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Urban Sprawl on Agricultural Land (Literature Survey of Causes, Effects, Relationship with Land Use Planning and Environment) A Case Study from Jordan (Shihan Municipality Areas)

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Abstract
This paper adopts the problem of urban sprawl on agricultural land that has become a phenomenon affecting the national economy, the environment and the national food security. Firstly, urban sprawl will be defined then exploring the causes, effects, and its relationship with land use planning. It will point out to the Arabian and international experiences that have own policy in reducing this phenomenon, to take advantage from their experience and build on it to suit our own. Egyptian model was chosen to take advantage of scientific studies in the subject of urban sprawl and recommendations to reduce it, and the model of Canadian province of Ontario because their experience proven usefulness in reducing this problem in those areas. The paper sheds light on a local case in northern of Karak city, to present alive example of what is happening on the reality of agricultural lands in Jordan. The required analysis worked by using field survey, photographing, and aerial photographs from Google Earth, data and statistics collected from the Directorate of Agriculture in Karak and the municipality of Shihan. To explore the relationship between urban sprawl and environment, more analysis was done by (DPSIR) approach (Drivers, Pressures, State, Impacts, and Responses), which is based on the analysis of the relationship between cause and effect, linking development and human welfare to the environment.
Keywords: urban sprawl, land use, agricultural land, Karak city, Shihan area, environment, DPSIR.

1. Introduction

Urban sprawl on agricultural lands has become a global phenomenon plaguing all countries of the world, rich or poor. This phenomenon formed a challenge to most countries of the world, especially developing ones, because of the increasing of population at high rates, consequent the depletion of resources, especially agricultural lands around cities.

Jordan; the country with limited natural resources, agriculture is the primary resource in achieving food security; cultivation of agricultural land is the source of living for many families, like other developing countries, dramatically urban expansion in the last decades of the twentieth century increased as a result of natural increase of the population. When the population increases, lead to increase the demand of lands for housing and human services. Thus, the agricultural lands started decreasing day by day, and the rapid cultural transition and population growth have transformed the traditional dependency between people and the environment in Jordan, as a result of urbanization, with the absence of proper planning (Bari, D, 2001).

1.1 Research Goals

This research aims to:

1. Shed light on the phenomenon of urban sprawl on agricultural land by exploring the causes, the effects, and the relationship between it and land use planning. Taking Jordan as example through the selection of Shihan municipality areas as a case study.
2. Gain access to the solutions, which may contribute in reduction of this phenomenon, which strains the economy and Jordanian man in difficult economic circumstances by benefiting from other experiences.
3. Reconsider the legislation and laws, that governs the planning and organizational process, that contribute to rein in the ongoing growing urbanization on agricultural land.
4. Raise awareness about the effects of urban sprawl on agricultural land and environment. Furthermore, clarify the role of participation and the limits of responsibility that can be entrusted to governmental and academic agencies at all levels, individually or collectively, to participate in research and finding solutions to the serious problem of this vast urban sprawl.

1.2 Methodology of the research:

This paper will study the phenomenon of urban sprawl on agricultural land by exploring the following issues:

1- Urban sprawl definitions, terms, and stages.
2- The causes and effects of urban sprawl, and its relationship with land use planning.
3- The Arabian and international experiences that have own policy in reducing the urban sprawl, to take

advantage from their experience and build on it to suit our own. Egyptian model was chosen to take advantage of scientific studies in the subject of urban sprawl and recommendations to reduce it, and the model of Canadian province of Ontario because their experience proven usefulness in reducing this problem in those areas.

4- A local case in northern of Karak city (Shihan municipality areas), to present alive example of what is happening on the reality of agricultural lands in Jordan. The required analysis worked by using field survey, photographing, and aerial photographs from Google Earth, data and statistics collected from the Directorate of Agriculture in Karak and the municipality of Shihan.
5- Exploring the relationship between urban sprawl and environment, by using (DPSIR) scheme (Drivers, Pressures, State, Impacts, and Responses), which is based on the analysis of the relationship between cause and effect, linking development and human welfare to the environment.
6- Recommendations in resolving the problem of urban sprawl.

2. Overview of urban sprawl

Urban sprawl takes many different forms, including, residential buildings, industrial facilities, infrastructure, Etc), and it takes many types, on agricultural land, toward highways, on archaeological sites, on water sources, and on the sources of biodiversity. Urban sprawl on agricultural land is still an issue facing the world's agricultural resources. It isn't just a development undermines the quality of life for residents of suburban, it is an alarm across all the world, advocates of fair housing, environmentalists, land use planners, and even many of the employers in the suburbs who cannot find employment that they need, recognized that the costs go far beyond aesthetics (Squires, 2002). Urban sprawl is a problem affecting urban communities and suburban and rural areas, resulting from loss of agricultural land to decay of old urban centers. In his way, sprawl consumes thousands of acres of forest and agricultural land. Land use policies that allow this sprawl is based on a complex framework of laws and regulations. (Soule, 2006) "Urban sprawl is public enemy No. 1." (Squires, 2002)

2.1 urban sprawl terms and concepts:

"Urban growth, urban expansion, and urban sprawl are sometimes used synonymously by common people, although they are different. Urban growth is a sum of increase developed land. One of its forms is expansion, whereas, urban growth having some special characteristics (typically has a negative connotation) is sprawl" (Bhatta, 2010). One of the earliest uses of the word sprawl in reference to land use was in a 1937 speech by Earl Draper, planning director of the Tennessee Valley Authority. "Perhaps diffusion is too kind a word…In bursting its bounds, the city actually sprawled and made the country side ugly…uneconomic of services and doubtful of social value."(Robinson, 2009). Urban sprawl-definitions can be distinguished in four basic types: (Haase & Nuissl, 2006)

(1) In terms of urban form as opposed to the compact city. "Scattered development that increases traffic, saps local resources and destroys open space." (Robinson, 2009). "Sprawl has been loosely defined as dispersed and inefficient urban growth. (Hasse & Lathrop, 2003).

(2) In terms of density, or density gradients. "low-density, scattered, urban development without systematic large-scale" (Robinson, 2009).

(3) In terms of changes in land use; urban sprawl " is a pattern of land use in an urbanized area that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity." (Haase & Nuissl, 2006)

(4) In terms of urban sprawl impacts: "Poorly planned development that spreads a city's population over a wider and wider geographical area. As outlying areas become more populated, the land between them and the city fills in as well" (Thompson, 2009). Urban sprawl refers to the outgrowth of urban areas caused by uncontrolled, uncoordinated, and unplanned growth (Bhatta, 2010).

In comprehensive view, urban sprawl can be defined as a scattered pattern of urban growth that results low density, automobile-dependent, fragmentation of land use planning among multiple municipalities, congestion, environmental damage, and a declining sense of community among area residents (Squires, 2002).

*2.2 Stages of urban sprawl on agricultural land:*For urban expansion: Expansion of urban areas starts through a core to grow and disperses to individual development of new centers. The process of diffusion continues to spread along the path of organic growth and external expansion. Then the development continues of spatial to a coalescence of individual urban blobs. This transition phase includes the beginning of development in the open space between the core and peripheral centers. This pattern of urban growth continues progresses towards the establishment of a saturated state. The final agglomeration will be the new core of urban areas for further urbanization. Fig (1),
Fig (2) (Bhatta, 2010).

But for urban sprawl, which can be formed in four stages:

Stage one: The farmer or the owner of the land divides it into small pieces, and constructs his private

residence on one of these pieces.

Stage two: Continue the construction process with the trend to build a larger area as possible regardless to street width or its function.

Stage three: Increasing the density of buildings, thus, spread of buildings on agricultural land.

Stage four: Turn agricultural land within a short period to a residential area congested of buildings (Eid& Mirghani, 2004). Fig (3), Fig (4).

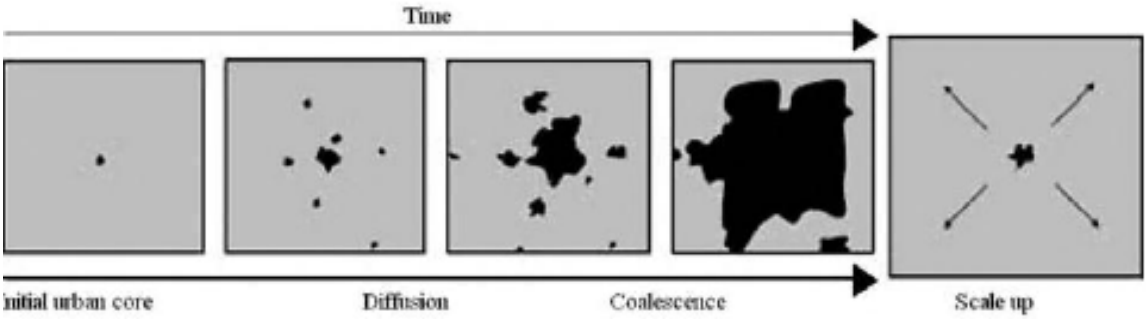


Fig (1) Sequential frames of urban growth. Source: (Bhatta, 2010).

