Land use and disturbance effects on the natural vegetation of Daphna rage zone (North Eastern part of Libyan coast)

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Abstract

The study area is a semidesert range zone with a vegetation cover constituted mainly of annuals, shrubs and sub-shrubs, adapted to survive in such harsh environment. The area is characterized by a semi-desert climate which is dry over the most of the year with sporadic and irregular rainfall from year to year and from one month to other. In the study area natural factors such as: geographic location, dry climate, topography, pad soil characteristic and lack of water resources play a key role in the presence and distribution of vegetation coverage and low biodiversity, but the most dangerous disturbance factors are the increased anthropogenic pressure such as: overgrazing, rain-fed agriculture, mining, wood gathering, urbanization and over population, which have imposed a very big pressure on the plant diversity in the region leading to desertification.

Key words: Daphna, plant diversity, natural vegetation, soil seed bank, environmental factors, anthropogenic factors.

1. Introduction:

Daphna is the eastern part of Marmarica plateau which is an important range zone considered to be a Marginal Land at the Mediterranean coast north the Libyan Desert (Sahara), it extends from the city of Tobruk (north eastern part of Libya) towards the Libyan Egyptian border, characterized by low water resources and dry climate conditions.

In fact, the wild biota in Libya was the main natural resource available throughout ages, wherefore the presence of the inhabitants depending on throughout the history of this part of the world. The plants were the main source of fuel, medicine, raw material for manufacturing many tools and daily equipment, the only source of fodder for livestock and some species were edible by the locals.

This part of eastern Libya (Cyrenaica and Marmarica) has been a prosperous area since the Pharaonic, Hellenic and especially the Roman age, as a pasture and agricultural area as well with a special concern to water harvest and storage regimes (El-Athram, 1988). Until few decades ago it exported considerable numbers of pastoral animals to Egypt, Malta and many other countries.

L'Houerou (1965) stated that the vegetation in this pasture region may be divided in two associations, first one Thymealea hirsuta and Noea spinossisma with coverage ranges between 20 to 30 %. The second association of Suaeda pruinosa and Salsola tetrandra this type occupies extensive areas in Marmarica area between Tobruk and Bardia it develops on slightly saline soils with rather low coverage ranges between 10 – 20 %.
According to EL-Shairi (2002) the flora of Daphna region comprises 294 species belonging to 200 genera and 60 families, However L'Houerou (1965) remarked that this zone is a part of steppes rich in endemic species. Cerni (1974) and Cominiere (1980) focused on the water resources in Marmarica plateau especially in the areas of sedimentary depressions (Sakhefa), areas of important agricultural activities.

This study aims to determine the main factors that affect the plant diversity in this region in term to make clear view to an integrated coastal management to the area to conserve and sustain the natural recourses particularly the natural vegetation.

2. The study zone:

The study area is a semi desert coastal area of Marmarica plateau located in north eastern part of Libya at the Mediterranean sea, between longitudes 25°09’- 23°54’ east and latitudes 32°06’ - 31°36’ north , The area extends about 130 km , and about 25 km deep (south) approximately rectangular shape, (Fig. 1).

Fig. (1) The location map of the study zone (the eastern part of Marmarica plateau)

The meteorological peculiarities were obtained from Tobruk meteorological station, The annual mean temperature in the region is of 19.7 C, The annual rainfall rate is of 184 mm / year at Tobruk area , while at EL-Bardia area in the far east of the study area is of 117 mm / year , while southward at Tobruk airport area 25 south the coast is 88.9 mm / year .The region is characterized by monomodal rainfall regime , and the climate –diagram shows the wet period extending from the month of December to the second half of February , while the dry period starts from February to the end of November and it reaches its utmost degree during the months of June , July and August , during which rainfall is completely absent and temperature reaches its highest degrees .

