

## **Increases Area of Republic of Iran Using Satellite Images and its Effect on Improving The National Spirit**

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### **Abstract**

*Several differing figures exist pertaining to the borders and boundaries of the Islamic Republic of Iran, with different computed areas. Therefore, based on the geographical forces, mission and organization, with the aim of preventing any disagreements, taking relative consensus, scientific literature, research and development into consideration, it is proposed for the first time to determine the area and identify the borders as precisely as possible. Data from Iran's neighboring countries, with precise geometric patterns, software and international standards. 1:50000 maps cover the country in this direction were measured and calculated over the borders and the environment. Our country's borders with neighboring countries and were calculated separately and in most cases based on surveying the land and water borders between border signs with neighboring countries. And obtained islands and waters of the total land area of 1,873,959 km figure. While the borders and boundaries separate land, water and marine calculated separately and neighboring countries and the figure for 8574 km along the borders. The water area of the first countries to separate domestic water, and land.... And calculate the total area of the country was also applied.*

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**Keywords: area, border, datum, Islamic Republic of Iran Introduction**

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### **Introduction**

The man for clarifying their surroundings, as it does not interfere with the neighboring range of activities, were forced to contract in the distal portion of the lines and the territory surrounding environment. This concept is extended to the peripheral line of the final part of a national scope that identifies by the political aspects which is called "border". According to the study of backgrounds and geographical and historical documents available for the first time, the Royal Geographical Society of England for this purpose demanded a 28-member group from the Eastern Indian Company to provide a complete map of the Iran.

In this regard, the first mapping of the geography of Iran took place during the First World War and between 1915 and 1918 AD, by the abovementioned company.

Thus, this plan aims to help military missions and the British Royal Geographic Society was prepared to order and breadth of Iran, based on the equivalent of 646 000 square miles was declared as 133/673/1 square kilometers. The abovementioned number was documented for a while by the researchers and scientific searchers and educational program of country as well. Also in 1899, Mirza Abdul Ghafar Najam Al-Dowleh, the son of Cleric Mola Ali Mohammad Esfahani as one of the pioneers of geography science decided to determine the area of Iran and to provide some maps from Iran's geography. Abdol Razagh Baghayeri also drew the map of Iran in 1898 and he announced the area of Iran as 1/580/000 square kilometers at that time. In this map Iran has 11 provinces. Abdol Razagh Baghayeri was the first person who had been dispatched to France in order to accomplish some mapping courses. In relation to the boundaries of Islamic Republic of Iran and its area, there are many different statistics and figures that continue to sample another way of referring. Geography of the area of military combat in the book was 1,648,195 square kilometers of Safavid Iran vote and military geography; in human geography book was 1.640.000 and in Webster's Geographical Dictionary it was 1,553,993 square kilometers and in the Persian dictionary of Moen it was 1.654,000 and in the Encyclopedia of NikoKakson was 1.647.232 and in the version 9 of Aynkarta encyclopedia, the area of country has been 1.648.009 square kilometer that based on the

difference between the above figures, there are over 100 thousand kilometers. The book documents the calculation of the natural geography of Iran (written by Abbas Jafari) for determining the size of the area and by Ali Daneshvar (using of the geographical map 1:250000 of geographical organization) has been done;

And the figure for the total area of 1,623,779 km is obtained.

Along the borders of Iran in connection with a different number  $\rightarrow$  the resources to catch the eye: Iranian military geography book written in Ezzati, 7704 km along the Iranian border; Iran's geography book complete in 8550, in Book 7744 Zomradiyan geomorphology and natural geography of Iran in the book of birth Compiling parsley and military geography of Safavid Iran, as is 8731 km 1600 km difference between the above figures there. Accordingly, and considering the importance of the border area, especially its legal aspects and the significantly different among cultivars, there is literature, this paper seeks to answer the main questions is important:

1. Area and along the boundaries of what is accurate and correct .What is the best way possible to achieve these figures?
2. Use of precise geometric patterns, software and the international standards, to what extent the results of the calculation of accurate and effective?

### **Materials and Methods**

In this research, descriptive research method - is used for analytical the data obtained in the library studying ways to hypotheses have been analyzed.

