



Review and Analysis of 40 Years of Fire Damages in Forests and Rangelands of the Islamic Republic of Iran (1968-2007)

Introduction

Out of the territory of the Islamic Republic of Iran of 136 million hectares (ha) the share of forests is 14,202,559 ha. Rangelands are covering an area of 90 million ha. 62% of the forest lands (8,855,870 ha) are located in the Zagros mountain range, and 13 percent (1,847,886 ha) in the North of the country, and the remainder (3,549,086 ha) distributed all over the country. The forest cover corresponds to 0.2 ha per capita (for comparison: globally the forest cover per capita is 0.8 ha). Iran is on 4th place of forest cover of the countries between northern Africa and Middle East.

Table 1. Forest surface in the North and the South of Iran by forest type (in ha)

Forest Type	Forest Area in other Parts of the Country (ha)	Forest Area in the North of the Country (ha)	Total	Percent (%)
Dense Forests	755,777	940,826	1,696,603	12
Semi- Dense Forest	286,846	593,927	3,400,773	23.9
Sparse Forest	7,842,183	313,133	8,155,316	57.4
Wetlands Forest	30,400	-	30,400	0.2
Planting Forest	919,468	-	919,468	6.5
Total	12,354,673	1,847,886	14,202,559	100

The area of forests in Iran has been reduced by half during the last 30 years. There are many reasons to destroy forests but one of the most important ones is fire. Fires are also affecting rangelands. The use of fire and inability to control are the main reasons for fire damages.

Materials and methods

Wildland fire statistics were collected (fire cases and burnt area) in all regions of Iran (29 provinces). Statistical data from provinces were compared and thus sensitivity to fire of provinces evaluated.

Discussion

Table 2 shows that, for example, the average of daily burned surface in the year 1968 was 3.94 ha. This daily rate has reached 122 ha in 1977. Thus, during 30 years, this amount has increased 31 times. In 2007 it decreased to 76.7 ha due to improved monitoring, protection and control by the forests and rangelands organization.

The comparison statistical data shows an increase of the average of burnt surface of forests and rangelands since the decade 1968-1976 by 7.5 times in the recent three decades (Table 2).

Table 2. Number of fire cases, burnt surface in ha, burnt surface average during 40 years per day

Time Period	Number of Fires	Total Area of Forests and Rangelands burned (ha)	Average Surface Burned in each Fire (ha)	Area Burned in each Fire (ha)	Damages (million \$US)
1968-1976	701	21,643	30.9	5.9	5.0
1977-1986	1,210	68,302	56.4	18.7	15.9
1987-1996	3,635	148,943	41	40.8	34.6
1997-2006	10,426	162,191	15.6	44.4	37.6
Totals and Averages	15,972	401,079	36	27.45	93.1

Causes of wildfires

The causes of wildfires in natural vegetation in Iran are classified as follows:

a) Human factors:

Intentional burning:

- To provide more space for agriculture and animal breeding
- Local and racial conflicts
- Conflicts between people and government and guards of natural resources

Accidental and negligent fires:

- Inattention of tourists
- Inattention of farmers, shepherds, hunters, charcoal makers, mine workers, nomads and villagers
- Throwing incendiary materials by passengers
- Inattention to using residues and pieces of trees products for creating fire
- Using fire to control harmful insects, birds and reptiles
- Use of fire by honey collectors during exploitation of natural and artificial beehives
- Explosion of dynamite by road construction and, drilling mining companies
- Children and narrow-minded people
- Fireworks in the forests and rangelands
- Military activities (use of tracer bullets and exploding land mines)
- Garbage burning
- Smokers
- Car accidents
- Explosions caused by gas pipelines crossing forests and rangelands

b) Non-human causes:

- Lightning

According to the data provided by the Organization for Forests and Rangeland Protection 2,483 fire cases that occurred between 1968 and 1992 reveal the distribution of causes (Table 3).