We conclude that the dry period extends nearly 9 months , during which the dry south east wind ( Ghibly ) is blowing causing Aeolian erosion and damaging crops. While the wet period extends nearly 3 months with fluctuations concerning rainfall , This is a characteristic feature of arid and semi-arid regions , Fig. ( 2 ).
3. Materials and methods:
   - Several field trips were performed during the years 2012 - 2013.
   - The Phytosociological technique followed in the present work was in form of 80 chart quadrates 25 cm$^2$ divided into 4 transects, each transect 20 chart quadrates performed according to the method of the Zurich Montpellier school (Braun – Blanquet) of subjective classification (1992) Domin-cover abundance scales.
   - The soil sampling was secured from different depth of soils between (0 - 30 cm) The analysis run: chemical properties, which includes, pH, total soluble salts, organic matter, The analysis of soils run according to Black et al. (1965).
   - The soil seed bank samples were collected from different transects in the different habitats, Each sample unit represent the upper most 10 cm of soil in an area of 50 x 50 cm$^2$, The samples collected, mixed and the seeds separated and seed densities calculated according to Major and Pyott (1966) and Johanston et al. (1978).
   - Statistical analysis, the program applied (SPSS) and the following tests were performed: Descriptive analysis & T-test & Chi-square & Anova test & Multiple comparison test (LSD) & Correlation test..

4. Historical background in the area:
   Historical studies pointed out the different settlements periods, starting from the Pharaonic era up till now.

   The great anthropogenic pressure on the environment actually, started with the Greek (Hellenic) occupation (631 – 96 BC) of the eastern part of Libya (Cyrenaica) and Marmarica Where the study zone Daphna is situated, but despite what is mentioned above this zone was a populated zone as well an important pasture area. The local tribes like Libo and Mishuash inhabiting the zone practiced pastoralism as the main occupation. Inscriptions on
walls of temples of ancient Egypt recorded that the zone stretching from Egypt in the east, towards the Gulf of Sirte in the west, was inhabited by the above mentioned tribes, supplied Egypt with livestock and shepards. Besides they also practiced agriculture and, lived a normal sedentary life. They cultivated trees and grains and other cultivars.

The Greeks (631 -96 BC ) and the Romans ( 96 BC-643 AD ) built agricultural colonies, dykes and cisterns in order to harvest run-off water, developed irrigation canal and organized water consumption. But they removed vegetation and expanded in land reclamation, turned forests to farmland in order to grow barley, wheat, fruit trees, olives, legumes, and vegetables, all at the expense of natural vegetation. The pressure on the zone natural resources continued as well, during the middle ages, where the zone exported grains, fruit trees, honey wool cotton, sheep, particularly to Egypt. During the Arab era at 7th and 8th centuries, agriculture was not a priority, when compared with pastoralism, and a remarkable changes in land uses were introduced, they encouraged the return of the pastoral life and nomad livestock. That led to the abandonment of many irrigation constructions and disappearance of old villages and cultivated areas, the fact that led the recurrence, by natural steppic vegetation found today as Artemisia herba-alba, Anabasis articulate and Thymelaea hirsuta.

During the Ottoman era (1554-1911), most of the activities relayed on the income of agricultural resources through imposing several types of taxes. Agriculture as the principal land uses, remained the most important economic resources, and, major concern was directed to cultivate barley and wheat, (shifting cultivation), due to its relevance to the nourishment of local inhabitants as well to the Ottoman army.

During the Italian occupation (1911-1941) efforts were undertaken, in order to exploit the agricultural sector, large areas were cleared, and changed to farms cultivated with varieties of cultivars, accompanied by the introduction of exotic plant species, all at the expenses of the local environment. The second half of the 20th century, especially during (1950-1975), the situation remained relatively in a steady state, but from (1975-1990), big efforts were undertaken with the aim to improve the agricultural sector, which took place in the way of land reclamation and the establishment of large agricultural projects, associated with the clearance of large areas with an increment in road construction, building dykes, dams, and digging of reservoirs, but since then this period is followed by a period of remissness, which increased the risks of land deterioration and desertification.

