



ULST Timisoara  
**Multidisciplinary Conference on  
 Sustainable Development**  
 21-22 May 2026



# Biodiversity and Environmental Importance of the Djurdjura Mountains, Algeria

**Maroua DAHBI, Douaa DAHBI, Raul PAȘCALĂU, Laura SMULEAC**  
*École normale supérieure d'Oran*

## Abstract:

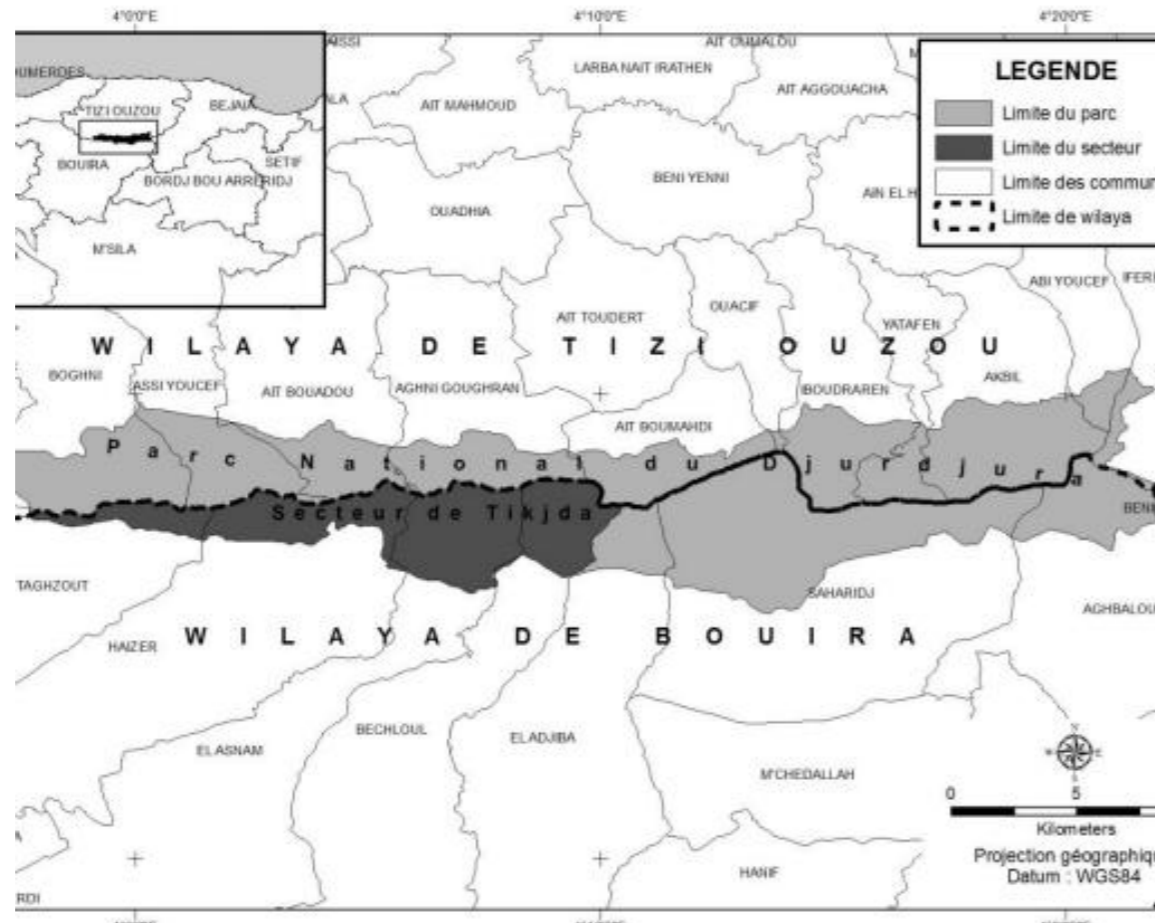
*This study focuses on the biodiversity and environmental importance of the Djurdjura Mountains in Algeria, a significant ecological region in North Africa. The area is known for its rich ecosystems and has been recognized as a UNESCO Biosphere Reserve due to its high biological diversity and environmental value. The Djurdjura Mountains host a wide variety of plant and animal species, including endemic and endangered species such as the Barbary macaque. Its diverse vegetation includes cedar forests, oak trees, and other Mediterranean species, contributing to the ecological richness of the region. In addition to its biodiversity, the Djurdjura Mountains play a crucial role in climate regulation, water resource management, and the preservation of natural habitats. However, this ecosystem faces several threats, including climate change and human activities. In conclusion, the Djurdjura Mountains represent an essential natural heritage that requires sustainable management and conservation efforts to protect its biodiversity and ecological functions.*

