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Rapid Growth Dynamics In Sensitive Urban Ecosystems: The Case of Siwa Oasis

A Thesis submitted in the Partial Fulfilment for the Requirement of the Degree of Master of Science in Integrated Urbanism and Sustainable Design

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Disclaimer

This dissertation is submitted to Ain Shams University, Faculty of Engineering
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The work included in this thesis was carried out by the author in the Year 2015/2016.

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

16/02/2016

Signature
Yasmine A. Halawa



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Dedicated to my Parents, family, friends, Siwa community and my beloved Egypt.

Thesis abstract

Urban Growth dynamics in sensitive urban ecosystems:

The Case of Siwa Oasis

Siwa oasis located in the western desert of Egypt is characterised by a sensitive urban ecosystem that is pressured by the rapid urban growth dynamics in it. The urban growth processes alter Siwa's ecosystem and threatens the distinctive culture and environment of the Oasis and its nature based economy. However, this challenge does not face only Siwa yet many other destinations worldwide, where the unmanaged urban growth alter the natural and urban ecosystems. (Turner etal. 1990; Lambin and Gust, 2001 cited in Bohnet 2010 and Bhatta 2010).

The research addresses this problem in Siwa through six objectives. It starts its investigation for the urban growth dynamics by understanding the conditions of the urban ecosystem in Siwa. Then, it maps the actors who shape them. Afterwards, the research investigates the processes shaped by the mapped actors and their generated patterns of urban growth. Thereafter, the research seeks the interpretations for these urban growth processes and patterns by investigating their drivers and impacts. The research targets next a locally developed future outlook for Siwa after its growth dynamics Finally, the research has the overarching objective of being developed through the local Siwan community to address its focus and meet its objectives.

The research methodology to meet its objectives is composed of three phases. The first phase is establishing a foundation from a literature review and secondary data collected to deduce the needed theoretical framework for the case study investigation. The second phase is a five weeks field study in Siwa composed of two stages. The first stage of the field study targeted developing a local knowledge database relying primarily on interviews in addition to other social and spatial mapping tools. The second stage of the field visit relied on two interdisciplinary participatory workshops to validate, calibrate the primary data collected and develop a future database. The final phase of the research methodology is processing the data collected and deduced it.

Keywords: Urban Growth dynamics, Urban ecosystem, Siwa Oasis.

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Acronyms

UG: Urban Growth

ESL: Environmentally sensitive landscapes

ESA: Environmentally sensitive area

EEIO: European Environment Information and Observation

Hateya: gardens cluster in Siwi Language

Mesreb: Silty Roads in the desert in Siwi Language

Sejel: Best soil lands used for Wheat cultivation in Siwi Language

Taqneen: Formalizing the hand claim owned land.

CULTNET: The Center For Documentation of Cultural and Natural Heritage is an Egyptian cultural center affiliated with Bibliotheca Alexandrina and supported by the Ministry of Communications and Information Technology

GOPP: General Organisation for Physical Planning

GOPP: General Organization of Physical Planning

MSEA: Ministry of Environmental affairs agency

EEAA: Egyptian Environmental Affairs Agency

TDA: Tourism Development Authority

ADA: Agriculture development Authority

IDA: Industry development Authority

EQI: Environmental Quality International

NGOs: Non Governmental Organizations

NSA: Native Siwa Association for Tourism services and Environmental protection

COSPE: a non-profit organization founded in Italy in 1983 operating in the field of international cooperation and solidarity and promoting inter cultural dialogue, fair, sustainable development and human rights.

Units

Feddans: an Egyptian unit of area equal to 1.038 acres

KVA :Kilo volt ampere

Currency:

EGP to Euro : 1 Euro equals almost 9 LE

PPM: Part Per Million

P.T: Egyptian Piastres





Introduction

1 Introduction

1.1 Growth in sensitive urban ecosystems in Egypt:

Egypt is a growing population country which seeks potential population dispersion possibilities over time. Egypt also owns rich ecosystems, biodiversity and 30 natural protectorates extending over 15% of the total Egyptian area (MSEA). These valuable natural resources are vulnerable to urban growth, development and deterioration (Viney, 2012 according to Tadamun 2014). This is a challenge that planners always face with every new development axis in Egypt due to it's environmental impact pressured by the attributed growth. Nevertheless, the Zero Scenario of disregarding the development is not valid due to the need for economic development as a sign of survival, growth and new spatial corridors potential (Ismail, 2003). However, the uncontrolled and unmanaged growth in Egypt has led to the loss of many primary resources such as the agricultural lands; where 1% of the total agricultural land in Egypt is lost annually. If the agricultural lands as a main resource for the country are being severely damaged and degraded with the application of regulatory tools to preserve the growth impacts and control it, then destinations of sensitive urban ecosystems under present or projected pressure of growth need to be highly considered (Ismail, 2003).

Ismail (2003) has surveyed the environmentally sensitive areas under pressure of growth and land use change in the fig.(1). This research is concerned with studying Siwa Oasis that suffers the pressure of present and projected growth and is characterised as an Egyptian environmentally sensitive area.

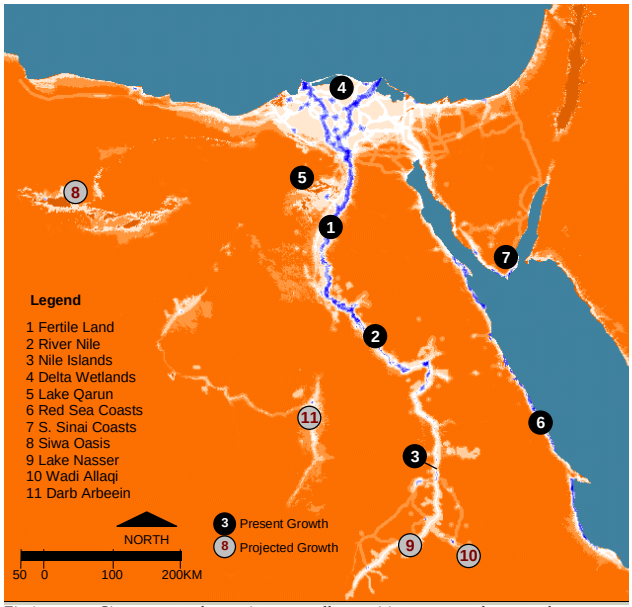


Fig 1. Siwa among the environmentally sensitive areas under growth pressure. Source: Ayman, 2003

1.2 Research Focus:

Siwa Oasis is an environmentally and culturally sensitive area (Ismail, 2003) with a nature based economy (Salheen, 2011) in the Egyptian Western desert. The oasis is under the pressure of rapid urban growth (Ismail,2003) and development processes since the 1960s (Salheen,2011). These processes are coupled with rapid urbanisation (Salheen, 2011) and social restructuring. These rapid growth dynamics in Siwa result in significant changes that alter Siwa's ecosystems and threatens its cultural and environmental qualities. In addition the social, cultural and economic impacts of the generated urban growth patterns.

Siwa's rapid growth dynamics and its alternation for Siwa's ecosystem is a challenge that face many destinations worldwide. Even with the small percentage urban areas constitute on the Earth's surface, uncoordinated and unmanaged growth dynamics generate sprawled patterns and impacts that alter the natural and urban ecosystems worldwide (Turner etal. 1990; Lambin and Gust, 2001 cited in Bohnet 2010 and Bhatta 2010). This issue concerns urban planners, environmental planners, landscape planners and even governments which consider sustainable cities and landscapes a goal (Antrop, 2000; Pauleit and Duhme, 2000; Pauleit et al. 2005, NSW Government, 2005; Bohnet and Smith, 2007 in Bohnet, 2010).

Hence, this research is concerned with the study of the urban growth dynamics in the sensitive urban ecosystem of Siwa Oasis. It is concerned with shaping the research through the locals' engagement to establish a local database of information and future outlook for the challenge the oasis is facing. It aims at understanding conditions of the sensitive urban ecosystem of Siwa and it's users. The study targets investigating the urban growth dynamic processes and their generated patterns in Siwa that alter its ecosystems. Finally, the research seeks understanding the drive behind for these dynamic processes and the impacts they generate to explore possible future outlooks for the Oasis.

1.3 Research Objectives:

This research has the primary objective of engaging the local community in shaping it to meet the following objectives:

1- Understand the *urban ecosystems conditions* of Siwa context.

2- Map the *actors* shaping the urban growth dynamics in Siwa.

