*Full Length Research Paper*

# Evaluation of Oak decline with local resident' opinions in Zagros forests, Iran

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**The study aimed to evaluate oak decline in Zagros region, west of Iran. Decline phenomena of vegetation especially trees in arid and semi-arid ecosystems have been considered as one of the key problems in Zagros forests. The role of local resident in these forests is very important. Semi-structured interviews were used in order to perform the evaluation of Oak decline with local resident opinions. The result showed there was not oak decline phenomenon in past and this event has been presenting for five years that the main reason of it due to successive droughts. Local resident believed that recently droughts, pest and dust have caused to reduce growth and seeding in oak trees. Sunny slopes had higher evaporation and lower soil moisture than shady slopes. Pruning the healthy trees is the main responder's solution for avoiding the oak decline. Local people suggested that trees completely contaminated and dried should be removed and their logs must be burned to removing all pests in soil. Trees that not completely contaminated should be fallen and logs can be stayed and rebuild new shoots in next year because oak trees can make new shoot after cutting the trees.**

**Key words:** Zagros forests, Oak decline, Local resident, Drought, Pests.

## INTRODUCTION

The Zagros forests, located in a region of western Iran characterized by a semi-Mediterranean climate, are one of the most important and sensitive ecosystems in Iran. A remarkable area of these forests is located in Ilam province (i.e. Ilam covers 640000 ha of these forests). The main tree species in the region is *Quercusbrantti.* The role of local resident in these forests is very important. Zagros forests involve some kind of conventional ownership by local resident within village. Forests and Rangelands in Iran nationalized through legislation passed in 1963. Zagros forest nationalized in 1963 and was ignored conventional ownership by local resident (Zandebasiri, *et al.*, 2012).

Decline phenomena of vegetation especially trees in arid and semi-arid ecosystems have been considered as one of the key problems in Zagros region. The major factors for this value include climatic parameters (reduced rainfall, higher temperatures and longer drought period), some human activities such as intervening and

providing the conditions for decline. Decline in recent years has occurred in the Zagros forests that it comes out of low soil moisture during the growing period of vegetation. Hence, these factors reduce tree grow than their seeding. In addition, dust as a harmful agent also has reduced the photosynthesis rate and growth of trees. Decline in many cases led to a destruction of oak trees in Zagros region especially in central and southern Zagros somewhere eminent decline phenomena have been increasing inIlam, Fars, Kohkilloieh provinces (Hamzepour, *et al*, 2010).

Khosrowgerdi *et al.* (2009) showed trees located in high above sea level were fresher than those in low elevation and also this value was found for different geographical directions in North, East, South and West, respectively. Hamzepour, *et al.*, (2010) in Fars province using random inventory concluded that the primary cause of oak decline in Iran due to low rainfall and humidity and high temperatures and vaporization. These factors have a direct impact on the physiology of trees and causing them to weaken. In addition, the indirect impact of these factors on various pests, particularly wood-eating pests has increased recently. Low precipitation has made trees

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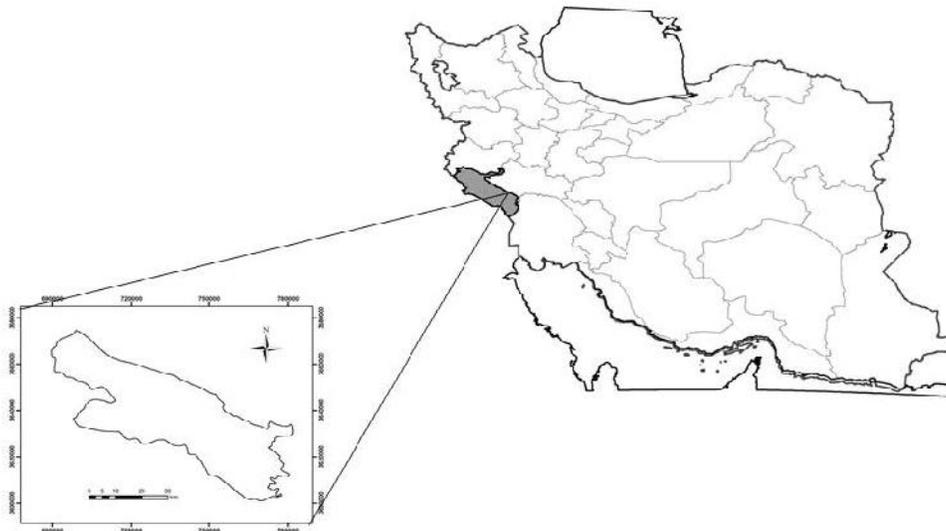
**Figure1:** The location of Abdanan forests in west of Iran

vulnerable to different disease and weak to regeneration in recent years. Experts studying pests believe that pests can't be only due to decline, but factors such as successive droughts, dust and suspended sediment, different industries and soil type are effective.