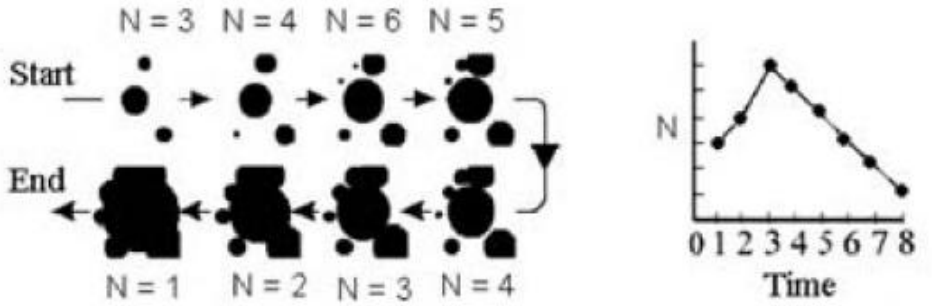
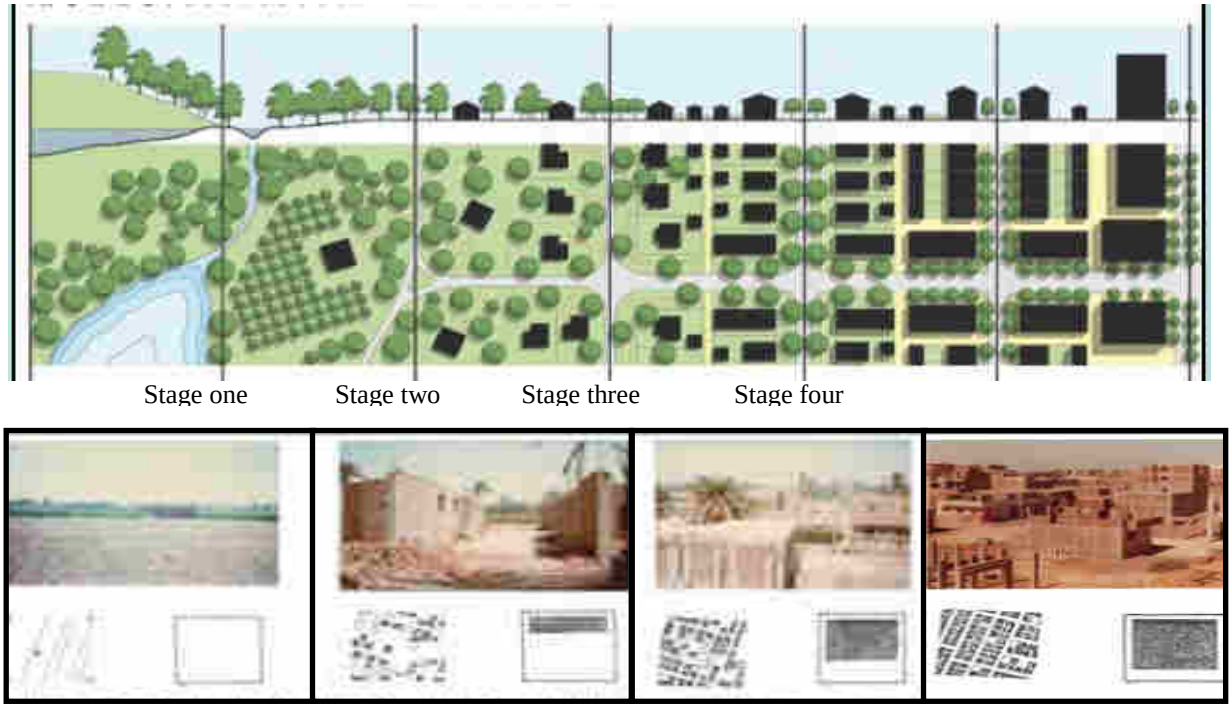


Fig (2) N: number of agglomerations, through a sequence of time steps. Source: (Bhatta, 2010).



(3): stages of urban sprawl. (Source: Eid & Mirghani, 2004)

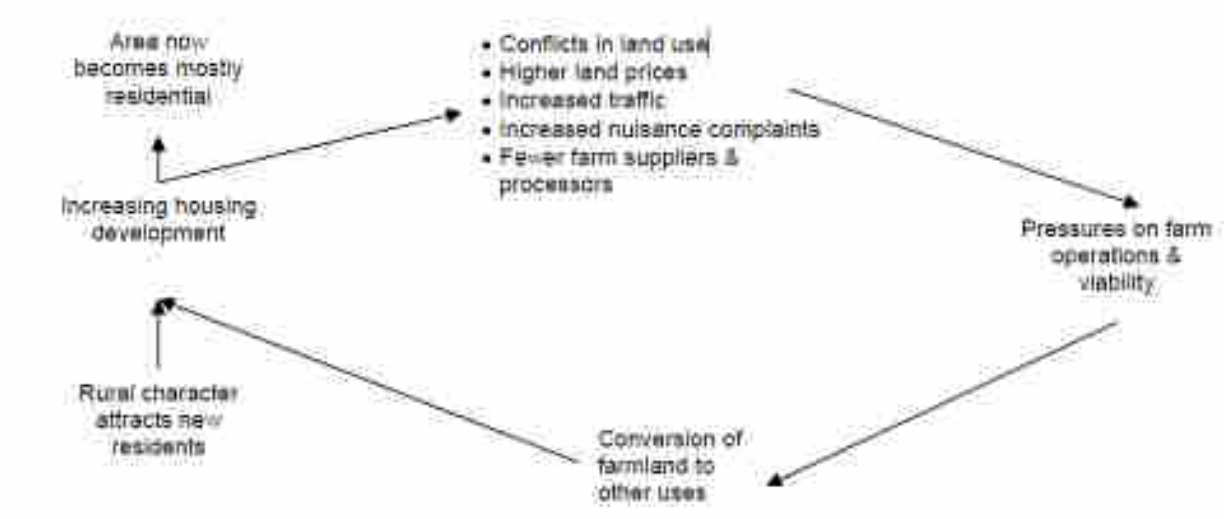


Fig (4) stages of urban sprawl Source: (Daniels & Bowers, 1997)

2.3 The causes of urban sprawl:

The causes of urban sprawl on agricultural land are many and varied, including:

1. Rapid population growth, which results from two population growth factors: (1) natural increase in population, and (2) migration to urban areas (Bhatta, 2010). That increase subsequent expansion and urban development. And the inability of local authorities to cope with increases in population and solve problems arising from the weakness of the regulatory bodies.
2. Allowance of fragmentation of agricultural land, which secrete agricultural land to small areas.
3. Lack of laws and regulations of planning in providing solutions to reduce sprawl on agricultural land. As the decision-makers in the municipalities are not specialists in planning and regulation work. (Jaradat, 2009) Most of decisions that made by the competitors in private sector and government sector are based on the expectations which do not meet the demands or needs of future development. (Bhatta, 2010)
4. Citizens' ignorance of urban legislation. Generally outside of the main city is lesser controlled and loosely regulated. As a result, many developers and individuals find these places more suitable for new construction.
5. Separation of Urban Planning bodies from economic and social planning operations which result regulation problems that go through in long processes when making decisions and laws.
6. Sometimes the sprawl is caused because of unsuitable physical terrain (such as rugged terrain, wetlands, mineral lands, or water bodies, etc.) which consequents high financial cost incurred on the provision of infrastructure services, and in return the ease of infrastructure services in agricultural land (Jaradat, 2009) (Brueckner, 2000).
7. The interest of municipalities in insertion of new territory to the municipalities to increase income that comes from regulations taxes.
8. Common ownership and scattered agricultural holdings led to allow the establishment of more than one building on a piece of land (Jaradat, 2009).
9. Farmers are often tempted by the prospect of selling rather than continuing the risky business of farming on the edge of residential developments (Gardner, 2006). Because the value of farm output which including the cultivation and houses and other structures. For society, the value of the return of built facilities much better than the value of agricultural production of the land and always urban use is preferred more than agricultural use, this leads to city growth and thus urban sprawl. (Brueckner, 2000) (Rosenberger, et al., 2002).
10. Not allowing vertical expansion in buildings in order to mitigate the horizontal extension. Governments do not allow construction of high-rise buildings if the site cannot be easily accessed, resulting in waste of vertical space.
11. Industrialization which leads to social transformations and change the traditional view of agriculture, where the region's population went to work in government jobs. And leave work in agriculture, which led to neglecting of the agricultural land. They began prefer to construct building instead of agriculture because constructing stores and renting, provide them with better income than their income in agriculture (Jaradat, 2009) (Rosenberger, et al., 2002). Establishment of new industries in countryside requires providing housing facilities to its workers in a large area. The transition process from agricultural to industrial employment demands more urban housing. (Bhatta, 2010)
12. Poor distribution of necessary services for the establishment of villages such as schools, health units, and all

the services required to the development process of the countryside. This in turn has led to urban sprawl to get closer to these services, which are often in agricultural land (Jaradat, 2009).

13. Lack of Affordable Housing for low income people. Due to the high price of land and the subsequent inability of these groups to buy land and build on it. (Bhatta, 2010) (Jaradat, 2009).
14. The presence of large areas within the territory of some cities and registered in the name of the government, but dedicated as non-illustrated tribal fronts and selling them by unrecognized tribal paper especially, in Jordan and other Arab countries.
15. The lack of comprehensive plans for land use and lack of government proper planning policies for areas outside the boundaries of cities and villages have resulted in slum and squatter areas (Jaradat, 2009). A city may be planned with exclusive zoning policies. And if the government has these planning policies but fail to enforce the implementation of them, this is one of the reasons of urban sprawl in developing countries. (Bhatta, 2010).
16. Other causes of urban sprawl like: land hunger attitude; many institutions and even individuals desire for the ownership of land. Often these lands left vacant within the core city area and makes infill policies unsuccessful. Legal disputes; which causes leaving vacant spaces or buildings within the inner city space. Demand and desire of more living space; in many developing countries, residents of the core city lack sufficient living space, this encourages countryside development for more living space and perceives quality of life in the suburbs as better. Single-family home; in many instances, individuals built a single-family home (rather than multi-family high-rise building) (Bhatta, 2010). (Squires, 2002).

2.4 Relationship between urban sprawl and land use planning

Sprawl is defined in terms of undesirable land use patterns- whether scattered development, leapfrog development, strip or ribbon development (Ewing, 2008). Land use planning issues are increasingly impacting upon farming community as subdivision, rural residential development, and urban sprawl (Hite, 1998). The process of urbanization or its growth drives the change in land use pattern (Long. et al., 2008).

So when you talk about urban sprawl on agricultural land it must be addressed to the issue of land use and classification to know the boundaries between uses to be able to determine if there is an urban sprawl or not?

The process of land use planning is a set of logical sequence of activities that aim to organize human societies through study and understanding of relationships between human settlement patterns and functions in a specific place and time.

Therefore, the planner must know the lines between urban and rural areas as well as between the natural and cultural issues in order to develop answers to questions such as:

Where can you choose the sites of new residential areas?

Can the design of new residential areas be safe, healthy and beautiful?

How can you improve the existing residential areas?

Where should the new development oriented?

How can you protect the agricultural land from urban expansion related to the increase of population?

Therefore, the land-use planning in essence is the balanced distribution of land among competing and different uses, particularly in the countries where the population is growing at a fast rate and less of land. land uses planning is the process of a systematic evaluating of land and its existing uses, taking into account the natural, social, and economical factors, in a way that helps and encourages users of the land to choose the sustainable patterns of uses which increase the production and meet the needs of population, and working at the same time on preserving the environment. (Abu Hjeer, 2003) (Alawneh, 2007).

