμα των Ηνωμένων Εθνών (UNEP) Κολόμπο, Σρι Λάνκα. Διεθνές Ινστιτούτο Διαχείρισης Υδάτων (IWMI) 64p. Βιβλία IWMI.
- Νταρακάς, Ε. (2010). *Ποιοτικά χαρακτηριστικά και διεργασίες νερού*. Α.Π.Θ. Πολιτικών Μηχανικών. Θεσσαλονίκη.

- Στεργίου Κ. Τσικλήρας Α. (2015). *Αλιευτική Βιολογία και Αλιεία*. Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.
- Τσαλίκης, Π. (2017). Προστασία θαλάσσιου Περιβάλλοντος. Αποτελέσματα Ρύπανσης-Πρόληψη και Αντιμετώπιση. *Νέες Τεχνολογίες- Ελληνική και Διεθνής Νομοθεσία*, σελ. 13-14.
- <https://ec.europa.eu>.
- <https://el.unionpedia.org>
- <https://europarl.europa.eu>
- <https://prasinosameio.gr/>
- <https://primeminister.gr>)
- <https://undocs.org>
- <https://www.eea.europa.eu>
- <https://www.eea.europa.eu/commission>
- <https://www.europa.eu>
- <https://www.greenw.efa.eu>
- <http://www.sustainabledevelopment.un.org>
- <https://www.YPEN.gov.gr>
- [United Nations Environment Programme \(UNEP\)](#)
- www.noaa.gov.