3- Investigate the shaped *processes* and *patterns* of UG in Siwa.

4- Investigate the *drivers* and *impacts* of UG in Siwa.

5- Outline a locally developed *future outlook* for Siwa Oasis.

1.4 The research investigation:

The research starts its investigation with finding which conditions characterise Siwa's Urban Ecosystem. Then, it seeks mapping the users and actors who shape the UG dynamics in Siwa. Afterwards, the research investigates what type of processes these actors shape. Hereafter, it tried to find which patterns of UG does these processes generate in order to define the type of ongoing UG. The research then seeks the interpretations for these patterns and processes. Hence, it investigates what drives UG dynamics in Siwa and which impacts results from their generated patterns in it. Finally the research outlines what a locally developed future outlook for Siwa may look like.

1.5 Research Methodology:

The research methodology is composed of three main phases as in fig. (2). The objective of the first phase is establishing a base foundation for the research by the review of literature and secondary data collected from central governmental entities. The second phase of the research is Siwa field study. It has the objectives of engaging the local community in generating a local knowledge data base for Siwa then validating and calibrating it to project a locally developed future outlook for the Oasis. The third phase of the research is processing the data generated through out the previous two phases. The methods, tools and outputs of these three phases are elaborated in the following sections.

1.5.1 Phase 1: Research Foundation

The research foundation phase is composed of two sections as seen in Fig. (2). The first section relies on a literature review. The review targets the deduction of a theoretical framework that can be adapted to the context of Siwa case study and the investigation needed for responding to the research questions. The second part of establishing the research foundation relies on reviewing the collected data from the central state entities relevant to the research questions. This includes the 2027 strategic plans produced by the GOPP and relevant research conducted by the DRC in Cairo. The data collection and interviews with some representatives in the central State entities has helped in allocating Siwa case study in the Egyptian plans and ongoing research.

1.5.2 Phase Two: Siwa Field Study

The second phase of the research methodology is the field study in Siwa. The field study lasted 5 weeks in March and April 2015 and is composed of two parts as seen in Fig. (3). The output of the first part in Siwa study is generating a local knowledge data base through the local Siwan community engagement over approximately 4 weeks. The second part in the 5th week of the field study validated and calibrated the local knowledge database generated and established a future outlook for Siwa designed by the engaged local Siwan community. Fig. (3) presents the time line of the field study and the frequency of the methods and tools used in it while Fig. (4) presents a catalogue for them.

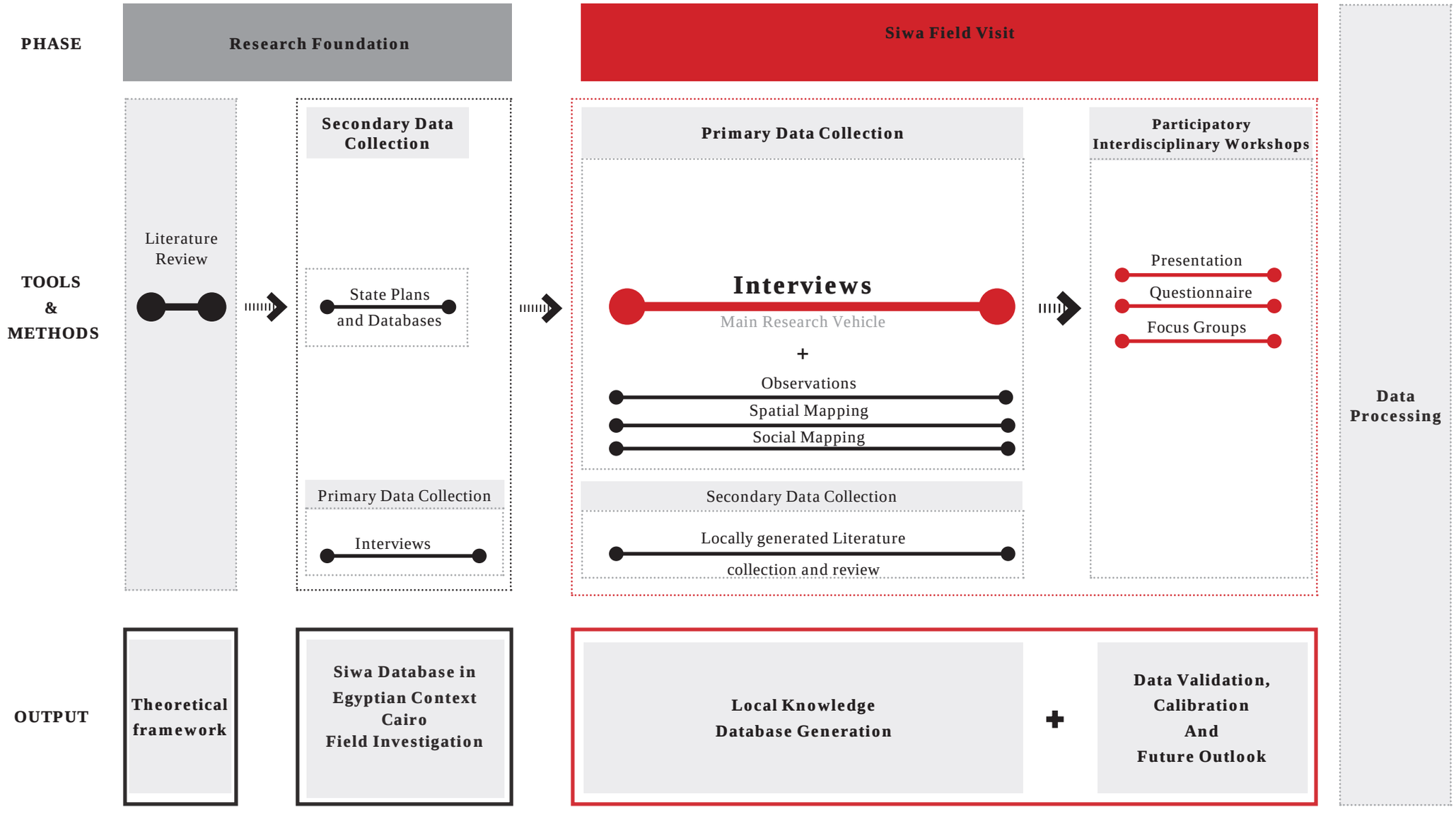
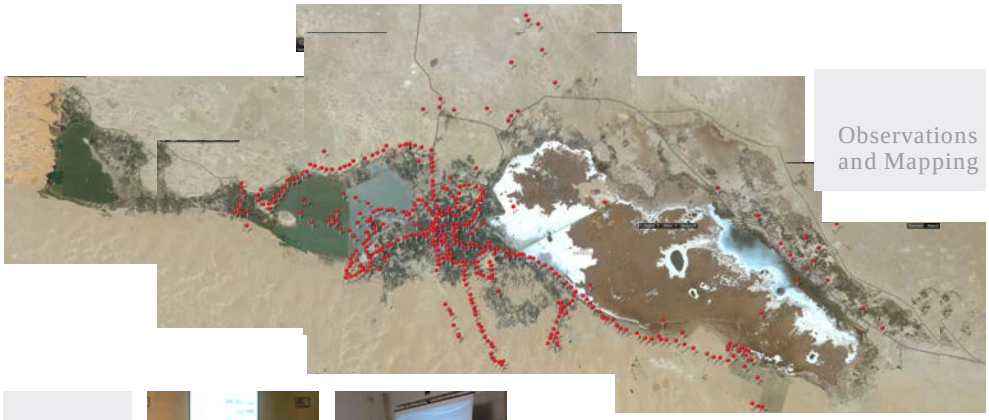


Fig 2. Research methods and tools diagram. Source: Halawa, 2016

March Field Visit Diary Process Diagram



Fig 3. Time line of the used methods and tools in Siwa field investigation March and April 2015.



