Journal of Tourism & Hospitality Research
Islamic Azad University, Garmsar Branch
Vol. 2, No. 1, Summer 2012, Pp. 29-45

A Survey on the Geopolitics of Environment in the Caspian Basin Energy Interactions

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Abstract
Caspian Sea with area of 366400 square kilometers is the greatest lake of the world appeared as a result of analysis of the great Tethys Sea's remnants in the third geology period. While it has not all characteristics of a sea, it is vast and saline and has waves and connects to the open seas through Volga-Don channel; so it is called a sea. Following the former Soviet Union collapse and gas and oil discovery in Central Asia and Caucasia, it faced complex realities and interests in international political economy. These problems were mainly rooted in developed countries' arrangements for increase of their influence in the area and in Russia's traditional relations with the Islamic and Turkish governments in the region. This paper investigates the Caspian Sea oil resources and the related routs for oil transmission trough a descriptive-analytical method. Moreover, it studies the role of these factors in regional interactions of the coast line countries. Finally, it analyzes the Environment geopolitics of the Caspian Sea, with regard to the oil material pollutions and the Islamic Republic of Iran's policies. The results revealed that the new routs of oil transmission and Iran's active role in environment preservation may have a key role in the regional constructive interactions among the Caspian coastline countries.

Keywords*: Caspian Sea, Oil resources, Regional interactions, Oil transmission routes, Environment geopolitics.*

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Received Date: 31 December2013 *Accepted Date: 3 April 2014*

Introduction

Energy is one the most efficient factors in the world political equations; and the Middle East are not an exception in this regard, because of its huge resources of gas, oil and fossil energy. Two great water areas, Caspian and Persian Gulf, possess a large amount of discovered and undiscovered resources. Caspian Sea catchment area is considered as a strategic energy source, concerning its Vast gas and oil resources (calculated and non-calculated). In addition to the importance of the resources in the area, the position and energy transmission routs increase the area's geopolitical and geo-economic characters.

The I. R. I. as one of the main role players in Caspian Sea has faced water border and water sovereignty changes, following the former Soviet Union collapse and formation of the newly independent countries. A great deal of changes are related to the "area's under-water resources. Each newly independent country around the Sea has specific plan for oil and gas extraction and transmission trough pipeline, which are opposed by the neighboring countries and their retaliating plans. On the other hand, the western powers and specifically the United States' intervention and their strategic and ideological threats for the regional countries such as Iran and Russia have increased the area's fears and hopes. At the eve of 20th century oil led to many wars at the world, but the current political utilities of the pipeline or transmission routes may hurt the governments' economic systems. However, existing hydrocarbon resources can enhance the regional convergence and lead to coalitions or unifier economic structures in the region. Concerning Iran's regional interaction and the neighboring countries coalitions in energy resources transmission and exploitation, the country may play a key role in constructive regional relations.

Methodology

This study has been conducted using descriptive analytical method and utilizing library documents as well as those of prestigious scientific centers. In this way we have analyzed the Caspian Sea environment, emphasizing on fossil energy resources' (oil) prolusion

factors. We have attempted to study the Geopolitics of environment in the framework of the Caspian Sea's regional interactions.

Theoretical bases

Environment in Caspian Sea

Caspian Sea with an area of 366400 square Kilometers is the greatest lake of the world appeared as a result of analysis of the great Tethys Sea's remnants in the third geology period. While it has not all characteristics of a sea, it is vast and saline and has waves and connects to the open seas through Volga-Don channel; so it is called sea.

The lake is in 36º 33´-37º 7´ north width and 45 º 43´-54 º 50´ East lengths (CEP, 2004, 10). The Caspian coastline is 7000km among which 1000km (from Astara to Atrak river)belongs to Iran, about 2300km belongs to Kazakhstan, 1642km to Turkmenistan, 825km to Azerbaijan and 695km to Russia (including 490km to Dagestan, 110km to Kalmykia and 95km to Astrakhan)[Mostaqimi, 2005. P. 4].