### **Definitions and concepts**

#### **- Borders**

The man for clarifying their surroundings, as it does not interfere with the neighboring range of activities was forced to contract in the distal portion of the lines and the territory surrounding environment. New concept which borders the back according to the Westphalia Peace Treaty (1648 AD) and came upon the nation. The creation of the new era of political boundaries in human relations and emerging and boundaries as a tool for regional integration and global which can cause communities to become stable.

To prove the concept of sovereignty and border relations with other countries and – government is necessary.



Map 1: The Position of the I.R of IRAN in the world and in the world and in the middle East

**- Area**

Area means measuring the surface. All floor levels or any geometrical shape of the area says it. This level could be related to one of the two-dimensional or a three dimensional shape. Area units based on the m (m<sup>2</sup>) and it is equal to a square area with sides of one meter. The size of the Earth's surface, the size of a surface is inscribed within a boundary.

To calculate the area of each range, a small range in which the earth is flat; but the very large range of such as Iran, not view of the curvature of the Earth Base level and nationality should be curve of the earth's surface.

**- UTM system**

Mathematical complications, two-dimensional surface on a flat surface, called the image system. For the transfer of an intermediate level spreadsheet was used. This spreadsheet can then be cut into a flat surface. Board of spatial forms, is a cone or cylinder. Photos system can be flat, cylindrical or conical - polar equatorial, or similar would also be classified floor area or distance. NATO decided after the Second World War, all military map in a single system can the UTM system was selected for this work.

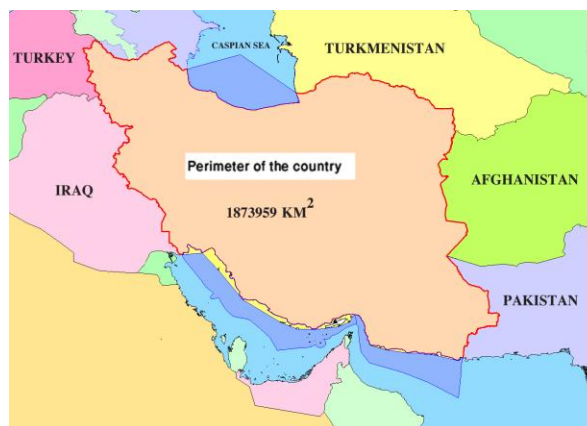
One of the important reasons for this choice was that this system, a similar picture (Conformal) is to map the topography is suitable. Because the Earth, not a full sphere to spheroid shape is oval; Thus for the calculation of size and computational need is elliptical. 1:250000 and 1:50000 map of Iran based on the European 50 computing is elliptical.

Today, because of satellite coordinates land and application of GPS, the computational WGS ellipsoid is used.

**Table 1: The Area of Islamic Republic of Iran**

Area	Square Kilometer	Square Kilometer
Land	-	1632210
Iranian islands in Persian Gulf	-	1884
Domestic water (Persian Gulf, Oman Sea and the Caspian Sea Fishing 10 miles)	-	35825
Territorial waters in the Persian Gulf and Oman Sea	-	42000
Regional water monitoring in the Persian Gulf and Oman Sea	-	30370
Exclusive economic zone waters of the Persian Gulf and Oman Sea	-	140250
Caspian Sea water area of 20% (range of 10 miles of fishing)	-	63790
The total area	-	1873959

Source: National Geographical Organization, 2011



**Map 2: The Area of the I.R. of IRAN including Lands, Islands, Internal waters of the Persian Gulf and Oman Sea and 20% of the Caspian Sea**

### **Datum**

Datum is a mathematical representation of the earth's surface. Base surface of the globe through a network is defined to be nearly spherical shape and position of the center of the earth. Representation of the Earth-like planet that is that they are numerous and accordingly there is a large basis. A base level of the horizontal frame of reference of the positions of size will be provided on the surface. This reference frame origin and the lines of latitude and longitude to determine. A local base level, the Korean peninsula for the highest proportion of them and they can be regulated in coordination with ground. Origin of the local base level is located on the ground. Fixed point of origin and other points on this point control are calculated. Origin of the coordinate system based on a local level, not the Earth's center. Base level which is currently widely used is Wgs84.