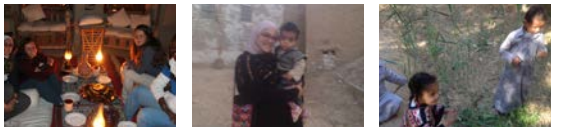
Scientific Events



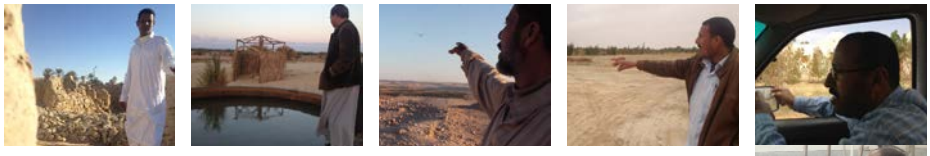
Local Events



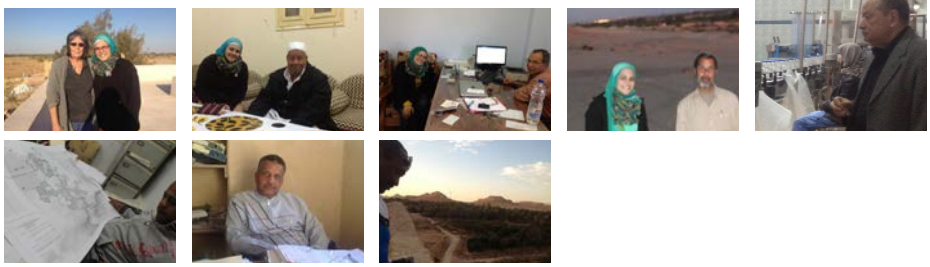
Social Events



Locals guided Tours



Interviews



Questionnaire & Men Workshop



Questionnaire & Ladies Workshop



Fig 4. Catalogue of methods and tools used in Siwa field investigation.

1.5.2.1 Part I: Local knowledge database generation:

Interviews were the main primary data collection vehicle in this part. Approximately 70 semi-structured interviews were conducted with key stakeholders who represent the different society groups. The interviews mapped the actors and users network presented in appendix (1.1). The interviews were combined with other methods and tools that contributed to the social and spatial mapping of Siwa as seen in Fig. (3) and Fig. (4). These other used primary data collection tools are namely: observations, site visits, self guided tours, guided tours by local community members and engagement in academic and social events. This in addition to the collection and review of literature and secondary data generated by the local community.

The observations, local guided tours and self guided tours contributed to the spatial mapping of Siwa. The spatial mapping routes in Siwa were documented using a Geotagging system of an embedded GPS as seen in the catalogue Fig. (4). The observations were through active and passive participation in all daily activities during the field study. They helped in understanding the dynamics of the Siwan community and integrating the researcher into it's challenging nature. The local guided tours were conducted by different society actors depending on their relevance. The diversity in the local guided tours emphasized the disparity in perceptions, ensured the researcher impartial stand in the society and eliminated any provoking potentials for the self guided tours. The engagement in academic and social events helped integrate the researcher into the community and motivating their engagement in the research. The methods and tools applied in this part of the field study generated a local knowledge database shaped by the social network built with the local community engagement.

1.5.2.2 Part II: Validation, Calibration and Future Outlook generation.

The findings of the first part of Siwa field study were validated and calibrated in this part through two multidisciplinary participatory workshops. Furthermore, a future outlook for Siwa was developed by the workshops participants in this part of the field study. A workshop was conducted for each gender separately to conform with the strict gender separation in the Siwan culture.

Hence, to overcome the women's limited access to public spaces and engagement in public events, the ladies workshop was hosted in a local family house. While the men workshop was held in the popular council. The locations of the workshops were selected to adapt to the local culture and ensure the impartial stand of the research. The structure of the workshops were also adapted to the disparity in knowledge between the two genders as a result of the variance in their exposure in appendix section (1.4 and 1.5).

Each workshop was composed of three sections; a presentation, a questionnaire then a group discussion. The presentation at the beginning of the workshops aimed at sharing the locally generated database to be validated and calibrated by the participants. It ensured the transparency and impartial stand of the research to engage the participants into the following workshops' sections. The presentations were followed by a questionnaire (appendix 1.7) and discussions that ensured the validation of the data presented and engaged the participants further into formulating a future overlook for Siwa.

The workshops were positively perceived by the participants in their evaluations (Appendices 1.12,1.11,1.13). They contributed to raising the awareness of the local community on the investigated challenges and creating an engaging atmosphere for an interactive participation to address them. This was fostered by the diverse background of the workshops participants, especially in the men workshop as emphasized next in the sample population section.

1.5.3 Data processing

The data collected is processed and analysed. The frequencies of the questionnaire responses are analysed using SPSS program with result in Appendix (1.15 to 1.27) then corresponded on Likart scale in addition to relying on some correlations studies conducted to highlight some findings.

1.5.3.1Likart Scale:

It is a statistical measure used to calibrate the of frequencies of the responses to the questionnaire. The scale estimates the frequencies' significance degree based on their position between the 5 grades in Fig. (5) and appendices (1.15 to 1.27).

Mean	Likart Scale Level
1 to 1.79	No Effect (Poor)
1.8 to 2.59	Weak Effect (Weak)
2.6 to 3.39	Moderate (Good)
3.4 to 4.19	Effective (Very Good)
4.2 to 5	Very Effective (Excellent)

Fig 5. Degrees of significance on Likart Scale.

1.6 Questionnaires sample population :

1.6.1 Diversity in Gender:

The sample population for the questionnaire and workshops participants is composed of 22 men (60%) and 15 ladies (40%) as in fig. (6). Each gender attended a separate workshop and responded to the questionnaires separately. The sample of the male respondents was more diverse than the ladies one due to the confined exposure of the female community, and their limited access to the public places especially with mixed genders. Even though the sample population that took the questionnaire and participated in the workshops does not represent 5 % of the community yet it is considered as exploratory indicator that contributes to the data base.

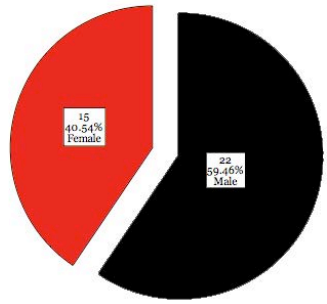


Fig 6. Genders of Workshops participants.

1.6.2 Diversity in Age :

The diversity in the sample population's age is more in the male group than it is in the ladies one as seen in Fig. (7). The dominant age group with 40% was the youth group aged between 20-40 years old fig.(8). The cross tabulation of age against the gender shows the disparity between the males and the female groups, where most of the female participants aged 18-20 years old. That is interpreted by their common place of residence; EL-Dakrour area. It is a new expansion area in Siwa where most of the residents are newly married couples. Hence, it was the location selected for the family house hosting the ladies workshop in order to conform

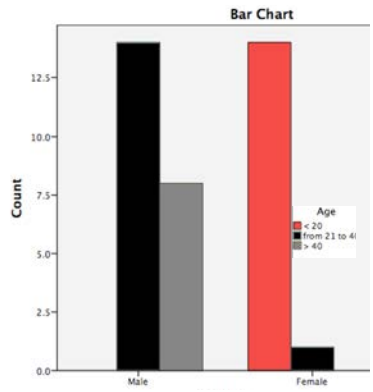


Fig. (7) Cross Tabulation of Workshop participants Age and Gender.

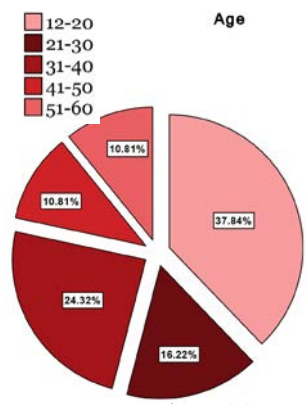


Fig. (8) Age Groups of the workshop Participants.

to the conservative nature and traditions of Siwa Oasis that hinders the mobility of female residents from one area to another. Hence, the participants of the ladies workshop were gathered through snowballing which influenced the sample diversity. More diversity in the sample required more workshops in different areas which was not valid due to the time and security constraints.

1.6.3 Diversity in occupation:

The men sample was diverse in terms of occupations included representative of different society sectors; local society member, state actor group and external forces actor groups (illustrated in appendices 1.8.1 and 1.8.2). The sample included local community members such as the tribe heads and youth tribe members from different occupations. It included state actors group representatives from Siwa protectorates and local municipality. In addition to some non-Siwi investors representing the external forces group. The ladies' sample group was less diverse, it included mostly newly married ladies. Few of the ladies sample had an official work and few were students. This is due to the Siwi traditions that do not encourage ladies work after marriage and encourages young aged marriages.

