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THE EFFECT OF CLIMATE CHANGE ON WETLANDS AND THE SITUATION OF WETLANDS IN TURKEY

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ABSTRACT

Other than uttering a great importance in terms of providing ecological balance and preserving biological diversity, the Wetlands are some ecosystems contributing to the economy of a country a lot. Climate change negatively affects the benefits of these ecosystems. These negative effects result in increase in sea level, The adverse effects are the increase in sea level, the danger of coral reef extinction, the change of hydrological structure, and the change of temperature in the water, leading to the diminishing or complete disappearance of wetland products and services. When the wetlands, also playing an important role in carbon circulation, are converted to be used for other purposes, high deal of carbon and other greenhouse gases cut free in the atmosphere. Therefore, it is important to evaluate the effects of climate change while establishing management plans for wetlands. The aim of this study is to put forward the effects of climate change over the wetland ecosystems, which are, after rainforests, the most important area of life. Additionally, the relative legislation has been scrutinised for the purpose of set forth the current situation of Turkey in terms of wetlands. Treaty of Ramsar (Convention on Wetlands of international Importance) that includes Turkey as a party, and its 9 criteria to define the international importance of wetlands have been taken into account; and the Ramsar areas in our country have been put into the study. Considering the climate change while planning and management of wetlands of wetlands will help preservation of wetlands and ease the effects of climate change.

Keywords: Wetlands, Ramsar Treaty, Ramsar Areas, climate change

INTRODUCTION

Wetlands are among the most productive, most valuable and endangered ecosystems. Wetlands provide many important services for people. They regulate water and nutrients, shelter and nutrition for birds and fish (1).

Wetlands have been exposed to intense destruction with natural and anthropogenic effects all over the world (1). The related effects in the near past have been directed towards the creation of areas for agricultural, industrial or urban growth, water pollution and the alteration of hydrological regimes by methods such as draining, drying and filling about half of the wetlands (2, 3, 4). The consequences of wetland losses have initiated the reactions of NGOs, scientific institutions and the governments, resulting the development of wetland preservation programs in various countries (5). Therefore, the wetlands have become the focus of international preservation activities since the beginning of 1970s.

With the purpose of protecting the water birds, the "Treaty about Internationally Important Wetlands as the Habitats of Water Birds" (Treaty of Ramsar) was put under signature in 2nd February, 1971 in Ramsar Province of Iran (5, 6, 7). After being approved by Greece as the 7th signing country, the Treaty was put into force in 21st December, 1975 (8, 9). Treaty of Ramsar is the first contract of preserving the important wetlands and, thereby, the first modern nature-preserving treaty (5, 9). Since the day of 2nd February 1997, when the Treaty was signed, has been celebrated as the "World Wetland Day" in all the countries to constitute a party on the Treaty (9).

The scope of the Treaty has in time been gradually amended to cover a complete set of factors of wetland preservation and wise use. The main purpose of the Treaty is to preserve and wisely use the wetlands through local, regional, and national action and international cooperation, as a contribution to sustainable development all over the world (7).

In our country, the Treaty of Ramsar complies with the Law Nu. 3958, dated 28/12/1993, and has been approved by the Council of Ministers Decree Nu. 94/5434 dated 17/05/1994 and has been issued in the Official Gazette Nu. 21937. Turkey is the 82th country to sign the Treaty. For sturdy application of the Treaty, a "Regulation about Preserving the Wetlands" has been created to establish basis of cooperation and coordination among the institutions and organizations authorized for preserving and improving the wetlands, whether of international importance or not (7). With the "Regulation about Preserving Wetlands" in January, 2002, the Ramsar principles were legalized to a great extent (9). This regulation was amended on 17.05.2005, 26.08.2010 and finalized on 04.04.2014 by being issued in the Official Gazette Nu. 28962 (10). According to this regulation, wetlands have been defined as natural or artificial, temporary or permanent, still or flowy watered, salty or hard or fresh watered lands with no more than 6 meters deep during ebb, and that constitute an important habitat for many living things, notably the water birds. These waters could be the marshy parts of swamps, reeds, peat moors with surrounding lands under ecological water.

