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Some Aspects of Anthropogenic Florístico-Order in Both Steppe Regions (El-Gor and El-Bouihi) in Western Algeria

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Abstract

This aim of this study is to highlight the critical view of human action and anthropic at the steppe zone of Tlemcen. Therefore, the current paper tends to tackle an analytical study of the dynamics of ecosystems in both states: El-Gor in the south-east and El-Bouihi in the southern-west of Tlemcen. To carry out this study it was necessary to present the bioclimatic context based on weather data to perform bioclimatic syntheses (diagram ombrothermic, climagramme rainfall Emberger). By comparison between old and recent periods (1913-1938) and (1984-2009), respectively, for the region of El-Gor and (1913-1938) and (1970-1990) for the El station-Bouihi, there is a net decrease in rainfall and higher temperatures at the new periods, which means that the study areas are moving towards the driest floors. The interpretation of multidimensional treatments AFC (Factor Analysis of Correspondences) vegetation helps to determine the existing affinities between the different taxa. These biostatistical analyses help to highlight the different factors often responsible for the dynamic regressive most cases.

Keywords

Anthropisation, Steppe, Bioclimate, Livestock, Factor Analysis, El Gor, El-Bouihi (Algeria)

1. Introduction

In Algeria arable land, pasture and forest in arid and semi-arid areas are affected by desertification caused much more anthropogenic factors (overexploitation of course, inappropriate irrigation, fire, constructions without planing) added to the action of natural climate; this action has adverse effects (soil depletion, loss of vegetation

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cover and rural exodus) aggravating the natural phenomenon of desertification and a critical impact on the socio-economic development of the country.

This plague was certainly supported early by Algeria in the early years of independence. Today a new vision is needed; it is a synoptic vision and understanding of the spatiotemporal dynamics of desertification by all stakeholders including scientists and techniques.

Algeria and North Africa saw its highly endangered vegetation because of demographic constraints and over-exploitation of course, what attracted unsurprisingly also the attention of many scientists rechercheurs include some of them it is [1]-[21].

An Algerian steppe witnessed that degradation for over than thirty years, accentuated increasingly all the components of the ecosystem (flora, vegetation cover soil, and its elements, wildlife and wildlife habitat) [22] [23]. As a consequence, the province of Tlemcen is now one of 12 states affected by desertification mainly in El-Gor and El-Bouihi.

The aim of our work is to try to highlight the problems of the steppe zones to try to come to an explanation of desertification including the different socio-economic and cultural factors. For that one has had to make a comparison between two steppe areas, one is located south-east of the province of Tlemcen (El-Gor) and the other to the southwest of the province; it is of the town of El-Bouihi.

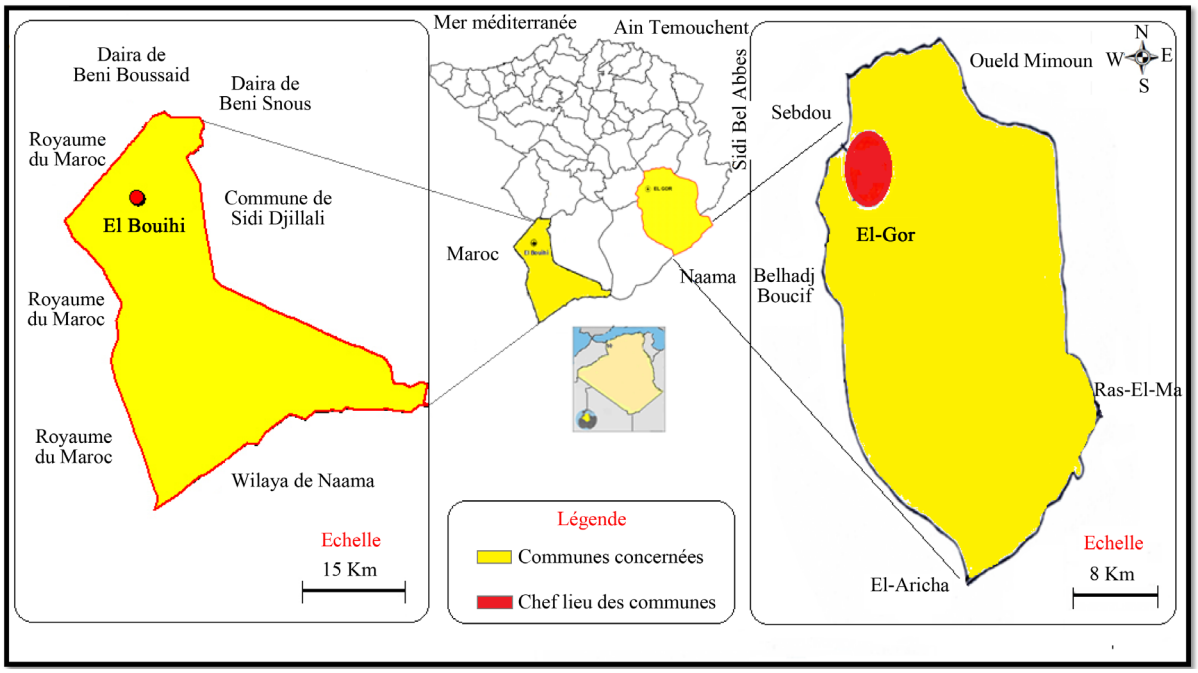
2. Geographical Situation: (Map 1)

2.1. Town of El-Bouihi

Bouihi county is one of 07 border municipalities of the province, it occupies 65,000 acres (650 km^2) and constitutes the western part of the steppe zone, The town is enclosed on the southern slopes of the mountains of Tlemcen and includes two areas and two distinct landscapes:

- In North clinging to the foothills forest and agricultural area covering the majority of the population, including the capital and the mining center of El Abed.
- In the south the steppe, most of the territory, where only the former socialist agro-pastoral village of Magura floundering and does not ensure its role, support center and socioeconomic animation, for which it was intended.