**Key words:** Djurdjura Mountains, Biodiversity, Environmental importance, Flora and fauna, Ecosystem conservation

### Introduction

The Djurdjura National Park, located in northern Algeria, is part of the Kabylies–Numidia–Kroumirie biodiversity hotspot, considered a high conservation priority in the Mediterranean basin. The park is characterized by an exceptional natural heritage, particularly a very rich vascular plant diversity. More than 1,100 vascular plant species have been recorded, representing around 27% of the Algerian flora and about 50% of the flora of the Djurdjura-Kabylia phytogeographical district, despite the park covering only a small portion of this region. The area also hosts numerous rare, endemic, and threatened species, including several plants found only in the Djurdjura Mountains, highlighting its strong biogeographical and conservation value. The landscape is composed of a mosaic of ecological units ranging from forests and pre-forest formations to alpine grasslands, rocky slopes, and mountain river ecosystems. These habitats support high ecological diversity and have been well studied through phytosociological research, revealing a complex structure of vegetation communities. However, the ecosystem is increasingly affected by human activities and environmental pressures, particularly recurrent forest fires and climate change, which contribute to vegetation degradation and species decline. These challenges underline the urgent need for effective conservation strategies to preserve the ecological integrity and biodiversity of the Djurdjura Mountains.

Figure 1. Location map of the Tikjda site (Djurdjura National Park) (PND, 2014)



### Material and method

This study focuses on the Djurdjura National Park, located in northern Algeria on the southern slope of the Central Djurdjura massif (Tell Atlas). The study area includes the Tikjda site, situated between 625–629 km (X) and 347–352 km (Y) in Lambert coordinates, at an altitude of approximately 1500 m. The climatic analysis is based on long-term data (1990–2009) from nearby meteorological stations, mainly Bouira and Tikjda. Due to the absence of a meteorological station inside the park, data were extrapolated using an altitudinal gradient approach. The main variables considered include monthly precipitation and air temperature, allowing the characterization of seasonal climatic variability. Vegetation data were obtained from published scientific literature and ecological studies describing the main plant formations of the Djurdjura, including cedar forests (*Cedrus atlantica*), evergreen oak forests (*Quercus rotundifolia*), shrublands, and alpine grasslands. Hydrological and hydrographic characteristics were analyzed based on literature sources describing the karstic nature of the massif, the presence of aquifers, and the seasonal behavior of rivers and springs. Environmental disturbance was assessed using fire data recorded between 2000 and 2009, including the number of fire events and burned areas in forested and non-forested zones. All data were analyzed using a qualitative synthesis approach in order to describe the climatic conditions, ecological structure, and main environmental pressures of the Djurdjura ecosystem.