Even though the benefits of the wetlands are of high importance for any kind of living things, the humans have not been able to realize that for long years. The wetlands, which are deemed to be the natural wealth of the world for its biological diversity, are the most important ecosystems on earth, thanks to their natural function and economic value. As a result of the climate change and the fast urbanization, the wetlands are among the most endangered ecosystems in the world (7).

The purpose of this study is to set forth the effects of climate change on the wetland ecosystems, the second most important living space after rainforests. Other than that, the existence of wetlands in Turkey has been observed by tackling the legislation about preserving the wetlands in Turkey.

MATERIALS AND METHODS

In this study, local and foreign literature based on wetlands constructed from the past to the present day were searched. In this context, the main material of the study is written sources. In the light of the relevant literature, the functions and the significance of the wetlands are discussed in detail. As a result of the effect of climate change on the corresponding functions, the change in the natural cycle has been revealed. In addition, in order to reveal the current situation of Turkey on wetlands, Ramsar Agreement, which is the subject of Turkey's legislation, and Ramsar areas determined in our country, taking into consideration 9 criteria defining the international importance of wetlands within the scope of the Treaty.

RESULTS

1. Importance and Functions of Wetlands

Wetlands among the most valuable ecosystems of the earth are regarded as natural wealth museums of the world as well as the countries and regions they belong to (4). However, from the first civilizations developed around wetlands and benefiting from water resources in the best way, the importance of wetlands has been undervalued and the destruction of these vitally-important areas has been rapidly initiated (11). Today, the importance of wetlands has begun to be grasped and the concept of "Wetland Area Value" has developed. The Wetland Value is to demonstrate the important and useful functions and qualities of a wetland for society. Wetland values can be grouped under three main headings (3);

- Environmental quality-enhancing values,
- Biological values,
- Socio-economic values,

1.1. Environmental Quality-Enhancing Values

Wetlands have a very important role in providing sustainability of high environmental quality, especially in aquatic systems, as well as providing a living environment for various plant and animal species (3, 11). Wetlands provide this quality by removing the chemicals, organic polluters and food materials, and providing cleansing of water, and producing food material to support aquatic life (11). The contribution of wetlands on environmental quality is detailed below (11).

Effects on water quality: One of the most important functions of wetlands is the protective effect on water quality. Wetlands have pollutant retention properties of nutrients and sediments. They help to filter waste, nutrients and sediments that move with the flow from the land due to the locations of wetlands between water and land (3, 11). An accumulation of sediments in a wetland can cause changes in biological functions, floodwaters in storage and groundwater exchanges, but retaining sediments in the sources provides the quality of the following ecosystems (12). Removal of wetlands from nitrogen and phosphorus media or conversion of inorganic nutrients into organic form is important for fish and wildlife (3). The most important role of wetlands in the cleansing of waters is to remove phosphorus and nitrogen from the fertilizers used in plant development (11). Toxic residues entering wetlands such as heavy metals, pesticides and herbicides can be removed from the environment by ion exchange and absorption. At the same time, wetlands are considered as a very good way to remove human and animal wastes from water (3).

An important role of wetlands is that during the development season when the water flows slow, they provide accumulation of nutrients. These nutrients contribute to the growth of the wildlife and agricultural products in the surrounding area as well as to the growth of the inhabitants of the water. In the season when the water flows rapidly; wetlands serve as a resource. This cycle is very important in terms of the growth of algae, fish production, water quality and the renewal