Hosseini, *et al.*, (2012) in a study in the forests of South East Ilam indicated that tree mortality and physiological weakness were because of drought directly and pests indirectly that this value was eminent in very young and old spices. The evaluation of oak decline in Missouri (America) showed that oak decline was as a result of interacting factors of tree stress (insects, drought, and freezing) secondary diseases and pests (root fungi and insect holes). Subsequently, the tensions cause to weaken trees, reduce growth, and eventually lead to die (Woodal, *et al.*, 2005).

Trees faced to long-term stress (pollution and competition) are susceptible to die in the short-term effects of environmental stresses (drought, insects and diseases) (Pedersen, 1998).

The study conducted in the Netherlands showed oak decline is associated with fluctuations in groundwater (Oosterban, *et al.*, 1991). Ogaya, *et al.*, (2007) in Spain concluded that drought phenomena caused to decrease biomass and tree growth and eventually led to tree growth. The research was conducted in the South-East Sweden indicated that reduction the size of the trees, sunny habitants, non-clay soils and pests are the obvious features of habitants with decline trees (Marie, *et al.*, 2011).

There are a large number of factors that cause to make decline so that various studies in different areas prove this value. Adverse condition of climate make vulnerable habitants for investing pests (Haavik, *et al.*, 2012*)* and

growing fungi (Helma *et al.*,2009), increasing air pollution and decreasing soil nutrients (Clinton, *et al.*, 1999*; Kabrick,* 2007*).* Increasing the temperature had a significant effect on tree growth in south of Europe (Allen, *et al.,* 2010*).* So that the main goal of this paper is evaluation of oak decline in Zagros region. Forest in this region, are dividing among rural resident according to common low. Current forest utilization practices are indigenous and support subsistence livelihoods (Ghazanfari, *et al.,* 2004). In this research by the public participation approach based on local resident's opinions, the main reasons of Oak decline in Zagros forests were gathered.

## MATERIALS AND METHODS

### Site description

The study was conducted in Abdanan city, Ilam province: west of Iran (N 32 $^o$52'10" and E 47 $^o$19' 6.4). Abdanan meteorological station shows the mean annual rainfall is about 587 mm figure 1. The average annual temperature is 17.5° C ranging from 48$^o$ C to -10$^o$ C. People live as tribe forms and this area mainly is covered by forest trees. The dominant spices in the area are *Quercusbrantii* and also some other forest spices are *Pistaciakhynjuk*, *Crataegusaronia* and *Acercineracens* (Noshadi, 2012). Providing fuel uses with wood, feeding the livestock by tree leaves and reducing the dust suspended in air are the main functions of these forests for local people. The income of local people depends on wood and non-wood products of the forest. Dinarkoh region covering 30 ha of these forest, includes seven districts named Boish,

**Table 1:** The results of interview with local people about oak decline

| Factors | Frequency | Frequency percentage |
|---|---|---|
| Drought | 4 | 31 |
| Pest | 4 | 31 |
| Fire | 2 | 15 |
| Dust | 2 | 15 |
| Wild animals | 1 | 8 |
| Total | 13 | 100 |

**Table 2:** The results of interview with local people in terms of prohibiting the Oak decline.

| Factors | Solution | Frequency | frequency percentage |
|---|---|---|---|
| Resistance and freshness of the tree | Sanitary pruning | 4 | 50 |
| Pest | Cutting and burning | 4 | 50 |
| Total | | 8 | 100 |

Gorazan, Kansia, Darin, Shovishe, Siakuh and Tangazi.

## METHODOLOGY

In this study, semi-structured interviews were used. Semi-open or semi-structured interview is the type of interview that both interviewer and respondent feel some limitations the interviewer asks certain issues and only get the given answer. It means responders can't express their personal opinions by freedom (Sarokhani, 1994; Zandebasiri, *et al.,* 2012). In this type of interview, the interviewer can make changes in interview's contains according to some standards and criteria.