The Caspian Sea has a water volume of 78200km³. The Sea length from north to south is 1200 km and the width is 200-400km [ibid, P. 4].

Many morphological parameters of the Caspian Sea (such as surface, volume, depth) changes with water level oscillation; therefore, the parameters must be mention along with the water level. That is why; many scientific sources and maps have considered the sea at 28m level. The deepest point of Caspian is 1025m in South Caspian with the average depth of 208m (Nikolaeva, 1971, 143). Depth distribution and surface area are highly different; the highest surface of the basin relates to the depth of up to 100m (62. 12%) and the most water volume relates to the depth of 100-600m (Moscow, 1986, 262).

The ratios of the North, Middle and South Caspian surface to the total surface of the sea are 24. 3%, 36. 4% and 39. 3%, respectively.

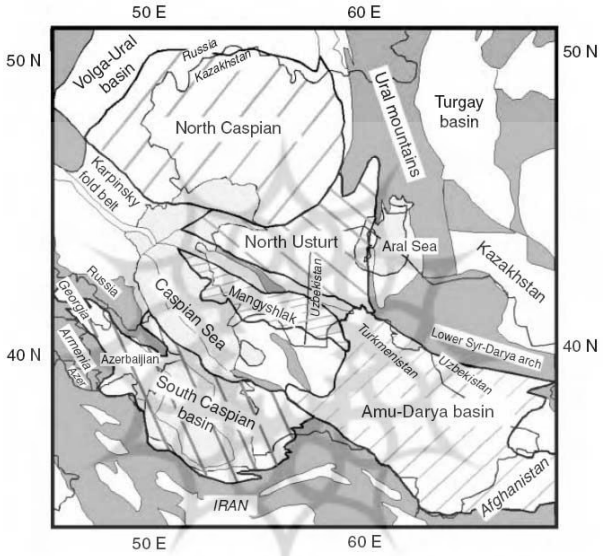
Characteristics of the Caspian Sea's Coastline countries

Country	Surface (km²)		Population (million)	
	Country	Catchments	Country	Residents of the Catchments
Iran	1685000	185000	75	11
Turkmenistan	488100	400000	5	0. 4
Kazakhstan	2717300	695000	15. 2	0. 4
Russia	17075400	1670000	142. 7	60
Azerbaijan	86600	866000	8	7. 6

Position and energy resources of the Caspian Sea

The Caspian Sea is surrounded by five geological basins including southern, Northern, North Ustrust, Mangyshake and Amu-Darya basins; however Iranian political borders does not follow the pattern.

The basins represent historical eras and diversity of the hydrocarbon reservoirs (Beloplosky and Taiwani, 2002, 14). In this regard, the southern basin which covers Iran, Azerbaijan and the South West of Turkmenistan is of great importance.



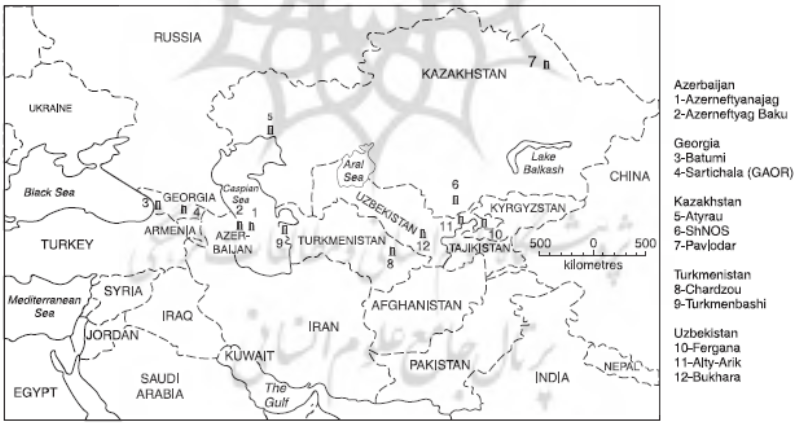
Map1- Five geological basins of the Caspian Sea
Source: Belopolsky and Talwani, 2002: 14