process of the ecosystems in the downstream watershed. Wetlands reduce the amount of nutrients in times when too much nutrients can cause eutrophication and release nutrients in the seasons when eutrophication is less likely to occur (3, 11).
Sediment storage; One of the biggest water pollution in most river systems is sediment formation. Wetlands usually come into play in basins. For this reason, wetlands serve as pools, and dust, clay and organic compounds accumulate in these areas (12). When the surface flow in a rainfall reaches a wetland, it is slowed down and stored because of the topography and vegetation of this area (3, 12). Wetlands are important in terms of reducing the haze of flood waters, especially in terms of port, rivers, dams not being filled with sediment and aquatic life. The sediment transported by rivers generally carries nutrients, pesticides and heavy metals together, so pollution of drinking water is prevented by protecting the wetlands. This affects the sea and lake life positively. In addition, for the continuity of recreational activities, the presence of these areas that protect the environment from sedimentation is of utmost importance. Because of the chemical properties of the soil in the wetlands, the carbon compounds stored in these areas decompose very slowly. Because of these properties, wetlands serve as places where these compounds are constantly stored (3).
Effects on spherical cycles and microklima; The involvement of wetlands between terrestrial and aquatic ecosystems is very important because of the connection of two different systems from biogeochemical maintenance. Wetlands play an important role in global cycle of nitrogen sulfide, methane and carbon dioxide. The wetlands on earth are reservoirs that collect and accumulate significant amounts of carbon in organic soils and turtles. The transformation of wetlands into agricultural areas in particular leads to changes in the global wetland-carbon cycle. This change has regional differences. Some wetlands have served as carbon warehouses while others have turned into carbon-supplying sources. This situation is very important for global warming (3, 11). Hydrological and energy transfer characteristics of wetlands balance microclimatic conditions, especially rainfall and temperature. This affects natural resources and agriculture-related activities and provides a balance between ecosystems (3).

1.2. Biological Values

Wetlands, the highest ecosystem of the world's biological production along with the rainforests, set appropriate environments for the breeding, feeding and sheltering of a large number of animal species, as well as growing a large number of plant species of high ecological value. Especially the wetlands on top of intercontinental migration routes are vital for water birds since these places are frequented by birds (4).

1.3. Socio-Economic Values

Wetlands also contribute to the socio-economic structure as they provide recreational and tourist opportunities with their visual values. Wetlands that provide energy for the people of the region contribute to the region's economy with the natural products they contain, as well as the transportation and transportation on them. In addition, they have duties, such as flood control, coastal and erosion control, recharge and discharge of ground water, natural products, hunting, fishing, marine animal breeding and energy (4, 11).
Flood control; Wetlands have the function of protecting downstream residents from flood damage due to the temporary storage and slow release of flood waters. The wetlands that occur in the flood beds carry flood waters from the upper basin to the following points. This feature is a very important function in today's rapidly urbanized areas and their protection from floods (3).
Coastal and erosion control; Wetland vegetation provides coastal stabilization by reducing the energy of waves, currents or other erosion forces. At the same time, they regulate the bottom sedimentation of an area by using plant roots. This prevents valuable agricultural and settlement areas from damage (12).

Providing recharge and discharge of groundwater; Wetlands have superior functions and contributions in balancing the water regime of the region they are in. Every wetland, even if it is miles away, certainly feeds many sources or another wetland (Dugan 1990). Particularly, waters accumulating in wet area types such as lakes, marshes, peat and flood plains pass to the aquifer layer, the water collected in the aquifer layer flows regularly and sometimes flows horizontally and emerges as a discharge of groundwater in another wetland (4).
Natural products, hunting, fishing and marine livestock; Products obtained with natural products such as timber, peat and reed, naturally supplied from many wetlands, and products obtained from fishing, hunting etc. are the basis of economy in many countries. In addition, many wetland meadows are also used as winter grazing as they are used as grazing grounds. Furthermore, many species of fish, considered to be economically important, spend at least one period of their lives in such areas, because many wetlands have a rich nutrient and safe nesting and living environment that allows the fish to lay and grow eggs (11).

