***State of Mediterranean Forests* – 2nd edition**

**Part 1: The Mediterranean landscape: importance and threats**

# Chapter 4. Drivers of degradation and threats

Keywords: vulnerability, forest fires, pests and diseases, dieback, overgrazing, unsustainable management, land abandonment, urbanization, genetic erosion, biodiversity loss, migration, water scarcity.

Suggested Outline:

## Introduction: Mediterranean forest at stake

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This chapter will present the different threats on the Mediterranean forest landscapes by structuring them according to indirect and direct threats. A distinction will be made between deforestation and degradation, and between agents and factors. Consequences of forest degradation will also be addressed in this chapter. *Previous chapters would be mentioned as how the principal characteristics of Mediterranean forests are also intrinsically linked with principal threats (e.g. aridity and drought, heterogeneity and fragmentation, etc.)*

Underlying (indirect) causes of degradation

*Local and regional policies*

Christophe Besacier (FAO, France)

*Micro and Macro-economy*

Ludwig Liagre (GM/UNCCD, France)

*Cultural and technological factors*

Dan Malkinson (University of Haifa, Israel)

*Demographic patterns and migration*

Mohamed Berriane (Mohammed V University, Morocco)

Direct causes of degradation and principal agents

*Climate change: climate warming, drought and other climatic extreme events*

Filippo Giorgi (Abdus Salam International Centre for Theoretical Physics, Italy)

*Land use change: agro-pastoral activities, urbanization & infrastructure expansion, forest exploitation, and land abandonment & forest encroachment*

Abdelhamid Khaldi (INRGREF, Tunisia) & Doblas

 *Alteration of wildfire patterns*

Elsa Enriquez (Ministry of Agriculture, Food and Environment, Spain)

(Case of Peloponnisos; Nikos Koutsias, Ioannina University, Greece)

 *Biological Invasions*

Montse Vilà (Doñana Biological Station, Spain)

Combination of causes and their consequences

### Alteration and pollution of water resources-

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In this section, the causes and threats of degradation in the Mediterranean Forest Landscape have been examined. Water pollution and alteration in water resources cause degradation in forests. Degradation in forests also effects water resources vice versa.

#### General Information

The water problem is increasingly felt in social, economic and environmental areas. According to the Risk Report prepared for the World Economic Forum in 2014, water scarcity is among the three most important risks in the world. This affects not only the water basins where water is drawn, but also many production processes. With increasing international trade volume, water is now considered a global resource, not a local one. For this reason, the sustainability of freshwater resources is critical not only for social and environmental reasons, but also for the sustainability of the economy[[1]](#footnote-1).

Very few surface and groundwater systems remain unaffected by human activities around the world. It is estimated that food, water and energy needs will increase by about 50% in 2030. Climate estimates predict that extreme weather conditions will increase, and that rainy regions will be drier and arid regions more arid.

Middle East, North Africa and Southern Europe are at the forefront of the most serious areas of decline in precipitation (National Intelligence Council, 2012). It is estimated that in 2030, the global water demand of today's 4,500 km3 will be increased to 6,900 km3, regardless of the scenarios prepared considering the average economic development and other effective utilization mechanisms. This amount is over 40% of the current available and reliable supply (2030 Water Resources Group, 2009).

Another issue is artificial water bodies. The use of evaporation from dams and reservoirs to hold water for energy and irrigation purposes increases the loss of readymade water. The amount of usable water lost in this way is more than the amount of domestic and industrial water (UNESCO, 1999).

#### Problems Affecting Water

The amount of water that exists on earth is fixed, it does not change. The various factors on the scarce fresh water resources lead to some problems with water quality. Some of these factors are listed below:

##### Population growth:

Over the last century, the world population has tripled, while demand for water resources has increased sevenfold. Over the next 40 years, 2.5 billion people are expected to be added to the world population (Godfrey et al., 2010).In order to meet the needs of the growing population, the demand for water will grow and 65% of the population will face serious water stress.

