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The Impact of Urban Expansion and Quarry on the Vegetation Cover around Al - Khoums City - Libya

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Abstract: ***The problem of the expansion urban is one of the main threats that agricultural lands suffer from, around the world. In general agricultural lands surrounding cities are decreasing day by day as a result of urban expansion, and population growth exerts great pressure on the natural and agricultural lands. The study area is suffering by many environmental problems, such as the deterioration of agricultural lands, because of urban expansion and increase in the spread of quarry. The problem of desertification in the Arab world took serious dimensions, especially since most of its lands are in the range of arid and semi - arid regions. The study concluded that there is a widespread phenomenon of random urban expansion because of the large increase in the population. Moreover, the absence of oversight from the authorities concerned with urban planning for cities.***

Keywords: urban expansion, environmental degradation, semi - arid, quarry & Vegetation cover.

1. Introduction

Population growth is putting increasing pressure on agricultural land. This growth represents the natural increase in the population as well as the increase resulting from migration from the countryside to the city, where the population increase leads to an increase in land demand for the purpose of housing and other human services[1, 2].

As a result of the bad planning for cities, the random urban expansion increases at the expense of agricultural lands, which leads to what known as desertification[3]. It has been noticed in the recent period that this phenomenon has become purely a global problem that preoccupies officials and international organizations, especially the United Nations.

Most of ecosystems in arid and semi - arid regions are considered fragile, sensitive and vulnerable to factors of environmental degradation, such as receding vegetation, desertification is known as a process of land degradation, in which fertile lands turn into barren lands, as a result of the loss of plant and animal life forms[4]. This may occur due to some natural factors such as climate change, in addition to some improper human activities such as deforestation and overgrazing.

The activities of the quarry have negative effects on the environment, as they work to destroy and sweep the soil, cause air pollution, and reduce the area of vegetation cover[5], as well as change the course of valleys and rainwater, which increases the area of the affected lands, in addition to the formation of holes and grooves that harm the soil[6]. The problem of expansion is one of the main threats afflicting agricultural and natural lands in major cities. This phenomenon has posed a challenge to the countries of the world because of the population increase at large rates, which is accompanied by an expansion of urban activity. Natural and agricultural lands contribute to achieving food security, reducing air pollution, and reducing temperatures[7].

Google Earth is one of the most important programs that can be used in many studies and fields, especially in the field of environmental sciences, where it is possible to monitor and track environmental problems that occur in any area, by taking pictures and maps of the area to be studied.

2. Study Aims

1) Determine the changes in the study area, in terms of urban development, vegetation cover.
2) Conducting some solutions and proposals to reduce the process of urban expansion and the spread of quarry at the expense of vegetation.

3. Study Area

Al - Khoums city is located at latitude (N 32^{o} $38^{'}$ $59^{''}$) and longitude (E 14^{o} $15^{'}$ $52^{''}$), at the northwest of Libya, on the Mediterranean coast southeast of the capital, Tripoli, about 97km away. The climate is characterized by moderation in spring and autumn, while it tends to be hot in summer and cold in winter.

Figure 1: A satellite image shows the site of study area (taken from Google earth).

4. Methodology

The areas were classified into three types, vegetation cover areas, industrial areas, and others that are used for building and construction operations.

Data collection:
A set of satellite visuals was captured using Google earth to obtain the required images in the study area. These images and visuals were pre - processed to correct errors and define areas using area measurement programs available on the google earth website, in order to easily distinguish between areas of urban development and receding vegetation cover, also the expansion of quarry in the study area during the time period from 1990 to 2020.

The study area covers the city of Al - Khoums, where four visualization (aerial photos) of the study sites were taken during the years (2000, 1990, 2010 & 2020) in the month of December.

5. Results and Discussion

Varieties areas in hectares during the year of (2000, 1990, 2010 & 2020) are listed in the next table.

Table 1: Shows area in hectares for each area type.

Type area (Hectare)	Years			
	2020	2010	2000	1990
Expansion urban	15500	10100	7700	6450
Quarry	16700	7010	2110	1120
Vegetation cover	7600	15090	23490	32630