1.6.4 Diversity in Residence Area:

The men sample population is more diverse in their residence area than the ladies sample. The limited diversity in the ladies sample's area of residence is due to the culture and tradition constraints explained in the age diversity section. Nevertheless, diversity in residence area within the sample is maintained as in Fig. (9 and 10). It also contributed to understanding its influence on the responses. Big portion of the sample reside in EL-Dakrour area which is a recent expansion settlement inhabited by youth and newly married couples. This justifies its selection as the ladies workshop location. The ladies workshop was hosted in a local family house in Dakrour, to adapt to the gender separation culture and limited mobility for ladies

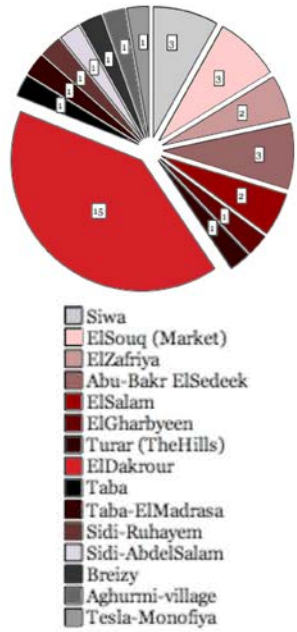
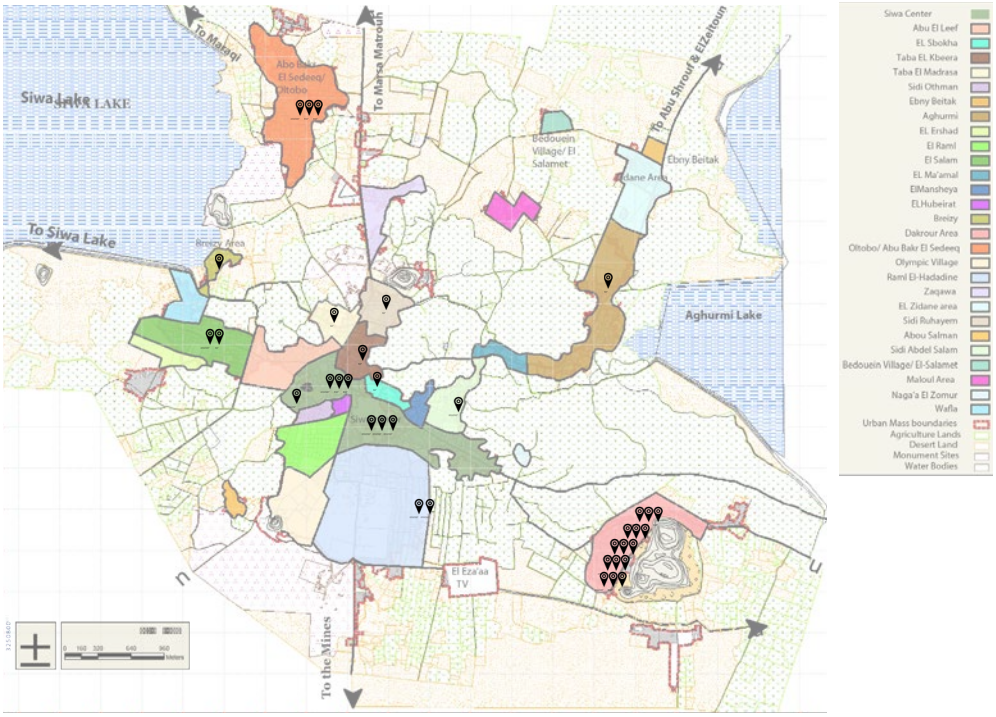


Fig. (9) Residence areas of the Workshop Participants.



Workshop participant residence area

Fig. (10) Residence area of the interdesciplinary stakeholders workshops allocated on Siwa neighbourhoods map provided by the GOPP.

between areas that restricted their participation in the men workshop held at the popular council. Thus, the ladies workshop participants residence area were concentrated in El Dakrour, while the men sample had more dispersed residence areas as seen in Fig. (10).

The different methods and tools used with their frequencies shown in the field study time line emphasizes the engagement of the local community and their involvement in shaping the study. These methods served the research academic objective. They also helped prove the impartial stand of the research and respond to the authorities' and local society's concerns over the field study which ensured the researcher's security in Siwa challenging context.

1.7 Case Study Selection

The Case of Siwa Oasis is selected due to it's fragile ecosystem, environmentally and culturally sensitive characteristics that are challenged by the urban growth dynamics and urbanisation processes. In addition to the researcher's familiarity with the context due to previous academic workshops in April 2013 and December 2015.

1.8 Research and site constraints:

Siwa is characterized by its distinguished characteristics from other Egyptian destinations. What makes it more challenging for the research is its socio-cultural conditions especially under the current political conditions in Egypt. Siwa's site constraints have challenged the researcher during the field study and hindered the research yet it has also fostered its findings.

The researcher's familiarity with the context through previous academic workshops is one aspect for the case study selection. Nevertheless, the perception of Siwan community to the researcher's short stay as part of international academic research groups was found to be different from their perception of the field study for self-organized research conducted by local Egyptian female that required longer stay.

The location of the Siwan community in the Egyptian western desert has resulted in its isolation along history until recent decades when its isolation was broken by major connecting roads i.e Siwa-Matrouh road. This isolation has preserved a strong tribal and cultural identity influenced by the ethnicity of its population as descendants from the Zanatah Berber tribes. These tribes roamed North Africa and are known for their high value of independence (Vivian, 2008). Siwa is one of the few Amazighi communities in Egypt. Its isolation has preserved the Siwan amazighi language that is spoken until today among the local community members beside the introduced Arabic language. Amazighi is a spoken only language in Siwa and is not understood by other fellow Egyptians. Siwa has also preserved its strong culture and tradition that encourages female marriages at young age, disfavour their higher education and restricts the female access to public spaces and mixed gender interactions.

The isolated location of Siwa 40km from the Egyptian-Libyan borders has also retained a strong military and state presence and control in the area especially during the current political instabilities in Egypt. These conditions justifies the trials of the Egyptian government to bring Siwa in alignment with the Egyptian culture and fostering development(Vivian, 2008).

These special characteristics emphasized in Siwa in addition to it's tourist

attractive nature have influenced several non-Egyptian researchers to reside in the community and conduct their research. However, field studies that required the stay of a local Egyptian female was not found common. Hence, it raised the concerns of the community and the authorities and challenged the research and researcher. Especially that one objective of the research is to have it shaped by the Siwan community. Thus, the characteristics of Siwa have one hand enriched the findings of the research, and on the other hand have challenged the field study and brought it to an end due to security reasons.

The Siwan community still refer to fellow Egyptian i.e the researcher as "Tamasrett" the Egyptian in Siwan language noting a "stranger" perception. The Siwan ethnic background influence contributed to the challenge to integrate into the community keeping an impartial academic stand to ensure the trust and engage of the locals for the purpose of the study and it's objectives. The Siwan spoken dialect adds up a language barrier in communication.

The stay in the oasis as an Egyptian female researcher was found to be not common in the conservative Siwan community. This restricted the use of some research methods and was a privilege for others. Self guided mapping tours were found provocative for some local individuals; it was monitored and perceived as inconsiderate to the context's tradition and conservative nature. A local escort seemed to be a need, yet a challenge to sustain the researcher's impartial stand within the community actors with different interests, backgrounds and concerns. Hence a social network was established using alternative methods. On the other hand, the access to the female community in Siwa Oasis was a privilege to the researcher. The privilege that is normally restricted for male researchers due to Siwa's conservative nature that limit the access of their ladies to public spaces and mixed genders interactions. The access to the female community has enriched the research and revealed the disparities between the two genders due to the variance in exposure. Nevertheless, the female community access privilege was challenged sometimes as well, due to the preference of some locals to restrict their female dependants from engaging in the research for some conservative reasons. In addition to the mixed gender restriction in the Siwan culture and their limited mobility from an area to another that confined their diverse engagement in the workshops.

The concerns due to the unfamiliarity of long Egyptian female field studies in Siwa has resulted in some monitoring and control checks by both the authorities and the community at some points during the field study. This is attributed to Siwa's speciality in terms of culture, social, ethnic background and its location as a border community during political instabilities period. These challenges have required conducting more field work to ensure the impartial stand of the research and meet the objective of engaging the community to shaping the research. Accordingly, several research methods and tools were used to build a social network in the society, engage them, gain their trust and motivation to contribute to the research as explained in the research methodology section. Nevertheless, the field study was put to an end for security reasons especially with the Siwan community preference to rely on tribal tradition rather than the state legislative system. Hereafter, these constraints can not deny the enriching engagement of the Siwan community to the research and kind contributions to it as well as their support the researcher.