The 25km sediment accumulated on the Ocean-basin-rocks like of the Sea, specifically in the southern part which are in conformity with the present roughness of the sea basin is a reason for good hydrocarbon potential of the Caspian Sea [Dehqan, 2005, 33]. Presence of the certain gas and oil resources in various points of the Sea, specifically Southern shores, Azerbaijan shores and the undiscovered Iranian territory reveal the potential energy capabilities in the regional countries' present and future political and economic structures. Thus, one of the greatest reasons for lack of a comprehensive legal region among the Caspian Sea coast line countries is the problem of distributing the basin and beneath the basin resources. Each country seeks the best portion of the resources in order to meet her national

interests. Ultimately such a legal region would determine each country's share of the Sea resources as a basis for investment plan for gas and oil extraction. So, the energy resources lead to a dial policy in the region. Regional agreements of discovering and extracting oil may cause convergent backgrounds, in one hand and competition and foreign intervention may cause tension in the region.

Geopolitics of oil in the Caspian Sea

The Caspian Sea and her surrounding counties have been faced to strategic axis of some preventive powers with various capacities. Some of the powers utilize the non-oil resources as an economic opportunity and others, specifically the newly independent countries (Azerbaijan, Kazakhstan and Turkmenistan) consider the Caspian as a precious water resource of food and the related products. Therefore, achieving a certain and optimum share of the Sea is one their crucial national goals. Actually end of the Cold War and collapse of the former Soviet Union paved the way for achieving a new energy resource of Caspian Sea [Bahjat, 2004, 7].



Map 2- Oil refineries in the Caspian Sea region
Source: Kalyuzhnov et al., 2002, 134

Some studies estimated that the probable oil reservoirs of the Caspian Sean is about 70-200 billion barrel which is equal to those of North Sea or at most of Iraqi resources (Rend, 2003, 117). However, with regard to lack of precise studies on the Caspian basin's gas and oil resources, the amount has not been calculated yet. Apparently,

geological assessments on the probable oil reservoirs are not reliable, and the estimates should be viewed doubtfully. The most reliable estimates have announced the reservoirs as 50-160 billion barrels (Rend, 2003, 117); which reveals the importance of this natural heritage. The Sea has been possessed by Iran and the former Soviet Union before collapse, but after the collapse the newly independent countries claimed possessing the Sea. In fact, the geographical possession integrates the developing energy of the Caspian Sea. The Sea was controlled by Iran and the former Soviet Union until 1991, but the Caspian's legal situation has not been defined since collapse of the former Soviet Union. All the five Caspian Coastline countries face great political and economic barriers which limit their energy export capabilities (camp and Hakavi, 2004, 277).

Table 1- Discovered oil reservoirs of the Caspian Sea basin (billion barrels);

Scores / Countries	Gas and Oil Magazine (2001)	B. P. Amu Co. (2000)	British Petroleum (1998)
Azerbaijan	1. 2	7	7
Iran	89. 7	__	__
Kazakhstan	5. 4	8	8
Russia	48. 6	__	__
Turkmenistan	0. 5	0. 5	__
Uzbekistan	__	0. 6	__

Sources: Jalali, 2005, 210-211

The newly independent countries had weak economy; therefore, they attempted to extract Caspian oil using the West's technical knowledge. Azerbaijan and Turkmenistan changed into petty role players in geopolitics of energy in the region through European companies' investment. These companies invested in Caspian basin for the following reasons:

- Recession of products in great oil centers of the North Alaska and the North Sea.
- The Caspian embraces some huge under-developed gas and oil regions.
- Saudi Arabia and Kuwait seriously oppose foreign investments in their countries.
- Iran, Iraq and Kuwait have been faced the U. N. multilateral economic sanctions as well as the U. S. unilateral sanctions.

Baku, Astana, and Ashgabat had a weak economy. The only way of encountering the recession was utilizing their hydrocarbon resources.