The world population, which was 7.1 billion in 2012, is expected to be 8.3 billion in 2030. It is anticipated that urbanization will increase with population growth and that about 60% of the population will live in urban areas (UNDESA, 2009). This will further increase the pressure on the quantity and quality of water resources. In addition, the problem of inequality between the amount of water and the proportional distribution of population, which is seen all over the world, is also present in the Mediterranean region. There is a disproportion between the amount of flow at the basin and the population benefiting from these basins.

##### Irrational use of water resources

The planned use of water resources is a serious problem for the Mediterranean region.In Turkey, more than 70% of the water resources are used in agriculture, 20% in industry and 10% in domestic. Nearly 90% of currently irrigated areas in Turkey are subjected to surface irrigation or other means of release irrigation. On the other hand, demand for food is increasing due to the increasing population and quality of life. This increases the use of water for agricultural purposes.

##### Excessive Underground Water Use

Excessive and uncontrolled use of groundwater is a major problem. Excessive use in some areas has caused groundwater levels to fall between 30 and 60 meters. Given that groundwater resources have been around for many years, it is understood that their use is far above the sustainable rate. The underground waters, which are regarded as the savior of the arid periods, are rapidly consumed and can not serve this purpose. This causes degradation in the forests that are in dire need of their lives for their lives.

##### Climate Change

During the last 25 years, precipitation has been observed to decrease by 20% in the Mediterranean Basin.

In the recent climate projections[[2]](#footnote-2),

* During 2090-2100 period, temperature increases will vary between 3-7 ° C,
* Due to the increasing temperatures, it is expected that the rainfall type will return to snowfall more frequently in the winter months and snowfall areas will decrease in the winter months,
* The warm-weather waves will increase in the 30-year period from the southern latitudes of Turkey to the north,
* There will be a variation from -60 mm to + 40 mm in average of 10-year seasonal rainfall,
* It is predicted that the snowfall in Turkey will gradually decrease between 2015-2100. Especially in the Eastern Anatolia Region and the Eastern Taurus, the reduction in snow cover should be expected to change the hydrological cycle of the Euphrates Dicle Basin.
* With the impact of climate change, it is predicted that in 2041-2070, the gross water potential of the certain basins could be reduced by up to 60%. On the other hand, the basins where the most valuable water spots are observed even if not in all periods are basins in the south of Turkey and Konya Closed Basins in general.

#### Pollution in Water Resources

The quality of water resources is rapidly deteriorating due to domestic and industrial wastewater, extreme fertilizer used in agriculture, and leachate from pesticides and landfills, mining activities and geothermal activities. The fact that there is not enough sanctions and control for the wastewater that does not end up with a treatment plant still leads to the growing problem. On the other hand existing treatment plants mostly cannot be operating properly. When the water cycle is considered, the pollution that will occur in any element of the environment will definitely pass through hydrological cycles to water resources, soil, forests and vegetation. The effect of this pollution is distorting many ecological equilibrium.

The forests of the Mediterranean region are generally close to settlements. Solid waste landfills are generally made in forest areas. In many places, garbage is poured into the forests without any treatment. Leaks from these wastes pollute both surface waters and underground waters. The mining activities carried out without taking the necessary precautions also constitute a serious pollution. Although the quantity is not very important, the laws that are used to combat forest pests can cause water pollution. In some countries, aircraft or helicopters use sea water when forest fires are extinguished. This salt water can be harmful to the forest ecosystem. Waste oils of machines used during forestry activities can also be harmful.

#### Conducted Studies and Developments**[[3]](#footnote-3)**

The number and examples of applications for water efficient use are increasing day by day. Steps have been taken to switch to pressurized irrigation techniques to reduce the water used in agriculture and to use the treated water.

Many good practice examples have been developed to reduce water consumption by reusing water in the industry. With international-level regulations, plans are being made for integrated management on a watershed basis, which provides an opportunity for balanced distribution among the water sectors. In these distribution plans all climate and drouhght scenarios are taken into consideration.