2.4.1 Land use planning objectives:

Land use planning aims to achieve the following objectives:

1- The basic objective of land use planning is to achieve the optimal balance between competing interests (Fazal, 2000).
2- Determination of the present and future needs of population and assess the ability of land to provide the needs and find the appropriate solutions to the existing and projected problems.
3- Find solutions and options that satisfy the existing needs and managing and directing the process of community development. (Nasrallah, 2003)

2.4.2 Factors that affecting land use:

Land uses within the city affected with a range of factors, these factors include:

1 - Economic factors: Resource-based rural land use change is dynamic, shifting from one use to another as economic factors favor different resource uses at different times (Rosenberger. et al., 2002). In most cases, human is being more materialistic when dealing with natural issues of an economic space in the city. Usually, the major land-use change is caused by the increasing demand for non-agricultural land because of urban and manufacturing development Urban-related industrialization is well known to be one of the most important

driving forces of land-use changes (Long. et al., 2008). The lands that yielding a little will regress in favor of the use of high-yield, for example declining agricultural use for the benefit of other uses in many areas (Hite, 1998), especially in the absence of a national policy based on adjustment of uses within the city to achieve the public interest and to maintain the available resources for future generations all of that led people to find ways to reduce production costs, thus, the overlapping of land uses without planning. so you can find shops and craft workshops with homes and apartment buildings to provide buildings for rent to generate good income for the family (Abu Hjeer, 2003) (Alawneh, 2007) (Nasrallah, 2003).

2 - Political factors: The political situation in any country plays a key role in influencing land use in particular. Often we find countries that suffer from stepped on its colonization implement laws, regulations and policies imposed in different areas of life, in contrast to countries that live under the umbrella of freedom and democracy where the citizens contribute in policy-making. (Abu Hjeer, 2003) (Alawneh, 2007) (Nasrallah, 2003)

3 - Social factors: Social factor effect is clear in the expansion of many cities, and it appears that the majority of people tend to live in suburbs. When studying the components of these cities, you often find that there are layers and certain assets live in especial neighborhoods and others in slums, lack many of services, that suffer from population congestion and contrast, you find upscale neighborhoods with wide houses, organized streets, and its abundant services. There are also residents of shanty dwellers on the outskirts of the big cities, where the laws and regulations in the construction uncommitted, we find no recesses in the homes and stuck together. (Abu Hjeer, 2003) (Alawneh, 2007) (Nasrallah, 2003)

4 - Cultural factor: Prevailing cultures affect in various communities on the patterns of land use, which is an integral part on the cultural background of the community and population. When the population contributes more in the design and formulation of policies, the uses will reflect the cultures, customs and beliefs of the community and could be applied to reality and vice versa (Abu Hjeer, 2003) (Alawneh, 2007) (Nasrallah, 2003).

5- Environmental factor: Land use is influenced by the characteristics of physical environment that determine the land suitability for a range of uses which include local climate, topography, bedrock type, soil type, water resources, and the current state of the quality of land (e.g erosion) (Briassoulis, 2014).

2.5 The effects of urban sprawl

Land is one of the most important natural resources. It is now crucial to understand the impact of human activities on the natural resource, especially in cases of rapid change in land use, that often undocumented and unrecorded (Sundarakumar K. et al., 2012). Once the agricultural land paved and built for urban use, it is lost forever in favor of non-agricultural uses, it is irreversible category (Rosenberger, et al., 2002). And thus, results urban sprawl on agricultural land which has negative effects. The apparent effects resulting from it are as follows:

1- Economic effects:

- One of the immediate consequences of agricultural land conversion is reduced food production which effects on national food security. Urban sprawl depletes the main natural resources as agricultural land, which is considered one of the most important elements of the economy. Thus, low per capita of productive agricultural land in the world (Abu Sunaina, 2009) (Rosenberger, et al., 2002).
- Taxes are risen (bad for the people good for the government) (Thompson& Olajoke, 2007)
- The cost for transport is higher.
- Higher cost for providing infrastructure. More people are buying vehicles, increased infrastructure costs.
- Living in larger, more spread out spaces generally makes public services more expensive.

2- Environmental effects:

- Urban sprawl leads to desertification. The program of United Nations for Environment defines the desertification that is the spreading and increasing of desert conditions that result low productivity of living material, which decreases crops production. The International Conference of Desertification defines it as low and declining vital energy of the Earth, which leads to conditions similar to the desert (Report ESCWA) thus, the loss of fertile soil, and the loss of land for organic elements necessary for plant growth, which makes it unfit for cultivation.
- Urban sprawl leads to higher temperatures. Cities with high levels of urban sprawl have more than twice as many days with extreme heat when compared to cities with more compact growth patterns (Stone B. et. el, 2010). Sprawl leads to increases in fossil fuel consumption and emissions of greenhouse gases (Bhatta, 2010). Fig (5)
- Sprawl is unsustainable, because low-density living patterns leads to higher traffic congestion and "auto dependency, which increase reliance on fossil fuel, resulting poor air quality (Hayward, 1998).
- Less trees and more urban/suburban areas, the air in rural areas are known to be much cleaner because there

is less polluted air than in the urban areas (Mashour& McDonell, 2006).

- Distortion of the urban fabric of the city, the indiscriminate expansion of urbanization leads to a lack of harmony between land uses because it was carried out without planning or thinking. Urban sprawl is responsible for changes in the physical environment, and in the form and spatial structure of cities (Bhatta, 2010).
- Effects on wildlife and ecosystem. In areas where sprawl is not controlled there is a change in patterns of ecosystems.
- Effects on water quality and quantity: urban sprawl has serious effects on water quality and quantity, because of large area of land is covered with impervious material, such as concrete, there is lesser percolation of rainwater to reach the groundwater aquifers. And thus expose the area to increased flood hazard, including inundation and erosion (Bhatta, 2010).
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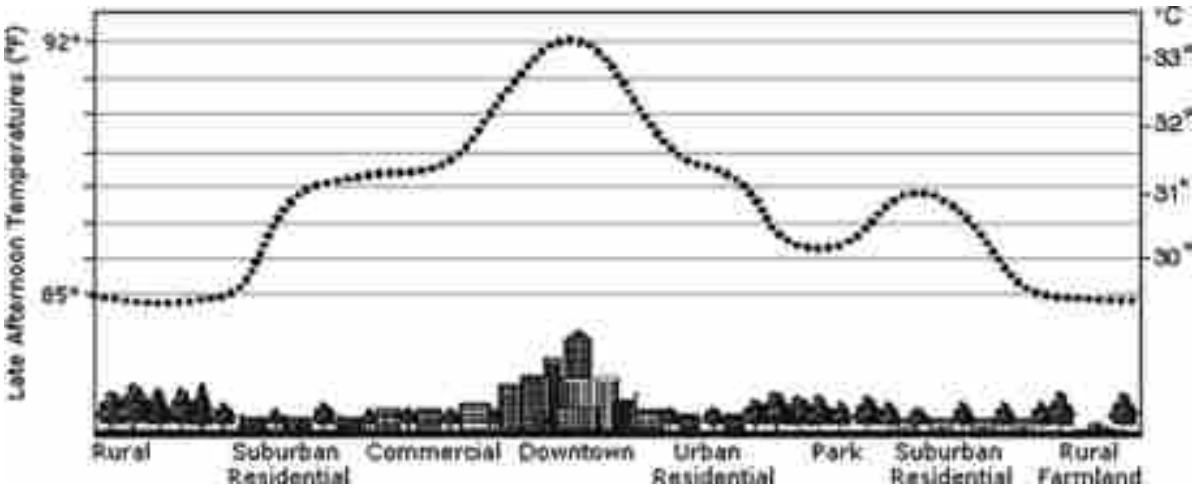

Fig (5) greenhouse gases & temperatures. Source: (Bhatta, 2010).

3- Social effects:

- Spatial diversities between the upper or middle class.
- Disparity in wealth between cities and suburbs; and sprawled social issues related to the deterioration of urban communities and the quality of life in suburbia (Bhatta, 2010) (Altınok& Cengiz, 2008).
- Effects on public and social health: As a result of sprawl, people getting sicker, fatter, more depressed, and less active physically and socially (Gardner, 2006).
  Since sprawl is so car-dependent, because people in sprawling nations tend to drive more.
- Urban sprawl causes disintegration of the social community. Houses in the sprawls are big with large backyards that tend to separate neighbors. Hence a social interaction among neighbors is much less in these regions than the cities (Bhatta, 2010).

3. Experiments in reducing urban sprawl:

In this section two experiences were chosen; Arabian Egyptian model to take advantage of scientific studies in the subject of urban sprawl and recommendations to reduce it, and the model of Canadian province of Ontario because their experience proven usefulness in reducing urban sprawl in those areas.

3.1 Arabian Egyptian experience:

A study of the Nile Delta region: There is no real, clear, and practical Arabian experience to reduce urban sprawl on agricultural land, but there are only studies and recommendations with no practical effect. Egyptian model will be presented through their scientific, varied studies that alerted to the seriousness of this problem. One of these studies is about the protection of agricultural land and fertile soil in the Nile Delta from random urban sprawl. Because of the agricultural economy of Egypt is very dependent on the Delta region. The study showed that the fertile land in the Nile Valley and Delta is about 3.7% of Egypt land. So, the communities there began to rely on civil societies to support their food needs, as a result of urban sprawl on the lands of the Delta. The loss was 100,000 jobs per year and a loss of 60,000 acres (25210 hectares).It also shows that there are limited spaces for Agricultural Development, which comprising (about 16%).

The study indicated to the urbanization and its proportion through years 1949-1990. Then, the ways of

urbanization spread were analyzed to find out which of these ways has the most percentage, to control the urban sprawl before it eliminates all the agricultural land. As shown in figures (6, 7, 8).

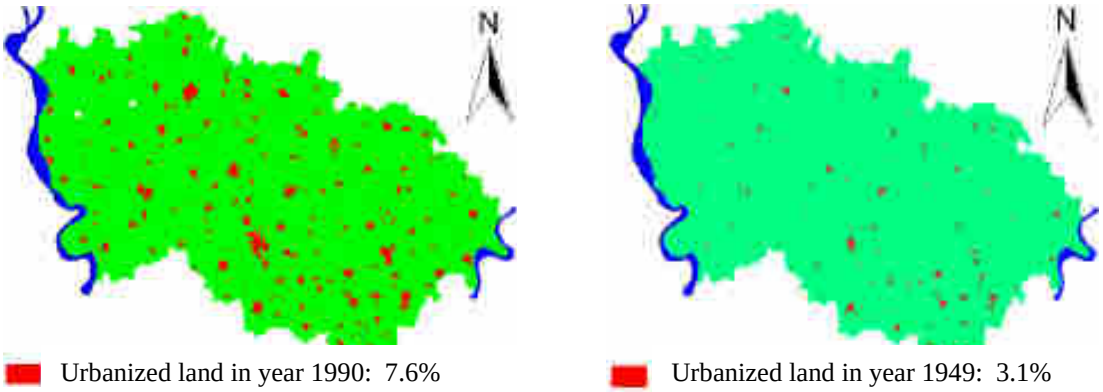

Fig (6): Cropped- urbanized land pattern. Source: (Afify, 2009).