However, they lacked financial sources to explore gas and oil fields. Their leaders contracted foreign inverters as a vital step for their economic growth. In fact, the international Energy Agency ahs estimated that the required investment for the Caspian Sea is about 200 billion dollars which would lead to comprehensive development and application of the gas and oil resources

Perspective for geopolitics of energy in the Caspian Sea

There are three efficient geopolitics factors on the Caspian Sea energy problem which produce deep concerns about the resources ownership; the amount of existing hydrocarbon for extraction, production and distribution; as well as direct and environmental expenses [Camp and Hakawi, 2004, 217].

Resources ownership: Many oil-rich points of the Caspian Sea have not yet been explored; because there is no generally accepted dividing system for the Sea, or because utility of the resources is faced by the neighboring countries' reaction. If the negotiations lead to specifying the sea borders and determining the basin and beneath the basin resources, we may hope that the related countries provide their economic plans for oil extraction.

Hydrocarbon for extraction: this factor depends on the situation of the resources ownership. Most of assessments in the Caspian Sea basin are estimation and many points have not yet been explored. However, the estimations may pave the way for utilization and investments.

Environmental expenditures: Since the Caspian Sea is currently a closed lake, any oil pollution provides the environment with a serious crisis; therefore, the environmental challenge of oil extraction from the Caspian Sea has put shadow on the geopolitics of environment and as a result, the way of practice, exploration, drilling and extraction affect the problem. Iran has not yet begun oil extraction because of environmental concerns. Also, Iran opposes any oil transmission and oil piping across the Sea for the same purpose. The amount of oil in the Caspian Sea has been estimated differently, since there are potential and undiscovered reservoirs in the area.

Table 2- Oil resources in the Caspian region;

Countries	Discovered Resources (Minimum-Maximum) (billion barrels)	Oil potential resources (billion barrels)
Azerbaijan	7-12. 5	32
Iran	0. 1	15
Kazakhstan	9-17. 6	92
Russia	0. 3	7
Turkmenistan	0. 5-1. 7	38

Source: Ehteshami, 2004: 62

Utilizing the Caspian Sea's energy is rooted in two political and economic problems which may affect directly or indirectly the development of the activities related to the economy of energy in the Caspian Sea basin

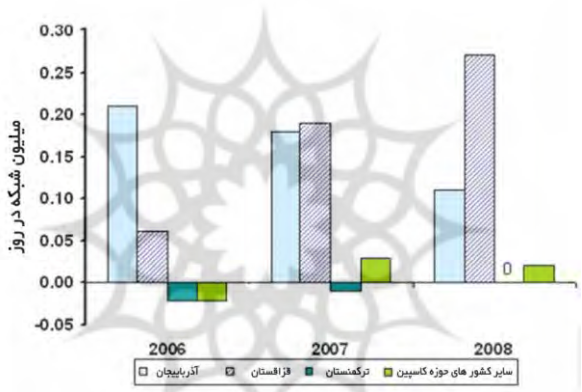


Figure 1- Oil production growth in the Caspian Sea
Source: EIA, 2007, 2

The political subjects related to the development of the Caspian Seal oil are as follows:
1- Definition of the Russia's role in the world after collapse of the former Soviet Union;
2- The new balance of the regional powers;
3- Reappearance of the regional powers;
4- National awakening of the former Soviet people and appearance of the oil-based economic nationalism.
The economic subjects include:
1- Competition of the great multi national companies for participation in utilizing the existing reservoirs;
2- Development of oil industries, in order to reduce dependence on the Persian Gulf exports as well as sustaining the oil price;

