The Spatial Effects of Deforested Areas by Forest Fires in İzmir-Seferihisar

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Abstract:

İzmir-Seferihisar which is located on the Aegean coast of Turkey, due to the its potentials regarding tourism, cultural characteristic and natural heritages like wide forest lands with biodiversity, is the first member of the International Cittaslow Association from Turkey in 2009. Seferihisar has both national and international environmental responsibilities arising from being the first member of the Cittaslow Union in Turkey. Its natural heritage like forest land should be protected due to its status. But in recent years the natural heritage of Seferihisar is under threat along with increased forest fires. For ten years, the forest lands surrounding that region have been exposed to the risk of being destroyed. It can be brief as approximately 910 hectares of lands. If we exemplify the most major ones, firstly, 1090 hectares of forest lands burned as a consequence of the great fire broke out on 10.08.2009. Secondly, 352 hectares of forest land had damaged on 23.08.2011. Thirdly 94 hectares of agricultural and forest lands gutted by fire on 20.08.2012. Lastly, 9 hectares of maquis and forest lands gutted by fire on 08.08.2012. The aim of this study is to assess the spatial effects of deforested areas by forest fires and to analyze this area in terms of decision making process on land use planning.

Key Words: Seferihisar, forest fire, cittaslow

Introduction:

Forests are ecosystems regulating climate and water balance and protecting soil of a region, as well as contributing to biodiversity with its fauna and flora. Also they are natural resources having various contributions such as social and economic. Due to their provision of values for ecological system of earth and economic structure of a country, loss and destruction of forest lands are the primary of the environmental problems every year.

The primary factor threatening forests is natural and human-induced forest fires in the world and Turkey. Unlike the other factors, forest fires cause the many-sides, long-term, local and regional and even global negative impacts.

Global warming and climate change are the world’s most important natural phenomenas in recent years. Forest fires cause an increase in global warming depending on the content of the burning substance like the carbon releasing into the atmosphere. Besides, the deforestation as well as reduction of the forests as the most important carbon sink areas make an indirect effects to the global effect.

Measures to be taken against this problem are to preserve and enhance the existing forests. Therefore many international processes have been initiated among which is the Rio process and Turkey is one of the signatory members of this process. Unfortunately, the process of deforestation in the world could not be stopped in spite of all these interventions. However, global warming, climate change and drought are rapidly increasing with the number of forest fires. Each year around the world there are about 4 million forest fires, 550 thousand in the Mediterranean countries, and the average area of 10 thousand hectares of forest are damaged in Turkey (4).

Extreme temperatures, relative humidity impairment and severe wind play a major role in forest fires, becoming a growing disaster. Natural lightning or human-induced forest fires within a few minutes from a small spark can turn into a major disaster. Within the last decade it has been observed that forest fires are 86% man-made, 9% thunderbolt, 2%Traffic, 4% Energy Transmission Line caused (4).

Due to the climate, topography, tree specie and similar features, the mediterranean involving our country is a hazardous geography in terms of forest fires. European Forest Fire
Information System (EFFIS) is available for obtaining actual information about fire risks. According to this system, Turkey Forest Fire Risk Map (Figure 1) shows the potential risk of fire. Fire risk area can change depending on the global warming, climate change and drought (4).

In Turkey, especially the coastal band starting from Hatay, crossing Mediterranean and aegean coastal regions and extending to Istanbul, set off the most risky area in terms of forest fires.

The primary fire-sensitive area is 7.182.051 ha, secondary fire-sensitive area is 5.091.788 ha. Accordingly, 12 million hectares which corresponds to the 60% of the forests in Turkey are located in the most risky areas (4).

![Figure 1. Turkey Fire Risk Map (4)](image)

The forest fires in Mediterranean zone climate where Turkey is located are inevitable. As being expressed before; every year the average of 550 thousand hectares forests gutted by forest fire in the Mediterranean zone. In Turkey, forestry has 170-year corporate structure. In Republic period, the first forestry law was enacted in 1937 and the duty of forest protection was given to the government. The General Directorate of Forestry (OGM) was established to oversee the practice of this law as well as being in charge of the protection, development and operation of all the forest in the country (4).

Research area Seferihisar is a town located in the South-west part of Izmir in the Aegean region which is 47 km away. Seferihisar is bounded by Urla to the north, and Menderes to the east. To the South and West is the Aegean Sea. Its town center is approximately 5km away from the sea and located on Izmir - Kuşadası highway (2).