5. **Natural vegetation and soil seed bank:**

The study zone is included within the North Saharan steppe and woodlands ecoregion. This ecoregion forms the north and western border of the greater Sahara Desert region. The monomodal rainfall regime, occurs during winter, nourishing a variety of annuals, that blooms, before the advent of the hot, dry summer. Compared to the South Saharan steppe and woodland, this ecoregion harbors a significant number of plant species, and endemics.

In fact, wild biota in Libya was the main natural resource available throughout ages. The plants were the main source of fuel, medicine, raw material for manufacturing many tools and daily equipment, the only source of fodder for livestock and some species were edible by the locals.
The frame network of vegetation in the area is composed mainly of shrubs, under-shrubs and annuals. Ecologically the perennial species are more important than the annuals either for grazing animals, or in terms of soil conservation.

Flowering plants in the area are constituted of 71 families, 395 species mostly shrubs, under-shrubs perennials and annual herbs (El-Barrani, 2008) constituting 31% of the plant species present in the eastern part of Libya, and 23% of Libyan flora, and 12 endemic species, constituting 2.95% of the flora in the study zone, distributed according to topography, which consisted wadis (valleys), narrows coastal areas, in the north and southern plateau zone.

In the northern areas sand dune elements encountered are Nitraria retusa, Retama raetam, Silene sicculenta, Lygeum spartum, Citrullus colocythus. In saline depressions at the end of some wadis, vegetation is mainly composed from species like Arthrocnemum macrostachyum, Arthrocnemum fruticosum, Halocnemum strobilaceum, Atriplex mollis, Tamarix aphylla, (salt marsh vegetation).

On account to topography, wadis depressions are more rich in number of species, they are constituted from species of dwarf shrub steppes, below the 200mm isohytes annual rainfall, and the physiognomy mainly is defined by woody chamaephytes, as Artemisia herba-alba, Euphorbia dendroides, Rhamnus oleoides, Thymus capitatus, Phlomis floccose, Ballota dictamus, Asphodelus ramosus, Rhus tripartita and of tall shrubs steppes, like Ziziphous lotus, and Atriplex halimus.

While the dominant, plateau species are, Haloxyon scoparium, which represents a depletion stage, and Anabasis articulate which occurs on silty shallow soils, Thymelaea hirsutae, in degraded steppes on sandy soils and in abandoned fields, Suaeda vermiculata, on silty or sandy gypsic soils, somewhat saline, Pituranthos tortuosus, Peganum harmala, the latter grows mainly on soils enriched with nitrogen from livestock wastes.

According to Le Huoerou (1965) floristically and ecologically the association in Marmarica region is akin to the type of pasture of the Agedabia region (South west, the area of Benghazi), it develops on slightly saline soils, sometimes of fairly skeletal nature and at all times warped on the surface.

In conformity with what Le Huoerou (1997) stated that North African steppeland biome is characterized by several plant community types dominated by perennial bunch grasses, dwarf shrubs, Mediterranean shrublands/steppe ecotones, steppic fallows and depleted ermes of nitrophilous forbs

Vegetation cover, is rather low in general, ranging between, (10 - 20 %), manifesting the importance played, by topographic factors, in the variation of vegetation cover. The salt-marsh vegetation cover, ranged between, (8 - 40 %) but sometimes it increases to reach (85 %), especially close to the end of some wadis deltas, due to water residing. While in some plateau vegetation the mean cover was (14 – 30 %) whereas, the mean cover as a whole was (21.3 %). It was found that there was significant differences between percentage cover of vegetation of different areas (P = 0.046).

These species are either annuals or perennials, The annuals are active only during the rainy season, short-lived plant growth appear during spells of rain and last as long as water is available. Their appearance and abundance changes from one year to the other depending on the amount and frequency of rainfall. The perennials, on the other hand, form more or less the permanent framework of the vegetation and do not suffer such drastic
temporal changes in presence or abundance. We state that two vegetation types are represented in the zone of study.

A. The “The mode contracte” Type.
   1. Permanent vegetation depending on precipitation or on accessible ground water, in the main wady channel with ground water relatively close to the surface.