### **Theoretical Standard**

#### **Calculating the area and dimensions of Islamic Republic of Iran**

##### **- Calculated by Ali Daneshvar**

The figure for land area was calculated as 1,623,779 km. The computational approach taken by his country's first map of the elliptical image is International. Next, Map of the surface thus obtained is used to solve from the way we map of the area to help the system files on the elliptical, planar surface, we show and the total surface area is calculated.

Of course the picture is that the system properties in area size and scope, we will witness the transformation of; accordance with the mathematical formula, changes in each case calculated and it was involved in the calculation level.

##### **- A practical method for calculating**

The country surface was covered with a 1:250000 map sheet. 76 ppm and 58 ppm with full coverage of the border areas they cover; May be partially covered with using the same cut classification, the area has been calculated. The following method has been used in the calculation:

A) The area of the maps which their coverage has been full was calculated by a mathematical formula and is calculated directly on the elliptical.

B) The maps that their coverage has been incomplete, they initially were divided into more detailed sections and the area of the sections that had geometric forms were calculated by the method of paragraph (a) and the irregularly shaped area which has been determined by plan meter. It should be noted that in calculating the level of map accuracy by Plan meter size was measured. Should be noted that the calculated level by Plan meter on the map, the accuracy of these reasons are:

System files in UTM, angles to the High Photos are real, but long and the area will change. Correction factor scale that is calculated at each point, a local coefficient and a large surface area for A and its generalization to more accurate calculations the low Finally, calculated using Plan meter for irregular surfaces, no great accuracy.

The calculation method for calculating the 1:250000 map of Iran is  $1.5^\circ$  in the East and West and has a degree in the north and south; first band of the elliptical surface is calculated to within 1 degree. Finally a calculation for a map that they have complete coverage is achieved in a single formula and accordingly, the area has been calculated by 1:250000 map sheet 76. Since the map is used to calculate these levels therefore, the average correction factor for the scale on each map considered and the surface to become the average coefficient divided by the scale to the level achieved on the elliptical.

Computed using the above mentioned parts of the area, an area of 1,623,292 was obtained for the elliptical surface.

This figure, calculated on the elliptical base area (approximately matches the mean sea level) The calculation of the level of the image based on the average height of about 1000 m considered, has been calculated. After this stage, according to all the above calculations, the figure for the total area of 1,623,779 km is obtained.

### **Analysis of research findings**

#### **Calculating the borders of Islamic Republic of Iran**

The first attempt to determine the geographical area of NM and the borders with neighboring countries, with Iran's GA detailed geometric patterns, soft ware and the international criteria. In this regard the

coverage maps 1: 50000 of country were measured and the calculation of borders length and environment of country has been done by that. As a result the borders of country with neighboring countries to the separation of water and land, and in most cases based on surveying between the border bars are calculated. This model is based on calculations as follows:

**- Iraqi border**

For drawing the boundary lines of the map of Iraq with 25 000 Scale: 1 Protocol of 1975, derived from aerial photographs with scales 1: 30 000 in the same year is used. The area criteria of maps is related to the elliptical Hiford ED50 And its file systems is WUT which has been done by determining the border place spots according to the amendments which have been done in this field on boundary signs. Initially in Map of MapInfo software version 8/5 and Datum ED50, Geo reference (the reference), and considering the amount of allowable error pixels, Map of the area were geometrical; the location on the map of rods were digit. Since the boundary line is not drawn on this map can be formed using the definitions of protocols and maps, will draw boundary lines and in other cases has been consistent with the definitions.



**Map 3: The borders length and Perimeter of the I.R. of IRAN**





**Map 4: The I.R. of IRAN's borders with IRAQ**

**- Turkish border**

Determining the borders of this country has been done in 1932 and the border maps have a list of the exact coordinates in datum WGS84 which they were measured in 2000 and the definitions of the boundary line is done based on the 1:84000 and 1:50000 scale map of the protocol.

For drawing the boundary line of digital maps with scale of 1: 25000 (prepared in 2000 and it was used in the datum WGS84. The border line has been plotted based on protocol definitions and forms accurately. It has changed significantly over the border between Turkey and new calculations based on previous calculations (81.1

km) which is resulted from the accuracy of maps and the existing measurements.