3- The western countries tendency to access the energy supply sources aiming at competition for the South East Asian economy;
4- Widespread attempts of all parties interested in controlling the huge pipeline networks which are used to transmit gas and oil to the world markets (Spatharou, 2001, 21).
However, these subjects in geographic and political domains require cooperation of some countries including Russia, Georgia, Turkey, Iran, Armenia and Azerbaijan, as well as oil producers of the Central Asia, Pakistan, Afghanistan, India and china.
Although the region's countries are to develop the oil production, extract and export from the basin, the problem will be accompanied by challenges and threats including conflicts and wars. The main factors in this regard are as follows:
- The effect of the international oil market and the Asian hydrocarbon consumers such as China, India, Japan and South Korea;
- Exploring the new hydrocarbon resources in the Caspian Sea basin;
- Oil export oscillation from the Persian Gulf;
- Increase of the Caspian Sea's resources exploitation in order to encounter the Persian Gulf oil producers' dominance;
- Tension between OPEC and Caspian Sea surrounding countries provided that the latter can affect the OPEC production (Ehteshami, 2004, 58);
In addition to the above mentioned factors, the regional factors may also affect the geopolitics of energy in the basin.
They consist of Caucasia political and ethnical riots and political competition among the Caspian coastline countries.

Findings

Environmental structures of the Caspian Sea

The Caspian Sea forms more than 40% of the world's lake areas and is by itself larger than total Oman and the Persian Gulf. The Sea has been considered seriously by the world energy market. When the experts announced that the world's oil resources are perishing and considered the problem as a crisis, the industrial countries concentrated on the Caspian coastline nations which had the highest income of 3500 dollars annually and contracted for exploitation,

extraction and transmission of this vital material. The related activities the oil pollution process in the Caspian Sea (Mostaqimi, 2005, 65).

Based on estimates, we may conclude that the Caspian Sea environment is increasingly polluted; and faces a gradual-growing threat.

This pollution is mostly rooted in oil exploitation in Azerbaijan and Kazakhstan republics' basins. However, these operations have influenced the Iranian shores. The Caspian Sea has been of great value concerning the see foods viewpoint; however this value is vanishing because of drilling and oil exploitation process. Although a little amount of the oil pollution in the Volga delta is out of the Strachan industries, the oil pollution is not a serious problem in the North Caspian. On the other hand the eastern shores sediments are oil-polluted. The Tangiz oil field in Kazakhstan is close to the coast and storm pushes oil pollution oil pollution to the Sea. There are offshore gas and oil reservoirs in the South half of the Caspian Sea. Azerbaijan seashore is a basic oil facilities position with numerous oil wells inside the Sea which are accompanied by refineries and petrochemical factories in the land. The developments have led to serious oil pollutions. In the mid 60s, it was estimated that each year one million Tons of oil, oil pollutions and oil products yet way to the Sea as a results of accidental gush, leakage, pipeline damages, shipping, industrial water waste and refinery sewage.

During 70s and 80s oil pollution has been reported in most of the southern Caspian's west coast as well as in eastern coast near to Abshuran peninsula and even in the east coast. Also, in some areas highly hydrocarbon-polluted sediments have been seen (Mostaqimi, 2005, 97).

Azerbaijan's national committee for environment and ecology believe that each year thousands Tons of the oil materials enter the Caspian Sea through Azerbaijan oil takers and dock. Moreover, the country's traveling, fishing and oil ships do not consider the environmental cautions.

The published report of the Caspian symposium in September 1990 states that the oil pollution of Baku has destroyed the sea life in the Baku Gulf, where the basin has been covered by 1-1. 5m thick oil remnants including Azotes (Amir Ahmadian, 1996, 20).

It is believed that oil exploration process in the recent years has been the main reason for the Caspian pollution, especially in Azerbaijan and Kazakhstan. The other natural and environmental threat for the Caspian Sea is being an earthquake area. The problem must be considered oil exploitation plans and proposes for establishing pipelines, while it is usually ignored. Concerning the oil pollution consequences, we must point to PH changes, reduction of water lucidity, sea basin pollution, formation of gas complexes, direct destruction of water life or its botulism and weakness. Also, oil pollution reduces birds' reproduction and egg laying, fetus death inside the egg and prevention of glands activities. Convoluted hydrocarbons may be lethal in densities of 1-100 in million for adult animals and in densities of 0. 1-1 in million for larval stage. Also, vibrating and explosion operations in oil explorations out of fish' endurance range (7000Hz) and explosion skill plank Tons and fish to tens meters from the center and change fish migration routes. Oil transmission using tankers makes it necessary to prevent accidents and balancing water evacuation system; since they create a great deal of pollution during natural disasters or accidents. Such accidents make oil utility in the Caspian Sea a crisis. For instance, fire in one oil well in the Sea followed by huge pollution in 1971.