1.9 Research Structure:

This research is composed of 6 chapters with the following component in sequence as represented in Fig. (11):

Chapter 1: Introduction

In this chapter the research presents the research's problem, it's objectives and questions. Then. it emphasizes the case study selection and its site constraints. Afterwards, it elaborates the methodology used to meet its objectives using the different methods and tools. This is followed by the research structure. Finally, the chapter concludes with a validity and reliability matrix for the research composed of the research structure Vs. its methods and tools .

Chapter 2: Theoretical framework

This chapter presents the theoretical framework deduced from the literature review to address the research questions and is adapted to Siwa investigation.

Chapters 3: Structures of Siwa actors and Urban Ecosystem

Chapter three presents the structures of Siwa urban ecosystem and it's users

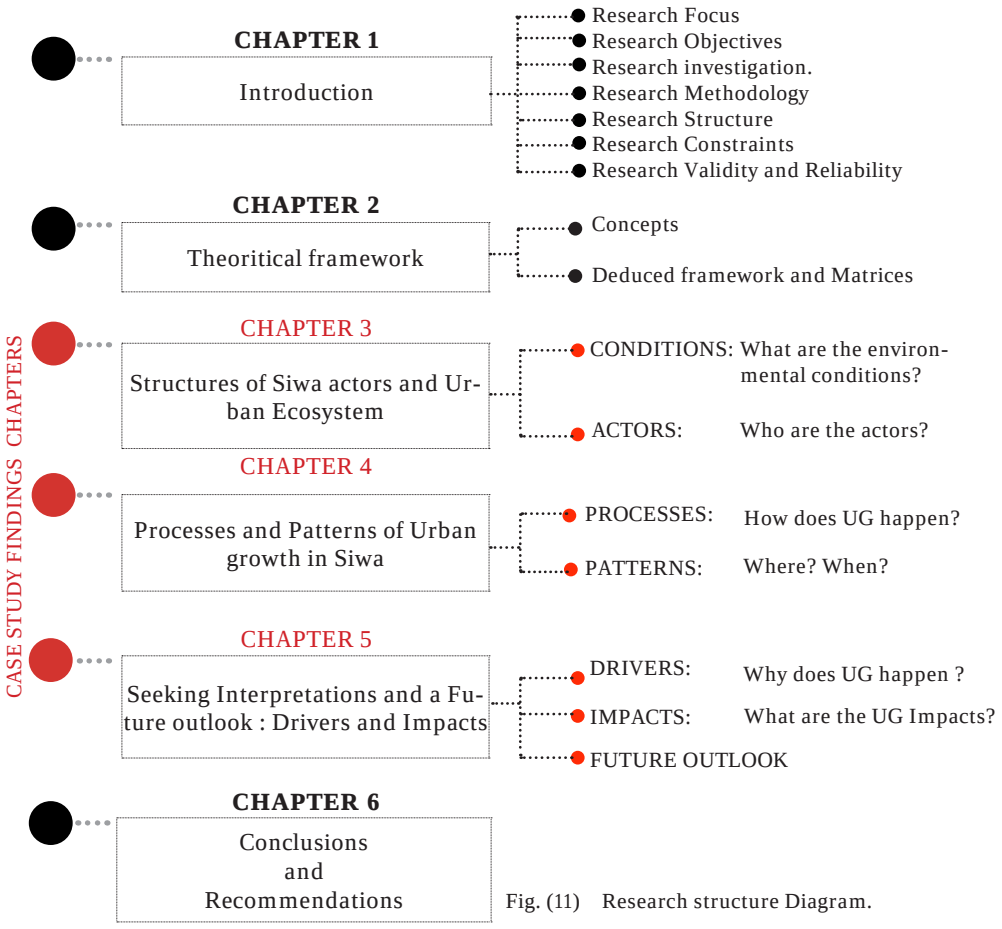


Fig. (11) Research structure Diagram.

and actors groups investigated. It lays out the basis for understanding their dynamics under the ruling governance systems.

Chapter 4: Processes and Patterns of Urban Growth in Siwa

The investigated dynamic processes of urban growth in Siwa shaped by the different actor groups are presented in this chapter. In addition to elaborating on the role of the ruling governance in influecing the generated patterns from these processes over time. Moreover, the chapter presents the generated patterns by the processes shaped by the mapped actor groups. Thus, it draws an understanding of Siwa Oasis, city and their settlements are shaped.

Chapter 5: Seeking interpretations and a Future Outlook: Drivers and Impacts

Chapter 5 presents the interpretations for the previous two chapters that elaborate the dynamics of urban growth in Siwa Oasis. It shows the validated and calibrated drivers and impacts of urban growth in Siwa Oasis as perceived by the local community. Afterwards, it presents the future outlook for Siwa Oasis developed by the local community throughout the field investigation.

Chapter 6: Conclusions and recommendations

The research is concluded in this chapter after responding to the research questions and meeting its objectives. Finally, the research gives some recommendations from the findings developed through its different phases.

1.10 Data Validity and reliability:

The following matrix explains how each of the data collection methods used, contributed to responding to the investigated research points. A triangulation of data was ensured through using more than a methods for investigating each research point as seen in Fig. (12).

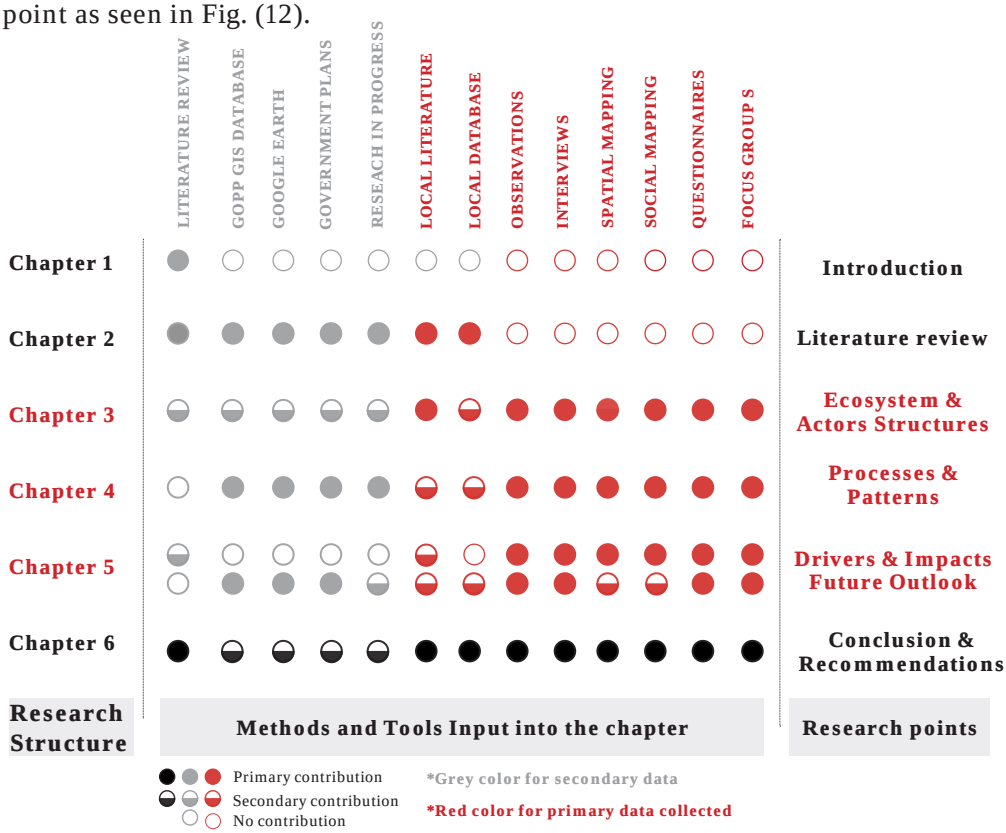


Fig. (12) Matrix of research methods and tools Vs. the research structure.





Theoritical Framework

(C) Halawa. 2015

2 Theoretical Framework

In this chapter the research presents the theoretical framework deduced from the literature review to be used in the Case study investigation and analysis. The framework is designed to conform with the context of Siwa Oasis. The chapter starts with introducing the concepts and definitions used in the research. Then, it previews the deduced theoretical background for the research questions' points; processes, patterns, drivers and impacts of Urban Growth in Siwa Oasis. Finally it presents the concluded deduced framework.

2.1 Concepts and definitions:

2.1.1 Urban? Urban Areas? Urban Areas Expansion?

The word urban in this research relies on the UN-HABITAT (2004) definition of settlements whose population reached 20,000 inhabitants. The research will not focus on the subjectivity of the term urban area, instead it will move to pinpoint two concepts that elaborate this term to convey the understandings needed in this research. These are the *Land Cover* and the *Land use* (Bhatta, 2010).