İzmir- Seferihisar has endowments such as natural, cultural and touristic sites, Therefore, these features influenced the selection of Seferihisar into Cittaslow membership. Seferihisar's geographical coordinates are 26°45'00" east; 27°01'30" east longitude and 38°17'00" North; 38°02'00" North latitude. Seferihisar is 18m high above sea level. Coastal areas in the west of the city center are of great importance in terms of tourism activities. İzmir- Seferihisar has endowments such as natural, cultural and touristic sites, Therefore, these features influenced the selection of Seferihisar into Cittaslow membership (2).

According to the Cittaslow Movement, each cttaslow member has to obey about 60 criteria under the Cittaslow membership. The criteria are divided into six headings: environmental policy, infrastructure, quality of the urban environment, cultural and heritage, quality of life, and local economy. Cittaslow: Cittaslow Union was established in Italy, in 1999. They are strong communities with less than 50,000 residents that have made the choice to improve the quality of life for their inhabitants without being tied to economical standards, but intended to protect local identity and historical factors.
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public, encouragement of local products and local production, hospitality and slow city awareness among residents. As is also explicitly mentioned under the environmental heading, one of the targets is to keep the natural values alive by protecting the biodiversity. Besides that, there are other criteria under ‘Quality of the urban public’ which emphasizes the protection of ecological values by integration of increasing green.

Seferihisar besides all these features, one of the most risky area in terms of forest fire in Turkey (Figure 1). In this research, the forest fires, the afforestation works in the gutted area and the spatial changes in Seferihisar are examined.

The Land Uses In Seferihisar:

In the research area there are three main types of land usage namely, buildings, agriculture and forest (Figure 2). Use of land in Seferihisar is determined according to the study of land cover as 26.6 % of the research area is agricultural area. Total agricultural land area is 9,898 hectares. Olive groves land is 6,005 hectares; citrus fruit garden is 1.269 hectares. The field land is 1,020 hectares in total. 48.25 % of the people in town work in agriculture sector. In the region agriculture is the fundamental sector. The agricultural land in the coastal area is used as mandarin gardens and olive groves land (2).

A significant part of the field area is forest. Forested areas are located in 13,633.5 ha and are 30.4% in total. However, some parts in this area, particularly ones near the coast, have damaged forested features. 8% of this research area is protected, and located in 3,577.5 ha. This protected area is mainly natural and archaeological. The feature of this area provides a significant contribution to Seferihisar’s becoming Cittaslow Union.
member. All natural protected areas are located on the coastal areas. Up to the present, local authorities have maintained the protected status of the areas and as a result, the natural beauty of these shores is largely retained.

4.55% (9,898 ha) are military zones. These zones are located in coastal areas for a long time for preventing the coasts from other intruding sectors.

The Forest Fires in Seferihisar:

As it is mentioned before, Seferihisar has the rich forest potential. So, Seferihisar has the natural wealth where biodiversity conservation is notably protected. On the other hand, it is because in the last decade the 4 largest fire incidence broke out in different fields that a great majority of natural heritage (fauna-flora, especially endemic species and their habitats) were damaged in this field (Table 1). However, afforestation was implemented afterwards and the fields are not as yet overgrown with trees.

i. 10.08.2009, 1090 hectares of forest lands

ii. 23.08.2011, 352 hectares of forest lands

iii. 20.08.2012, 94 hectares of agricultural ant forest lands

iv. 08.08.2012, 9 hectares of maquis and forest lands

Seferihisar, especially during summer, is one of the regions which have the highest fire risk. Forest fires are known to have substantial damage on coastal vegetation and it cannot be ignored to the effects of the population growth and the development of tourism activities (2).

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td>Date</td>
<td>10.08.2009</td>
<td>23.08.2011</td>
<td>20.08.2012</td>
</tr>
<tr>
<td>Fireplace</td>
<td>The pasture area between Seferihisar and Doğanbey Gulf</td>
<td>Urkmez Town-Çamalanı Position</td>
<td>Between Gödence, Ulamış and Gölcük Villages</td>
</tr>
<tr>
<td>Dimension of Land cover Guttered by fire (ha)</td>
<td>1090 Hectares</td>
<td>352 Hectares</td>
<td>2.0 hectares forested area, 22 hectares private afforestation, 70 hectares olives groves</td>
</tr>
<tr>
<td>Burned Tree Species</td>
<td>Pinus pinea, Pinus brutia, Pinus halepensis, Pinus nigra, Pinus glautica, Acacia cyanophylla</td>
<td>Plantation areas of the Pinus pinea and Pinus brutia</td>
<td>Pinus pinea, Pinus brutia Olea europaea. (Olives groves belong to the private owners.)</td>
</tr>
<tr>
<td>Planted Species</td>
<td>In the external part of the area: fire-resistant species such as Cupressus sp. Acacia cyanophylla, Prunus amygdalus L. In the internal part: Pinus pinea, Pinus brutia, Pinus halepensis</td>
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</tr>
<tr>
<td>Treatment Cost</td>
<td>This could not be calculated due to the implementation of afforestation which includes the burnt areas and its surroundings.</td>
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As can be seen from the examples given in the table 1, fires generally occur in the coastal areas during the summer months (Figure 3). Burned tree species are commonly *Pinus pinea* and *Pinus brutia*. Different strategies have been used while planting the burnt area. The external and the internal areas of the burned area are planted with different species to protect against the new forest fire hazard. Another issue pointed out in the table is the high treatment costs, as this expenditure covers only the burnt fields. The cost of the surroundings of the burnt area(s) cannot be computed. It shows the forest fires damages on the proportion of national wealth.