This joint is the Daira Sidi Djilali after the last administrative division, it is limited as follows:



Map 1. Location of the municipalities of El-Bouihi (left) and El-Gor (right).

- In the Northwest by Daira Beni Boussaid,
- In the North-East by Daira Beni Snouss,
- To the east by the town of Sidi Djilali,
- In the southeast by the municipality of Aricha,
- In the South by the wilaya of Naama,
- To the west by the Kingdom of Morocco.

2.2. Town of El-Gor

It is located between 1˚59' and 1˚58' west longitude and 34˚50' and 34˚57' north latitude. The town this located in the extreme south-east of the province of Tlemcen. The northern part belongs to the southern foothills of the province and has a canopy formed mainly by a degraded scrub trees. The southern section, or, nearly 80% of the territory is represented by the high steppe plains characterized by sparse vegetation cover Stipa tenacissima and Artemisia herba-alba often highly degraded and pasture steppe rangelands.

The town of El-Gor is located:

- 53 Km from the capital of the province of Tlemcen,
- 18 Km from the capital of the Sebdou District,
- 36 Km Ras El Ma and 35 km from Moulay Slyssan.

It also covers a total area of 79,258 Ha. This joint is the Sebdou District, following the last administrative division, it is limited as followings:

- In the north by the municipality of Beni Semiel,
- To the east by the town of Ras El Ma,
- To the west by the municipality of Sebdou,
- In the South by the municipality of El Aricha.

3. Materials and Study Methods

We use data on the physical environment (climate, geomorphology), socio-economic data with the pastoral activities that we have collected from the two municipalities. All these data have been biostatistical treatment, carried out using the "MINITAB 16" software.

3.1. Working Methodology

- Climate data: precipitation and mean annual temperatures of the two stations for two periods, the former from 1913 to 1938 were provided by [24] and the recent one that was available to us by meteorological services. All these data have been operating from a bioclimatic indices (ombrothermic diagrams Bagnouls and Gaussen and not forgetting the pluviothermic climagramme Emberger).
- In order to conduct a bioclimatic study from meteorological stations located not far from El Gor and El Bouihi the climagramme Emberger and ombrothermic charts, it was forced to refer to meteorological data from nearby stations areas of study, and this because of the lack of reliable data on rainfall stations themselves, and the lack of temperature data. The study sites are: Ras El Ma for the town of El-Gor and Sidi Djilali to the town of El-Bouihi.
- Socio-economic data and those of pastoral activities and agriculture and geomorphology: from several services respectively DSA (Agricultural Services Branch), the district forest Sebdou, the PDAU (Plan Director of Planning and urban planning), the A. NAT (National Agency for Regional Development), Hall Sebdou.
- The correspondence analysis (using MINITAB 16 software) will consolidate subsets whose elements are similar floristically over them they resemble other; [25].

3.2. Choice of the Region

Both stations summers chosen because of their geographical position and their abuse related to man (deforestation, plowing, crops, grazing). This choice was imposed on us because of the lack of comparative work in these two regions.

The station, according [26], depends on the homogeneity of the plant cover in order to avoid transition areas.

4. Results

4.1. Bioclimatology Study Areas

4.1.1. Quotient Rainfall Emberger

Rainfall exercise a preponderant share for the definition of global climate drought [27]. Depending on rainfall, each floor includes a vertical stratification. The arid bioclimatic stage is divided into upper arid, arid middle and lower [26] [27] made it clear that, in the diagram, the boundaries were drawn where the vegetation change was observed. The quotient Emberger is specific to the Mediterranean climate, it is most frequently used in North Africa. "A climate can be meteorologically Mediterranean, Mediterranean rainfall possess the characteristic curve without being ecologically or biologically, if the summer drought is not pronounced" [28].

Both stations Sidi Djilali and Ras El Ma were installed on the climagramme through Q2 Emberger **Figure 1**.

This last fact we prove that the two stations are lagging moving to the right, the first station (Ras El Ma) picks it fresh winter medium semi-arid to arid winter temperate means. At the second station there is a detachment of the sub-humid temperate winter below to semiarid temperate than winter.

4.1.2. Diagrams Ombrothermic

According [29], a month is said biologically dry if the monthly total precipitation expressed in millimeters is equal to or less than double the average temperature in degrees Celsius ($P \leq 2T$).

It is observed according to **Figure 2** that stations are marked by a dry season. Early periods (1913-1938) show droughts that stretch from April to September for both stations Sidi Djilali and Ras El Ma, a period of 6 months a year on average.

We also observe an increased drought at the new periods especially Ras El Ma it runs from April until late October or early November 7 months in the year, however it is a little shorter in Sidi Djilali station because it starts in late March early April and lasts until October for the recent period (1970-1990).

[27] consider that the Algerian steppes are framed by isothermal "m" −2˚C and 6˚C, and the temperature range; Mm varies little and remains substantially equal to 34.6˚C.