Even differences can be observed across regions, improvement has been achieved for treatment of polluted water. There is an increase in the number of facilities built with international funds. The place of forests in the water cycle is more evident and it is envisaged that in the near future planning will be included as a reserve area for clean drinking water needs considerably.

#### Reducing the Risks

Some chain of actions should be realized to reduce risks related with water scarcity at local, national and global level.

Solution Suggestions:

* Integrated management and perspective,
* Establishment of a balance between protection and use,
* Increasing cooperation between institutions,
* Increase of stakeholder and public participation

There are four main strategies that will form the basis for the policy on preventing water quality problems and increasing water quality (Ministry of Environment and Urban Planning, 2011);

* Control of pollution sources,
* Treatment of dirty water,
* Restoration and safe use of wastewater,
* Ecosystem restoration.

**Turkey Case (If necessary):**

According to 2010 TURKSTAT (Turkish Statistical Institute - [www.turkstat.gov.tr/Start.do](http://www.turkstat.gov.tr/Start.do)) data, 73% of the total population in Turkey has access to sewer systems. While the ratio of the population served by the wastewater treatment plant was 10% in 1994, it was 52% in 2010.

One of the factors that cause environmental pollution in Turkey is industrial activities.

Industry wastewater is about 1% of the total discharged wastewater, but materials such as mercury, lead, chromium and zinc, which have a high toxicity rate in their contents, constitute a great threat.

The adverse effects of industrial activities are more harmful to the environment than the adverse effects of other activities.

In the Turkish Environment Situation Report (2011), the elements that cause pollution of freshwater resources in Turkey are listed as follows:

* Urban wastewater to be discharged to the surface waters without being treated or partially purified,
* Leaks from sewage and solid waste piles pollute groundwater,
* Mixing agricultural chemicals and chemical fertilizer residues in soil and irrigation channels with surface waters and aquifers,
* Deforestation and inadequate / incorrect agricultural practices that accelerate erosion, leading to sediment accumulation in natural lakes and reservoirs.

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 *Land degradation and fragmentation*

João Pedro Nunes (Centre for Environmental and Marine Studies, Portugal)

(Case of Marmora; Rachida Nafaa, University Hassan II, Morocco)

 *Forest dieback and regeneration decline*

Fabio Attorre (University of Sapienza, Italy)

 *Deforestation and overgrazing*

Nicolas Picard (FAO, France)

 *Pests and diseases expansion*

Gahdab Chakali (ENSA, Algeria)

(Case of Sierra Nevada; José Antonio Hódar, University of Granada, Spain)

 *Biodiversity loss and genetic erosion*

Helena Freitas (Centre for functional Ecology, Portugal)

Geographical and temporal trends of degradation: facing the challenge

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The analysis should highlight the geographical heterogeneity of the drivers and threats, with different prevailing processes in the North (land abandonment, forest fires, etc.) and in the South/East Mediterranean (overgrazing, overexploitation of fuelwood, migration etc.). *Next chapters would be introduced as potential strategies to face the described threats.*

1. <http://awsassets.wwftr.panda.org/downloads/turkiyenin_su_riskleri__raporu_web.pdf> [↑](#footnote-ref-1)
2. <http://sura.ormansu.gov.tr/sura/AnaSayfa/Surabelgeleri.aspx?sflang=tr-iklim> çalışma grubu [↑](#footnote-ref-2)
3. [http://www.efi.int/files/attachments/publications/efi\_what\_science\_can\_tell\_us\_1\_2011\_en.pdf - Page 105](http://www.efi.int/files/attachments/publications/efi_what_science_can_tell_us_1_2011_en.pdf%20-%20Sayfa%20105)

<http://www.dkm.org.tr/dosyalar/yayindosya_rnf27jiq.pdf> [↑](#footnote-ref-3)