THE EFFECT OF DEFORESTATION ON GLOBAL CHANGING AND ITS CONSEQUENCES IN TURKEY

Hayri Hakan DENLI and Gaye ONURSAL DENLI
Istanbul Technical University, Civil Engineering Faculty, Geomatics Division
34469 Maslak, Istanbul-TURKEY
Email: denli@itu.edu.tr

KEY WORDS: Land Use, Forests, Environment

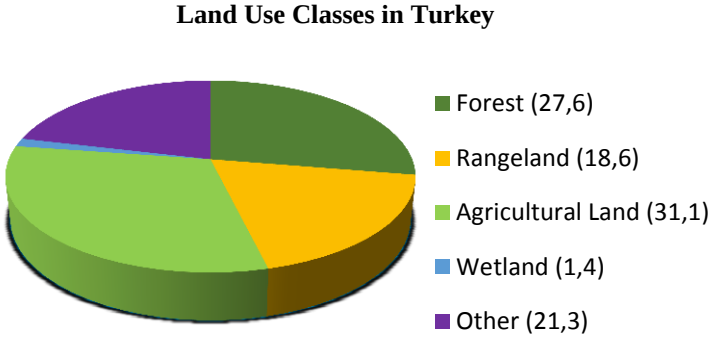
ABSTRACT: Land use has generally been considered as a local environmental issue, but it is becoming a force of global importance. Global changes to forests, farmlands, waterways, and air are being driven by the need to provide food, water and shelter to more than six billion people. Global croplands, pastures, plantations and urban areas have expanded in recent decades, accompanied by large increases in energy, water and fertilizer consumption, along with considerable losses of biodiversity. The changes in land use have enabled humans to appropriate an increasing share of the planet's resources, but they also potentially undermine the capacity of ecosystems. The expedition and size of this change is becoming noticeably conspicuous now. According to the International Union for Conservation of Nature (IUCN), the global temperature has been increased of about 0.74 degree Celsius since the Industrial Revolution. Interdisciplinary science that integrates knowledge of the many interacting climate services of forests with the impacts of global change is necessary to identify and understand as yet unexplored feedbacks in the Earth system and the potential of forests to mitigate climate change. The general scientific opinions on the climate change states that in the past 50 years, global warming has effected the human life resulting with very obvious influences. Remote sensed data for wide regions in Turkey proves the fact for the land changes caused by deforestations. High rates of deforestation within a country are most commonly linked to population growth and poverty. In Turkey, the forests are destroyed for various reasons resulting to a change in the climate. This study examines the causes of deforestation and its consequences in Turkey. Suggestions on preventing negative effects are also given.

1. LAND USE and FORESTS

1.1 Current Status of Forests as Natural Resources in Turkey

Turkey, 27.6% of its land covered with forests, has many plant species and rich fauna resources; is among the countries rich in biodiversity among temperate generations. The distribution of Land Use Classes in Turkey is shown below.

Fig.1 Land use classification (URL2).



There are a large number of ecosystems in Turkey based on ecological and floristic composition of forest habitats, and the function of each ecosystem is more or less different. The Mediterranean biogeographic region covers all the coastal regions of the Mediterranean and the western part of Thrace and includes many different forest ecosystems. In areas where Mediterranean climate is influential, forest ecosystems can range from sea level to the highest parts of the mountains depending on soil-climate-plant relationships. The continental climate and steppe plants are suppressed in Central and East Anatolia region. Forest ecosystems here include arid zone forest ecosystems. The Europe-Siberian biographical region stretches from North Anatolia to the Black Sea and Thrace Region to the Black Sea. It is the wettest

climatic region, with a large part covered with forests. Turkey's forests according to topographical structure, climate and soil differences are very rich in terms of plant diversity. In particular, the richness of endemic plants further increases the importance of Turkish forests in terms of biological diversity (OGM).

The distribution of forest areas in Turkey's regions:

Black Sea Region	: % 24.2
Mediterranean Region	: % 24.9
Aegean Region	: % 16.8
Marmara Region	: % 12.8
Eastern Anatolia Region	: % 10.8
Central Anatolia Region	: % 7.5
Southeastern Anatolia Region	: % 3.0

There are four classes of land change: deforestation, rangeland modifications, agricultural intensification and urbanization. The most deforestation occurs by invade and burn the forest. High rates of deforestation within a country are most commonly linked to population growth and poverty,
shifting cultivation in large tracts of forests (Mather and Needle, 2000).