4.2. Distribution of People

According to [30], excessive population degrades the environment and the means of production, such as soil. The population has a great influence on the environment. To know the effect of the latter on the natural given environment is referred to the PDAU the two study areas.

Comparing the two graphs in **Figure 3**, we see that the population of El Gor tends to settle this leads to over-

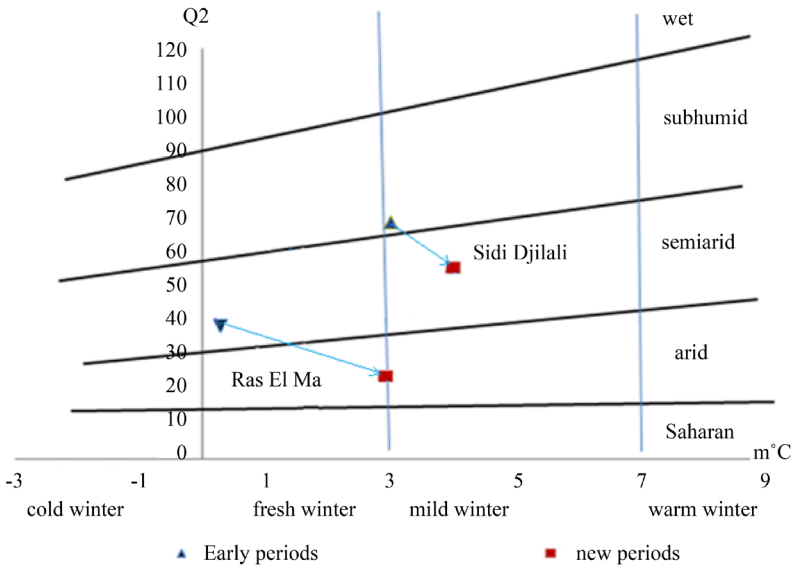


Figure 1. Quotient rainfall Emberger for both stations.

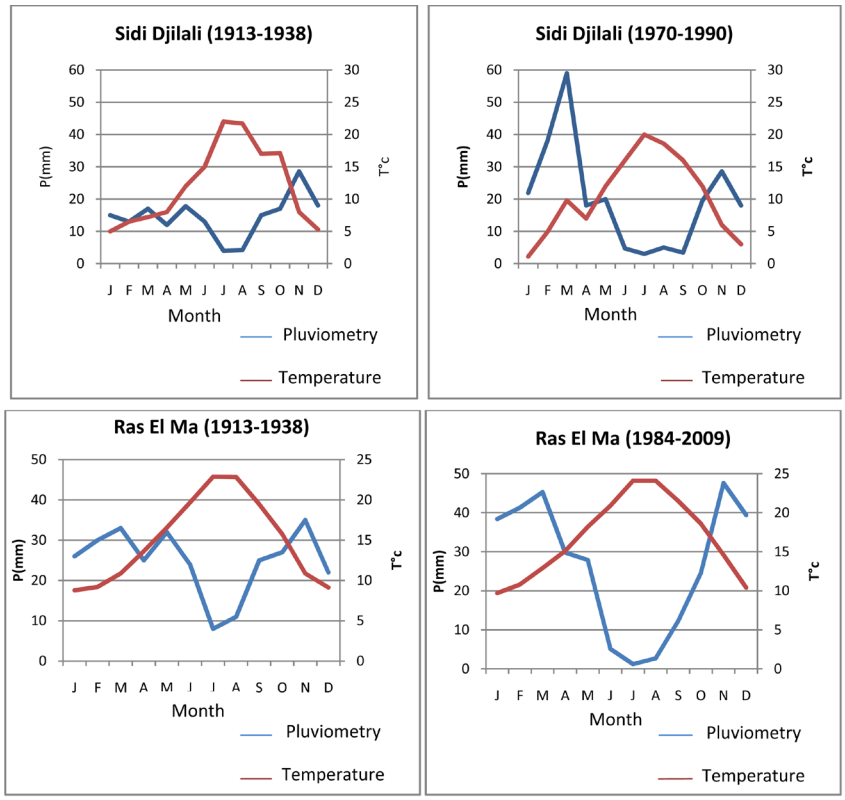


Figure 2. Diagrams ombrothermic old and new periods of Sidi Djilali station and Ras El Ma.

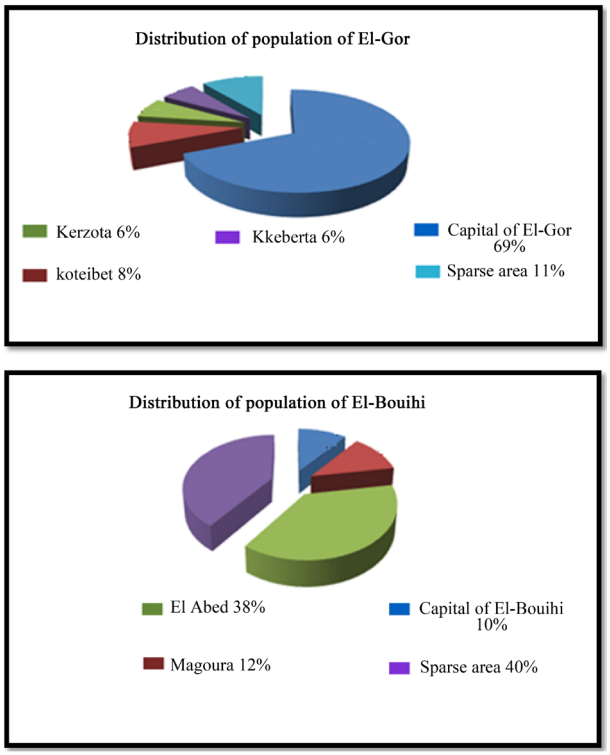


Figure 3. Distribution of populations stations Studies.

grazing some surfaces sometimes increasingly reduced and causes accelerated degradation of the natural environment, particularly by compaction soils [31].