2. Wetlands and Climate Change

One of the biggest challenges is discerning the impact of climatic conditions and the loss of habitat that large portions of biodiversity face in our century (13). In this context, worldwide climate change is defined as the greatest threat to the survival of all ecosystems and species (14).
In the past, most of the wetlands have been destroyed due to urbanization and industrialization. But in recent years the importance of protecting wetlands has been emphasized and the importance of these areas has been understood by humans. Wetlands are very important for habitats that provide ecological diversity of life. However, the management, and protection of wetlands are considered to be least important subject in balancing the effects of climate change (15).
For this reason, it is necessary to evaluate the effects of climate change when establishing a management plan for wetlands (16). Climate change significantly affects the spatial extent, distribution and function of wetlands (15). Pressures on wetlands stems from the changes in hydrology, the direct and indirect effects of temperature, as well as the change in the use of the area.
Mortsch (1998) has analyzed the effect of climate change on the shores of The Great Lake, and effect of wet and hydrological characters over ecology. Dawson et al. (2003) analyzed the water balance in the application of the climate change scenario. As a result of both investigations, wetlands have been shown to change their water balance due to climate change. At the same time, changes in the habitat and species diversity resulting from the changes in the water balance have been discussed (16).
Witney and Van Kooten (2011) analyzed the effects of climate change on wetlands and waterfowl. As a result of the analysis, it has been concluded that there have been changes in the wetlands due to increased temperature and precipitation and that these changes in the water have affected the waterfowls (16).
Climate change effects such as sea level rise, danger of extinction of corals, hydrological changes, temperature changes of the wetlands and greenhouse gas emission affect wetlands adversely.

- **Effects of Sea Level Rise**

One of the main effects of sea level rise is coastal erosion. The effects of erosion include; Increased coastal flood, increased habitat loss, increase in salinity of estuaries and freshwater aquifers, change in the connection between rivers and bays, transportation of sediments and nutrients, pollution in coastal areas. The rate of increase of speed in the see level rise results in the change of the species order and in the reduction of production and function of wetlands. The rise in sea level causes wetland systems to move into the inner areas. The rise in sea level and the large waves caused by the storm are badly affecting the fresh water assets of coastal wetlands due to salt water. Salty water in the delta system adversely affects the available water quality for agricultural, local and industrial uses (17).

- **Coral Bleaching**

Coral reefs are very important in terms of biological diversity in the marine ecosystem but are very sensitive to temperature changes. The short-lived 1-2 ° C increase in water temperature leads to the bleaching of coral reefs. A continuous 3-4 ° C increase, on the other hand, causes the coral reefs to die. The increase in sea level and the large waves caused by the storm are also damaging the coral reefs. The concentration of carbon dioxide, which has increased in the atmosphere in recent years, adversely affects the growth of coral reefs (17).

- **Hydrological Effects**

Changes in the hydrological cycle are affecting wetlands. These cycles include precipitation, evaporation, sweating, flow, changes in underground recharge and flow. These changes affect both surface and underground water systems as well as wetland function, local water supply, irrigation, water power generation, industrial use and water tourism (17).

- **Temperature Change Of Water In Wetlands**

The increasing temperature of the world leads to the evaporation of water in the wetlands and increases the deterioration speed of the organic matter retained in these areas, while at the same time reducing the glaciers and rainfall which are important resources for wetlands. This causes the CO2 and methane (CH4) gas to be released from the wetlands to the atmosphere. Rare and endangered plants and animal species are very sensitive to small temperature changes. Global warming causes these species to disappear. (17, 18).

- **Wetlands As Greenhouse Gas Reserves And Sources**

Wetlands are carbon storage sites and account for approximately 10% of global carbon deposits. When these areas are destroyed or damaged, CO2 and other greenhouse gases are released in large quantities in the atmosphere. Therefore, protection and preserving of wetlands is crucial for the existence of carbon storage sites (17).

The impacts of climate change on wetlands also affect the continuous provision of ecosystem services. The situation shows that the role of climate change needs to be taken into account in the management of wetlands and in the taking of decisions affecting them. The fight against climate change is examined under two broad strategies. These strategies are mitigation and adaptation. Reduction means that the total amount of greenhouse gases is reduced in the first place where it enters the atmosphere. Especially peatlands, mangroves and salt marshes are very important for the reduction of greenhouse gases because of the function of being a carbon deposit or pool. Adaptation includes the actions minimizing the negative effects of climate change. Although wetlands are endangered by climate change, the fact that well-managed wetlands are very effective against some of the harmful effects of global warming has emphasized the significance of the adaptation strategy. Coastal wetlands such as mangroves, tidal flats and salt marshes absorb the energy of storm and tidal waves and the roots of wetland plants stabilize the shoreline and reduce erosion. In a study of the modeling of the major effects of the hurricanes, the United States has shown that each hectare of coastal wetlands avoids damage worth an average of US $ 33,000 (19).