- Rangelands are defined by the presence of grass and trees used by grazers or browsers, and encompass vegetation types ranging from complete grass cover, through woodlands with as much as 80% canopy cover, to pastures within dense forests.
- Agricultural intensification defined as higher levels of inputs and increased output (in quantity or value) of cultivated or reared products per unit area and time permitted the doubling of the world's food production from 1961 to 1996 with only a 10% increase in arable land globally (Tilman, 1999).
- Urbanization as land cover, in the form of built-up or paved-over areas, occupies less than 2% of the earth's land surface (Grubler, 1994). Changes in the area of urban land, therefore, do not appear to be central to land-cover change. This claim appears to support a misconception that urbanization can be ignored in land change studies (Heilig, 1994). In reality, urbanization affects land change elsewhere through the transformation of urban-rural linkages. In Turkey, the northern forests of the Marmara region are best exemplified as the result of urbanization as deforestation. This situation was detected by remote sensing data in Fig.2.

Figure 2. The north of Istanbul was extremely forested area once upon a time (URL2).

1.2 Threats to Forests

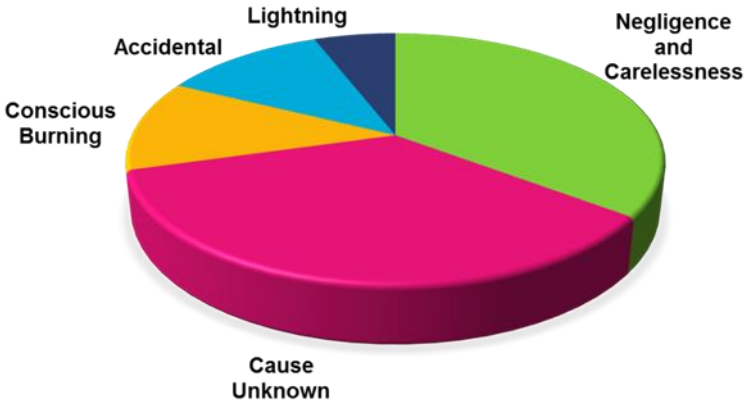
Forests cover about 30% of our planet. Forests, one of the most important natural sources, are under a big pressure because of some reasons such as rising population and the agriculture territories which expands day by day, urbanization and industrialization. Now the forest decreasing or being unfruitful economically is a current problem. One of the most important factors of forest decreasing is fires. It is seen that about 1.5 million forest lands suffered harm between 1937 and 2002 in which 72 thousand fires occurred and orderly statistics were totaled about fires. Only in September 2017, in Turkey, fire broke out in 130

different places. Known as disasters in view of their results, forest fires mostly occur in Aegean, Mediterranean and Marmara regions in Turkey. Such climatic characteristic as heat, rain, relative moisture and wind make a suitable condition for forest fires especially in summer in these regions. Moreover, the fire risk rises when various human activities are added to these natural conditions. Even if the forest fires aren't be able to prevent completely in Turkey's condition, it will be possible to reduce the forest fires and its results minor forming the population of country and the taken measures. It is too important for Turkey's future and maintainable forest activities. More than half of the forest ecosystems in Turkey have been destroyed.

1.3 Factors leading to the reduction of biological diversity in Turkish forest ecosystems

- Excessive use of forests, regardless of ecosystem and species level transport capacity (hunting, grazing, lumber production, visitors, in-forest construction, etc.)
- Atmospheric pollution and the effects of global climate change,
- Living forms based on agricultural and forest products of the population living in and near the forest (livestock, uncontrolled use, field openings)
- Destruction of forests to obtain agricultural land
- Forest fires
- Increasing constructions with tourism incentives
- Highland tourism
- Number of extreme visitors in archaeological sites
- Uncontrolled collection of plant-animal specimens

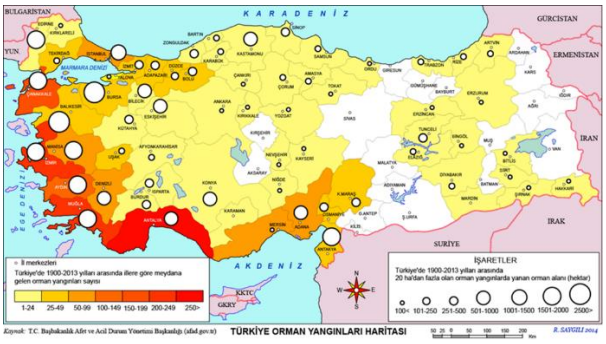
Figure 3. The causes of forest fires in Turkey.



Figures 4. 140 hectares of forest land were damaged in forest fires due to the wind at Adrasan-Kumluca district in Antalya (URL2)

Due to the nature of the conditions in Turkey, the rate is supposed to be covered with forests of more than 80% is only 27%. 77.9452 million hectares of which 20,763,248 hectares of land is covered with forests in Turkey. More than half of forest areas are degraded. Forests are the lungs of the world to make its mission, to provide oxygen to the atmosphere and regulate the balance of rain. Therefore, the forest has a significant impact on the world's climate.

Figure 5. Forest fires and burned areas (hectare) by province in Turkey between the years 1900-2013 (URL2)



12 thousand hectares of forest have been destroyed in a fire in the last decade in Turkey.