- Evolution of the population:

According to **Figure 4**, the area is characterized by low population rate (17,800 inhabitants compared to the entire population of the Wilaya which is 937,000 people, or 2%) (Anonymous 1) but with high population growth **Figure 4** regards both the sedentary population as sparse population and this for both common, which makes us think that there is a significant regression of nomadism which subsists sporadically [32]. This leads to overexploitation of pastoral resources; So pastors have changed their production system by combining cereal crops and livestock.

4.3. Economic Activity Areas

Figure 5 and **Figure 6** demonstrates that the structure of employment at the study areas is marked by the absence of industrial employment and the predominance of agricultural employment. The unemployment rate is high at 69% for the whole of the area relative to that of the province of Tlemcen (26%) (Anonymous 2) This high rate reflects the weak sources of economic opportunities in the steppe. It helps explain the immigration population the steppe to the north to seek employment.

The data indicate that the number of women workers is much reduced and this for both municipalities. For men the permanent employment rate is 51%, and temporary employment is 6.15% for the municipality of El Bouihi, and 35.14% for permanent jobs, and 2.3% for temporary jobs, cella for the town of El-Gor.

Note: However, the number of unemployed identified does not reflect reality, since the residents keep livestock unreported for fear of taxes owed.

4.4. Agricultural Area

The graph **Figure 7** shows that the agricultural area which is useful (U. A. A.) occupies 19,500 hectares in comparison weith 44,100 hectares of the global agricultural area (G. A. A.), that is a percentage of 44.21% for the district of “El-Bouihi”. As for as “El Gor” is concerned, the useful agricultural area is of 17,000 Ha against 46,000 Ha for the useful agricultural area (U. A. A.) for a percentage of about 37%.

[33] has underlined that on the high plateaus clearings of the lands are the most important they offret at least 1% of the global forest areas every year in the maghreb contries.

4.5. Evolution of Herds in the Two Communes

The sheep rate is very high compared to goats and cattle, and that in both stations (**Figure 8**), however, the cattle is remarkably higher in the El Gor station which can make us understand that farmers in this region are richer than the region of El Bouihi as has been reported [34] cattle breeding is a crucial to both economic and symbolic for the breeder have reached a certain comfort level measured departure in terms of owned sheep flocks. How-

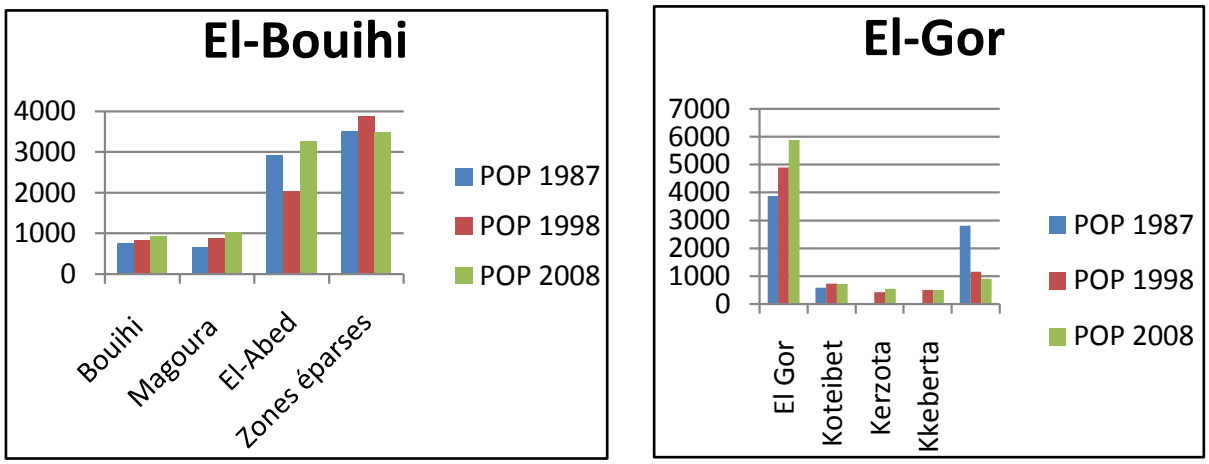


Figure 4. 1987 Evolution of the population in 2008 and El Gor El Bouihi. Source: (P. D. A. U., 2013).