B. Accidental vegetation type depending on the precipitation only.
   According to the pattern of water redistribution the accidental vegetation may fall into the following groups.
   1. Run-off dependent vegetation in the main wady channels.
   2. Run-off dependent vegetation of plays formation.
   3. Rain-off dependent vegetation on leveled plains of sand sheets.

The biological spectrum of species in the study zone is constituted of 26 Phanerophytes (6.85%), 112 Chamaephytes (28.35%), 38 Cryptophytes (9.62%), 1 Hemicryptophytes (0.25%), 218 Therophytes (55.18%) Fig (3).

Concerning the seed bank, no significant difference was found (P=0.804) in the soil of the study zone, which ranged between 600 - 6000 seed / m², these findings approximately coincide with the findings of Yang and Evans (1975), where they stated that, in desert areas, soil seed densities ranged between 2450-8431 seed / m², but this does not coincide with EL-Barasi and Buhwarish (2005) concerning the seed bank of semi-desert range area south El-Jabal Al-Akhdar.

A significant difference was found in number of seeds in the soil seed bank at different depths specially in areas offering deep strata (in some places more than 4 meters depth in the Sikhaif) and in soils accumulated, behind rocky dykes implemented in wadis and depressions in order to prevent soil erosion. The seed densities ranged between 1800 - 25200 seed / m².

Moreover there was a relation between age of dykes and density of seeds blocked in soils behind. Most seeds constituting the soil seed bank belonged to Brassicaceae (43.3%), Chenopodiaceae (10.0%), Fabaceae (10.0%), other families (36.7%).
The soil seed bank of depressions embraced the highest seed densities. This coincides with the findings of Paco and Levassor (1998) concerning the effect of rain and topography on soil seed bank, Fig.(4).

However Marmarica where the zone of study is situated, receives less amounts of rainfall compared with the adjacent zone El-Jabal El-Akhdar (The Green Mountain), but it consisted of larger soil seed bank, this may be explained by the fact that most of the vegetation is xerophyous and composed mainly of annual species, which produces a large number of seeds, El-Barasi and El-Barrani (2013).

**Landscape features**

Topography and landscape, determines the distribution of soil and water: in steep lands, erratic rains and erosion restrict the soil to a thin, patchy cover; light showers merely wet the surface and the water evaporates where it falls; rare torrents produce flash floods that carry water, mud and dissolved salts to foot slopes and depressions.

The hydrological conditions in depressions and wadis explain the importance of vegetation grown, (Kassas 1954, Zahran & Willis 1992). In the study area the drainage system and hydrology modify and redistribute moisture.

As a matter of fact, the study area is a part of the great sprawling plateau that forms the Libyan Desert. Topography of the area has a great effect on the distribution of natural vegetation, it redistribute the runoff water after rainfall, the low land receives more water through runoff, and it is more protected against wind and anthropogenic factors, hence many wadis or water-collecting channels of the drainage systems harbors, the restricted type of vegetation, which distinguishes, the run off desert, from the rain deserts.

Generally, the study is considered as an open area with an average height above sea level of about 118 meters. Many low-rise hills are spread throughout the area, and many dry watercourses (Wadiis), incise the area in many directions, and the stones and gravel are abundant in most depressions, the earth surface is characterized by the presence of Gypsum and calcium carbonate deposits, few meters east there are a north south chain of mobile sand dune.

Landscape features and Topography controls water availability and vegetation distribution in the zone, especially in the plateau where depressions (Sakhaif) served as traps, trapping eroded soils.

Water wells salinity samples ranged between 5033 - 10854 ppm, Due to the absence of fresh water source, the native people depended on the digging of shallow wells (Swani) and collecting run-off water.