Protecting wetlands and ensuring their sustainability by using management strategies involving natural habitats will prevent ecosystems from being damaged, destroyed, crumbled and contaminated. The restoration of damaged wetlands and the creation of artificial wetlands compensate for the loss of natural wetland function at maximum rates (17). As a result, conservation of wetlands, good planning, careful use, restoration of destroyed or damaged wetlands is the most effective solution to climate change.

3. Status of Wetlands in Turkey

Wetlands that are regarded as natural riches of the world because of their biodiversity; are the most important ecosystems on the face of the earth with their natural functions, social and economic values (20). The most important development regarding the wetlands was the signing

of the Convention on Wetlands of International Importance Particularly as The Habitat of Water Birds" with the participation of 18 countries in Ramsar city of Iran on February 2, 1971 and its entering into force in 1975. While, in the early days, the scope of the contract was limited to wetlands having an importance for water birds only, it was expanded in a way to include almost all artificial and natural water bodies in the developing process. The name of the Convention was also amended and changed to "Convention on the Protection of Wetlands of International Importance" (21).

The aim of the Ramsar Convention; to ensure the protection and rational use of all wetlands by providing international cooperation through local and national activities as a contribution to achieving sustainable development around the world. The treaty is therefore a nature conservation agreement that sets such a framework aiming sustainable development by providing a conservation-use balance and that does not regard the wetlands only as some kind of property to be preserved (21).

The wetland legislation in Turkey is related to many international regulations and numerous national legislation. In this context, the legislation on wetlands can be examined in 3 sections; International legislation, national legislation and subsidiary legislation. Within the framework of international legislation, wetlands are areas of almost all of which are also covered by the nature conservation agreements to which Turkey is a party. The international agreements concerning wetlands to which Turkey is a party (21):

- Conservation of Wetlands with International Preservation (Ramsar) Convention
- Biodiversity Convention
- International Convention for the Protection of Birds (Paris Convention)
- Convention on the Arrangement of the Trade of Endangered Wild Plant and Animal Species (CITES)
- European Landscape Contract
- The Convention on the Protection of the Wildlife and the Environment of Europe (Bern)
- Convention on the Protection of the Mediterranean against Pollution (Barcelona Convention)
- Protection of Migratory Species from Wild Animals (Bonn) Convention (Turkey not a party)
- Directive on the conservation of wild birds (2009/409 / EEC) (Bird Directive, 1979)
- Directive on the protection of natural and semi-natural habitats and wild flora-fauna (92/43 / EEC) (Habitat Directive, 1992)

All of these contracts mentioned above are the contracts for the conservation of important habitats for species inhabited by wetland species or for species including wetlands. However, the Ramsar Convention is merely a convention on wetland ecosystems that strived to protect wetland ecosystems (21).

The legislation regarding the wetlands can be listed as follows: (21):

- Decision of the Council of Ministers on the date of 15 March 1994 and ratification of the Ramsar Convention No. 94/5434 (with the Official Gazette dated 17.05.1994 and 21937)
- 1993/1 General Circular of the Prime Ministry (dated 11/01/1993 and number 02209)
- Environment Law No. 2872 (amended by Law No. 5491)
- Land Hunting Law No. 4915
- Decree Law No. 645 on the Establishment and Organization of the Ministry of Forestry and Water Affairs
- Regulation on Conservation of Wetlands
- Regulation on the Procedures and Principles for Detection, Registration and Approval of Protected Areas
- 1st Communiqué on Wetlands (Official Gazette dated 28.05.1994 and numbered 21943)
- 2nd Communiqué on Wetlands (Official Gazette dated 05.04.1995 and numbered 22249)
- 3rd Communiqué on Wetlands (Official Gazette dated April 14, 1998 and numbered 23314)
- 4th Communiqué on Wetlands (Official Gazette dated 09.02.2005 and numbered 25722)