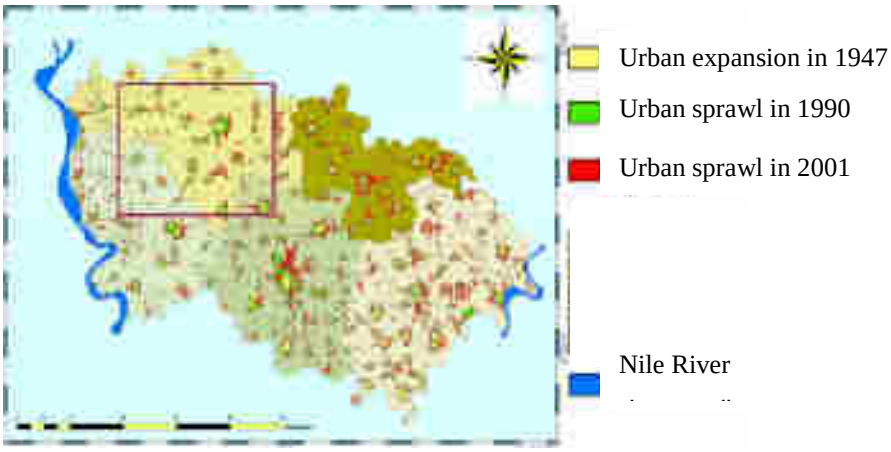

Fig (7): Monitored rates of urban sprawl on cultivated land. Source: (Afify, 2009).

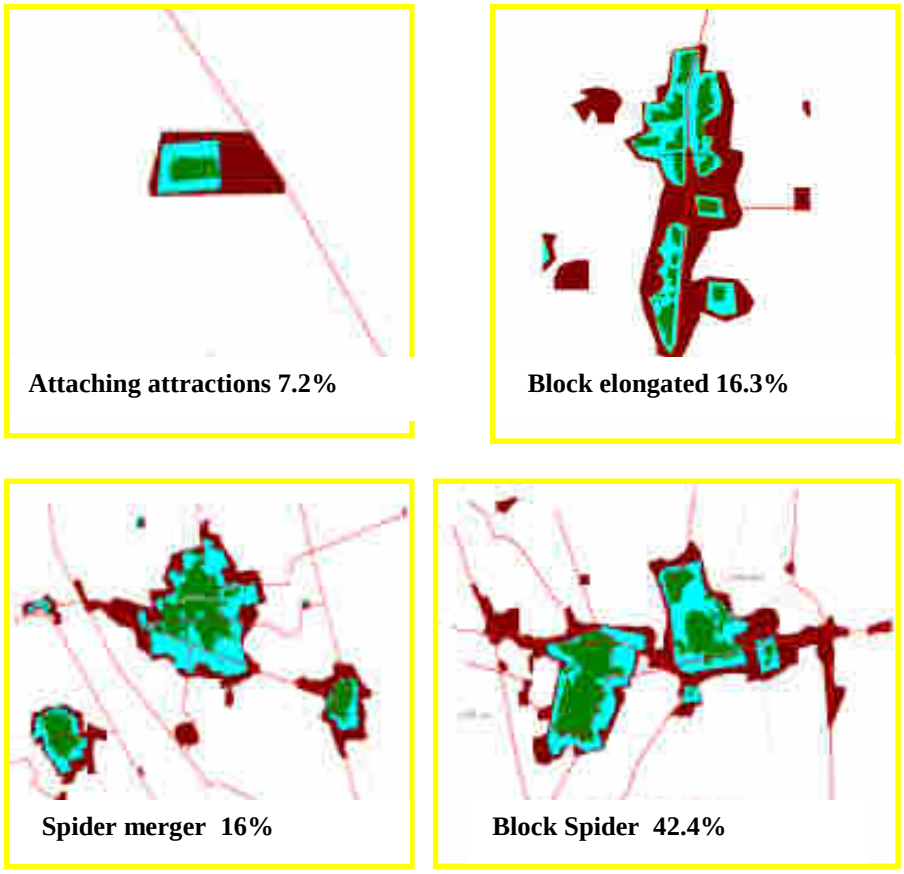

Fig (8): Types of urban expansion with Percentages. Source: (Afify, 2009).

Fig (9): Urbanization in Delta with rate of 86 ha per year. Source: (Afify, 2009).

The study showed that the rate of urbanization on the territory of a Delta is 199 acres per year through years1985-2007 that is during 22 years. Thus, after 209 years, the urbanization will eliminate all the agricultural land that is in year 2216. Fig (9)

The recommendations in the study of the Egyptian Nile Delta as follows:

• Do not tolerate or compromise on agricultural land in the Delta and to take extreme measures for any illegal construction on the cultivated land.

• Continuous of updating to monitor urban sprawl on agricultural lands, and using the latest remote sensing data. And take the rapid precautions against this infringement.
• Emphasis on the idea of retaining the Nile Valley and Delta, through classified protectorate.
• Selection of new areas that have attractive investment qualities for movement of settlements and population. (Afify, 2009)

Another Egyptian study; the researcher discussed different impacts and causes of agricultural land loss, and list the different actors involved in the protection of agricultural land in Egypt. The researcher subdivided the different impacts into four main classification; economic impacts, physical impacts, environmental impacts and finally livelihood impacts.

Economic impacts; the loss of agricultural land leads to losing of job opportunities as the loss of each feddan resulting in losing directly one job opportunity and about 0.7 indirect job opportunities.

Physical impacts; related to the emergence of informal settlements, which is perceived as a disaster. This informal urbanization is becoming the common pattern in the Egyptian development, which is estimated that more than 80% of the buildings in Cairo are informal. Unplanned use of land, lack of local services and open spaces resulting uncontrolled use of agricultural land and unhealthy, deprived high-density in informal areas.

Environmental impacts; environmental degradation has become one of the main characteristics of Egypt; pollution of Nile river: this is caused by pesticides, fertilizers and hormones which leaks or drains to the river. Air pollution in rural areas: the rates of air pollution increased as a result of the intervention of polluting industrial areas in the agricultural areas in addition to the dependence on motor vehicles.

Socio-Economic impacts; Ruralization of urban areas: the increased migration from villages to cities leads to the existence of new and weird social problems within the city structure. One of these problems is the transfer of behavior, traditions and the way of living of the rural areas to the cities. The researcher clarified the Causes for informal sprawl on agricultural land; shortage and un-affordability of housing stock, high price of agricultural land, weakness and inappropriate control tools, pressure from public infrastructure on agricultural land, and lack of coordinating mechanism to guide development.

The researcher also suggested proposals for dealing with the issue of urban sprawl on agriculture lands in Egyptian villages, which represents the major part of the problem of perpetual loss of this important national wealth:

- Vertical expansion may be feasible and solve the problem partially, but not in all cases as this would require the development of new detailed plans and organizational lines and permitting demolition and rebuilding inside villages.
- Identifying buffer areas to be included within the new boarders must be based on clear-cut criteria to decrease fraud and manipulation in this respect. Such buffer areas may be defined as the empty spaces surrounded by building from three sides at least, with the open side being the shortest in length, also pockets are defined as the enclosed areas between buildings and one of the natural boundaries such as a drainage canal or a main road or a railway line.
- Legalizing buildings currently outside 1985 boundaries, and imposing legalization charges on their owners would not be feasible because such buildings have already been legalized through obtaining acquittal judgments by the owners.
- Follow the policy of new urban boundaries so the government can is control them and put new legislation to enable to have the appropriate facilities and services, then the government later sell them at affordable prices for indigenous people, similar to land readjustment technique.
- Including of the local authorities in the decision making process and the formulation of policies, especially in a country which was highly characterized of being very centralized (El-Hefnawi, 2005).

3.2 International Experience: Canadian model in the province of Ontario (Green Belt)

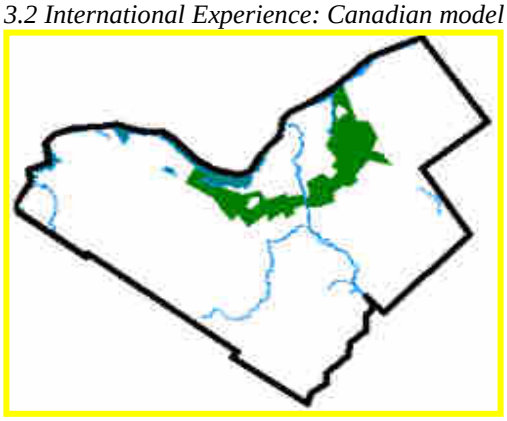

Fig (10): site of greenbelt, Ontario.

Ontario province located in the south Canada, accounting for more than one-third of Canada's population, the population of Green Belt constitutes more than 75% of population of Ontario province. For all this the government put a development plan in The Greenbelt (Golden Horseshoe region) where it is expected that the population growth is happening in 2001 to 2031 with increase of 3.7 million inhabitants, it is considered the most populous and fastest-growing region, with an area of 203.5 square kilometers (78.6 square miles) (Ali, 2007). Green belt Include the world-famous Niagara Falls.

In order to maintain a productive agricultural land in the region it has been used the Green Belt policy to make it a protected area on a permanently. This area is composed of green space, agricultural land, forests, and water parks.

The executive development plan for the government began in 2005 to protect the area from urban expansion that expected. Fig (11)

Fig (11): Greenbelt Plan 2005

So they demand from municipalities in the region, which are 89 municipalities to set up the necessary plans to protect the area from urban sprawl. Each municipality planned by the nature of its region to complete the plans within 3 years. The government during this period will assess and rehabilitate the plans that achieve the desired goal. These plans include the non-agricultural uses, places of recreation, tourism, infrastructure, natural resources, existing uses, and suggestions for future expansion places. Then the plan will be reviewed every 10 years; to see their affectivity and achievement of objectives. Hence the development of jobs, population, and linking of transportation and traffic networks with the new centers, and the development of

necessary legislation. To allow them to expand in agricultural land that does not produce staple crops. During that period, agriculture will be encouraged in the area of the Green Belt and preservation of its ecological features (Mittelstaedt, 2008).