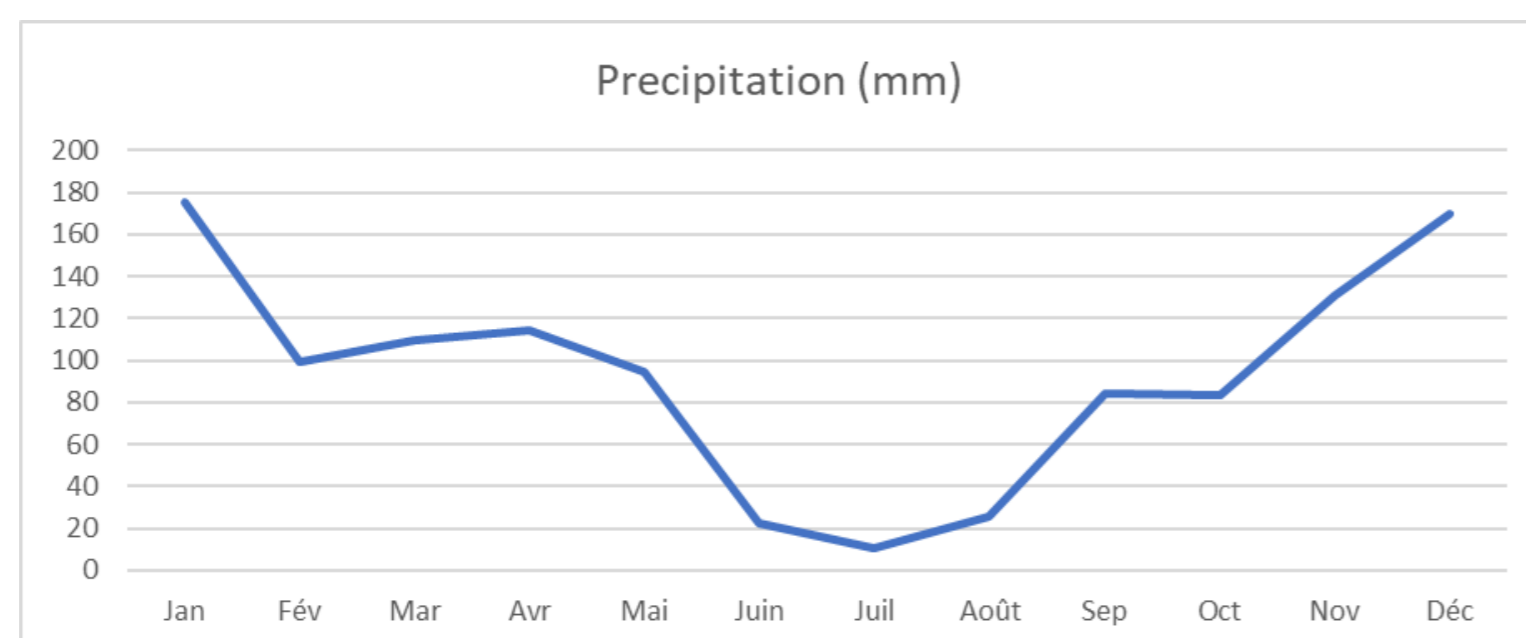


Figure 2. Monthly precipitation at Tikjda station (1990–2009)

Month	Jan	Feb	Mar	Avr	Mai	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean Temperature (°C)	2.8	3.6	6.16	8.23	13.06	18.44	21.9	21.98	17.71	13.23	7.26	3.76

Table 2. Monthly mean air temperature at Tikjda (Djurdjura National Park, 1990–2009)

### Results and discussions

The Djurdjura National Park, located in northern Algeria within the Tell Atlas, is a Mediterranean mountain ecosystem of high ecological and biogeographical significance. This study investigates the environmental structure of the Tikjda region by analyzing climate, vegetation, hydrology, and fire disturbances to understand ecosystem functioning and vulnerability. Climatic conditions are characterized by a humid montane Mediterranean regime. The mean annual precipitation is estimated at 1119.5 mm, with a strong seasonal distribution marked by wet winters and dry summers. January represents the wettest month, while July is the driest. The mean annual temperature is approximately 11.5 °C, with cold winters (temperatures often below 2 °C) and warm summers reaching up to 27 °C, reflecting strong seasonal thermal contrasts. The vegetation cover is highly diverse and structured into a mosaic of plant formations influenced by altitude and environmental gradients. Shrublands and grasslands dominate the landscape, while forest ecosystems such as cedar (*Cedrus atlantica*), evergreen oak (*Quercus rotundifolia*), and mixed maquis formations represent key ecological and biodiversity-rich habitats. These formations reflect both natural ecological conditions and long-term anthropogenic pressure. Hydrologically, the Djurdjura massif is characterized by a karstic geological structure that promotes significant groundwater infiltration and the development of aquifers. The hydrographic network is dense but highly seasonal, composed of streams and valleys that experience torrential flow during wet periods and partial or complete drying during summer. This hydrological variability strongly influences soil moisture and vegetation distribution. Fire disturbance is a major environmental factor in the region. Between 2000 and 2009, 146 fire events were recorded, affecting a total area of 912.43 hectares, including both forested and non-forested formations. Shrublands and grasslands are the most affected due to their high flammability, but forest ecosystems are also impacted. Fire occurrence is closely linked to summer drought conditions and human activities, contributing to vegetation degradation and ecosystem instability. Overall, the Djurdjura ecosystem results from the complex interaction between climate variability, topography, hydrology, vegetation structure, and anthropogenic disturbances. These combined factors highlight the ecological sensitivity of the region and emphasize the importance of conservation strategies to ensure long-term ecosystem stability.