Also, a group of the Iranian experts visited the Abshuran peninsula and found a vast oil stain in 1984 and 47000 Tons of crude oil entered the Sea from Azerbaijan oil fields in 1978 (DaneKar, 1998, 127-129).

Oil leakage during exploration, extraction loading and transmission as well as during see accidents related to oil tankers and locks from the very beginning of crude oil dispersion on the water surface to creation of tar mass may endanger directly or indirectly the sea life. Oil materials cover the water surface and prevent the sunshine and gas exchange and food material formation.

Some part of oil materials sedimentate gradually and cover the Sea basin and prevent exchanges between the basin and water.

Any how, the problem is very important; and the usual destruction and pollution is critical event if we ignore the pollution and environment damages as a result of gas and oil extraction and transmission. The pollutions are also serious from the viewpoint of economy and the costs imposed on the coastline countries.

Environment pollution in the Caspian Sea

Since the Caspian Sea is surrounded by land, entrance of pollutions to the Sea leads to the biochemical changes which remain in the water for years. Water dilution is for the external buffer solution. One reason for pollution of the Caspian Sea is entrance of pollutions through Volga and other main rivers which carry endless sediments. Oil and gasoline are transmitted across the Sea using the oil tankers between the harbors which possess necessary facilities. Leakage danger is not ignorable during transmission or storing. The mercury accident happened in 2002 when the Actua tanker was carrying crude oil to Baku. Most of the tanker crews died a great deal of oil entered the Sea. Table 3 shows the amount and pollutions percent enter the Sea each year, according to the statistics of 2002.

Table 3- Percent of pollutions enter the Caspian Sea in various ways during one year

Source	Oil share in one year (Ton)	Total oil share in one year (Ton)	Percent
Leakage and destruction	20000	10000-50000	12. 5
Oil industry activities	8000	5000-13000	5. 0
municipalities	21000	10000-40000	13. 1
Other industries	35000	15000-50000	21. 9
Rivers	75000	50000-260000	46. 9
Space	1000	300-2000	0. 6
Total	160000	90000-300000	100

Source: Aliparast, 2007: 60

Following the former Soviet Union, increase of the pollutions in the Caspian Sea reduced the agricultural and industrial activities in four countries.

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Map 3- Environmental polluters of the Caspian Sea
Source: NATO: 2005, 18

Gas and oil drilling
Oil well leakage
Polluted and destructed lands
Polluted rivers (industrial pollutions and urban sewages)
River pollutions with land sources (mainly by heavy industries)
Sites of producing dangerous industrial wastes which were not recognized well or polluting industrial activities
Places in which nuclear test has been conducted
Main sand storm paths which transmit salt toward the prone Volga region
Sea polluter (oil, pesticides, chemical combinations, heavy metals or bacterial polluters
Pipelines in seashores
Gas and oil exploitation regions
Saline Soil

There is not enough information about polluters observed in Volga and Kura rivers' catchments. The region faces the threat of reservoirs flow in an accident or dam break. Some heavy metals are found at relatively high level of Caspian Sea. However, regional pollution dispersion including agricultural chemicals, specifically DDT and

Endo-sulfate are the main reason for concerns about the Caspian Sea. The prohibited materials including DDT prevent a great amount of productions in the Caspian Sea and lead to sedimentation. These materials at relatively high amounts are some kind of venom for fishes and seals. They will affect the Caspian environment seriously and endanger its future.