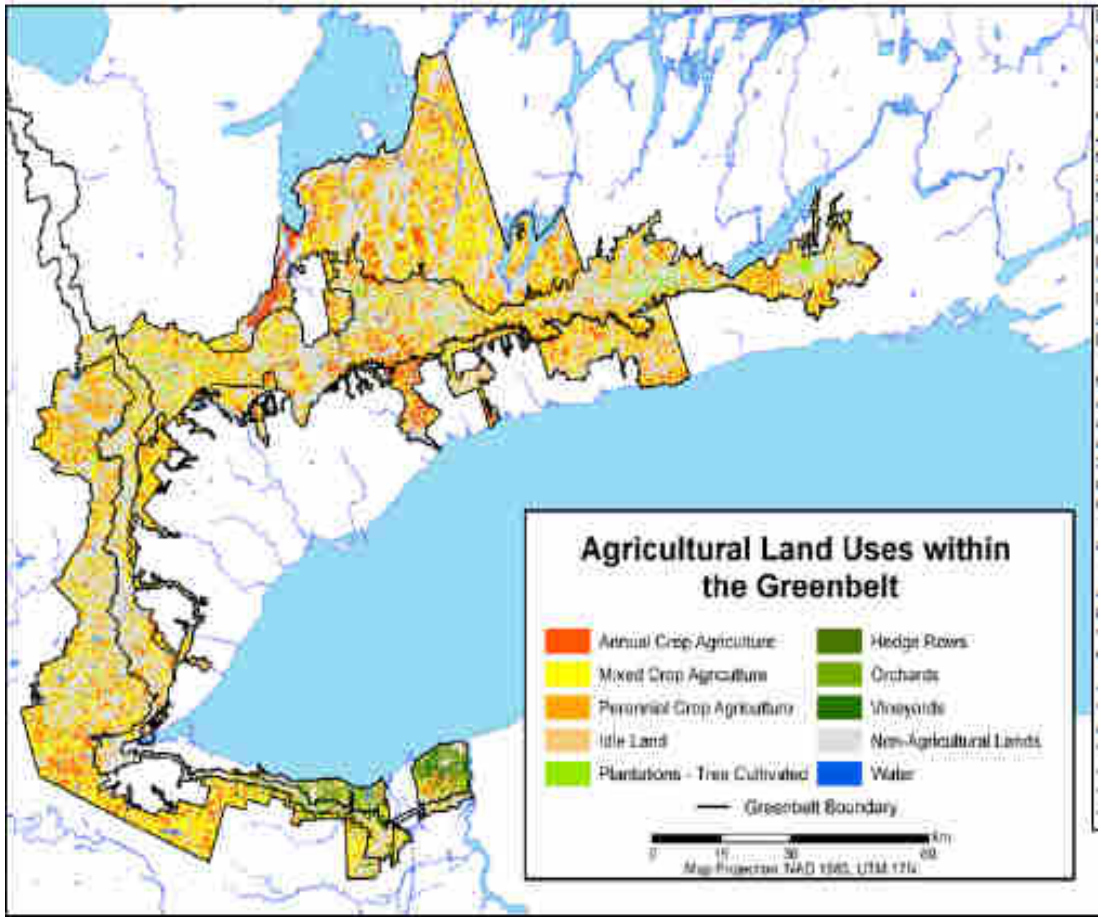

Fig (12): Agricultural land uses within the greenbelt

The benefits of the Green Belt were represented as follows:

- Belt Provides parks to residents of the area, hiking trails, rivers, lakes and other recreational land.
- Provides clean air and clean water to the population, animals and plants.
- Protect many communities and historic villages and small towns, which are important for education in the area in their cultural heritage.
- The Green Belt a big step in the prevention of urban sprawl on environmentally sensitive land.
- It is considered from the largest complexes in urban areas in the world. (Cheng & Lee, 2008)

4. Overview of study area

4.1 Introduction

Jordan is one of developing countries located in the Middle East and borders Syria, Saudi Arabia, the Red Sea, Palestine, Israel, and Iraq. Covering some 89,342 sq. km. it is located at 31 00 N, 36 00 E. Jordan's only port is at its southern tip, at the Gulf of Aqaba. Much of Jordan is covered by the Arabian Desert however; the north-western part of Jordan is part of the Fertile Crescent. The geography of Jordan consists of arid plateau in the east irrigated by oasis and seasonal water streams, with highland area in the west of arable land and Mediterranean evergreen forestry. Jordan is part of a region considered to be "the cradle of civilization", the Levant region of the Fertile Crescent. Major cities include the capital Amman in the northwest, Irbid, Jerash and Zarqa, in the north, Madaba, Karak and Aqaba in the south. The climate in Jordan is semi-dry in summer with average temperature in the mid 30°C and relatively cold in winter averaging around 13 °C, the country has a Mediterranean-style climate. Jordan, however, is one of the most water-scarce countries in the world. Jordan has a population of about (6.2 million) estimated by the year 2011, with a population growth of Jordan about 2.67% (Royal Jordanian Geographic Center).

4.2 State of agriculture and agricultural lands in Jordan

Jordan; this country with limited natural resources, agriculture represents the primary resource of achieving food security, and maintaining the ecological balance. Agriculture contributed greatly to the economy in independence time of Jordan, but then suffered a steady decline for decades. In the early 1950s, agriculture accounted for nearly 40 percent of GNP. War in June 1967, it was 17 percent. Jordan was agriculturally self-sufficient until the end of 1960s (Ministry of Agriculture, 2002). By the mid-1980s, the share of agriculture in GDP is only about 6 percent. Several factors contributed to this downward trend. With the Israeli occupation of the West Bank, Jordan lost prime agricultural land. Starting in the mid-1970s, hastened the Jordanian labor migration also fell Agriculture. The peasants' abandonment of Agriculture, to take more lucrative jobs abroad, sometimes as soldiers in the armies of Saudi Arabia and the Persian Gulf states or in service industries in those countries. Although the agricultural sector's share of GDP declined in comparison with other sectors of the economy, remained economically important agricultural production grew in absolute terms.

By several estimates, between 6 percent and 7 percent of Jordan's territory was arable. Only about 20 percent of Jordan's geographic area received more than 200 millimeters of rainfall per year, the minimum required for rain-fed agriculture. Much of this land was otherwise unsuitable for agriculture. Moreover, rainfall varied greatly from year to year, so crops were prone to be ruined by periodic drought (Metz, 1989).

When agricultural sector weakens, the production will weaken also, so the country has to import food, and agricultural crops from abroad; to provide food for its people, which lead to a lot of burden and debt, thus to weaken the ability to self-sufficiency.

The most important indicators for the agricultural year 2012:

- Area of arable land is 8.9 million acres.
- Area of planted land is 3.8 million acres.
- Forest area is 1.3 million acres.
- Grazing area is 741 700 acres.
- Number of agricultural holdings is 80152 possessions.
- Number of manpower in agriculture sector is 113593 (representing 7.9% of the total workforce)
- Value of GDP in agricultural sector (at current prices) is 21.9655 billion dinars
- Contribution percentage of the agricultural sector in GDP(Gross Domestic Product) is 4.5%. (Department of Jordanian Statistics)

Cultivated land in Jordan is only 3.6% of total area, which is approximately 88777 square kilometers. And the areas that can be cultivated is about 8.9 million acres, that is constitutes 10% of the total area (Ministry of Jordanian Agriculture, 2005).

Jordan experienced a high rate of urbanization during the last five decades. This has created high demand for the more areas to meet housing, commercial, industrial and other service planning requirements (Makhamreha & Almanasyeha, 2011) and that resulted loss of vegetation, depletion of open areas and pressure on infrastructure to keep pace with the needs of growing population. Most Jordanian cities suffer from rapid urban growth due to migration from neighboring countries and internal migration from the countryside to the city (Saleh, Rawashdeh 2007). In Jordan, 16 per cent of urban residents live in informal settlements and approximately 80 per cent of the population resides in cities. Jordan is one of the more urbanized countries in the world with 78 per cent of the population living in urban areas (UN-Habitat, 2012).

Urban sprawl on agricultural land has led to a decline in the area of land that dedicated to the cultivation of wheat from 2.52 million acres in 1939 to 86.2 thousand acres in 2006, that is, retraction in the lands dedicated to the cultivation of wheat by 290%. Also retraction in agricultural land dedicated to field crops in favor of buildings, from 3.634 million acres in 1939 to only 176 thousand acres in 2006. There are four Jordanian universities established on the best strategic areas for the cultivation of wheat (Iskandar, 2008).

The erosion of agricultural land -which is capable of sustaining rain-fed agriculture that is a rare commodity in Jordan-, is one of the main obstacles that stand in face of development of agricultural sector. More than half of arable land in Jordan relies on rain-fed agriculture; which receiving more than 250-300mm of annual precipitation. Despite this rainfall is quietly limited, but it is effective because it falls in cold season (Oroud& Al-Rousan, 2004).The other problem is the fragmentation of agricultural lands and turns them into unproductive units. As the UN report says, without proper planning well in advance, Jordan and other countries projected to experience similar growth of urban populations could witness slums and unhealthy living environments (Bari, 2001) (UN-Habitat, 2012) (Al Kably, 2013).

Listed below general statistics of building permits, issued by the Jordanian Department of Statistics monthly report on building permits during the first five months of 2014:

- 6.6 million Square meters buildings' area licensed in the country during the first five months of 2014, an increase of 16.1% compared with the same period in 2013.
- The total number of building licenses issued has reached 17321 licenses in 2014, compared with 14051

licenses in 2013, an increase of 23.3%.

- The total area of licensed buildings has reached 6625 thousand square meters in 2014 compared with 5705 thousand square meters during the same period in 2013, an increase of 16.1%.
- The total area of licensed buildings for residential purposes in 2014 about 5559 thousand square meters compared with 4753 thousand square meters during the same period in 2013, an increase of 17%, while the total area licensed buildings for non-residential purposes about 1066 thousand square meters in 2014 compared with 951 thousand square meters during the same period in 2013, an increase of 12.1%.
- The area of licensed buildings for residential purposes in 2014 formed 83.9% of the total area of licensed buildings, while the area of licensed buildings for non-residential purposes formed 16.1% of the total area of licensed buildings. (Jordanian Department of Statistics, 2014)

4.3 Case study of urban sprawl on agricultural land in northern of Karak city (municipal areas of Shihan)

Karak is a city in southern of Jordan, known for its Crusader castle; the castle is one of the three largest castles in the region, Karak lies 140 kilometers to the south of Amman (Capital of Jordan) on the ancient King's Highway. It is situated on a hilltop about 1,000 meters above sea level; it has a view of the Dead Sea.

Human habitation in Karak since the Iron Age, its land had many of ancient civilizations. Karak has played a key role during the flowering period of Islamic civilization, where it was the capital of the largest province in Jordan for two centuries, as it was the capital of the Mamluk for a period of time.

