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EFFECTIVENESS AND APPLICABILITY OF PRE AND POST-FIRE REHABILITATION PROJECTS IN FIRE PRONE AREAS: THE CASE OF YARDOP PROJECTS IN TURKEY

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Abstract

Rehabilitation of Burned Areas and The Establishment of Fire Resistant Forests (YARDOP) Projects have been widely implemented in fire prone areas in Turkey since 2008. The projects have been carried out in burned and unburned fire prone areas. In the application phase, the structure of the landscape has been redesigned using buffer zones and fuel breaks. Fuel brakes and buffer zones were up to 100 m in width and planted using local less flammable plant species as well as non-wood plant species of economic value. Project areas involved wildland-urban and forest-agricultural interfaces. Buffer zones were used in these areas to separate forest from and urban and agricultural areas. The total cost of the 64 projects were around 68 million $US, and the total area covered was 173.000 ha as of the end of 2013. The objective of this study is to present and evaluate the effectiveness and applicability of the large scale fuel management projects such as YARDOP from ecological, economic and social aspects. Seven year experience of YARDOP projects indicated that projects developed and implemented with the principle objective being successful fire suppression would be extremely limited and could not satisfy the ecological and economic expectations from them. A successful project development, planning and implementation calls for the cooperation and collaboration of all respective stakeholders including people living in and using the project area, and the integration of the ecological requirements of the ecosystem and its components into the planning process. In conclusion, results obtained from the study indicate that experiences gained from YARDOP projects are important and require genuine attention as many countries are struggling with fire problem in similar environmental conditions in the Mediterranean countries in particular and in the world in general. The results of this study are believed to make great contributions to the overall forest fire management planning.

Keywords: Forest Fires, Post Fire Management, Fuel Management, YARDOP, Turkey

Introduction, scope and main objectives

Forest fires are an integral part of the Mediterranean forest ecosystems and have a major impact on their management (Moriera *et al*. 2010). Fires have economic, ecological and social impacts on the environment, the people who are dependent on forest resources and goods and services that forests provide (Bilgili and Coskuner 2014). Changing land use practices, depopulation of rural areas, high life standards of people in general and changes in fire regime have all contributed to the changes in the structure and development of forests in the region (Bilgili and Goldammer 2000). As a result, in all Mediterranean countries including Turkey, wildland fire problems and problems associated with wildland-urban interface have become one of the major challenges for fire management organizations and land managers (Bilgili 1998).

To mitigate the negative, unwanted effects of fires on the environment and on the society, Turkey has maintained a very strong fire management organization focusing mainly on fire suppression. However, the acknowledgement of the ecological role of fires on fire adapted ecosystems and the social and

economical demands of the people living in fire prone areas, as well as the high cost involved in fire suppression have resulted in a major shift in fire management strategies. Fire management policy has been complemented by strong prevention, pre-suppression and post-fire rehabilitation programs. Pre-suppression and post-fire rehabilitation activities usually involve fuel management practices that help control fires, and reduce the loss and the level of damage incurred by fires (Coskuner and Bilgili 2013).

One of the major efforts to minimize fire loss and increase the resistance of forests to fire has been the project called "Rehabilitation of Burned Areas and The Establishment of Fire Resistant Forests (YARDOP). This project, in principle, is a fuel management project involving fuel and fire breaks in and around the forests surrounded by residential areas, roads, villages and agricultural fields.

The objective of this study is to present and evaluate the effectiveness and applicability of the large scale fuel management projects such as YARDOP from ecological, economical and social aspects. In this regard, sixty four YARDOP projects in fire prone areas from 2008 to 2013 were evaluated. Six of these projects have been implemented in burned and fifty eight in unburned areas (Coskuner 2014).

Methodology/approach

In this study, a total of 64 Rehabilitation of Burned Areas and The Establishment of Fire Resistant Forests projects (YARDOP) in fire prone areas in Turkey were evaluated. The implementation of the projects were realized following the technical guidelines (GDF 2010, GDF 2012, GDF 2014) and did not vary considerably among regions. Project implementations were monitored in Mugla-Gokova YARDOP project site for 2 years from the beginning to the end. Also, stakeholders were consulted in the area including people living in and using the project area to get acquainted with the effects of projects on local rural people.

Results

In 2008, YARDOP Projects were officially started after the Antalya Serik-Tasagıl forest fire that affected approximately 20.000 hectares of land area, and have since been widely implemented in geographically different locations throughout fire prone areas in the country. The total number has reached 64, as of the end of 2013. The implementation of the project has been carried out in burned and unburned areas. In burned areas, the area was divided into patches separated by fuel brakes. The size of the patches were subjectively determined taking into consideration fire behavior potential expected in the future and the general terrain characteristics. Fuel brakes with widths up to 100 m were planted using less flammable local plant species and non-wood plant species with economic value (Figure 1).