Table 3. Causes of wildfires in forests and rangelands of Iran

Fire Causes	Number of Fires	Percent
Intentional fire	292	11.7
Negligence	1,185	47.7
Unknown cause	995	40.1
Lightning	11	0.5
Total	2,483	100

Fire seasons

The fire seasons differ in regions throughout the country. The fire season in the northern forests and rangelands of Iran begins with the foliage loss in autumn and the influence of warm Mediterranean winds which rise temperature and decrease moisture. This situation lasts until the beginning of snow fall in winter (from 1 October to 20 December).

In other parts of country this season starts with decreasing humidity and rising temperatures from 15 April to 20 November.

Different provinces of country are divided to three groups according to sensitivity to fires:

1. Very critical provinces: These provinces are at the first place for number of fire cases and burnt surface – Kordestan, Lorestan, Fars, Kermanshah and Ilam.
2. Critical provinces: Golestan, Kohgiluyeh and Boyer-Ahmad, Chaharmahal and Bakhtiary, and Boushehr.
3. Low-risk provinces: Mazandaran, Hamedan, Hormozgan and all other provinces except the above-listed.

Analysis of damages of forests and rangelands in the past 40 years

The calculation of damages in terms of money is difficult or almost impossible concerning the intangible benefits, e.g. emotional benefits of forests like pleasure of recreation in the natural environment, damage to natural flora and fauna, soil and water resources.

However, it is possible to calculate damages of some products such as wood, provender, cosmetic and medicinal plants. All financial damages have calculated \$US 93.1 million during the last 40 years (without considering spiritual, non-tangible benefits).

According to Table 4 the annual area destroyed by fire amounts to about 10,027 ha of forests and rangelands. But the velocity of increase of these damages has been 31 times as much from 1968 until 1997. The total burned level was 1,442 ha in 1968, while this amount has been 44,596 ha in 1997.

Table 4. Calculation of burned surfaces and financial damages in \$US

Time Period	Number of Fires	Burned Area (ha)	Damages (\$US)
1347-1386 (1969-2008) (accumulated)	15,972	401,079	93.1 million
Average annual damages	399	10,027	2.3 million

Problems and barriers to improve the protection of natural resources

The main problems for insufficient protection of nature include:

- Disagreement between responsible land management authorities: Although in Iran forests and rangelands must be controlled by the Organization for Forests and Rangeland Protection there are four zones for organizing environmental protection considering native cultures of Iran. In some regions forests and rangelands have been divided among native people, and this process is continued. There is no coordination between native tribe groups and the Organization for Forests and Rangeland Protection.
- Lack of resources: Due to the lack of security guards the Organization for Forests and Rangeland Protection offenses against forest regulations cannot be encountered. In some cases officers and workers of the Organization for Forests and Rangeland Protection cannot do anything because of poverty of people. For example in provinces which tribes are living, most of people are earning for their livelihood by harvesting and selling forests and rangeland products. Preventing this will result in increase of unemployment in those regions.

- Transition and changes of jurisdiction and management responsibility from the Ministry of Natural Resources to the Ministry of Agriculture, and the separation of the Ministry of Agriculture from the Ministry of Jihad, and again merging them, were harmfully affecting the state of nature protection in Iran.

Suggestions for possible solutions

The following recommendations are given for improving natural resources and avoiding detrimental wildfires:

- Training of staff of the Organization for Forests and Rangeland Protection must be improved. Financial resources must be provided for the Organization for Forests and Rangeland Protection. Specialists must be trained at various levels, including training by institutions for higher education. For example throughout Iran there is no specialist who has a higher education in the field of forest fire science and / or management.
- The establishment of a National Fire Management Center in Iran is necessary. This Center should be connected to the Global Fire Monitoring Center (GFMC), which at present does not have classified information about fires occurring in forests and rangelands of Iran.
- In various regions of Iran trees which are resistant to fire must be recognized and be used as green fire protection belts.
- Improvement of training, research and administrative capabilities by appropriate funding to pay more attention to forest and rangeland fire in Iran.
- Adding the subject of wildland fire science and management to the subjects offered by Iranian universities.
- Prioritize definition and protection of high-risk wildfire zones in Iran, and for post-fire recovery of forest and rangelands affected by fire.

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