**-Border with the Republic of Azerbaijan, Armenia and Turkmenistan**

Border of Islamic Republic of Iran with the abovementioned countries was determined in 1956 during the former Soviet Union. From the whole border line, some maps with the scale of 1: 50000 in datum crossfoxi which border line and place of border signs have been determined on them have been provided. In addition to that all the bars have coordinative in datum crossfoxi and the independent description of bar is the place of bar and the line of border. Desired maps have been georeferenced in MapInfo (in datum crossfoxi ) and after obtaining the required accuracy, the boundary line was digit on the map above and finally they were converted into WGS84 datum.



Map 5: The I.R. of IRAN's borders with the republic of Azerbaijan, Turkey, Armenia, Turkmenistan

**- Afghan border**

The Afghanistan's border was determined through three stages and arbitrations. After several years from all these borders, the Russian

maps were obtained from crossfoxi datum and the place of signs and the procedure of determining border line had been plotted in them. In 2005 a new measurement was done in the datum WGS84 which took place on the border signs. For drawing the boundary line of the scale cover map of 1: 50 000 (in Datum ED50 □) and later after adding the coordinates of the symptoms and the boundary line defined in MapInfo, the boundary line drawn on the side and finally the datum WGS84 was obtained.



Map 6: The I.R. of IRAN's Borders with Afghanistan

#### **- Pakistan border**

For drawing the border of Pakistan the maps coating 1: 50000 were used. The datum of these maps was elliptical haiford ED50. In addition to that, the Iran-Pakistan border coordinates exists in the datum of Everest that after conversion to datum WGS84, it has been brought to the above maps. Based on the above model, the total

length of land boundaries Iran's GA 3965 km, 2045 km in total length and total length of border rivers maritime border in the Persian Gulf, Oman Sea and the Caspian Sea is 2564 km. According to this, the area of country is 8574 kilometers which its results have been shown in the related tables and maps in bellow.



**Map 7: The I.R. of IRAN's Borders with Pakistan**

**Table 2: Length of borders based on the 1:50000 map**

Name of border	Type of border	Length of Border	Total
Iraq	Land	1181.5	1608
	Water	426.5	
Turkey	Land	524.2	566.1
	Water	41.9	
Armenia	Land	-	45
	Water	45	
Azerbaijan	Land	178.7	756.8
	Water	578.1	
Turkmenistan	Land	786	1189.9
	Water	409.9	
Afghanistan	Land	681.4	919.1
	Water	237.7	
Pakistan	Land	613.4	924.8
	Water	311.4	
Total	Land	3965	6010
	Water	2045	

Source: National Geographical Organization

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**Table 3: Maritime boundary of the Islamic Republic of Iran with the neighboring countries in Persian Gulf, Oman Sea and Caspian Sea**

Row	Name of country	Length of Border (kilometer)
1	Saudi Arabia	258
2	Iraq	24
3	Kuwait	144
4	Bahrain	27
5	Qatar	268
6	UAE (Persian Gulf)	330
7	Oman (Strait)	227
Total border in the Persian Gulf		1278
8	UAE (Oman Sea)	102
9	Oman (Oman Sea)	456
10	Pakistan	204
Total border in the Oman Sea		762
11	Republic of Azerbaijan in Caspian Sea	224
12	Republic of Turkmenistan in Caspian Sea	300
Total border in the Caspian Sea		524
Total maritime boundaries of the Islamic Republic of Iran		2564

Source: National Geographical Organization

**Table 4: Length of the Islamic Republic of Iran's borders**

Row	Type of border	Length of border (kilometr)
1	Land borders	3965
2	Water Borders	2045
3	Sea borders	2564
Total length of borders		8574

Source: National Geographical Organization

Also the length of the Islamic Republic of Iran's coasts in the Persian Gulf, along the, Oman Sea and the Caspian Sea, including fractures and without considering theme was measured which its results have been brought in the following table.