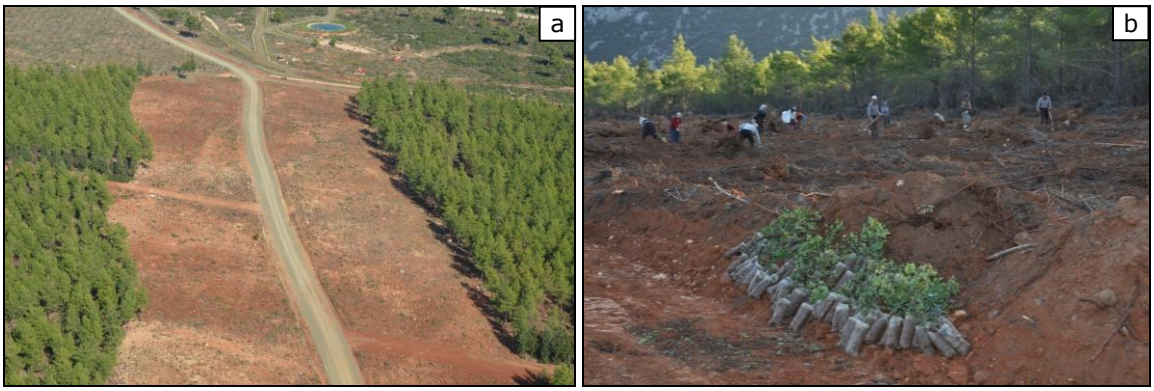


Fig. 1: One Hundred meters width Buffer zone of road (a) with local less flammable plant species (Antalya Düzlerçamı YARDOP) (b)

In unburned fire prone areas, the implementation of the project was similar to that of burned areas. But fuel brakes were established by clear cutting a strip of existing forest stand and replanting it with less flammable local broadleaved species and non-wood plant species with economic value. Project areas also included wildland-urban (WUI) and forest-agricultural interface (FAI). Similar but a slightly different approach was adopted in these areas. Buffer zones were established between these interfaces to separate forest from residential and agricultural areas. Initially, a road network was established along the

boundaries delineating WUI and FAI. Then buffer zones with widths up to 100 m were bulldozed (cleared from all trees) on the forest side and planted using less flammable local plant species and non-wood plant species with economic value. Six of these projects were implemented in burned and fifty-eight in unburned areas. The total cost of the projects were about 68 million $US, and the total area reached 173.000 hectares as of the end of 2013 (Figure 2).

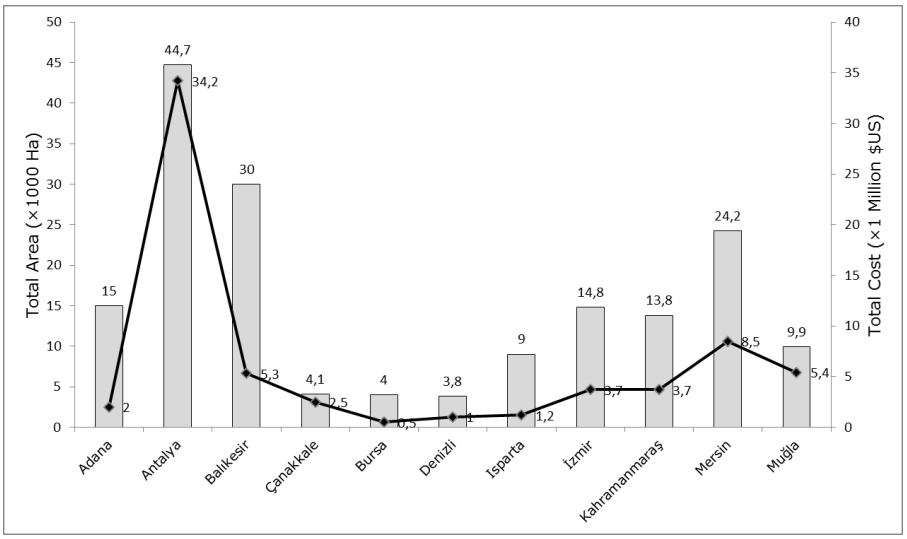


Fig. 2: Distribution of total area and cost of YARDOP projects by Regional Forest Directorates in Turkey (Coskuner 2014)

The projects were implemented following the instructions in the Technical Guide No. 6665 until August, 2012 (GDF 2010). Few years after the implementation of the projects, some economic, ecological and social problems started to emerge. Most important problems were related to soil erosion, maintenance and sustainability of the planted zones (Fig 3).