Fig (13) Map of Jordan, site of Karak

The topography of Karak city and its regions had a clear impact on the growth stages. The agricultural use is the main use for the land of Karak, which reflects the architectural character. It is a city that combines the manifestations of the urban area, and green spaces on the other hand. Agriculture has been the core craft in the city of Karak. The land was always the main concern for the people of Karak because of their dependence on agriculture, especially the cultivation of wheat, olives and vegetables. The majority of families were dependent for their livelihood on agriculture. (Al Hadedi, 2001)

Karak city has been estimated as one of the poorest in Jordan. One of the most distinctive features of this region is the high number of pensioner-farmers. After twenty-five years in the Civil Service, many householders retire from the urban areas with a loan deducted from their pension to build a new house. They reclaim access to family lands and build up a small agricultural enterprise, adequate to supply the household. Most of the region is given over to dry land rain fed cereal production, with olives and almonds as perennial crops, which made it an important region for Pastoralism (Blench, 1995). Karak Governorate has ten municipalities; Shihan municipality is one of them which will be discussed in the next section.

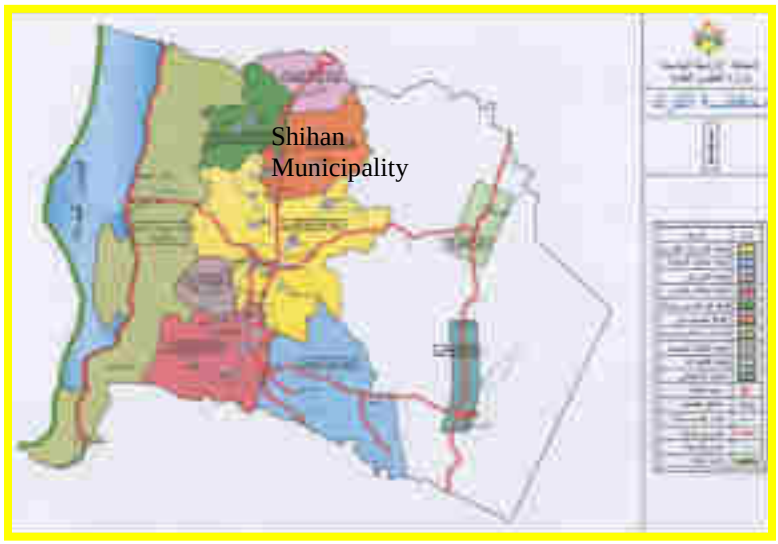

Fig (14) Karak municipalities, site of Shihan's

4.3.1 Shihan Municipal areas

Shihan location: it is located in the northern of Karak city, one of the municipalities of Karak covered by the merging of municipalities that have been in 2001, and included four regions were previously constituted municipalities, namely, (Al-Qasr, Al-Rabbah, Al-Yarut, Al-Smakiyah), which are small villages, it extends north of the major municipality of Karak.

Table (1) Shihan Municipal areas

Region	Area (squared meters)
Al-Qasr	2887
Al-Rabbah,	4312
Al-Smakiyah	2890
Al-Yarut,	4187

Fig (15) Shihan Municipal areas land use plan

Shihan characteristics: Shihan Municipality areas are distinguished with natural agricultural land. A visitor to Shihan municipality areas will feel that he is walking on a wide carpet of red fertile land, and see meadows of golden wheat meander across, especially in the areas of Al-Yarut and Al-Qasr. As well as the spread of olive presses in Shihan. For those characteristics; the Faculty of Agriculture in Mutah University was established there, because the area is rich in agricultural crops, as well as the establishment of a center resources management and agricultural projects for Karak and Tafila in the same area.

Social Environment: Tribal affiliation still remains a major organizing principle of society in the Karak region. Different tribes have access to more or less political power, following dispositions probably established in the Ottoman era. As a result, there has been an accumulation of land ownership in the hands of the a few major families (Blench, 1995).The social environment is also in Shihan areas characterized by the Jordanian personalities prominent locally, regionally, and internationally as Prime Minister, dignitaries, ministers, Parliamentarians, and the leaders of army and other sensitive positions, which raised the level of public taste, and the trend towards competition to build luxury homes, which achieve the fame. Resulting in increased demand for construction materials and the sale of land after divided into small pieces upon request.

Shihan Topography: The topography of Shihan is flat, with a few small to medium sized hills.

Shihan Regulatory situation: Shihan Municipality is the second category of municipalities which are located in the centers of the brigades. The regulated area is about 8820m^2 which represent 60% of gross area of municipal boundaries. Still 40% not regulated which allow the random expansion especially on agricultural land. Here should be noted that there is no so-called regulated agricultural housing in the land use plans like other land use plans in Jordan.

4.3.2 Urban sprawl on agricultural land in areas of the municipality of Shihan:

Karak city nowadays is suffering from urban sprawl on its fertile agricultural land, like other cities in Jordan, which was a source of economy throughout its long history. The urban sprawl in Karak is along road networks, from the linear pattern of urban areas. This is because the closeness of services like electricity and water networks (Oroud& Al-Rousan, 2004). Shihan municipal areas represent the big part of agricultural land, which have been infected also by concrete constructions without stopping. Urban sprawl on agricultural land in Karak from many citizens, in search of great economic resources due to successive years of drought, which has proven the futility of Agriculture and the high wages of residential buildings. Urban sprawl reduces agricultural lands in Karak and threatened with extinction. It has been decreased by 25% from the eighties till now (Directorate of Agriculture / Karak).

The phenomenon of urban sprawl on agricultural land in the municipality of Shihan will be analyzed by the relationship between urban sprawl and environment, using the Driver-Pressure-State-Impact-Response (DPSIR) scheme which is a flexible framework that can be used to assist decision-makers in many steps of the decision process. It is based on the analysis of the relationship between cause and effect linking development and well-being of the human with environment. Within this approach, the pressures of human activities produce impacts on the state of the physical and social environment of human settlements, which in turn affecting the quality of life, health and access to services. And that the community responds to the pressures and the state of human settlements policies and programs aimed at alleviating the pressures and maintain the components of the environment and improve them and to prevent degradation or contamination through the conservation of natural resources by studied planning (Al Azzah, 2008).

DPSIR was initially developed by the Organization for Economic Co-operation and Development (OECD 1994) and has been used by the United Nations (UNEP 1994; UNEP 2007) and European Environmental Agency (Dutch National Institute for Public Health and the Environment 1995; Pierce 1998; EEA 1999) to relate human activities to the state of the environment.

DPSIR components:

1- Drivers: human needs; in particular Drivers are often defined as socio-economic sectors that fulfill human needs for food, water, shelter, health, security and culture.
2- Pressures: human activities; that exert pressure include land use changes, resource consumption, release of substances and physical damage through direct contact uses. Pressures depend on the kind and level of technology involved in source activities, and can vary across geographic regions and spatial scales.
3- State: Ecosystem; the pressures exerted by society may lead to unintentional or intentional changes in the State of the ecosystem.
4- Impact: services; changes in the quality and functioning of the ecosystem have an impact on the welfare or well-being of humans through the provision of ecosystem services.
5- Response: decisions; humans make decisions in response to the impacts on ecosystem services or their perceived value. Responses are actions taken by groups or individuals in society and government to prevent, compensate, ameliorate or adapt to changes in the state of the environment by seeking to control drivers or pressures through regulation, prevention, or mitigation, directly maintain or restore the state of the environment and deliberately “do nothing” (EPA, 2014).

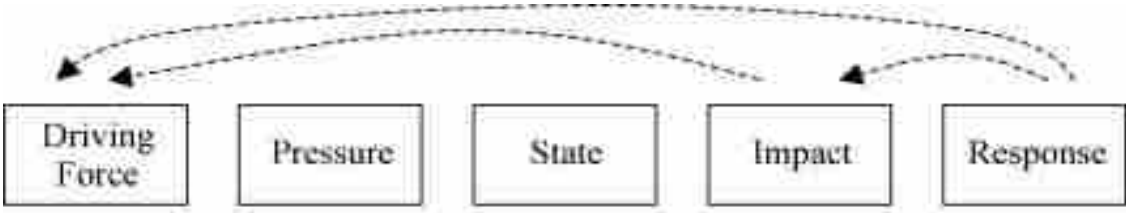

Fig (15) DPSIR Process Source: (Haase& Nuissl, 2006)

Benefits of DPSIR:
The DPSIR heuristic framework has several features which have contributed to its wide use:

1- Transparency and simplicity, with five concepts that are readily obvious to both scientists and stakeholders.
2- Enhances communication between scientists and stakeholders by simplifying the complex connections between humans and the environment.
3- Allows particular linkages or interactions to be isolated while retaining conceptual relevance to the larger system
4- Inherently human-centric, it is appealing to the public and decision-makers (EPA, 2014).
5- Appealing to policy actors because it links political objectives to environmental problems and implies causal relationships among factors, it also helps to select the variables and indicators to be monitored and analyzed in order to study the environmental dimension of the state (Haase& Nuissl, 2006).
6- The elements of DPSIR can be mapped onto other frameworks, including those of the Millennium Ecosystem Assessment (Hassan et al. 2005) and Long Term Ecological Research Program (EPA, 2014).

Assessment of urban sprawl on agricultural land in municipal areas of Shihan by using DSPIR

1 - Drivers:

Demographic and social factors affected on the process of urban sprawl on agricultural land in the areas of Shihan Municipality as a result of the following drivers:

- The natural increase in the population of the region in high growth rates. This increase formed a driver for the need of building, and search for land provides them with ease of housing construction, so the agricultural land was the victim.
- Social situation where the region includes many personalities from Jordan, who arrived to senior positions, the impact of this situation form a competitive driver among the citizens to build in agricultural land that has been subdivided for small pieces which saturate their desires to get a beautiful house compete houses of the region.

Fig (17) Images for some of competitive houses in Shihan areas. Source: researcher.Fig

- Ease of construction in plain agricultural land where the services available to them instead of the rugged mountain areas devoid of services and cost a lot of reconstruction.
- Lack of regulatory legislation governing the construction, and weak oversight prompted citizens in the areas to expand randomly in the construction without regulation (Al Azzah, 2008). The terms regulating building codes in Jordan, which specify the maximum number of floors by four and the maximum height 14m. That thing limits the vertical expansion and encourages the horizontal urban sprawl at the expense of nearby and the agricultural lands. Government also lowered the minimum size of agricultural plot that can be divided among inheritors from 10 Dunums (1ha) to 4 Dunums (0.4ha) which encourage the abandonment of those small plots and made it easier for developers to convert them to urban use (Oroud& Al-Rousan, 2004).