If the question is ambiguous for responder, the interviewer is allowed to modify the text clearly (Rafeiepour, 1991). Two interviews were conducted in Tangazi including the reasons of decline and the ways for solving the problems. Selecting the respondents was based on reputation approach (Zandebasiri and Ghazanfari, 2009) and the old people with vast information about that area. In reputation approach, people with specific role in tribes such as the head of tribe were selected as responders. Questionnaires were filled up by responders aged from 70 to 80 with high experience about tribal life.

## RESULTS

Questionnaires showed there was not oak decline phenomenon in past and this event has been presenting for five years that the main reason of it due to successive droughts. Local people believed that recently droughts have caused to reduce growth and their seeding. In addition, all responders believed that pests are the second factor for creating this situation. 50 % of responders expressed that air pollution and dust are the third factor for oak decline. Dust was collected on leaf surfaces and it is proved that dust doesn't lead to absorb enough solar energy and also cause to reduce photosynthesis rate. This value eventually makes trees vulnerable to pests. Eight percent of people answered that wild animals like porcupine and boar with eating tree roots weaken them. 15.2 % of people believed that fire events were the other factor that made oak decline.

## DISCUSSION AND CONCLUSION

Table 1 and 2 indicated the results of interview with local people about oak decline and the results of interview with local people in terms of prohibiting the oak decline, respectively, in Zagros forest especially in Ilam province. According to people's mentions, trees located in sunny slopes are more significant than those in shady slopes about decline. Questionnaires showed that sunny slopes had higher evaporation and lower soil moisture than shady slopes. This was the main reason for significant changes between sunny and shady slopes. Pruning the healthy trees is the main responder's solution for avoiding the oak decline. Pruning trees would have less leaves the next year. Local people believed that trees with low leaves can use soil nutrients better than those with high leaves. According to people's idea, leaves came out next year are greener and more resistant to pests. They suggested that trees completely contaminated and dried should be removed and their logs must be burned to removing all pests in soil. Trees that not completely contaminated should be fallen and logs can be stayed and rebuild new shoots in next year because oak trees can make new shoot by cutting the trees.

Some parts of this region without any attention to people have thought, idea and collaboration had been forbidden for livestock by government. Arson is the adverse factor that occurred in non-grazing area. This value weakened forest soil and trees and eventually would make decline phenomenon in the close future.

According to experiences and information of qualified people, oak decline was not in past and it has been out breaking in recent years. The main reason for oak decline can be climate parameters and successive drought.

According to meteorological data, the gross rainfall has decreased. In addition, dust suspended in air has been accelerating decline for about one year. Hence, this issue makes trees more vulnerable to secondary factors like invasion of beetles. The main reason of arson is due to the prohibition of natural resources offices for avoiding livestock entering to forest. Agroforestry is not common there because of mountainous area and non-productive soil. The results were similar to those obtained by *Hamzepour*, *et al.*, (2010). Trees located in the case study are old (Noshadi, 2012) so that this value makes an appropriate situation for invading pests. This issue was proved by local people so that they expressed that wood beetles were observed in oak trees. The results of this study were proved by those concluded by Hamzepour, *et al.*, (2010) and *Marieet, et al.*, *(2011)* so that they concluded that oak decline was happened in DBH 25-30 cm. Hoseini, *et al.*, (1391) obtained the similar results so that trees in DBH 5 cm due to weak rooting faced to weak competition, tree mortality in DBH 25-35cm due to high competition is remarkable and old trees with more than 35cm are more vulnerable due to unable to compete. Trees grown in sunny slope are faced decline phenomena more than those grown in shady slopes.

The reason of this issue is because of high evaporation. It is similar to results obtained by khosrawjerdi, *et al.*, (2009) that trees located in west and south directions are healthier than those grown on east and north directions. Drought as main climatic factor affects forest trees directly (with reducing growth, producing seeds and reducing germination) and indirectly (by fires and diseases) that both of them can be found in Zagros region. Another climatic factor that occurs in growing period and makes irreparable damage in these forests is frost (Marvimohajer, 2005). Oak trees are more sensitive to drought in mixed stands rather than other deciduous spices. The results were similar to those obtained by *Suarez,et al.*, *2004* in northern Carolina that the growth of oak trees directly were affected by climate.

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