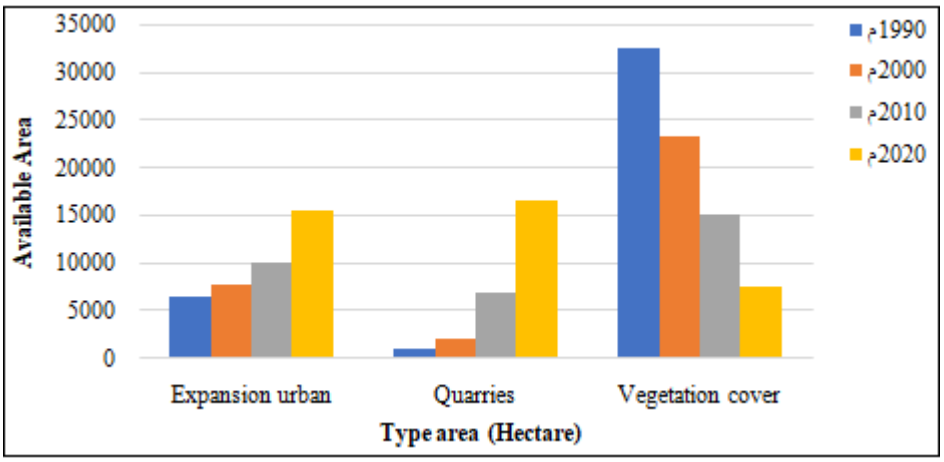

Figure 2: Shows changes of available spaces with time

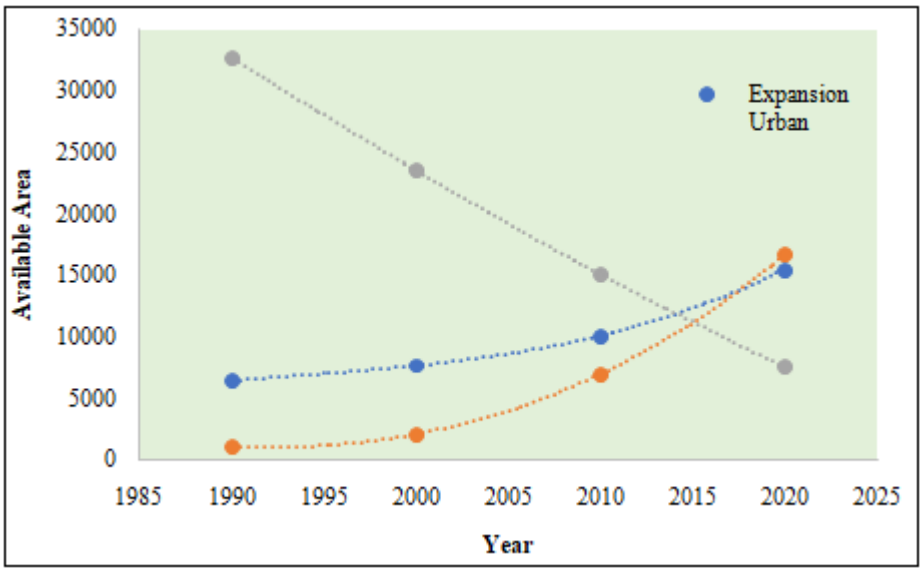

Figure 3: Urban and industrial expansion at the expense of shrinking vegetation cover areas

Table 2: Shows the percentage of increase or decrease in the size of three types in study area

Type area (Hectare)	Time Periods		
	1990 - 2000	2000 - 2010	2010 - 2020
Expansion urban	1250	2400	5400
Increases(%)	19.37	31.16	53.46
Quarry	990	2900	9690
Increases(%)	88.39	137.44	138.23
Vegetation cover	- 9140	- 8400	- 7490
Decreases(%)	28.01	35.75	49.63

From these results it was noticed that the vegetation cover and agricultural lands were constantly shrinking at a rate almost constant, as the area in the year 1990 was (32630) hectares, then the area gradually decreased until it reached (15090) hectares in the year 2020, due to exploiting these lands for urban expansion and the establishment of quarry, especially in the last decade, when the rate of decrease in vegetation cover was 49.63% between 2010 and 2020.

Urban expansion areas and quarry, they were constantly increasing during study periods, as the area of quarry was (1120) hectares in the year 1990, then it increased remarkably until it reached (16700) hectares in the year 2020, as well as urban development was increased rapidly, during the years of study, where the rate of increase was very large between the years 2010 and 2020, it was 53.46%.

6. Conclusion

1) The spread of the phenomenon of random urban expansion at Al - Khoums city as a result of the absence of oversight from the authorities concerned with urban planning for cities.
2) Most of the urban development in the study area is characterized by the horizontal expansion of buildings.
3) Clear decrease in vegetation area in the study area.
4) There is a rapid spread of quarry in the city of Al - Khoums.

7. Recommendations

1) Further similar studies on urban expansion and quarry and other sources which led to decreasing vegetation and destroying lands in the region should be conducted to assess their impact on the region's vegetation and bio diversity.
2) Educating the citizens about the necessity of preserving natural and agricultural lands.
3) The agricultural sector must be supported by the government and the relevant authorities
4) The activities of Quarrying and urban expansion must be regulated within the legal framework, and new permits should only be issued once environmental conditions are strictly conformed.
5) Rehabilitating the affected lands by urban expansion and quarry to become arable and enhancing the ability of soil to boost the quantity and quality of crops.

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