**Table 5: Length of the coasts of the Islamic Republic of Iran in Persian Gulf, Oman Sea and the Caspian Sea (in the maps of 1:50000)**

Coast (Kilometer)	Without Fractures	With fractures
Persian Gulf	1358	1536
Oman Sea	796	1053
Caspian Sea	660	837
Total	2814	3426

Source: Geographical Organization, 2011

### **Calculating the area of the Islamic Republic of Iran**

The Geographical Organization of Armed Forces for the purpose of the abovementioned objectives has extracted the references and geometric and geographic information in the UTM image system (the feature of preserving the angles- conformality) and the data and the used method of each of them is as follows:

**The first method**

- Coordinate implementation of border signs in an environment with coordinates
- implementing boundary line protocol on the interpretation of the text before the digital environment
- Connection closed borders and the space and determine the area based on the pattern of software

The second method

- counting the number of complete maps of 1: 50000
- Implementation of incomplete map of the border line on 1: 50000 in geometric ARC GIS environment
- Connection closed borders and the space and determining the area based on the pattern of software

**The third method**

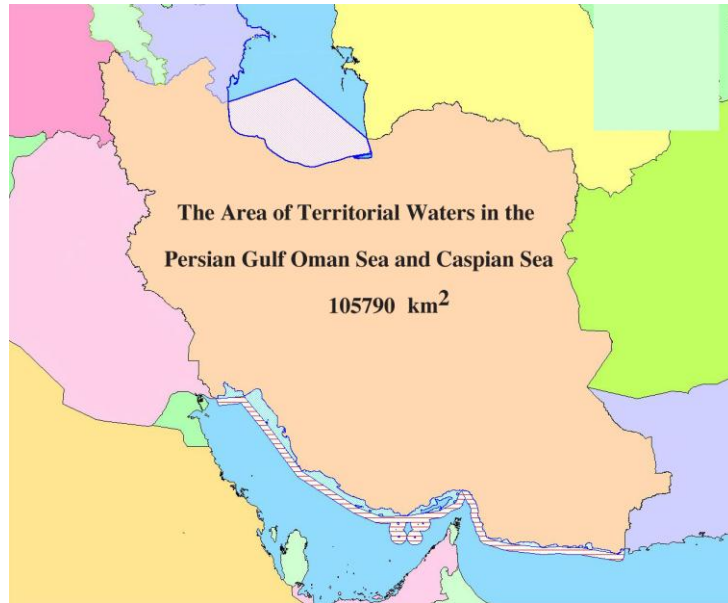
- implementing the border coordinate signs in an environment with coordinates
- implementing boundary line protocol on the interpretation of the text before the digital environment
- Connection of borders and closed spaces and determining the area based on the pattern of software

According to the integration of the third method and the lack of dependence of that to a special map, the above method is the base of counting in the area of the Islamic Republic of Iran and eventually for the lands and islands of the country, the number 1.634.094 kilometers was obtained. Also the area of the southern waters in the Persian Gulf of Oman Sea was counted separately based on the domestic waters, lands... and the northern waters of country in the Caspian Sea which they were counted based on the 20 % share.

**Table 6: the Area of domestic waters**

The Area of Domestic Waters	
Name of Region	Area Based on Square Kilometer
Persian Gulf	21.188
Oman Sea	2.569
Caspian Sea (10 miles of fishing)	11.773
Between the islands	295
Total	35825