2. EFFECTS OF DEFORESTATION

Deforestation can have a negative impact on the environment.The most dramatic impact is a loss of habitat for millions of species. Eighty percent of Earth's land animals and plants live in forests, and many cannot survive the deforestation that destroys their homes.

Deforestation also drives climate change. Forest soils are moist, but without protection from sun-blocking tree cover, they quickly dry out. Trees also help perpetuate the water cycle by returning water vapor to the atmosphere. Without trees to fill these roles, many former forest lands can quickly become barren deserts. Removing trees deprives the forest of portions of its canopy, which blocks the sun's rays during the day, and holds in heat at night. This disruption leads to more extreme temperature swings that can be harmful to plants and animals.

Trees also play a critical role in absorbing the greenhouse gases that fuel global warming. Fewer forests means larger amounts of greenhouse gasesentering the atmosphere-and increased speed and severity of global warming.

The most feasible solution to deforestation is to carefully manage forest resources by eliminating clear-cutting to make sure forest environments remain intact. The cutting that does occur should be balanced by planting young trees to replace older trees felled. The number of new tree plantations is growing each year, but their total still equals a tiny fraction of the Earth's forested land. (URL1)

2.1 Dramatic Results of Deforestation in Turkey

Turkey's average annual temperature and extreme weather events clearly demonstrate the terrible change in the last years.

Figure 6 . Turkey's average annual temperature and trends (URL3)

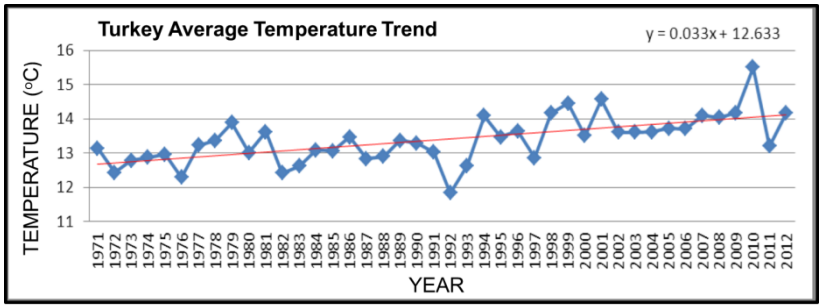
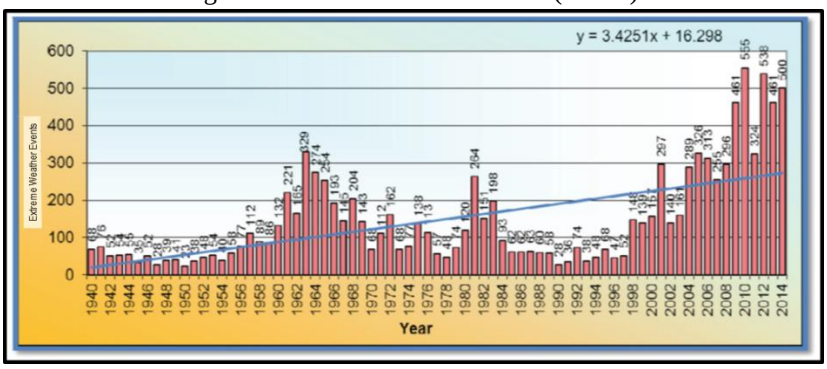


Figure 8 . Extreme weather events (URL3).



2.2 Suggestions

- Each whatever reason, it should prevent forest fires.
- It should be prevented from cutting trees, controls should be tightened.
- Goats must be removed from forests, because of their damage.
- Instead of burned or felled trees, new trees should be planted.
- Use of wood as well fuel must be reduced.
- The public must be educated about the awareness and benefits of forests and protection.
- Articles made of wood must be used more carefully.
- Forest burning people should be given a large fine.

Forest management plans that form the basis of sustainable forest management should be complemented and implemented with ecosystem-based functional planning. The national forest inventory must be updated with renewed plans, the state of change should be followed by years, forest assets should be protected by making comparisons and analyzes.

References

Eroglu,V., Ciftci,I., 2012, "Forest Map" (Orman Atlası), Turkey General Directorate of Forestry.

Grubler, A., 1994. Technology. In:Meyer, W.B., Turner, B.L. II (Eds.), Changes in Land Use and Land Cover:A Global Perspective. Univ. of Cambridge Press, Cambridge, pp. 287–328.

Heilig, G.K., 1994. Neglected dimensions of global land-use change: reflections and data. Population and Development Review 20 (4),83 1–859.

Mather, A.S., Needle, C.L., 2000. The relationships of population and forest trends. The Geographical Journal 166 (1), 2–13.

Tilman, D., 1999. Global environmental impacts of agricultural expansion:The need for sustainable and efficient practices. Proceedings of the National Academy of Sciences of the United States of America, Vol. 96, pp. 5995–6000.

URL1: www.nationalgeographic.com/environment/global-warming/deforestation/

URL2: http:/www.ogm.gov.tr

URL3: http://www.mgm.gov.tr/2014