**6.1 Soil characteristics**

In the study area, the physical disintegration of rocks leaves relatively large fragments; it is only chemical weathering which can break up these fragments. The process of chemical weathering in these areas is slow because of the characteristic water deficit. Also, extended periods of water deficiencies are important in the elimination or leaching of soluble salts, for which the accumulation is enhanced by the high evaporation. Short periods of water runoff do not permit deep penetration of salts (only short-distance transport), often resulting in accumulation of salts in closed depressions.
Vegetation plays a fundamental role in the process of soil formation by breaking up the rock particles and enriching the soil with organic matter from aerial and subterranean parts. However, this role of the vegetation is diminished in the study area because of the sparse canopy cover and the limited development of aerial parts. Nevertheless, the root systems often exhibit exceptional development and have the greatest influence on the soil. Due to the low vegetation coverage, the effect of vegetation on the soil properties in the area is really very little.

On the other hand, the chemical properties of soil control the availability of nutrients. Arid soils are characterized by significant leaching of nutrients and intensive weathering of minerals, although these two activities are slowed with decreasing rainfall. Natural fertility (which largely depends upon the organic matter content of the topsoil) is often low.

The sedimentary soil in the area suffers severe erosion. The surface covered with gravels and stones, as a result of severity Aeolian erosion, few centimeters beneath there is calcium carbonate sedimentary, the pH tends to be alkaline. Generally the soil contains a high percentage of sand (exceed 90%) as a result of the presence of the parent sand rocks scattered in many sites around the area, also calcareous and gypsum deposits could be seen as well.

Chemical analysis showed poor Soil fertility and high CaCO$_3$ content which ranged between 16.86% - 43.41 %, and very low organic matter content, in most examined samples not exceeded 1%. and the pH high and ranged between 8.19 and 9.45, So the soil classified as alkaline soil, with shallow Soil profile Fig. ( 5 & 6 ).

Fig (4) Seed bank densities

Fig (5) pH values for Soil samples
6.2 Climatic conditions

Climate is one of the most important factors having a direct impact on wildlife, particularly on the distribution and density of plant species, in addition to its impact on the composition and properties of soil.

The climatic pattern in the study zone is frequently characterized by "moderate" rainy season (winter), followed by a relatively "hot" dry season (summer). In general, there are significant diurnal temperature fluctuations within these seasons. Quite often, during the "moderate" rainy season, daytime temperatures peak between 35 centigrade and fall to below 10 centigrade at night. Daytime temperatures can approach 40 centigrade during the "hot" dry season and drop to 5 centigrade during the night. These diurnal temperature fluctuations restrict the growth of plant species.

Growth of plants can take place only between certain maximum and minimum temperatures. Extremely high or low temperatures can be damaging plants. Plants might survive high temperatures, as long as they can compensate for these high temperatures by transpiration, but growth will be affected negatively. High temperatures in the surface layer of the soil result in rapid loss of soil moisture due to the high levels of evaporation and transpiration, in the study zone it reach 50 centigrade at midday hot season. Although problems of low temperatures, in general, are less common in this zone, when they do occur for relatively long periods of time, plant growth can be restricted; at temperatures below 0 centigrade the plants can die. The average number of days above 32 centigrade is 158 days/year, and the average number of days below zero is 22 days/year (fig. 2).

Within a desert, rainfall events may vary significantly from one pulse to next: some spells may occur in winter, others in summer, some events may bring very little precipitation, others may bring intense showers, and the period between pulses may also vary substantially.

Rainfall also varies from one year to another in arid zones; this can easily be confirmed by looking at rainfall statistics over time for a particular place. The difference between the lowest and highest rainfall recorded in different years can be substantial, although it is usually within a range of ± 50 per cent of the mean annual rainfall. The variation in monthly rainfall is even greater.
All the drought characters are seen in the study zone, due to the geographic location at the center of Libyan desert which is a big part of Great Sahara, therefore it is a subject to the desert extreme changes such as lack of rainfall (ranged between 0–30 mm/year) and it reaches its peak in January then decrease as Summer approaches, the average number of rainy day is only 4 days/year (Hun meteorological station-the nearest station). Clima-diagram of the study zone shows that is no wet period throughout the year and all the months are dry (Fig. 2).