- 5th Communiqué on Wetlands (Official Gazette dated June 20, 2009 and numbered 27264)
- 6th Communiqué on Wetlands (Official Gazette dated 31.01.2013 and numbered 28545)

Upon the enactment of the Decision of the Council of Ministers with reference to being a party to the Ramsar Convention No. 94/5434 and date 15 March 1994 and its publish in the Official Gazette no. 21937 on 17 May 1994, the Ramsar Convention is the first legal arrangement in our country to protect wetland areas (21). "Regulation on the Protection of Wetlands" was prepared in order to determine the principles of cooperation and coordination among the institutions and organizations responsible for the protection and development of all wetlands of or without international importance for the implementation of the Convention (7.). The "Regulation on the Protection of Wetlands" issued on 30 January 2002 paved the way for Ramsar Convention principles to be significantly legalized (9). This regulation was amended on 17.05.2005, 26.08.2010 and it was finalized by being published in Official Gazette No. 28962 on 04.04.2014 (22).

Subsidiary legislation regarding wetlands (21);

The necessary work for the protection of Natural Protected Areas declared by the Law No. 2863 on Preservation of Cultural and Natural Heritage, the Protected Areas declared by National Parks Law No. 2873, "Special Environmental Protection Areas" declared by Decree Law No. 383 and the wetlands remaining within the scope of "Water Products Law" is carried out by the relevant institutions.

According to the Ramsar Convention criteria, 135 Wetland Areas of International Importance have been identified in Turkey. Most of these areas have international importance for water birds and fish species they harbour. There are 9 criteria defining the international significance of wetlands. These criteria are given in Table 1 (9, 20, 22, 23).

Table 1. Criteria of Wetlands of International Importance According to Ramsar Convention

Group A: wetlands that are representative, rare or having unique characters		1. If a wetland is rarely encountered or forms a specific example of wetlands in the unusual bio-geographical region; (Rarity, typicality)
Group B: Wetlands with international importance to protect biodiversity	Criteria about species and ecological populations	2.If a wetland is in support of rare, dangerous, or endangered plant and animal species, or contains one or more individuals (a significant number) of these species,
		3. If a wetland possesses a particular value to sustain the ecological and genetic diversity of an area indirectly characterized by flora and fauna and quality; or a wetland has a particular value in terms of endemic plant or animal species or populations; if it regularly supports a considerable number of water birds from the waterfowl groups that will demonstrate the values, productivity or diversity of a wetland, it can be characterized as a wetland of international importance.
		4. A wetland can be described as a wetland of international importance if it plays a special importance by forming a habitat for plant and animal species at critical stages of biological cycles of them.
	Criteria about water birds	5. A wetland has an international importance if it harbours 20.000 water birds
		6. A wetland can be considered a wetland of international importance if it regularly supports 1% of the population of a species or subspecies of waterfowl wherever it is possible to obtain data on populations,
	Criteria about fish	7. If a wetland hosts subspecies of natural fish, or their families, life stages, intercrop relationships and / or populations that indicate the benefits and / or value of the wetland, and thus global biological diversity it can be characterized as a wetland of international importance.
		8. A wetland can be characterized as a wetland of international precaution\importance if it has an important source of food for the fish, in the wetland or elsewhere connected to it, or if it is the oviposition area, or if it is on the feeding environment and / or on the migratory route of the fish or tiddlers
	Criteria about non-flying animal species	9. A wetland may be characterized as a wetland of international importance if it regularly holds 1% of the world population of species or subspecies other than water birds living depending on the wetland.