The land use term is used to explain activities the land gains due to the human activity on them, be it residential, industrial, agriculture, recreational or for other purposes. This can be further defined by not being detectable through remote sensing techniques most of the time (Bhatta, 2010). **The Land Cover** term is the physical characteristics of the lands which can be detected by the remote sensing observations, that can be natural, semi-natural or even human managed such as water bodies, forests, grasslands,..etc (Bhatta, 2010). Urban areas are composed of Land uses and Land covers. They may include non-developed land covers pixels within the intensive land uses spans (Martinuzzi et al. 2007).

2.1.2 Urban Growth UG? Urbanisation?

The phenomenon of UG addressed in this research refers to the spatial expansion of the urban areas (Bhatta, 2010). It is also defined as the total developed lands' increase, which refers to the increase in the Land Uses as a growing patch Bhatta (2010). Meanwhile, it can be understood as a landscape transformation process defined by Foster (1995) as the "r*eduction of non-developed land cover type*."

The UG phenomena is in conjunction with a process of urbanisation. Urbanisation refers to the non-spatial processes of social restructuring in terms of social relations transformation, due to the shift into a city and town life (Bhatta, 2010). This process is referred to the immigration of rural settlers to urban areas in many contexts. The research refers to the United Nations (2005) definition as the transformation of the community from within.

The patterns of land uses (from the UG perspective) and the patterns of land covers (from the landscape transformation perspective) describe the built environment spatial distribution as it is influenced by the social human interactions (Bhatta, 2010).

2.1.3 Urban Growth? Urban Ecosystem?

Even though urban areas constitute small fraction of the Earth's surface, their growth processes alter the natural and Urban ecosystems worldwide (Turnet et al. 1990; Lambin and Gust, 2001 cited in Bohnet, 2010).The UG processes generate urban patterns that result in several impacts on the natural landscapes. They alter the Land uses and Land covers within urban areas and it's surroundings. These alternations concern urban, environmental and landscape planners and governments who seek sustainability. Accordingly, the dynamics of the UG process need to be studied through analysing their drivers of change and their generated impacts (Bohnet, 2010). The analytical study of these processes protects not solely the environment, but also economies based on their natural assets. It also protects people from striving to abandon the altered urban areas (Bohnet, 2010).

2.1.4 Urban Ecosystem? Sprawled UG?

If the system is defined as a group of interacting subsystems for the same goal, then the Urban Ecosystem can be explained as the result of a dynamic intra-action processes between its subsystems. The Urban Ecosystem is a hybrid of man made and natural components; these are physical, social, economic, ecological, environmental, infrastructure and institutional subsystems (Bhatta, 2010) as seen in Fig. (13). The incoherent intra-actions between the subsystems of the Urban Ecosystem due to their lack of coordination and management result in sprawled Urban Growth (Bhatta, 2010).

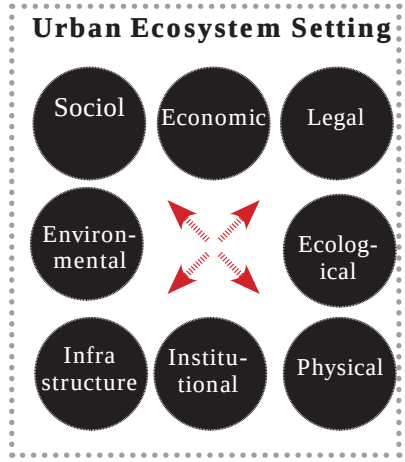


Fig. (13) Structure of an Urban Ecosystem.

2.1.5 Sensitive Urban Ecosystem?

The impacts of UG on the urban areas' ecosystems are of bigger concern when the area or it's landscape are characterized with features that gives them higher sensitivity. To understand the term sensitive urban Ecosystem used in this research, two terms are pinpointed in this section: the environmentally sensitive landscapes (ESLs) and the Environmentally Sensitive Areas (ESAs). Their definitions are used to position the selected case study area into the Egyptian context and the wider concepts scope.

Environmentally sensitive Landscapes (ESLs)

The ESLs definition fits more in this research even though, it is not yet commonly used in the literature. It is recently defined by the Regional Growth management Strategy in the Region Waterloo as the landscape distinguished from it's surroundings by geographic and ecological features due to their concentration, overlap or proximity. ESLs enclose natural features of high value such as protected areas by policies, significant wetlands, stream valleys, or special habitat. They may also contain supportive environmental functions such as ground water recharge or vital ecological corridors. ESLs' compositions form a heterogeneous landscape mosaic that contributes significantly to the regional biodiversity conservation. ESLs regions may enclose some lands that are altered by human settlements (Land uses), yet they should not reach a predominant phase. The ESL region shall maintain its open natural character and its location beyond the boundaries of areas that are irreversibly altered by concentrated human settlements, major highways or where major urban development plans are prepared by the governments.

ESLs' preservation contributes to the local and regional diversity protection and ecological functions provision. It also serves human centred functions through offering aesthetic, recreational, scientific, archaeological or cultural heritage values. Furthermore, it maintains the existing different land use activities hosted by the landscapes.

Environmentally sensitive areas ESAs

The term *Environmentally Sensitive Areas* (ESAs) is more often used in literature. This term can be defined as cited in Ismail (2003) as:

According to Oxford dictionary:*"An area officially designated as containing landscapes or wildlife that would be threatened by unrestricted development."*

American Law Institute (1974): *"An area significantly affected by or having an impact upon, an existing or proposed major public facility or other areas of major public investment. It is also an area "containing or having a significant impact upon historical, natural or environmental resources of regional importance."*

Forester Ndubisi et al. (1995); ESAs are *"Places that are vital to the long-term maintenance of biological diversity, soils, water, or other natural resources. They include wildlife habitat, steep slopes, wetland, and prime agriculture lands"*

According to the EEIO, ESA is:**"***Area where it is likely that a change in some parts of the system will produce a recognizable response."*

ESA in the Egyptian context accordingly can be defined according to Ismail (2003) as *"Places of unique historical, natural or environmental resources vital to the long term maintenance of biological diversity, soils, water, or other natural resources that are or may become vulnerable by major public investment"*

The EEIO definition of ESAs as a system with noticeable responses to alternations within it, is linked with Bhatta (2010) definition of the Urban ecosystem that generate sprawled UG upon incoherent interactions among its subsystems. Finally, the term sensitive urban ecosystem term is used in this reseach according to these definitions to refer to areas of the following features in fig. (14):

Characterised by special:	**Maintain the services of:**	**Threatened by:**
•Geographic Features •Ecological Features •Environmental Features •Historical Features •Natural resources •Non-Dominant Land Uses	•Regionally Biodiversity •Local Biodiversity •Human Centred Functions •Environmental Functions •Natural Resources •Land Uses •Resources of Regional Importance	•Unrestricted development •Major public facilities.

Fig. (14) Characteristics of a sensitive Urban Ecosystem.

The research moves to understand types of UG and development types after presenting the sensitive urban ecosystem dynamics.

2.2 Patterns and Processes of Urban Growth and development:

Urban growth can take place in three main different patterns based on their proximity to the existing developed land. These are the *Infill* growth, *Expansion* and *Outlying* growth (Bhatta, 2010). The outlying growth patterns may occur in the form of an *Isolated* growth, *linear* branch or *clustered* branch (Bhatta, 2010) as seen in Figure (15).

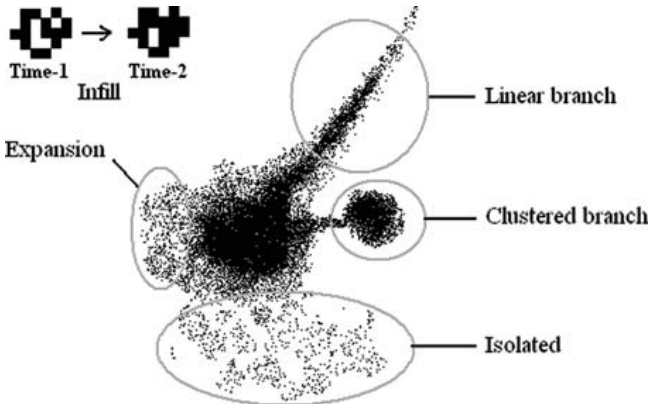


Fig. (15) Patterns of Urban Growth. Source: Bhatta, 2010.