Although rainfall and temperature are the primary factors upon which aridity is based, but there are other factors which also have an important influences, such as atmospheric humidity that is important for the water balance in the soil. When the moisture content in the soil is higher than in the air, there is a tendency for water to evaporate into the air. When the opposite is the case, water will condense into the soil. Generally, relative humidity is low in the study zone and ranged between 35-59% (fig. 2).

The occurrence of dew and mist is necessary for the survival of many plant species. Many plant species in the study zone particularly the perennials depend, to survive, on the atmospheric humidity. The mean relative humidity in the region is low within 48 %. But it becomes high in some times as in night and supply plants with very important amount of water. The average dew point ranged with 1–11 centigrade. The occurrence of dew and mist is common in this area, which play a key role in the survival of many plant species.

Because of the scarcity of vegetation, and absence of high mountains that can reduce air movements, the study zone is windy. Winds remove the moist air around the plants and soil and, as a result, increase evapotranspiration.

Soil erosion by wind will occur wherever soil, vegetative, and climatic conditions are conducive to this kind of erosion. These conditions (loose, dry, or fine soil, smooth ground surface, sparse vegetative cover, and wind sufficiently strong to initiate soil movement) are frequently encountered in such zones. Depletion of vegetative cover on the land is the basic cause of soil erosion by wind. The most serious damage from wind-blown soil particles is the sorting of soil material; wind erosion gradually removes silt, clay, and organic matter from the surface soil. The remaining materials may be sandy and infertile. Often, sand dunes, present a serious threat to surrounding lands, as in the study area.

In spring and autumn a strong hot dust laden wind-namely the so-called Ghibli-blows from the south desert, filling the air with sand and dust and raising the temperature over 50 Celsius degrees. These strong Ghibli winds are a major erosion factor transferring a large amount of sand from the Sahara desert to the northern parts of Libya. Beside the arid conditions that prevailed over the whole country, water resources are very limited and there is no permanent surface water, the underground water is the only available resource.

6.3 Anthropogenic factors:

Dry desert climate in the study zone (aridity ) ,water and wind erosion, are the main factors contributing to system fragility, while livestock pressure and ploughing, are the main antropic pressure in the region.

Although species richness and endemism here are low, some highly adapted species do survive with notable adaptations. Only a few thousand years ago the Sahara was significantly wetter, and a significant large mammal fauna resided in this area. According to Krzynski (2001) a desert climate spread over a major part of the once forested Sahara during the Pliocene and exercised a selection pressure which favored drought-resistant plant species, moreover the present floristic distribution indicates a recolonisation, following the cool and dry Pleistocene climate (ca.20,000-15,000 BP.) moreover the intense human clearing, collecting and hunting
over the past 100 years, has obliterated most of these flora and changed the vegetation pattern. Now, in vast portions of the Libyan Desert, merely rock, sand and sparse vegetation are found.

The study zone constituted 286619 hectares, while agricultural activities covered 79801 hectares, in other words 28% of total area, the remainder 72% of the land with an area of 206818 hectares is designated for range activities (EL-Barrani, 2008).

Owing to intensity of rainfall, temporal and spatial variability most lands are cropped with annual crops (only once) with wheat and barley in addition to agricultural activities in catchment areas receiving considerable run-off water and in wadis, This type of agricultural activities, the principal land uses activities, on average, subject to very large annual fluctuations, depending on autumn and early winter rains, is highly enhanced to cover 96% of the zone. Irrigated area constituted 4%, The former type of activities brings more damages to environment as a result to its link to shifting cultivation.

The plots are distributed wide apart all over the area in an attempt to receive larger quantities of rain water. Perennial cultivation mainly figs, olive, grapes especially in wadis other cultivars as tomatoes, onions, and other crops grown in the sikhaif (27801 hectares) at the margin of the plateau, but wheat and barley are also cultivated in this zone, this type is practiced in depressions on the surface of the plateau, as run-off farming this covers nearly 50000 hectares. These activities are continuously underway in the zone. The hazard of these activities is latent in the fact that this ecosystem is considered to be fragile, with open plant cover.