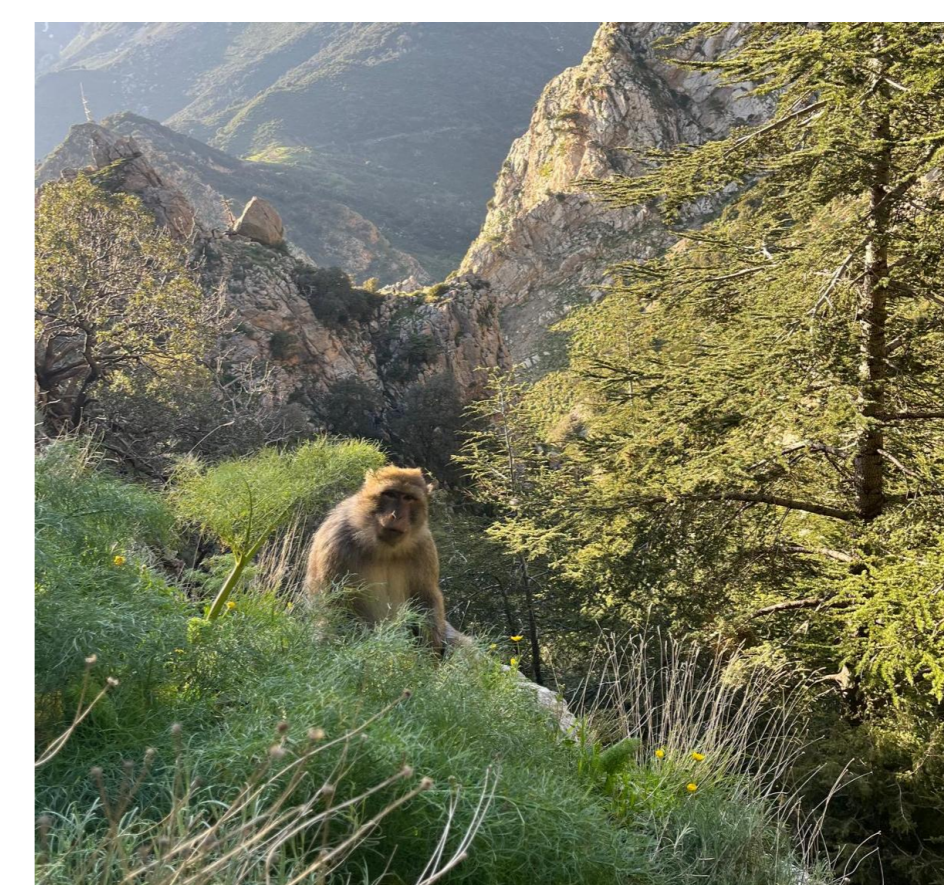


Figure 4. Wild macaque observed in cedar forest ecosystem of the Djurdjura Mountains

### Conclusions

The Djurdjura National Park, located in northern Algeria, constitutes a key Mediterranean mountain ecosystem characterized by high ecological complexity and strong environmental gradients. The present study of the Tikjda region highlights the interaction between climatic conditions, vegetation structure, hydrological dynamics, and fire disturbances in shaping ecosystem organization and stability. The climate is defined by a humid montane Mediterranean regime with marked seasonal variability. High annual precipitation and strong thermal contrasts between winter and summer create distinct ecological conditions, with a wet cold season and a hot dry summer. These climatic characteristics strongly influence water availability, vegetation growth cycles, and disturbance regimes. Vegetation in the study area is structured into a heterogeneous mosaic dominated by shrublands and grasslands, while forest ecosystems such as *Cedrus atlantica* and *Quercus rotundifolia* represent ecologically important but fragile components. This distribution reflects both natural environmental constraints and long-term anthropogenic pressure, leading to progressive ecosystem openness in some areas. Hydrological analysis shows that the Djurdjura massif is controlled by a karstic system that promotes significant groundwater storage and seasonal surface flow variability. Water resources are therefore highly dependent on precipitation regimes and are particularly sensitive to summer drought conditions. Fire activity represents one of the most important ecological disturbances in the region, with a high frequency of events recorded over the last decades. These fires, combined with climatic stress and human activities, contribute to vegetation degradation, reduced forest cover, and changes in landscape structure. In conclusion, the Djurdjura ecosystem results from a dynamic interaction between climate, topography, hydrology, vegetation, and human influence. Its ecological sensitivity highlights the importance of continuous monitoring, sustainable land management, and effective conservation strategies to preserve its biodiversity and ensure long-term ecosystem resilience.

