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Research Paper

Sudden Oak Death in Iran forests

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Abstract: In the recent decades the Mediterranean and semi-Mediterranean forests have been faced with climate changes. Oak distribution has shifted in response to changes in climate, disturbance regime, and human population and culture. Oak dominance has decreased throughout the 10 years of since 1998. In the recent decades the Mediterranean and semi-Mediterranean forests have been faced with climate changes Zagros Forest especially vulnerable to the adverse impacts of climate change. Only 1.5 million ha of them have loss in five years. The most important plant species in this region includes *Quercus infecturia, Quercus libani* and *Quercus brantii*. Zagros forests not only protect the soil and land, but also provide the source for approximately 45% of the water supply in Iran, and contribute to the development of the economy in the country. In its study we were introduced the root results of oak sudden death in Barm plain, Zagros forest, Fars, Iran.

Key words: Oak Death, Zagros Forest, climate changes and Iran.

Introduction

With 8,200 plant species, of which almost 2,500 are endemic, the Islamic Republic of Iran is considered a unique country in terms of its plant diversity and genetic reserves (NBSAP 2000) (Fig1). With about 12.4 million hectares of forests, covering 7.4 percent of the country's area, the Islamic Republic of Iran is a low-forested country in the Middle East (SCI 2007). The per capita forest cover (about 0.2 hectares) is close to the estimated average for the Middle East and North Africa region and is only one-third of the world's average (FAO 2007). Moreover, the country's commercially usable forest area per capita is only about0.02 hectares (Lelia Croitoru).
Its forest diversity provides a wide range of benefits, including water and soil conservation, biodiversity, and landscape value. Despite these benefits, the country's forests have been severely degraded during the past half-century. Forest clearing for agriculture, firewood, and charcoal production reduced the forest area drastically, and overgrazing and overhunting are believed to be responsible for decreasing forest quality.
During the last decade, oak decline has caused critical health issues within the Zagros forests in west Iran, which is currently approaching a threatening level with effects on stand structure and stability. Identifying the influential factors on the spread of this phenomenon can thus help forest planners and administrating units to control the crisis. This study aimed to assess different aspects influencing deterioration of oak trees with respect to stands environmental characteristics in the southern part of Zagros forests.

Martial mad Methods

The symptoms that define Sudden Oak Death were first recognized in 1998-2014. Over the next few years, SOD reached epidemic proportions in oak forests along approximately 1milion ha of the central Zagros coast. The main hosts included fungi disease in Persian oak.

Recent oak decline, which covers a relatively vast area of Fars province, the oak forests of Plain-Barm which were most exposed to drying. Infected factors on dead oak including human factors (branch and/or clear Cutting and pruning, rain-fed farming under the trees in the forest floor, etc.), climatic factors (rainfall and temperature), and disturbing factors (pests and diseases) were assessed. Oak forest which dominates between 1,000 and 2,000 m elevation of Zagros Mountain that almost 40 % of the country's forests.
To consider the high damage of oak decline, in Fars forest landscape, rate and intensity of its infestation on 1200 ha of oak different species were studied in 10 Zagros forest regions in Barm Plain, Kazerun, Fars, Iran.
We have collected a number of dried trees and light rapping between February 2012 to May 2013 in Barm plain, Kazerun, Fars, Iran.
So far, a number of egg, larva and pupa beetle have been collected in Barm Plain forest. Beetle specimens were sent to phytopathology Laboratory of Fars agriculture and natural resources and identified as *B. mediterranea* species-group that is element factor of charcoal disease on oak.
Signs of disease involve: spraying of sap in vegetation polluted sections, dried and mortality of oak tree, defragment of tree bark, darken and blacked of vascular cambium, so adjacent phloem and xylem. *Cerambyx spp* beetle adults bore through the

bark and produce tunnels called "galleries" in the relatively thin area composed of the vascular cambium that caused to introduce of fungi pollution.
Social and economic study is accomplished with interview and assessment of local community of Barm plain, Fars, Iran.