The number of existing Ramsar areas which provides the necessary criteria to become a Ramsar area in our country is 14. These areas are in Table 2 (6, 20, 22,);

Table 2. Ramsar Areas in Turkey

No	Name of the Wetland	City	Year	Area (ha)	Other Protection Status
1	Sultan Sazlığı	Kayseri	1994	17.200	Natural Protected Area, National Park
2	Manyas Gölü	Balıkesir	1994	20.400	National Park, Natural Protected Area
3	Seyfe Gölü	Kırşehir	1994	10.700	Natural Reserve Area, Natural Protection Area
4	Göksu Deltası	Mersin	1994	15.000	Specially Protected Environment Area, Natural Protection Area
5	Burdur Gölü	Burdur	1994	24.800	Wildlife Improvement Area Natural Protected Area
6	Kızılırmak Deltası	Samsun	1998	21.700	Wildlife Improvement Area (Cernek ve Çevresi) Natural Protection Areas
7	Ulubat Gölü	Bursa	1998	19.900	None
8	Gediz Deltesı	İzmir	1998	14.900	Wildlife Protection Area and Archaeological Site
9	Akyatan Lagünü	Adana	1998	14.700	Wildlife Improvement Area Natural Protected Area
10	Yumurtalık Lagünleri	Adana	2005	19.853	Natural Conversation Area Natural Protected Area
11	Meke Maarı	Konya	2005	202	Natural Protected Area Natural Monument
12	Kızören Obruğu	Konya	2006	127	Archaeological Site
13	Kuyucuk Gölü	Kars	2009	416	Wildlife Improvement Area
14	Nemrut Kalderası	Bitlis	2013	4.589	Natural Monument

DISCUSSION AND CONCLUSIONS

Along with the developing world, the climate change caused by the increasing population pressure, adverse effects of agricultural production, irregular urbanization and unplanned industrialization, domestic wastes, interventions to the water regime, factors impeding the continuity of biodiversity and threatening flora-fauna and global warming has a negative impact on wetland ecosystems (7).

Wetlands are a very important ecosystem that provides social, economic and environmental benefits globally. And climate change negatively affects the benefits provided by these ecosystems. These adverse effects in question lead to the increase in sea level, the danger of coral reef extinction, the change of hydrological structure and the change of temperature in the presence of water, the decrease or complete loss of wetland products and services. Wetlands that play an important role in the global carbon cycle are also called carbon storage areas. When wetlands are converted to different areas of use, a fearful rate of carbon and other greenhouse gases are released into the atmosphere (17).

Yasar Korkanç (2004) stated that wetlands are ecosystems that have very valuable functions and values within a watershed system and must be protected. He emphasized that the continuity of these ecosystems is vital and proposed that the programs to be developed by the approach of integrated watershed management in the management and planning of wetlands, important in terms of ecological processes, would provide significant contributions to the sustainable use of these areas (3).

Erwin (2009) stated that the conservation and sustainability of these areas would be achieved by undertaking wetland restoration programs and implementing sustainable ecosystem management plans to reduce CO2 emissions and reverse existing climate change trends (14).
Can and Taş (2012) emphasized that there is the rapid depletion of freshwater resources due to global warming; water and aquatic products and aquatic ecosystems are the most important concerns; and that today it should be a national security issue to protect wetlands and to carry them to the next generation in the healthiest way possible (24).

Erdem (2013) stated that wetlands are important carbon deposits. He reported that 40 % of the world's carbon is stored by wetlands; and that wetlands despite forming 3% of the earth, retain 25% of the carbon on the face of the earth. In this context, he emphasized that the emergence of carbon dioxide stored by wetlands would increase global warming by 60 % (25).

Sülük et al. (2013) have emphasized that in addition to the economical use of wetlands, they provide many other benefits in aesthetic sense for the protection of fish and birds and wildlife, improvement of water quality, flood control and ecology (7).

For this reason, conservation of wetlands and the use of intelligent uses will be achieved by considering the climate change. Taking climate change into consideration in the planning and management of wetlands, conservation and restoration of wetlands will help alleviate the climate change. As a result; wetlands are important ecosystems that have important functions and values that must be protected. The sustainability of these ecosystems is very important in terms of ecological, economic and social processes.

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