Fig (18) Aerial view of Shihan areas

2 - Pressures:

The human settlements are the master key to patterns of consumption of natural resources. So urban sprawl on agricultural land produces environmental, humanitarian and economic stresses as following:

- Expansion in residential land use resulting depletion of agricultural land which has increased pressure on the need for residential land, increased requests for land, that led to a random expansion in the regulated lands, and most of these expansions on agricultural land.
- Imbalance of housing sector, where many families have tended to spend on housing at the expense of basic needs to keep up with the social situation in the region. It expanded horizontally or vertically in violation of the provisions of building regulations.
- Pressure on non-renewable energy sources, water systems and landfills, and increased the construction waste resulting from the buildings, which in turn generates pressure on infrastructure. And therefore great pressure on agricultural land.
- Pressure on human health and well-being.

Fig (19) Images of sprawling's continuity on red fertile agricultural land; pressures on infrastructure and on non-renewable energy.

3 - State:

- Urban sprawl on agricultural land, and state of fragmented agricultural plots which make construction easier without regulatory complexities. In areas of Shihan municipality, the agricultural areas that have been converted to residential use reached to 400 acres distributed among the regions of Al-Rabbah and Al-Qasr between years 2001-2004. As a result of these additions, the municipality granted forty building permits, and the number can be increased to face the need for building new housing with the increase in population. (Source: Municipality Shihan)
- The emergence of random scattered communities spaced at distances, that thing led to the state of distortion of the urban fabric of Shihan, which forced the local authorities to deal with it as an existing reality which need a new regulated land use plans and services for these communities. Fig (20)
- The municipality provided infrastructure to randomly constructed houses in areas not originally designated for residential use Fig (20).

Fig (20) Fragmented agricultural plots, random scattered communities spaced at distances.

-
- Jordan's zoning regulations during the British Mandate set a minimum parcel size of 250m2, which was too large to be affordable for most households. This resulted in development of 250m2 parcels co-owned by several people (UN-Habitat, 2012).

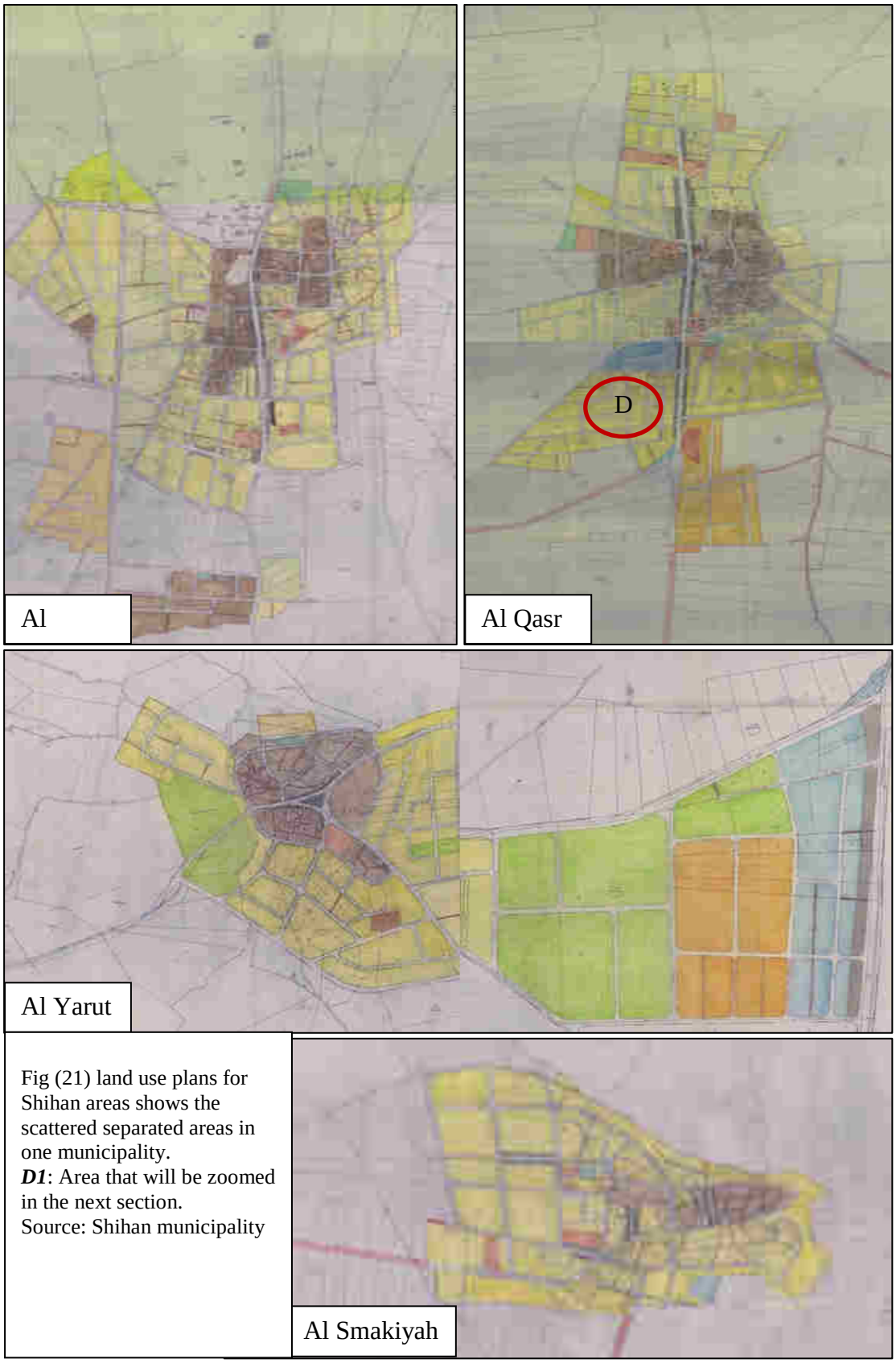

Fig (21) land use plans for Shihan areas shows the scattered separated areas in one municipality.
D1: Area that will be zoomed in the next section.
Source: Shihan municipality

4- Impacts:

- Farmers are increasingly impacted by legislation which impacts upon the daily operations of their business and the land use planning area is no exception. Some farmers wish to retain the ability to subdivide their agricultural land to provide a potential income source if required with the average age of farmers, drought, declining agricultural terms of trade and rising land prices providing additional incentives in this regard. In Jordanian municipalities and Shihan is one of them, the regulated boundaries follow the randomly alone constructed homes provided it with services. As soon as services provided to a lone structures, land around it increases substantially, and the area converted from agricultural to urban use (Oroud& Al-Rousan, 2004). Fig (22)

Fig (22) ***D1*** subdivision of lands after it has been converted to urban use.

- The impact on the ecosystem: The environment is affected by the results of urban sprawl on agricultural lands. This has been deduced from scientific studies that are looking at the subject of the decline of agricultural land. That studies showed that green areas have a big role in purifying the air from pollutants, impact on air humidity as a result of transpiration, carried out by them, and their role in the reduction of dust. The fact that the Shihan is an open area and the opportunity for east wind is there to raise the dust and toxic gases that released into the atmosphere. It is also noted high temperatures in the region, which was an example of a moderate climate. All houses in the Shihan rely on septic tanks, which are affecting on the groundwater and the consequent negative effects on public health and the spread of diseases. And therefore impact on architecture and urban, so buildings and infrastructure are suffering from cracks. All of that led to deformation in the urban fabric as a result of the lack of greenery.

- *Impact on the economic system*: The economic system suffers from many of the imbalances that entail urban sprawl on agricultural land, which are structural imbalances caused by the large gap between resources and population. This sprawl took 25% of agricultural land in Shihan, which effect on main agricultural crops as wheat crop, which in turn affect the national economy (Source: Agriculture Department Karak). As well as physical burdens arising from the creation of the infrastructure of roads, electricity and telephone service to residences in four scattered villages. And the weakness of infrastructure services as a result of increased demand for these services, which were not originally designed to serve increases in random expansions of residential buildings. Housing and infrastructure suffering from large cracks because it was built on the fertile agricultural land which is unstable structurally. There are also financial burdens arising from the impact on public health, which has the impact on the economic system as well.

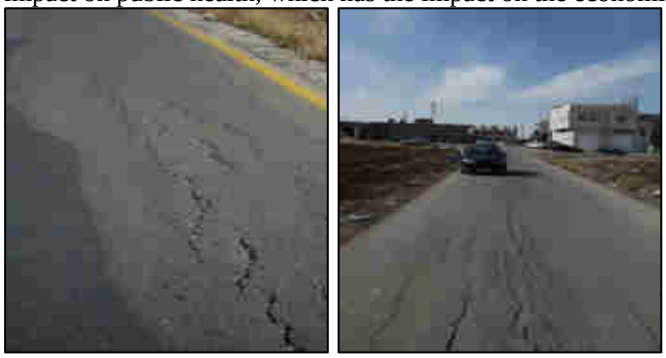

Fig (23) Images of some cracks in roads

5- Responses:

- *Responses in the field of economic and social development*: The response of the harmonization between population and resources from the attention of the Jordanian government in the face of population issues and the determination to meet the challenge of harmonization between population growth and the requirements of development and economic growth, by using the policy of low-income housing. With the weak of purchasing power of low-income and low contribution of the private sector in the production of these segments, the government tended to bridge the gap between supplies and need for housing. But areas in Shihan did not get that kind of responses with low housing. Jordan is expected to develop 100,000 affordable housing units between 2008 and 2013 and has also focused on the construction of infrastructure and the redevelopment of slum areas, as part of its policy to develop new towns in the desert to preserve agricultural land (UN-Habitat, 2012).

- *The response in the field of land*: This response can be happened by directing regulators to increase the small plots of lands through regulation or reorganization, and by the reduction of significant unplanned expansion in regulated spaces at the expense of agricultural land. Legislation, laws and regulations contribute actively to the reduction of any practices that harm the food security of the citizens and the national economy, and that if it is applied fairly and transparently. Since 2004, the municipality of Shihan has tried to refuse the additions of regulated lands from agricultural lands until the completion of the national comprehensive land use plan. (Source: Municipality Shihan). The most important objectives of this plan is the protecting of agricultural land, and ensuring the sustainability of exploitation for agriculture and development, stop the proliferation and random sprawl of cities and villages and communities, to identify urbanization sites, and update legislation related to planning, regulating, which control the construction process. A common government response has been to increase the provision of serviced parcels or, more rarely, subsidized low-income housing (UN-Habitat, 2012). Reactivate the system of land classification in terms of suitability for agriculture, to the following sectors: -
  A - Agricultural areas sector and denoted by the symbol (A).
  B - Rural areas sector and denoted by the symbol (B).
  C - Marginal sector areas and denoted by the symbol (C).
  D - Desert areas sector and denoted by the symbol (D).
  E - The forestry sector.