2.2.1 Infill Urban growth pattern:

It is the conversion of non-developed land pixels into urban uses and being surrounded by at least 40% existing developed pixels. It can be explained as the development of a small land area that is most of the time surrounded by Urban Land cover (Wilson et al. 2003). It is also the development of vacant gaps within built up areas (Ellman, 1997), while the development occurs more often on lands where the infrastructure and public services already exist.

2.2.2 Expansion Urban growth pattern:

It is the pattern generated from the expansion process of developed urban patches, where non-developed land patches are converted to developed ones, on the condition of being surrounded by maximum 40% developed patches (Wilson et al. 2003).

2.2.3 Outlying Urban growth pattern:

It is the growth pattern where the development of the land patches lies beyond the boundaries of the existing developed Land cover, yet in the form of an expansion to it (Wilson et al. 2003). It can be also defined as a development outside the urban fringe i.e. in the suburbs (Heimlich and Anderson (2001) cited in Bhatta (2010). Wilson and his colleagues (2003) identified three-forms of Outlying growth; these are the *isolated* growth pattern, *linear* branch pattern and *clustered* branch pattern.

2.2.3.1 Isolated growth pattern:

It is described as the pattern generated from a perforation or a hole making process (Forman 1995 cited in Bhatta, 2010). It is the development of single or multiple patches located at a distance from existing developed area (Wilson et al. 2003).

2.2.3.2 Linear Branch growth pattern:

It is the development of non developed land cover patches into developed ones in a linear connected sequence. The newly developed patches are surrounded by non-developed land patches and located at a distance from existing developed land patches. The development can be in the form of a road, corridor or a new linear development (Wilson et al. 2003) dissecting or fragmenting the landscape mosaic (Forman, 1995 in Bhatta 2010)

2.2.3.3 Clustered Branch growth Pattern:

It is the development of non-developed land cover patches into a cluster UG pattern which is often dense, compact and large development.

2.3 Urban Growth in theory

2.3.1 Process of urban growth

Urban Growth has three dimensions; time, density and land use. The influence of the UG dynamics on the urban ecosystem and the environment de-

pends on it's generated patterns and their impacts. Only through an impact based analysis can the UG be assessed. Furthermore, time is an important aspect in the analysis of UG. A pattern of UG represent only a snapshot of a structural space distribution that changes over time in a dynamic process (Bhatta (2010), Galster Et al. (2001), Harvey and Clark (1965), Ewing (1997)). The process of UG over time reflects the changes in the spatial structures of cities, yet its rate is what decides the generated impacts. Rapid growth is problematic when it occurs at a rate that the community lack the capacity to manage it by itself or by it's governing system, then it impacts its containing environment. Thus, UG processes result in positive development when they are managed to occur over a reasonable time span within the capacity of the containing environment. Nevertheless, they result in Sprawled UG when uncoordinated, unmanaged or unplanned.

2.3.2 Sprawled Urban Growth?

The sprawled UG refers in this research to the result of incoherent interactions of the subsystems of an urban ecosystem (Bhatta, 2010). The sprawled UG definition challenge lies in the lack of clarity on a common agreement on it (Johnson 2001b; Barnes et al. 2001; Wilson et al. 2003; Roca et al. 2004; Sudhira and Ramachandra 2007; Angel et al. 2007 cited in Bhatta, 2010). The research uses its following definition emphasized in Fig. (16):

> "*Sprawl can alternatively or simultaneously refer to: (1) certain patterns of land-use, (2) processes of land development, (3) causes of particular land-use behaviours, and (4) consequences of land-use behaviours."* (Bhatta, 2010 p.8)

Sprawled UG is also defined as unauthorised, non planned urban growth or areas development which are mostly at the suburb area of the cities. They are featured by their effect and interference with the urban environment in a manner that impacts the urban context and the agricultural rural environment (Rahman et al. 2008 in Bhatta, 2010).

It is also used to describe the outgrowing process of urban areas due to the uncontrolled, uncoordinated and unplanned growth that is driven by a num-

ber of processes that generate inefficient resources use. Sprawl if defined with disregard to it's drivers and impacts can be explained as the outgrowth of an urban area core beyond the population growth rates, with low compactness level having an impact on the sustainability of the environment and humans (Bhatta, 2010). Sprawl patterns are visually previewed in the landscape through the dispersed buildings and urban patterns over the landscape (Jaeger Et al. (2010) in Bhatta 2010)

2.3.3 Sprawled Urban Growth or development ?

A non sprawled development can be influenced through discouraged outgrowth of urban areas, and high compactness of the developed land cover patches whenever growth is necessary. The rate of growth and patches development shall not exceed the population growth rate, meanwhile it should not hinder the human environment's current or future interests and needs. These considerations influences more compact and sustainable UG while their disregard foster more sprawled one (Bhatta, 2010). Nevertheless, the degree of efficiency of the UG varies from one type of development to another in density, land use and time. One type of development that maintains efficiency in land use and density might not be efficient time wise for instance.

Thus, sprawl as a type of urban growth as a pattern or a process can be assessed through it's drivers and impacts. The patterns represent the spatial structure of the urban area at a temporal snapshot taken along a process of urban area structuring over time (Bhatta, 2010) as seen in figure (16) based on (Bhatta (2010), Galster Et al. (2001), Harvey and Clark (1965), Ewing (1997)).

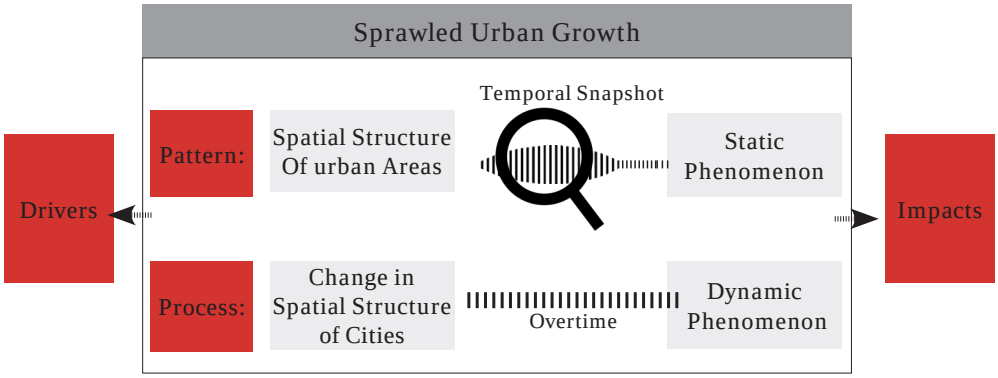


Fig. (16) Framework for investigating sprawled urban growth.

The analysis of the development structural pattern at different temporal snapshots reveals the process of urban sprawl or growth (Galster et al. 2001). However, the impacts of the patterns of development or growth is what renders their stand as efficient urban growth or inefficient, and accordingly their desirability, not the pattern spatial structure in itself (Bhatta, 2010). Moreover, the fine line between one efficient development type and another can be only determined through analysing their impacts.

2.3.4 Multi-temporal snapshot analysis?

The UG usually stems from a historical urban core that starts to grow in a dispersed manner as shown in Fig. (17). The dispersed new clusters form new nuclei for individual development centres. These nuclei in turn start to grow and expand outwards or organically until they diffuse together with the old historic urban core forming a new thickened area. This process continues until the infusion of all the previously scattered new developments adjoin in a coalescence. Hereafter, it forms a new bigger core which upon zooming out of the scale, the coalescence pattern is viewed as a core for a new process reproduction (Herold et al. 2005) as seen in Fig. (17).

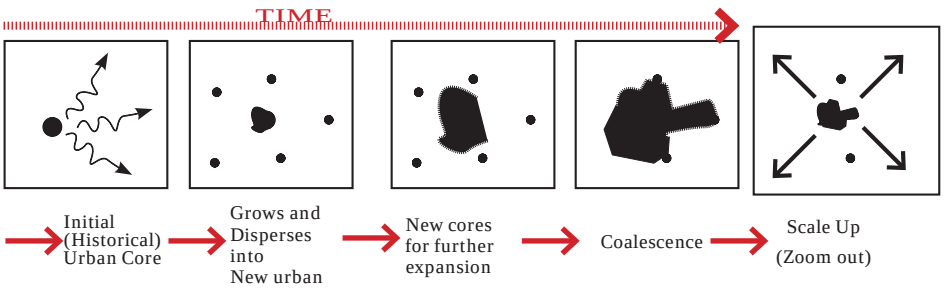


Fig. (17) Multi-Temporal Time line for patterns of Urban growth. Source: Herold et al., 2005 modified by the author.