Nomadic pastoralism is a traditional habit in Daphna region depending mainly upon natural vegetation, favoured by Mediterranean climate, with winters generally more or less mild, depriving vegetation from protection in this season against grazing.

Summer as a consequence of drought, is the unfavorable season for plant life, but even though grazing animals remain on the pasture for the whole year leading to conspicuous over grazing.

The range area constituted (72%) of the whole region (nearly 200.000 hectares) and grazing animals constituted 139.456 head (131320 sheeps, 1351 cattles, 6425 camels, 360 others).

Sometimes the area of grazing increases when lands (receiving 50 mm rainfall) south this area are included due to failure of wheat and barley cultivation (increasing the area temporarily to 500.000 hectares).

This grazing activities since long time, resulted in severe destruction of the vegetation (dominated by Artemisia herba-alba, Thymus capitatus in wadis depressions, Holoxylon scoparium, Anabasis articulata) on the plateau, but a decrease in number of grazing animals in recent years is noted associated with the breakdown of the pasture, Fig.(7 & 8).
According to EL-Barasi and Buhwarish (2005), the effect of overgrazing will increase in the coming years in arid and semi-arid zones especially with the improvement of transportation means and the continuous digging of water wells, this will attract the herds facilitating overgrazing, moreover the palatable species in the study zone constituted 45.82% of the total flora. Fig. (9) Table (1).

According to EL-Batanouny (1975), mostly the perennial palatable plants which protect the soil best, are destroyed and replaced by ephemerals which dry up and produce less.

Fig (9). Percentages of Palatable and unpalatable species in the study zone.

<table>
<thead>
<tr>
<th>Palatable species</th>
<th>Number of Species</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpalatable species</td>
<td>54</td>
<td>46%</td>
</tr>
<tr>
<td>Palatable species</td>
<td>181</td>
<td>45.82</td>
</tr>
<tr>
<td>Unpalatable species</td>
<td>214</td>
<td>54.17</td>
</tr>
<tr>
<td>Total</td>
<td>395</td>
<td>100</td>
</tr>
</tbody>
</table>
Ploughing, shifting cultivation, trampling and mining (16 quarrying sites covering an area of 190 km\(^2\) approximately 5.8% of total area) in the zone, involving clearing up of top soil, over burden removal of sand this results in the complete destruction of the soil profile, compacting and create new profile.

However the original top soil with the soil seed bank, is exploited or replaced. This is a situation in which the subsequent succession is not strictly the primary succession any more.

Cutting of woods, most of the shrubby species as *Thymelaea hirsuta*, *Haloxylon scoparium*, *Salsola tetragona*, *Anabasis articulata*, *Zizyphus lotus*, *Atriplex sp.*, *Lycium eorepeum*, are cut and harvested in Daphna zone to be used as fuel.

Other factors which affect vegetation biodiversity are urbanization and population which increased from 14.618 inhabitant in year 1954, in 2006 it reached 143.662.

7. Conclusion:

According to Le Houerou (1997) The arid steps of north Africa are mainly of second nature, They have been derived from xerophilous open forest and woodland through a "steppization" process which affects both soil and vegetation via the nature and distribution of the organic matter in the soil profile. Now days it is further subjected to desertification. like steppization, desertification results from intense anthropogenic impact on fragile and unstable ecosystems. As a matter of fact some 50% of the steppes have been cleared for cultivation over the past 80 years, giving way to fallows and steppic fallows dominated by weed-like steppic elements promoted by superficial soil disturbance and/or soil eutrophication from dung, stemming from a fourfold increase of livestock numbers over the past 50 years. It is worthy to note in the study zone, agriculture in most cases is not considered to be a principal occupation and majority of the farmers have another occupation, despite that, 56.4% of them admitted, that agriculture have an acceptable return, meanwhile 90% of the farmers do not posses the suitable education, and they mainly relay on transferring the experience from one generation to the other.