Unfortunately this system has not been activated, although it will contribute strongly to the reduction of urban sprawl, especially if all agricultural land in Jordan has been classified (Ministry of Municipal Affairs).

Challenges:

There are always challenges that hinder the wheel of development and change in Jordan. Some of those challenges as follows:

- The laws and regulations of Jordan have not been activated and the texts of the laws did not serve the subject of reduction of expansion on agricultural land. These regulations were only provided for the designation of agricultural use. Furthermore, the related decisions were not deterrent, it is just a financial contravention which is often canceled or reduced by a large margin due to the nature of the relationship between citizens and decision-makers and private social composition of Jordan. As well as the law presents more than one subject, which may cause a problem with users of legislation.
- Jordan's regulations are too old; they have been issued by the government in 1953 and updated in 1994, which mean the regulations should be updated more; this in turn will reduce the cost of routine and simplify the procedures.
- Laws should reduce monopolies of serviced residential land through the imposition of taxes on this land for motivation to enter the market, thus reduce the price of land.
- Systems of land use and construction should allow the small plots and regulate densities.
- Challenge of authorities' response to the subject of continuous attacks on agricultural land.
- Demographic challenge of high population growth.
- The biggest challenge in the social mentality to accept improvements.

5. Proposed ways to reduce the problem of urban sprawl

"Trying to protect rural land uses against an encroaching urban frontier is a bit like trying to protect beaches from a relentless ocean" (Hite, 1998). There is still an opportunity to reduce the urban sprawl on agricultural land togetherness of all authorities with the municipalities, which have a major role in the reduction of this phenomenon. Benefiting from studied researches of the phenomenon and this paper, urban sprawl on agricultural land can be reduced if the following proposals have been applied, taking the national circumstances

into account:

1. Develop policies relating to the management of land use in cities and its surroundings, taking into account the expansion and growth of communities and establish laws, which governing the city borders.
2. Continued development and rehabilitation of municipalities by providing them with technical organization specialized in urban settings to control the regulation throughout the construction process, and have a role in awareness of the dangers of urban sprawl on agricultural lands.
3. Reduce the horizontal expansion of buildings on agricultural land by encouraging vertical construction in residential buildings.
4. Good planning for industrial, so do not take place at the expense of agricultural land.
5. Future orientation of urban expansion to non-productive areas.
6. Building homes and creating the infrastructure in the rugged land, instead of building on fertile agricultural land.
7. Encouragement to work in agriculture and raising awareness of its importance to food security.
8. Providing the necessary guidance to farmers about new methods to maintain the agricultural crops.
9. Limiting of building permits in agricultural land.
10. Return to cities and downtowns, and the creation of village centers that are walkable and transit oriented. This approach solves the public health problems, with preserving open space for farming, ecosystem services, and for its aesthetic and recreational values (Gardner, 2006).
11. Tax policies have long favored new development in outlying communities and overseas over reinvestment in older urban facilities and communities (Squires, 2002).
12. Affordable housing construction and distribution of such housing throughout metropolitan areas. Vigorous enforcement of fair housing laws, and increased public and private investment in central cities to achieve more balanced development throughout the region (Squires, 2002).
13. Governments should revise zoning regulations to ensure that potential farmlands remain undeveloped.
14. Improve systems of mass transportation.
15. Assess any economic activity in terms of land scarcity and its possible impacts on natural resources which then can assure better food security conditions and creation of new job opportunities (López. et.al, 2001).
16. The multipurpose use of land should be taken into consideration wherever possible and no piece of land should be allowed, as far as possible, to remain vacant or as wasteland (Fazal, 2000).
17. It is important to involve the multiple stakeholders in urban planning process and development including municipalities, local leaders, village councils, private sector, academic or research and interested institutions in order to address the needs and priorities of the different stakeholders involved, to allow better quality decision finding and making (Al Hudhud, 2007).
18. Urban planners should integrate urban agriculture as a tool for city planning for its vital role.
19. Urban agriculture zone should be established within the boundary of each city at the nearest and appropriate location to the identified per-urban areas surrounding the cities (Al Hudhud, 2007).
20. Brueckner has addressed that the excessive urban growth resulted from"three sources of market failure; the first arises from a failure to take into account the social value of open space when land is converted to urban use. The second arises from a failure on the part of individual commuters to recognize the social costs of congestion created by their use of the road network. The third market failure arises from the failure of real estate developers to take into account all of the public infrastructure costs generated by their projects". Those sources can be remedied by the following:

    Open space provides city residents with chance to enjoy nature. Such open-space benefits are not taken into account when land is converted to urban use. Conversion depends on the value of the houses built relative to the land's productivity in agriculture. The remedy of this problem by charging a development tax on each acre of land converted from agricultural to urban use. The magnitude of the tax is set equal to the value of the open-space benefits that are lost when the land is converted (Brueckner, 2000).

    The second market failure arises through the activity of commuting. When the commuter drives on congested roadways to get to work, another cost is generated above and beyond the private cost. This cost is due to the extra congestion caused by the commuter's presence on the road. The lower speed prolongs everyone's trip, raising the time cost of travel for all commuters. The remedy of this problem is by reducing road usage to socially optimal levels, several steps are appropriate. Some traffic should be diverted to off-peak hours, when roads are less congested, and some car commuters should switch to public transit. The remedy is to raise commuting costs by imposing a "congestion toll." Such a toll charges each commuter for the congestion damage imposed on others. Unlike the development tax, the proper magnitude of congestion tolls can be computed reliably, drawing on the wealth of accumulated knowledge about commuting behavior (Brueckner, 2000).

    The infrastructure costs generated by new development are another source of market failure that affects urban growth. When a new housing development is built, roads must be constructed, and facilities such as

schools, parks, and recreation areas are needed. The remedy of this problem is to alter the system of infrastructure financing so that new development pays for its infrastructure costs; a system of "impact fees". The impact fees are calculated exactly to offset the infrastructure costs from the new development, so that no additional financing is required (Brueckner, 2000).

21. Continuous of updating to monitor urban sprawl on agricultural lands, and using the latest remote sensing data. And take the rapid precautions against this infringement.
22. Smart growth of developing plans; the concept of Smart Growth concentrates growth in compact walkable urban centers to avoid sprawl which is the efficient use and conservation of land and other resources. Minimizes wasted space and money, encourages diversity, and preserves natural spaces. Smart Growth concepts have been proposed and applied to transportation planning process. The transit-oriented development (TOD) model has become one of the transport planning strategies utilized to improve the urban environment by means of Smart Growth principles. It thus emphasizes on compact, transit-oriented, walkable, bicycle-friendly land use, including neighborhood schools, complete streets, and mixed-use development with a range of housing choices (Wey, 2013). Smart growth involves encouraging development close to or inside the limits of existing cities. Good public transportation systems help to make smart growth possible by cutting down on auto traffic (Hayward, 1998).
23. Green urbanism redevelops existing cities to be ecologically sound. Focus on in-fill and brownfield development, low-rise, mixed income housing near city centers, provide incentives for alternative transportation, encourage ecological building techniques. Green Urbanism Encourage co-housing, groups of houses around a common green space provide recycling facilities Invite public participation in decision-making (Cunningham & Cunningham, 2011).
24. Government should establish farm settlements at designated places at the urban fringes, and that land should be allocated to farmers based on need as well as provision of other farm input subsidies and necessary services. This will revitalize economic activities at the urban fringes and progressively improve the standard of living of the people as well as serve to prevent further spatial expansion of the city. At the same time this measure will encourage vertical rather than horizontal city expansion.
25. The formalization and reinvigoration of farmers association in the same way the government is promoting Community Development Associations within cities for the improvement of urban localities is suggested. Through the associations farmers can directly receive financial assistance and other farm input subsidies and other logistic support from government and extension workers (Thompson& Olajoke, 2007).
26. Urban growth boundaries could be demarcated by adopting the use of green belt area around the city. This will not only enhance the aesthetic value of the environment but also serve to slow down the rate of urban spatial expansion (Thompson& Olajoke, 2007).

From the previous different ways to reduce urban sprawl, the solutions for Shihan municipality areas can be adopted from those ways taking into account the conditions and specialty of that area with the goal of ascertaining their respective patterns of urbanization to avoid expanding in the wrong directions (Saleh& Al Rawashdeh, 2007).

6. Conclusions

The conclusions take a cautious and recommendations approach. The study showed that Shihan Municipality areas lost much of its agricultural land as a result of urbanization and indiscriminate, like other towns and villages in Jordan. The study concluded the need to ring the alarm bells, to take the urgent necessary steps, to expedite the processing of land use plans that limit urban sprawl, and improve the legislation that prevents constructions in agricultural land; to save what remains of these lands. Through the study of urban sprawl on agricultural land the following conclusions appeared:

- The urban sprawl is a serious problem in life-threatening agricultural areas in Shihan municipality, and must reduce it.
- There are several reasons led to urban sprawl on agricultural land in the region; the increase in population and therefore increasing the demand for housing construction to meet the needs of the population, and the traditional view of agricultural work, which leads to the neglect of land and used in construction, inadequate legislation and poor oversight on agricultural land.
- The negative impact of urban sprawl on agricultural land has declined production of these lands by a large margin in the region after it was formed tributary significantly to the city's economy.
- Few green spaces have led to pollution and high temperatures were not seen before areas of the municipality of Shihan.
- Municipalities have a significant role in the reduction of urban sprawl, and the reduction of giving building permits.
- There are ways to reduce urban sprawl, such as building houses vertically, not horizontally to reduce the area of land used in construction, and work on the construction in the rugged land, rather than building in

the fertile agricultural land.

- There is still an opportunity to reduce the possibility of urban sprawl in the area Shihan and togetherness that all competent authorities for the classification of agricultural land and the distribution of crops and practical guide that can be tapped and economic feasibility to encourage investors in the agricultural field.
- Work to raise public awareness of the problem of urban sprawl and danger, through the distribution of leaflets and magazines for damaging statement.
- Encourage citizens to work in agriculture, investment in agricultural land instead of neglecting and used it in construction.
- Provide guidance to farmers who work in agriculture for new farming methods, and how to use modern agricultural machinery in agriculture for the better production.
- Support associations and cooperatives in popular participation by all possible means to contribute in the reduction of serious phenomenon of urban sprawl.

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