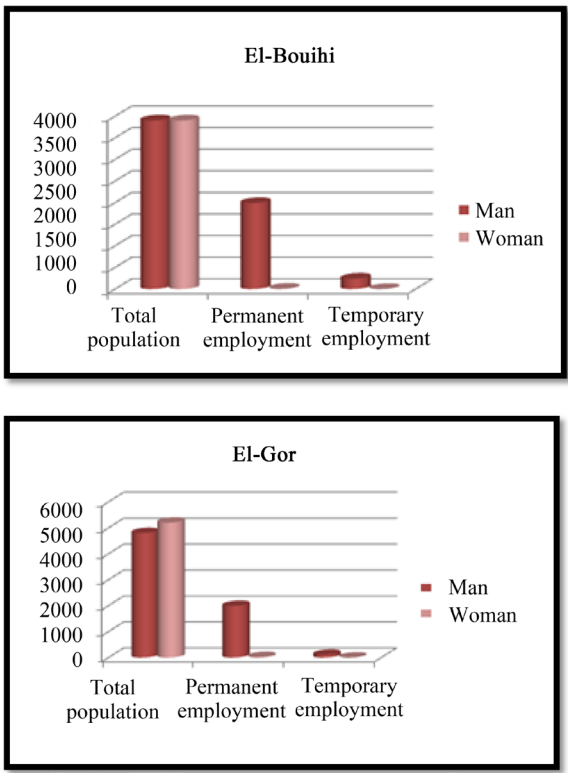


Figure 5. Male and female employees rate their mean age. Source: The mayor of Sebdou, 2012.

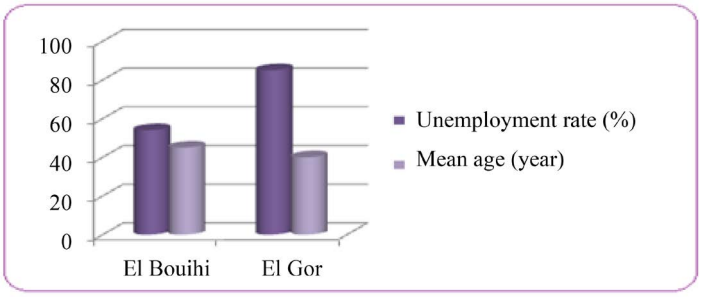


Figure 6. Male and female unemployees rate their mean age. Source: The mayor of Sebdou, 2012.

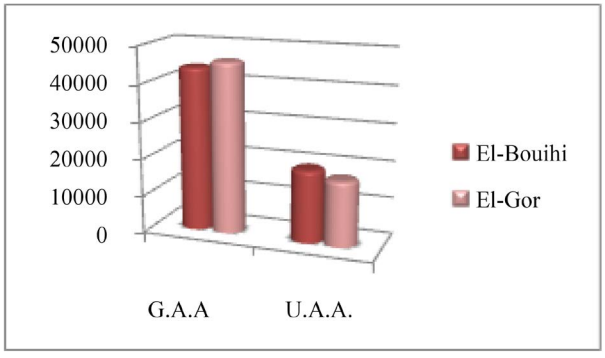


Figure 7. Total farm area and useful of the two municipalities. Source: Directorate of Forestry in the wilaya of Tlemcen, 2010.

ever, goats are regularly included in herds of sheep, with a role not only to guide the flock but also to give him the example by addressing the brush and herbaceous species leathery [35].

4.6. Geomorphology (Map 2)

Biological Characteristics of the Study Areas

Several authors have addressed the relationship between the distribution of biological types and environmental factors and other factors include [16] [36]-[38].

Regarding our study area the biological types show a predominance of therophytes followed by chamaephytes, hemicryptophytes at the expense of phanerophytes and geophytes, and for the two stations**.**

Therophytes occupy the first place, of: Plantago lagopus, Echium vulgare, Medicago rugosa, Bromus rubens… Several authors agree that this dominance is a form of resistance to climatic rigors [39] [40] show that therophytisation is considered the ultimate stage of deterioration of different ecosystems with the dominance of sub-nitratophiles species linked to overgrazing. [41] reports that in the high plateaus Algerian, increased therophytes is related to increasing aridity gradient. [42] argue that the harsh climate and structural instability of the soil (sandy substrate, 50%) favor the development of short life cycle species.

The loss of vegetation resulting in the gradual disappearance of phanerophytes and extension of chamaephytes. These are in second place with a sizeable representation that reflects a good acclimatization of species to climate, according to [43] overgrazing leads to the development of chamaephytes. We Daphne gnidium, Ulex bovini, Cistus villosus Rosmarinus officinalis, etc… Their proportion increases dice that there is degradation preforest environments, because biological type fits better to the summer drought and light that phanerophytes [44].

According [40] non hemicryptophytes abundant in the Maghreb countries because of the presence of organic matter and moisture, we find Atractylis humilis Paronychia argentea, etc…

4.7. Floristic Analysis AFC

The correspondence analysis is used by many scientists as: [7] [25] [45]-[53]. It gathers subsets whose elements are similar floristically more between them than they resemble other; [25] and according [48], this analysis makes reading tables originally difficult to decipher.

The correspondence analysis according [49] jointly processes the floristic variables and ecological variables.

4.7.1. Methodology

To make a biostatistical study we applied a factor analysis of correspondence to variable taxa on a raw data matrix representing plant species by their absence/presence and abundance/dominance.

These variables were introduced in the form of codes whose meanings are found in the Annex.