- 85.7% of the agriculture is rain fed, while 1.2% of the small farms (The Swani), relay on shallow water wells (less than 5m. deep), concentrated in the coastal strip near the sea, while 13.1% depends on, rain and ground water, in irrigation.

- Nomadic pastoralism is a traditional habit in this arid region, and occurs on about 72% of the study zone, the unfavourable season for plant life is summer as a consequence of drought, it causes severe conditions and reduces the rate of establishment of plants and may cause uprooting of the already established individuals, e.g. the rapid drying of upper soil layer.

- More than 87.5% of pastoralist are practicing open grazing without restrains in the deteriorated rangelands, and the herds are also fed by imported fodder all around the year.

- Majority of the herds owners are also practicing other activities, this is a philosophical heritage and way of life, the possession of a large number of animals, sheeps, goats, camels and others, has for long been regarded as a sign of richness, and thus constitutes a symbol of prestige and power within the tribes, among individuals who are not pastoralists, and as mean of saving money in the form of animals. Moreover many city dwellers are not bedouins, may invest their savings in domestic animals.
During the eighties the number of intruders to the profession of pastoralism increased due to economic stenosis, which led to many of the capitalist to invest in the profession of animal husbandary, which led to increasing the number of the herds at expenses of the grazing areas in the whole region, due to stop the sale or slaughter of the females, which led to accelerate the process of range land deterioration.

- The diversity of flowering plants is suffering of low soil seed bank densities/m² especially at the southern part of the zone (50 mm rainfall) on the verge of the desert.
- Pollution (especially with solid waste) the shrub *Nicotiana glauca* (bio-indicator of pollution) is widely distributed along the high way, and companion species noted are *Sarcopoterium spinosum*, and *Ziziphus lotus*.
- Ploughing, shifting cultivation, trampling, which may leads to compaction of soils and mowing, which can be attributed to litter decomposition.
- Over collection with selectivity of species as, *Thymelaea hirsuta*, *Haloxylon scoparium*, *Salsola tetragona*, *Anabasis articulate*, *Artemisia herba-alba*, *Ziziphus lotus*, *Lycium europium*, *Atriplex sp.*, *Urigenea marittima* Despite diminished activities of collection due to availability of energy sources the present time, but still collection of woods is practiced.

- *Urigenea marittima* one of the important species overcollected in the zone is reputed for its medicinal value, according to EL-Batanouny and Khalifa (1970), under natural conditions, the re-establishment of a community of squill needs more than three years. This boliferous plant is intensively collected in the zone, so it becomes an endangered species.
- Degradation of land is occurring due to interaction between landscape, soil, vegetation, climate and anthropogenic factors. This affects productivity of the soil-plant system by breaking down soil structure, redistribution of water on these soil surface and removal or deposition of soil and nutrients by wind and moving water.
- According to Ghabbour (1997) every spot where plants grows in an arid region is theoretically a hot spot. It indicates where life exist and where the prerequisites of life are available, water, good soil, plants, animals, as well as man and human society itself.
- This zone carries the characteristic of the hot spots, with enhanced anthropogenic pressure.
- However, human disturbance affects the structure of communities in a manner encountered by natural disturbance. The point where human disturbance begins to differ in kind and degree is determined by time scale.
- The repetition of the human disturbance, particularly when the time between events is shortened, and the harsh climatic conditions decreases the ability of the ecosystem to recover from such periodic disturbance. The extremity of this example lies in the form of continual human disturbance which denies the disturbed system any chance of response or recovery.
- El-Barasi et all. (2013) stated that plants once overgrazed far beyond their capacity to remain vigor will fail to complete their life cycle.
More over the mean cover of the plateau vegetation ranged between (14-30%) whereas, the mean cover as whole was (21.3%) indicating moderate to severe desertification when the all the above mentioned disturbance factors are taken in account, according to the FAO\UNEP matrix (1984).

References


17. **Major, and Pyott W. T.** (1966): Buried viable seeds in two California bunchgrass celes and their bearing on the definition of flora vegetation, USA.