Fig. 1: Administrative division map of Iran (http://en.wikipedia.org/wiki/Template:Provinces_of_ Iran_Labelled_Map http://wikimediafoundation.org/wiki/Terms_of_Use).

Results

In the recent decades the Mediterranean and semi-Mediterranean forests have been faced with climate changes (Nogués Bravo *et al*., 2008; Parry *et al*., 2008). Rainfall diminution, inappropriate annual rainfall distribution and ground water recharge decreases in forest ecosystems may compromise tree health and survival (Bréda *et al*., 2006; Van Mantgem *et al*., 2009). Warmer and drier conditions are partly responsible for reduced forest productivity (Kirilenko and Sedjo, 2007; Schröter *et al*., 2005). Growth failure and extinction of plant species in massive areas of woods in the world is reported (FAO, 1994). Zagros forest is 5milion ha of Iran forest that located in west of Iran. The Zagros Mountains extend from the North-west border up to the Straits of Hormoz alongside Hassan Longi River in the west of Minab. The most important plant species in this region includes *Quercus infecturia, Quercus libani* and *Quercus brantii*. Zagros forests not only protect the soil and land, but also provide the source for approximately 45% of the water supply in Iran, and contribute to the development of the economy in the country. Most of species is oak involve Persian oak (*Quercus. Brantii* Lindl). During of 1998-2014 several reported of sudden oak dead with charcoal disease (fungi disease). The disease was spread of all Territory of Zagros Mountain that caused to dead of 1miliom hectare of oak. In the Zagros Mountains we would attitude 'integration' through a strong focus on local participation. Aims to conserve the biodiversity by using participatory approaches that ensure the active involvement of local people. Iran loss 1.5milion ha of its forests through spread of disease and pest in Zagros Forest. These include the charcoal disease and *Chrysobothris Parvipunctata* beetle of Buprestidae family that become aggressive on stressed trees, and several root and stem decay fungi (Fig 2 and 3). The rooting result of oak death was Outbreak of charcoal disease caused of fungi of B. Mediterranean on *Quercus SPP* Trees in forest of Zagros Mountains in Iran. Ascospores of *Biscogniauxia mediterranea* on *Quercus brantii* was find in 2010 in Zagros forest.

Fig 2: Larval and Galleries excavated by larvae of the smaller *Chrysobothris Parvipunctata* beetle. Not only does this beetle inflict damage by its feeding activities, but it is also a vector of the Oak disease fungus (Photograph by author).

Fig 3: Charcoal disease

Conclusion

Zagros Forest especially vulnerable to the adverse impacts of climate change. Only 1.5 million ha of them have loss in five years.

According to climate models, the steady accumulation of greenhouse gases in the atmosphere is expected to cause global warming and variations in precipitation distribution over the globe. Since 1750 the concentration of CO2 has increased by31%, currently rising at a rate of about 0.4% per year. The Intergovernmental Panel on Climate Change (IPCC 2001) estimates a consequential increase of 1.4–5.8ıC in the global average surface temperature during the period between 1990 and 2100.

Therefore, it is expected that under a climate change scenario, the great stability and genetic diversity of the many relic tree species of the Near East may play a significant adaptation role, and become an important target for in-situ conservation strategies. Nevertheless, there are also evidences of the extinction of trees species and forest types at a local and regional scale, mainly due to the combination of sharp changes in climate and human impacts, such as the Neotithic intensification in the use of fire to convert forestland into agriculture and pastoral land (Carrion, 2003; Tinner *et al.* 2000 & 2005). Because of the high human impact in the region, the Near East forests will be especially sensitive to future environmental changes and their consequences.

The temperature increase due to climate change is responsible for the northward and upward range expansion of several insect species and for the changes in the seasonal phenology, leading to faster development and higher feeding rate, as is the case of insect outbreaks in the Mediterranean region (Battisti, 2008).