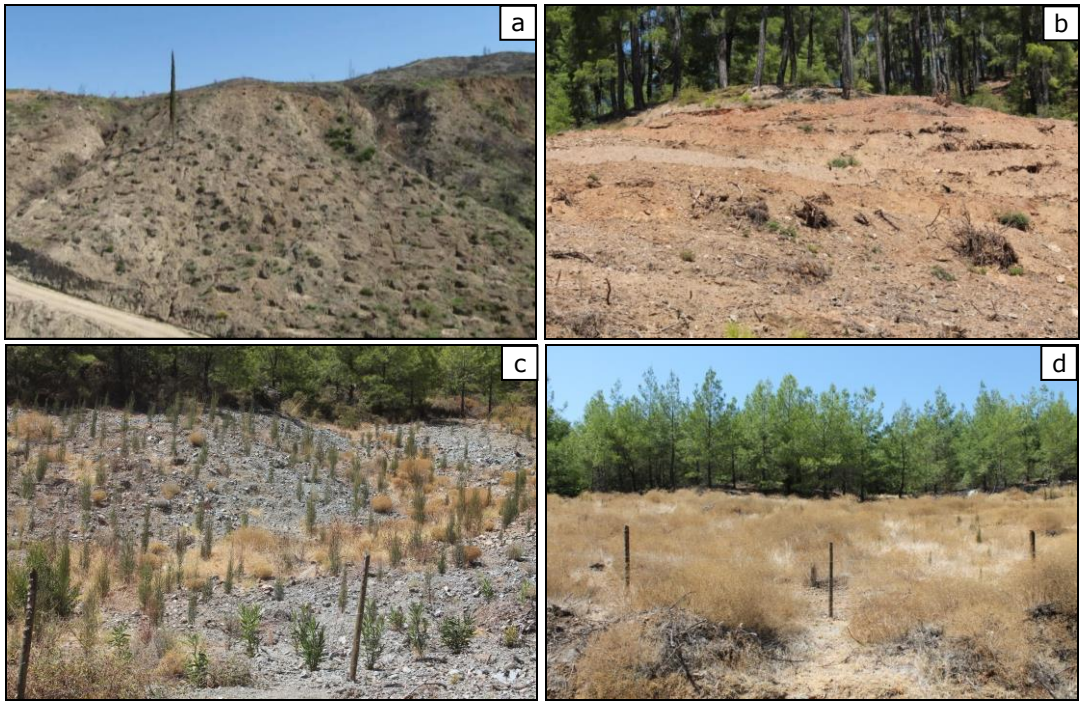


Fig. 3: Soil erosion problem after land preparation to create buffer zones (Antalya-Serik Tasagil 2009 (a) (Photo credit: Ismail Baysal) and Mugla Gokova YARDOP 2011 (b)). Treated (c) and untreated (d) zones after plantation with less flammable and non-wood plant species with economic value.

In 2014, technical guidelines (GDF 2014) for the implementation of YARDOP projects was revised based on the experience and the results obtained from project implementations. As a result, the width of the fuel breaks and strips of land clearance was reduced by 50% (i.e., 50m) around forest stands in wildland-urban and agriculture-forest interfaces. In addition, fire and fuel break construction in unburned stands (mature stands) was abandoned in the new version of the YARDOP directives. In these areas, the implementation of the projects has been limited to some silvicultural interventions such as pruning and thinning to create shaded fuel breaks where required.

Discussion

YARDOP projects have been implemented as a response to destructive wildland fires in Turkey. The results obtained revealed that the implementation of YARDOP projects have resulted in both positive and negative outcomes. Project applications were well taken up and appreciated by the public, in that these areas were perceived as a platform to raise public awareness in relation to the dangers of fires. One of the apparent use of the project implementation has been the added income contribution of the non-wood forest products in project areas to local population for their livelihoods. Negative impacts of the project implementations were more pronounced, however. The results revealed serious consequences with respect to ecological and economical damages in these ecosystems such as soil loss, wildlife habitat fragmentation, weed problems and high cost of maintaining fire/fuel breaks. There has been no assessments of the effects of the implementation of YARDOP projects to date.

One of the principle objectives of YARDOP projects has been to help successfully suppress fires with little regard given to the ecological and economical implications of the outcomes of the project implementations. The results clearly indicated that the implementation of projects with a single objective that contradicts with the overall functioning of the system would be extremely limited in overall effectiveness and could not possibly satisfy the ecological and economic expectations from them. Therefore, a successful project development and implementation can only be achieved by the cooperation and collaboration of all respective stakeholders, and the integration of the ecological requirements of the ecosystem and its components into the planning process. Any plan failing to take into account the very basic components that make up the system or contribute to the system's functioning will be bound to fail. Thus, multi-faceted and multi-purpose plannings such as that in YARDOP projects should be handled with all stakeholders and showing respect for what the nature has and requires.

Conclusions/outlook

In conclusion, the results obtained from the study indicate that experiences gained from YARDOP projects are important and require genuine attention as many countries are struggling with fire problem in similar environmental conditions in the Mediterranean countries in particular and in the world in general. The results of this study are believed to make great contributions to the overall forest fire management planning.

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