Generally, pollution sources of the Caspian Sea can be divided into two sources of gas and oil exploitation and land sources. Each year, 74 million tons of polluters enter the Caspian Sea a great amount of which are form great Russian rivers. The pollution sources include Volga (60 million Tons), Kura (1. 5 million Tons), Turk (3 million Tons), Sulak (2. 5 million Tons) and Samur (1. 5 million Tons) rivers. The reason is closeness of the industrial centers to the Caspian coast and the rivers carrying the polluters to the Sea.

Therefore, all the coastline countries must cooperate and participate in securing the Caspian environment; otherwise it will be soon become mesotroph. Now we are going to determine each country's share in pollution of the Caspian Sea (CEP, 2004, 39).

Table 4 and 5 show the Caspian Sea surrounding countries share in oil pollution of the region and the amount of oil pollution resulted from oil production in the Caspian Sea.

Table 4- Oil production in the Caspian Sea and its share in the Sea pollution

Countries	Oil production (barrel a day)	Share in pollution (percent)
Azerbaijan	259300	30
Iran	0	0
Kazakhstan	602100	46
Russia	144000	10
Turkmenistan	124800	14
Total	1130200	100

Source: Adl Tabatabai, 2002; 69

Table 5- Oil pollution resulted from oil production in the Caspian Sea

Sources	Percent
Deblasting load	70
Refineries, petrochemical complexes	7
Accident	4
Off shore productions	6
Other sources	13
Total	100

Source: Adl Tabatabai, 2002; 69

Conclusion and proposes

Since, energy has changed into a competition in the Caspian Sea, intervention of the transregional powers through investments and specifying the pipeline paths may challenge the Islamic Republic of Iran's interests in the region. With regard to the Iran's one-hundred year experience in the gas and oil industry, the country may help the newly independent countries and pave the way for common cooperation and investment in the region; provided that Iran improves her political situation in the world and applies the confidence making patterns. The effects of the environmental pollution on the Caspian Sea surrounding countries' economy are as follows:

1- Increase of the oil decontamination and pollution prevention costs;
2- Diminution of tourism industry;
3- Reduction of food, protein, sea food and industrial resources;
4- Pollution of cities, coasts, harbors and recreational center;
5- Diminution of snorkeling and fishing;
6-Diminution of fishing, boating, shipping, transportation and loading systems;
7- Wasting national capital as a result of oil dispersion in land, sea and air;
8- Changes in quality of saline and fresh waters as well as surface and under-surface waters;
9- Huge investments and application of equipment and experts for decontaminating water, land and air;
10- Investment for curing diseases, and compensation of damages and destruction of the Caspian Sea's flora, found and ecology as well as hurts to the human life and capital.

Calculation of the pollutions damages is very difficult; because it requires to determine the amount of polluters in land, air and sea and to explore the relation between pollution dispersion and environmental damages. It also requires considering the value of economic losses out of damages and destruction of environment as well as hurts to culture, history and communities. Despite of the problems, we have to prevent any encompass able losses. The Caspian coastline countries' priorities must be to achieve sustainable development, preservation of the vital environment and prevention of ever increasing pollutions. Of course, this idea is different among the countries. Their top priority is

exploration of gas and oil resources, while the oil is not important for Iran, but the environment is the country's priority. Although, Iran is interested in transmission of the Caspian Sea resources, the country emphasizes on environmental cares and preservation. Prevention of the environment destruction is and inevitable must for the Caspian Sea's sustainable development. This requires concerted activities to encounter the potential and real threats. The activities are as follows:

1- Individuals but consented activities of the countries to reduce pollutions;

2- Action in the frame works of international institutes; because cooperation's would be facilitated and enhanced in this way;

3- Cooperation's with NGOs and enhancing tem; because they can play effective role both in domestic and international levels. Also, there are a considerable number of NGOs who concern about the Caspian Sea's environment;

4- Participation in extraction of resources in common basins as well as consultation for determining gas and oil pipelines, aiming at pollution reduction.

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