The combination of high population growth, poverty, and rapid urbanization is putting enormous pressure on the forests of the Near East. In 2002, the population of the Near East countries was about459 million people, with relatively high, although uneven annual growth rates. In Iran population has doubled since 1979, and the demand for more agricultural and pastoral products has forced people to convert forest and rangelands into cultivated land, and to overuse wood and plants as fuel for household cooking and heating. In most countries, the combination of high population growth rate and high population density in rural areas is the cause of the growing pressure on the scarce natural resources, especially on forests, trees and ranges.

Urban development and unsustainable tourism represent an important threat to coastal and mountain forests, and a cause of forest fragmentation and loss, pollution and wildlife disturbance. Rapid urbanization creates new pressures, such as forest fragmentation and clearance in the course of urban expansion, and overcutting in peri-urban areas to supply fuelwood to urban populations. The risk of accidental fires with dramatic environmental and socio-economic consequences is magnified by the fact that the seasonal increase of tourists often coincides with the warmest and driest periods, and by the fragmentation of the forestland caused by the sprawl of holiday resorts and secondary houses.
At formal campsites, cars, caravans, bicycles and campers' feet cause soil compaction, erosion, and alterations to natural drainage and damage to trees. Trampling, for example, results in maceration and removal of leaf litter and a reduction in the depth of organic soil layers. It can also damage or destroy ground flora, further reducing soil porosity. Absence of ground flora exposes the area to erosion, especially since rainfall cannot easily penetrate the compacted soil and the increased runoff will carry away soil loosened by feet and vehicles. Emissions from cars, camping stoves and barbecues may also cause ecological damage.

Rapid population growth in the Middle East and North Africa (MENA) carries serious implications for employment, access to services and the cost of subsidies. MENA since the 1970s has experienced a dramatic rise in population compared to other parts of the developing world. The result has been that the region's population has grown from 127 million in 1970 to 305 million in 2005. Even these figures disguise some remarkable numbers. For example, in the ten years between 1976 and 1986, the population of Iran grew by 50%. Of In a similar vein, a rising population further adds to the growing need for food imports, which has characterised the region since the oil shocks of the 1970s. This has already raised concern regarding security of food supply in the region.

Cultivation in Oak Zagros forest based on two method: Rainfed Mixed Farming System; and Dryland Mixed Farming System. The Pastoral Farming System has also been included because of its relevance to other farming systems across the region. While it is neither demographically important nor offers a significant opportunity for poverty reduction, the role of the system in providing a reservoir of livestock which feed through into other systems - either seasonally or in the form of animals for fattening - makes it important in regional terms. The Irrigated Farming System is found throughout the region.

Soil erosion by wind and water continues be a fundamental problem in the region, often as a consequence of inappropriate cultivation methods and heavy grazing pressure in specific areas. Climatic changes are likely to result in greater extremes of drought conditions, which may well affect the low-rainfall areas more severely than those that currently have moderate rainfall.

The issues related to natural resource management arise partly from the continuing deterioration in quality of both water and soil resources. In addition, non-renewable water resources are under increasing threat from excessive extraction in several areas. In addition, non-renewable water resources are under increasing threat from excessive extraction in several areas.

Priority attention should be given to the following areas: (i) the revival and adaptation of older systems of rational, rotational grazing and land management that involve all stakeholders in planning and monitoring resource changes; (ii) watershed-based (rather than individual farm) soil and water management systems; (iii) the development of sustainable groundwater management systems; (iv) the introduction of realistic and equitable water charges; (v) long-term, sustainable soil and water management techniques for annual and perennial cropping; and (vi) the conservation and development of the unique flora and fauna of the region.

OF Course Iran is a component of country that increase forest area. The FAO Forest Resources Assessment 2000 identified the ten countries with the largest plantation development programmes(as a percentage of the global plantation area) as China, 24%; India, 18%; the Russian Federation, 9%; the United States, 9%; Japan, 6%; Indonesia, 5%; Brazil, 3%; Thailand, 3%; Ukraine, 2% and the Islamic Republic of Iran, 1%. These countries account for 80% of the global forest plantation area (Jeffrey Sayer et al, 2012).

Now, 1.5milion ha of Zagros Forest have lost by fungi and beetle since 2008. Future of its forest is in ambiguity circular.

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