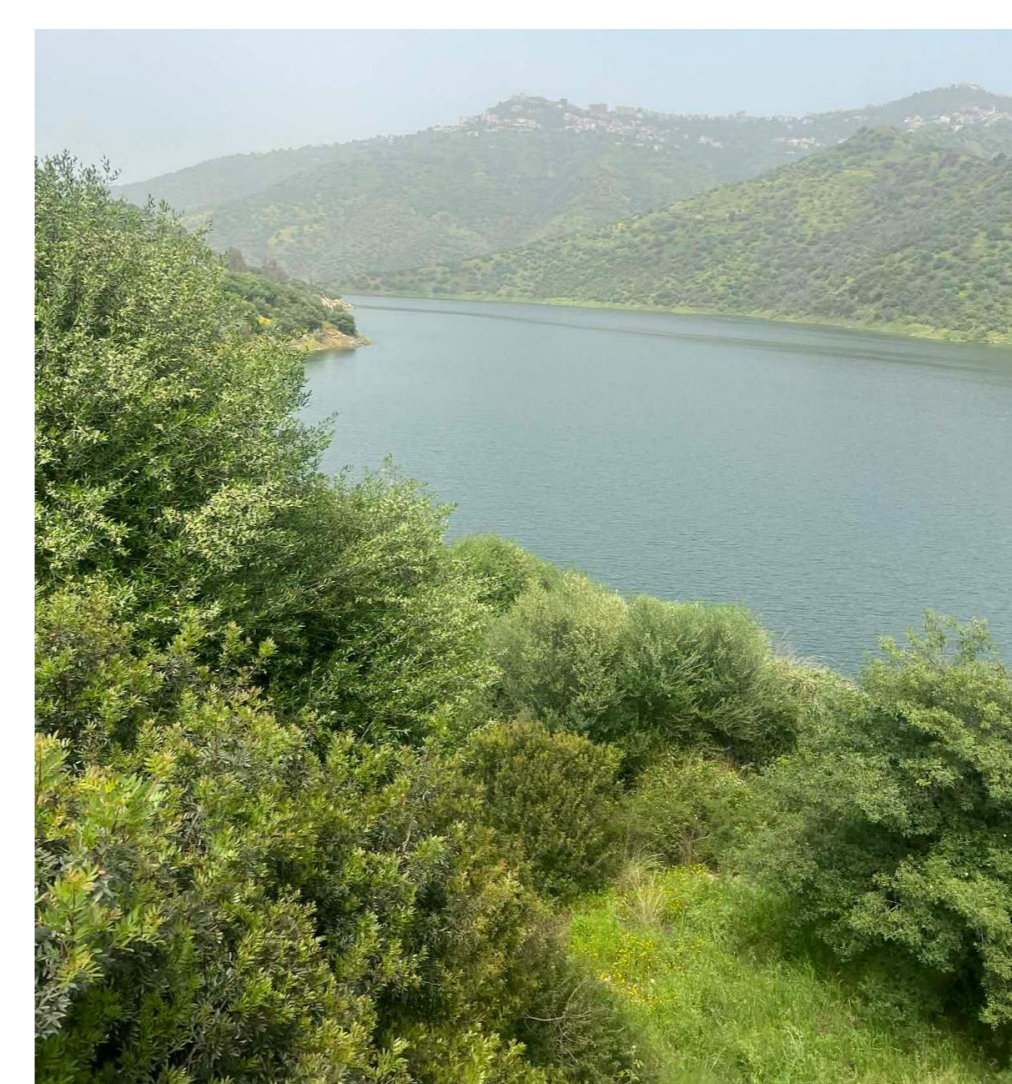


Figure 5. Dam reservoir in the Djurdjura region showing anthropogenic influence on water resources