Source: National Geographical Organization, 2011

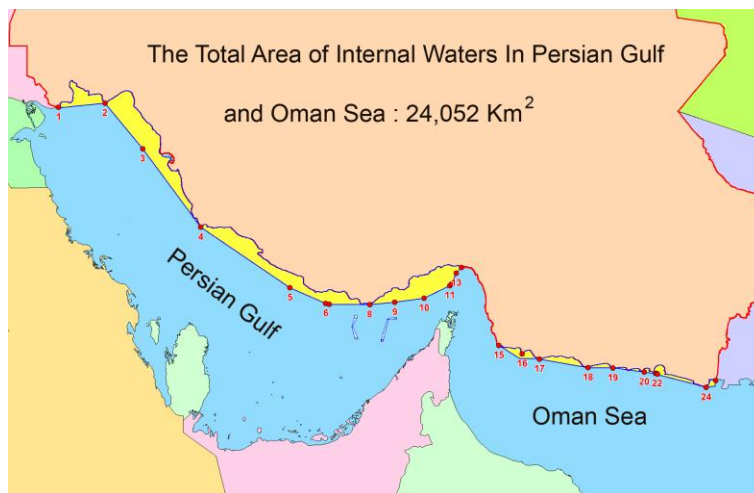


**Map 8: The Area of the I.R. of IRAN's territorial waters in the Persian Gulf, Oman Sea and Caspian Sea**

**Table 7: water area of land**

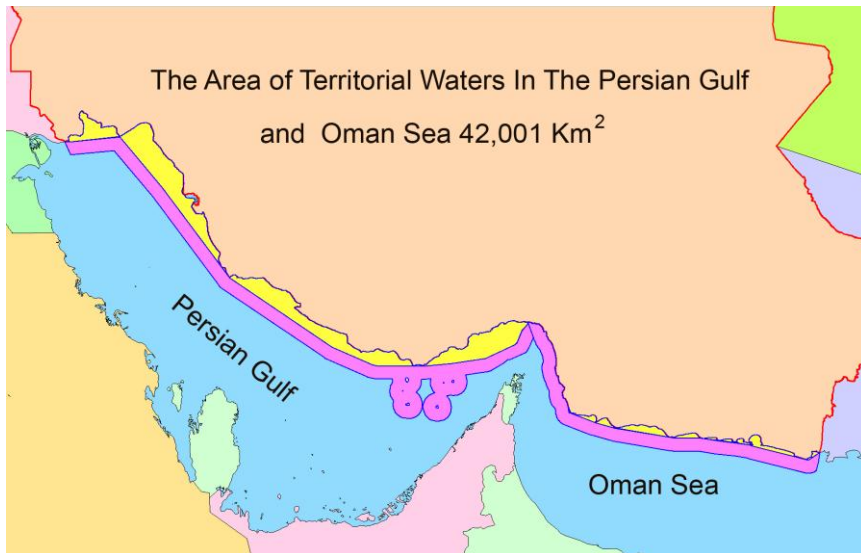
Name of Region	Area Based on Square Kilometer
Persian Gulf	28.090
Oman Sea	13.910
Caspian Sea (%20)	63.790
Total	105.790