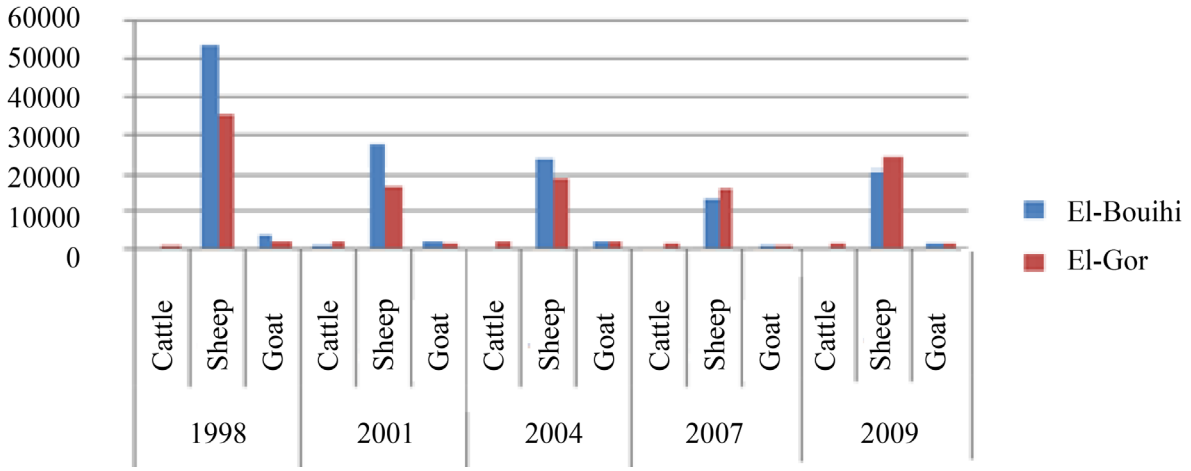
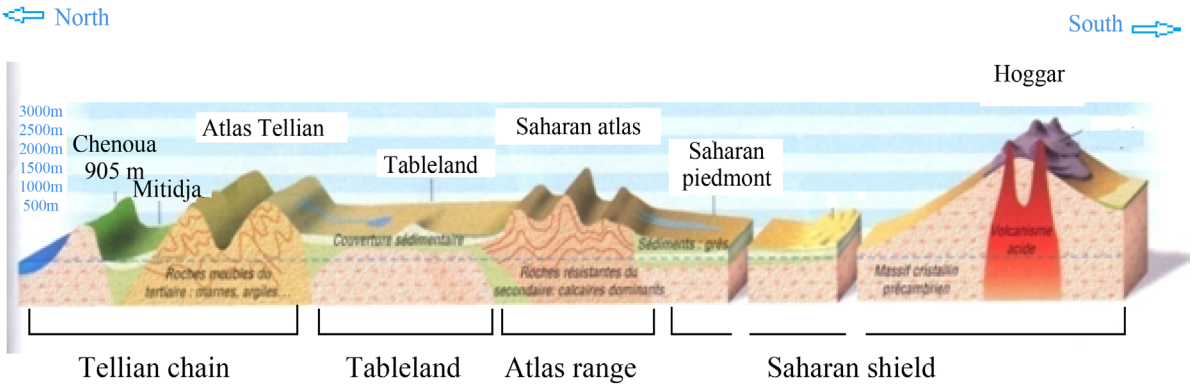


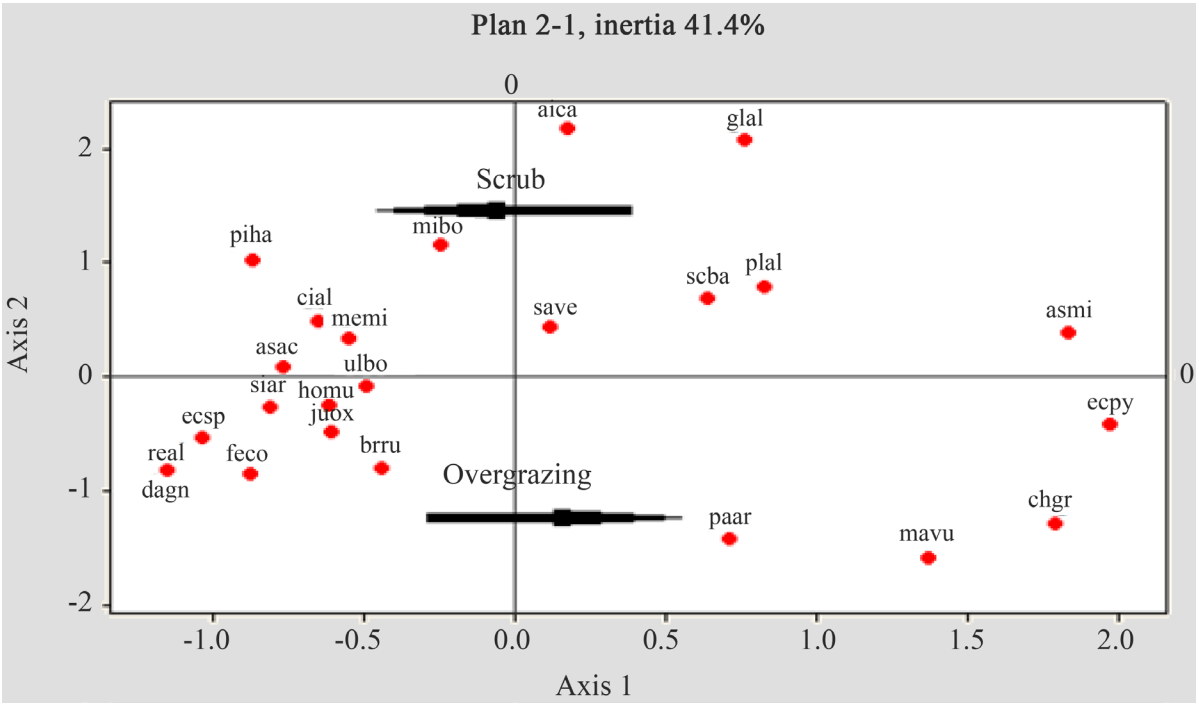
Figure 8. 1998 to 2009 livestock Evolution of El Bouihi and El-Gor. Source: D. S. A., 2011.