The General Forest Directorate has a new strategy named YARDOP "Rehabilitation of Burnt Forest Areas and Fire Resistant Forests Plant Project" for reclaiming forest areas which were destroyed from fire and protecting the least damage from possible fires.
Result And Discussion:

The forest fires affecting both socio-economic structure and natural resources have to be prevented with the appropriate forest management strategies. 3 Main Strategies for Forest Fire intervention:

- To prevent breaking out of fire (awareness raising, education)

Awareness should be raised concerning forest fire prevention cutting from elementary school pupils to retired people as well as organizing training and seminars for sensitization campaigns.

- Early warning system, fast and effective intervention

The first intervention of forest fires is extremely important. A new project is carried out by the Ministry connecting some cameras in sensitive areas for determining forest fire smokes in the first 15-20 seconds. Remote sensing tolls are used to monitor the fire area and to reclaim the damage.

- Afforestating the gutted area in the shortest time possible

Fire risk mitigation can be taken with fire resistant plants and rehabilitation of the burnt fields. Some suggestions are as follows on Forest Fire Resistant Plant:

Cultivation of Mixed Stand: Propagation speed of fires is different in a single tree forest fire and fires occurring in mixed stands. The combustion characteristics of the species will be different and the possibility of the spread of fire is slower in mixed stands. Therefore, a mixed plantation should be created. Leaved tree species burn more difficult because of their higher moisture and not containing easily combustible materials such as resin. Therefore leaved trees such as oak gall, hairy oak, acorn oak, ash, locust, laurel, oak, mulberry, walnut, almond, hackberry species are used in areas of coniferous trees such as pine.

Regular Treatment of Forests: During forest fires, species of the same type and their proximities to each other on both sides of the road facilitate easy transition of fires flow of trees from one end of the road to the other. In addition to the measures taken to prevent the occurrence of forest fires, roads and firebreaks should be made to mitigate fires’ occurrence in the field. These roads are built to prevent the spread of fire, as well as transportation used in fire response teams (1). According to the plantation on Figure 4, it is very easy transition of fires flow of trees. On Figure 5, It is observed that the plantation was implemented in gutted area by fire which is located in research area, Seferihisar. Under these circumstances, the transition of fires flow of trees is difficult due to different species and proximity.

![Figure 4. Tree planting example 1.](image-url)
- **Live (Green) Fire Stopping Zones**: Forest transportation and fire safety roads strips should be made at the intersection of roads and forests. Hard combustibility short plants will extinguish the fire to the ground and facilitate interventions. Suitable habitat conditions on both sides of the strips, hard wood burning (cypress, fig, mulberry, walnut, acacia, and so on.), and the ecological conditions of the region types of fire-resistant shrubs (carob, oleander, purple, gum, terebinth, prickly pear, etc.) should be established. The width of these bands should be at least 50m.

- **Wind Screen Facility**: Wind is one of the most important factors affecting forest fire propagation speed and its extinguishment. For this reason, the direction of the prevailing wind should be considered during plantation and at least five pyramidal cypresses should be planted in rows on the stand edges with strips of transportation and fire safety roads. In addition, dividing forest areas into parcels measured 20-30 hectares will prevent the spread of fire.

- **Stream Vegetation**: Stream vegetation consists of different shrubs and herbaceous plants with broad-leaved tree species and constitutes an important source of biodiversity. Therefore, protection should be given in these areas, hard combustibility broad-leaved trees (oak, alder, frankincense, and so on) and hard combustibility scrub plants (oleander, chewing gum, redbud, meninges, etc.) should be used.

The plant species using in rehabilitation studies are seen on Figure 6 according to the information received from Department of Forest management in Seferihisar. These plantation implementing in recent years will reduce the risk of great fire outbreaks.
Figure 7. Tree planting example 4.

References