Source: National Geographical Organization, 2011

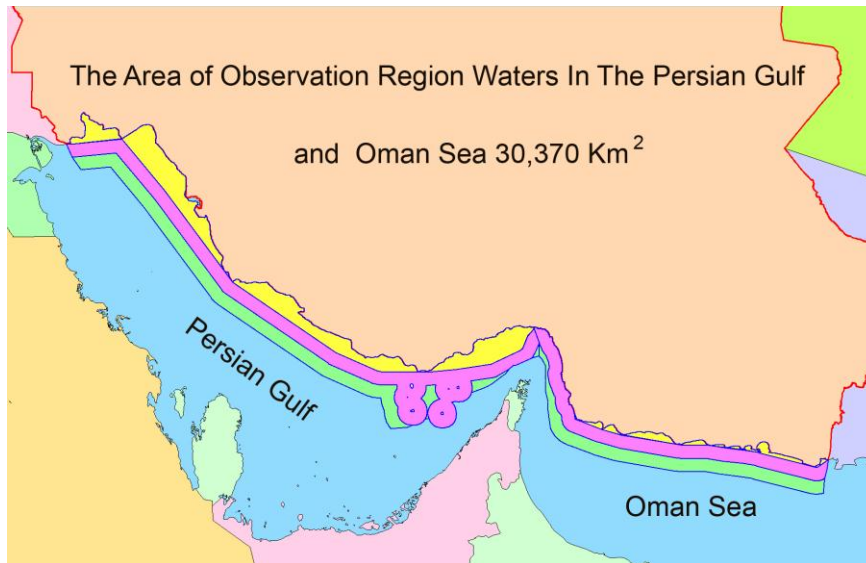


**Map 9: The Area of the I.R. of IRAN's internal waters in the Persian Gulf and Oman Sea**





**Map 10: The Area of the Territorial waters in the Persian Gulf and Oman Sea**



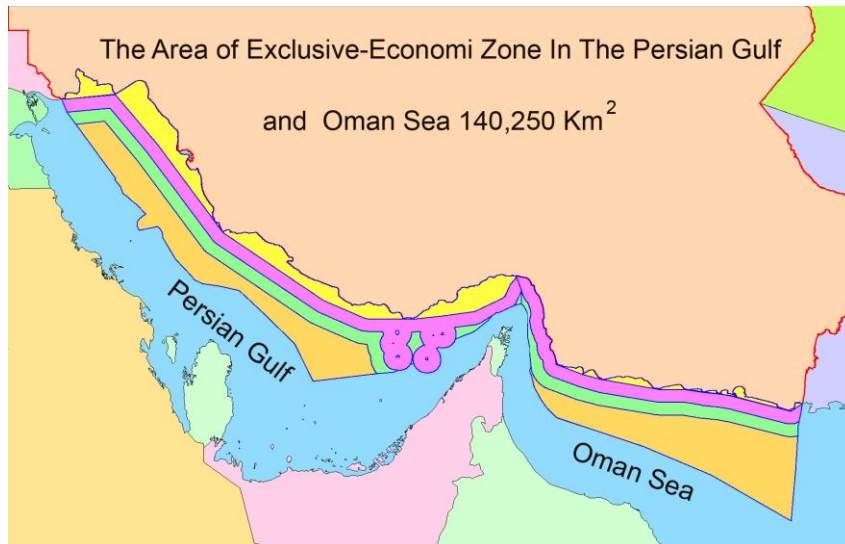
**Map 11: The Area of the waters of supervision region of the I.R. of IRAN in the Persian Gulf and Oman Sea**

**Table 8: Area regional water monitoring**

Name of Region	Area Based on Square Kilometer
Persian Gulf (12 miles)	18.220
Oman Sea (12 Miles)	12.150
Total	30.370

Source: National Geographical Organization, 2011





**Map 12: The area of the Exclusive- Economic zone of the I.R. of IRAN in the Persian Gulf and Oman Sea**



**Map 13: The Area of the I.R. of IRAN's waters based on 20% share and 10 miles of fishing in the Caspian Sea**

**Table 9: Area waters and exclusive economic zone**

Name of Region	Area Based on Square Kilometer
Persian gulf	78080
Oman Sea	62170
Total	140250

Source: National Geographical Organization, 2011

Measuring the area on the ground in the level of a country is not possible by the direct ground method. Therefore, this work can be done by using special techniques of mapping such as photogrammetric and converting photos to map. A surface on the ground with specified scale on the paper and map can be displayed and at a certain scale and the map will be displayed and scale (proportion) of land connecting the two spaces will be real and geometric paper.

Not real big on the surface of the ground plane can be considered and the geometric surface that can land to a good show, is elliptical as it is in base level lies. Although the display surface area basis, its actual area is approximate. The proposed method is defined by the geographic coordinate is a framework; Then a background picture with the exact position of the boundary signs intended and using the boundary line of the interpretation of border  $\neg$  which is attached to all protocols; Boundary lines are drawn more accurately be geometric space, which have a close encounter with using software not Planimeter we calculated the area of the closed space "Certainly it is expected that a far more accurate than other methods. In the second method, however, than the previous method is more accurate, but due to the dependence on the space map, the area is not too difficult to image the system remains. The master plan has been calculated on the basis 1:250000; In some areas due to lack of map boundary only risk criteria can act as computational space, if the claim is considered on the elliptical, but the double integrator approximation procedures are summarized not that it can be considered superior.

### **The Results**

Among cultivars so far in connection with the area and along the borders of Iran, as has been only method that has been presented by Mr. Daneshvar, the computational method has been specified that the absence of reasons, including the area of system files, UTM, no exact boundary line, instead of having to discuss the accuracy of maps 1:250000 and  $\neg$ , has failed to show the actual area.

Although the computational method should be mentioned in his period (1984 AD. P) And the result is very close with today's figures, but it should be admired. The geographical organization is the use of

new and advanced technology in producing maps and with formation of specialized software, the boundaries of the area and length of the Islamic Republic of Iran has with neighboring countries. Accordingly, in dry areas, the established boundaries between international and in the water south of Baseline and 20 percent share in the Caspian Sea, has been the basis for calculations. In fact, in addition to the geographical organization of technology day, what is left of the round, it is important that the country is considered Drmhasbat about geopolitics. This represents nearly all the territory of Iran's dominion. The borders of our country's borders with neighboring countries to distinguish between water and land surveyor, and in most cases based on boundary signs (bars border) has been calculated for each country based on the pattern of expression is calculated separately. Often inaccurate and computational basis or not, or the base is not comprehensive. Computational methods adopted by this organization and also  $\neg$  map, the software application protocol and ... The calculation is based, in fact, confirmed to the questions that this study.

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