Map 2. Map representative of the morphology of the steppe of the wilaya of Tlemcen. Source: D. P. A. U., 2013.

4.7.2. El Gor

The plan includes a 2-1 inertia ratio equal to 41.4%



The representation in the plane of axes 1 and 2 allows to highlight an increasing gradient from overgrazing on the positive side to the negative side of the axis (*Asphodelus microcarpus* and *Chrysanthemum grandiflorum*). Against the opposite side is characterized by a gradient scrub (*Pinus halipensis* and *Daphne gnidium*) which moves towards the negative side.

The plan includes a 3-1 inertia ratio equal to 38.1%.

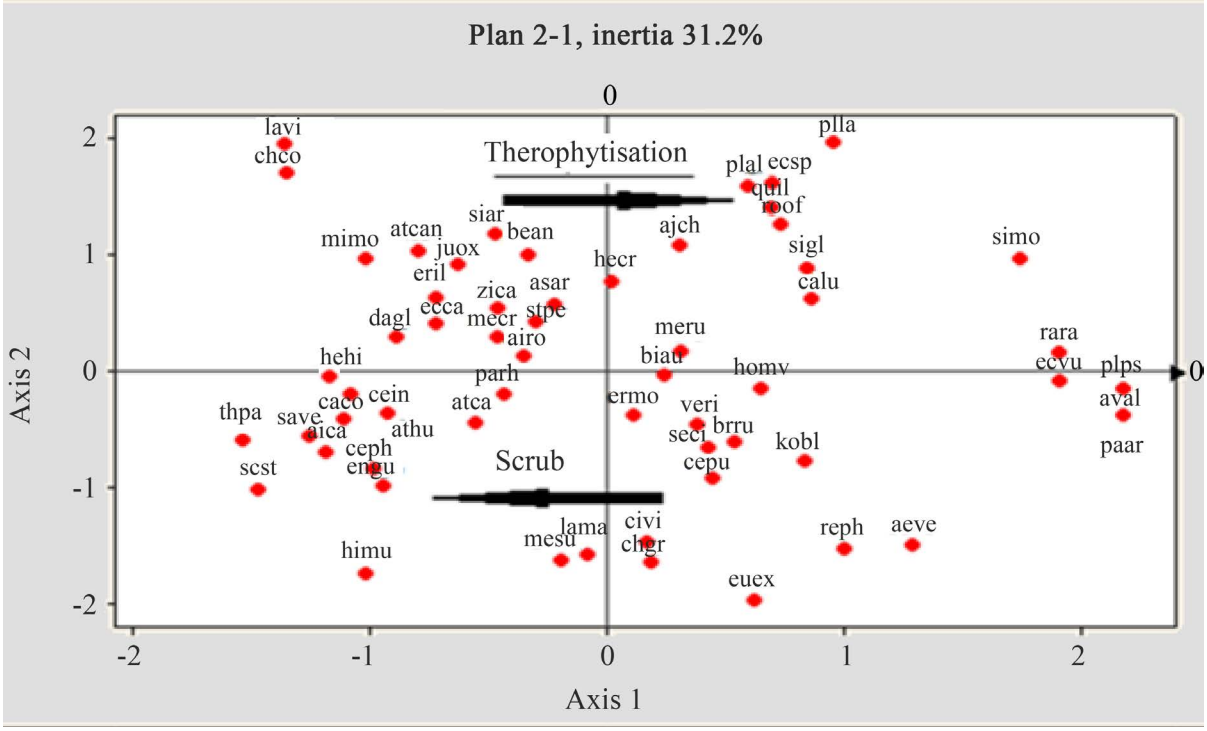
This plan includes forestry topics on the positive side (*Pinus halepensis* and *Juniperus oxycedrus*). The negative side is related to annual cash thérophytie showing a gradient from the positive side to the negative side (*Hordeum murinum*, *Salvia verbenaca* and *Plantago albicans*).

The plan has a 3-2 inertia ratio equal to 30.4%.

This plan is underpinned by an increasing gradientfrom human impact on the positive side to the negative side of the axis (*Chrysanthemum grandiflorum* and *Paronychia argentea*). On the other side of the scrub species dominate (*Globularia alypum* and *Alyssum campestre*).

4.7.3. Sidi Djilali

The plan has a 2-1 inertia ratio equal to 31.2%



On the negative side of this axis focus of scrub species (*Thymelea passerine*, *Chrysanthemum coronarium*) from the negative side to the positive side. On the positive side are located mainly in vegetation structure taxa less advanced than that differentiate the species grouped on the negative side, this axis corresponds to a gradient of increasing therophytisation (*Plantago psyllium*, *Paronychia argentea*)

The plan includes a 3-1 inertia ratio equal to 29.6%.

This axis opposes the one hand the species of scrub at the negative side (*Cistus villosus*) in the indicator species such as overgrazing (*Atractylis humilis*, *Eryngium ilicifolium*) located to the positive side.

The plan includes a 3 - 2 inertia ratio equal to 28.3%.

The negative side of this axis is marked by the presence of *Cistus villosus* and *Chrysanthemum grandiflorum* indicator of dématorralisation from the negative side to the positive side. Moreover, the positive side is characterized by annual species marking a therophytisation (*Plantago albicans* and *Plantago lagopus*) moving toward the negative side.

5. Conclusions

The exploitations are used as a means of combustion and installation of cereals; the latter led to the impoverishment of the vegetation cover as shown in **Figure 9** with 70% Therophyte and only 3% of phanerophytes Sidi Djilali, and 46% and 8% of Therophyte phanerophytes in El Gor.

This flora 75 taxa between the two stations, 60 taxa in the area of Sidi Djilali and 24 taxa in the area of El-Gor, remains poor compared to 3150 species in North Algeria counted.

The AFC has allowed us to see that the inertia ratio of the factorial axes remained more or less significant, with percentages between 28.3% and 41.4% for the two stations, that character is the fact that the analysis was conducted over a large part of the vegetation including particularly the steppe.

The factors considered in this study are bioclimate and human actions. Bioclimate because of the drought intensified as demonstrated by ombrothermic diagrams of the stations of studies is a major factor in plant distribution, however the main factor in the decrease in the diversity of these steppe formations appears to be due to

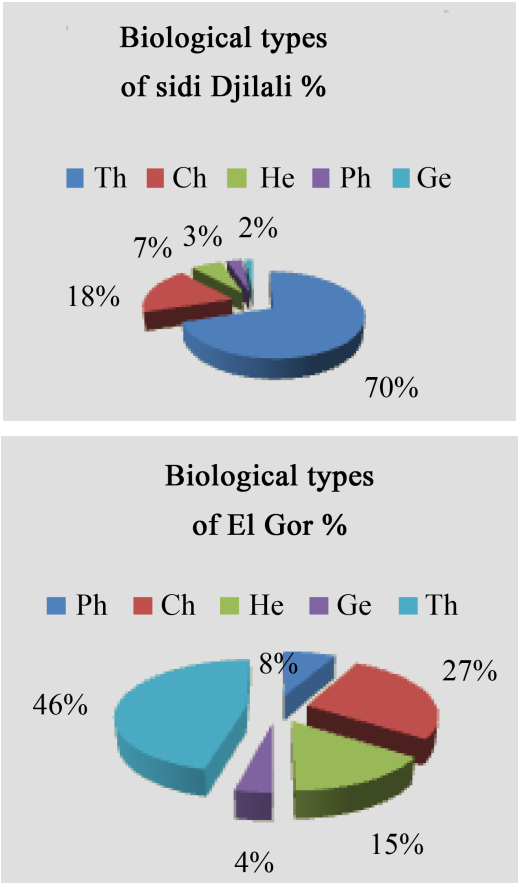


Figure 9. Biological types of stations (%).

the action anthropogenic; it seems to handle most of the AFC axes.

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Annex

Cash	Code	Cash	Code
Aegilops ventricosa L.	*aeve*	*Hippocrepis multisilliquosa* L.	*himu*
Ajuca chamaepitys Schreb.	*ajch*	*Hordeum murinum* L.	*homu*
Allium roseum L.	*alro*	*Juniperus oxycedrus* L.	*juox*
Asparagus acutifolius L.	*asac*	*Koeleria blansae* Coss.et Dur	*kobl*
Asphodelus microcarpus Viv.	*asmi*	*Lactuca viminea* (L.)	*lavi*
Atractylis carduus Willd.	*atca*	*Medicago minima* (L) Bartal.	*memi*
Atractylis cancellata L.	*atcan*	*Medicago orbicularis* (L.) All	*meor*
Atractylis humilis (Forsk.) Christ.	*athu*	*Medicago rugosa* Desr.	*meru*
Avena alba Vahl.	*aval*	*Micropus bombycinus* Lag.	*mibo*
Bellis annua L.	*bean*	*Minuartia montana* L.	*mimo*
Biscutella auriculata L.	*biau*	*Papaver rhoeas* L.	*parh*
Bromus rubens L.	*brru*	*Pinus halepensis* Mill	*piha*
Carthamus coeruleus L.	*caco*	*Plantago albicans* L.	*plal*
Cathananche lutea L.	*calu*	*Plantago lagopus* L.	*plla*
Centaurea incana Desf.	*cein*	*Plantago psyllium* L.	*plps*
Centaurea pullata L.	*cepu*	*Quercus ilex* L.	*quil*
Ceratoce phalus falcatus (L.) Pers.	*ceph*	*Reseda alba* L.	*real*
Chrysanthemum coronarium (L.) Batt.	*chco*	*Reseda luteola* L.	*relu*
Cistus albidus L.	*cial*	*Reseda phyteuma* subsp: Collina Gray Batt.	*reph*
Cistus villosus L.	*civi*	*Rosmarinus officinalis* L.	*roof*
Daphne gnidium L.	*dagn*	*Salvia verbenaca* (L.) Briq.	*save*
Echinops spinosus (L.)	*ecsp*	*Schismus barbatus* (Loefl. ex L.) Thell.	*scba*
Echium pycnanthum Pomel.	*ecpy*	*Senecio cineraria* (L.) DC.	*seci*
Erygium maritimum L.	*erma*	*Sideritis montana* L.	*simo*
Erodium guttatum (Desf.) Willd.	*ergu*	*Silene glauca* Otth.	*sigl*
Erodium moschatum (Burm.) L'hor.	*ermo*	*Sinapis arvensis* L.	*siar*
Hedypnois cretica (L.) Willd.	*hecr*	*Stipa pennata* L.	*stpe*
Herniaria hirsuta L.	*hehi*	*Ulex boivinii* Webb	*ulbo*
		Velezia rigida L.	*veri*
		Ziziphora capitatab L.	*zica*