This framework suggests that some parts of the urban areas pass through a sprawl stage before diffusing into a coalescence pattern with the other parts and overcoming their entitled sprawl state. Thus, determining to what extent, when and where the sprawl occurr might be a bit challenging along a temporal spatial sequence of Pattern frames (Bhatta, 2010). However, it helps in understanding the UG process and the pattern generated at each phase over time.

2.4 System Structure Model

The research relies on the system structure model as a framework for investigating the human interactions with the Urban Ecosystem under the ruling governance. The research uses this readopted model from Salheen (2001) as an abstraction of the multiple dynamics between the city structures that are reproduced over time under the governing rules formulating the system as seen in Fig. (18). The dynamics of the city according to the previously defined concepts include the intra-dynamics between the subsystems of the urban ecosystem. They also include the social human interactions with the built environment spatial distribution. Thus, urban ecosystem structure interacts with the actors and users under the governing rules of the place resulting in reproduced structure frames of the city over time.

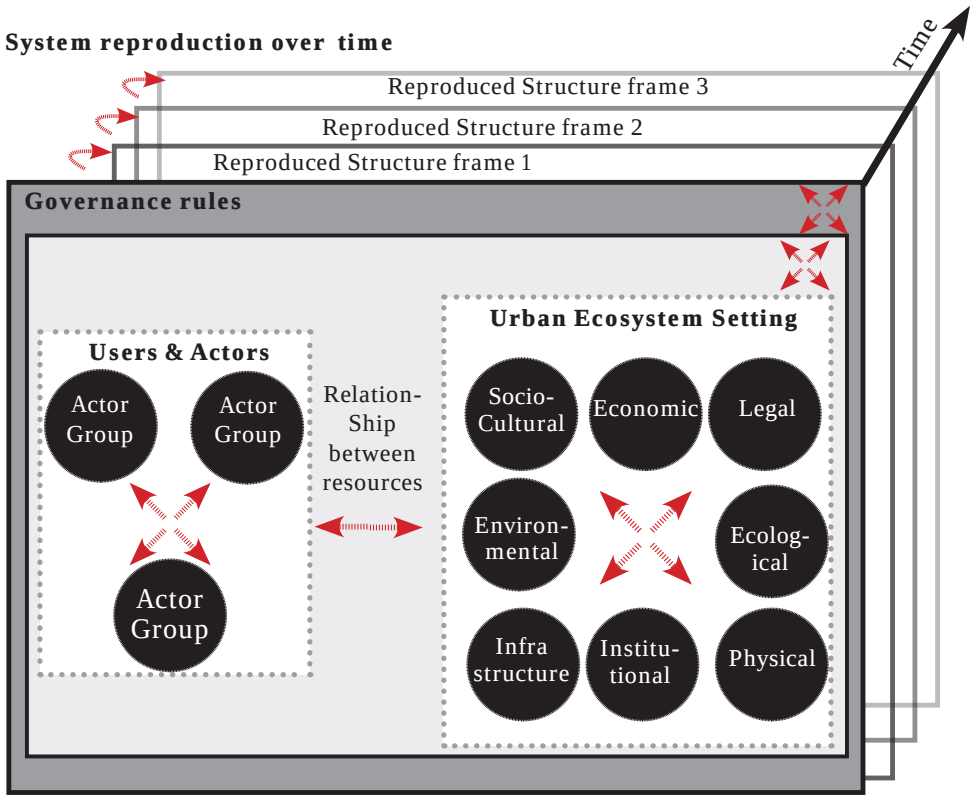


Fig. (18) Structure-System model adapted framework for the investigation in Siwa

2.5 Drivers of Urban Growth:

UG processes have different drivers that generate multiple patterns of variant impacts. Bhatta (2010) suggested a matrix of UG drivers as seen in Fig. (19). They are categorised based on their contribution to either compact or that sprawled UG. This matrix constitutes the initial framework for investigating the drivers of UG in Siwa. They were classified according to the sub-systems of the urban ecosystem and are elaborated as follows according to Bhatta (2010).

Description	Compact Growth	Sprawl Growth
Population Growth	✓	✓
Independence of Decision		✓
Economic growth	✓	✓
Industrialisation	✓	✓
Speculation		✓
Expectation of Land appreciation		✓
Land Hunger attitude		✓
Legal Disputes		✓
Physical geography		✓
Development and property tax		✓
Living and property cost		✓
lack of affordable housing		✓
Demand of more living space	✓	✓
Public regulation		✓
Transportation	✓	✓
Road Width		✓
Single family home		✓
Nucleus Family	✓	✓
Credit and Capital market		✓
Government development policies		✓
Lack of proper planning policies		✓
Failure to enforce planning policies		✓
Country living desire		✓
Housing investment		✓
Large lot Size		✓

Fig. (19) Drivers of compact and sprawled Urban Growth.Source: Bhatta, 2010 modified by the author.

Socio-cultural drivers:

• Population growth can be a result of natural population increase, internal migration due to push and pull factors or international immigration.

• Some social and family structures aspects contribute to UG and it's possible sprawled forms.

• Single family houses as an individualistic trend instead of the family housing fosters horizontal outwards city growth instead of vertical one.

• The social change from joint family to nucleus family generates bigger housing demand.

• Countryside living attract many urban residents to move to peripheries desiring solitude or retreats fostering UG.

• Aspiration for more living space that is more available at the peripheries or in country sides rather than city cores foster sprawled urban growth.

Economic drivers:

• Economic Growth fosters the increase of employment, individuals GDP and their needs for new houses and space.

• Under priced infrastructure and services foster excessive cities expansion(Brueckner 1997, Bhatta 2010). This phenomena is noticed in country sides where the cost of implementing or maintaining the infrastructure exceeds it's equivalent costs in cities, yet their taxes are location independent. The taxes for peripheries that should be higher seemingly appear the same as cores. The seemingly cheap infrastructure paid by developers or by public services often fosters further urban expansions.

• Loans and crediting systems facilitate the process of UG in capital market.

• Industrialization of countryside foster the transfer of agricultural employment into industrial one. This results in their demand for new housing or the generation of housing facilities provided by the new industries. This can be a potential for impervious surfaces and horizontal expansion when peripheries lands are cheaper.

• Speculation on future growth, future governmental policies or facilities such as Transportation can induce premature growth lacking proper planning (Clawson 1962; Harvey and Clark 1965 in Bhatta 2010). Political elections as well can foster speculations for growth. Speculation could foster land withholding that results in fragmented development in a form of Sprawl.

• Expectation of land appreciation at the peripheries may cause land

owners to withhold land from the market according to the owner's perception of the land's suitability for development. This attitude contributes to the discontinued development (Lessingen 1962; Hensmann 1977 in Bhatta 2010).

• Living and property lower costs encourages more people to move to the countryside even if they prefer to live in the cores of the city (Harvey and Clark 1965 in Bhatta, 2010).

• Lack of affordable houses fosters people to move to the country side seeking affordable alternatives.

• Land hunger attitudes of institutions or individuals for acquiring more owned lands, coupled with unsuccessful infill policies, fosters abandoned city cores and outwards growing city (Harvey and Clark 1965, in Bhatta 2010).

• Second homes construction in country sides attract more investments in country side for future housing investment, due to the lower interest rate and high housing demand.

Environmental drivers:

• The physical geography within cities such as unsuitable terrain e.g wetlands, mineral bodies, ..etc can hinder continuous growth and foster sprawled leapfrog development.

Spatial drivers:

• Small road widths in old city parts especially in developing countries is hinders the possibility of vertical expansion due to possible political or financial compensation reasons. This process fosters alternative horizontal expansions and outwards growth.

• Transportation can induce linear branch development especially as a country side to city accessibility connector.

• Roads development excessively induce urban sprawl. However, it is

a crucial need for urban economy development and job opportunities generation.

• Construction with bigger land lot sizes fosters more urban sprawl and horizontal expansion in cities especially in developing countries (Bhatta, 2010).

Institutional, legal and planning drivers:

• Legal Disputes such as ownership, tenure, subdivision or taxation problems or single floor buildings in city centres can cause cities to grow outwards leaving behind abandoned cores.

• Government development, land use policies and urban services variance from an area to another foster discontinuous development.

• Development restriction in some areas fosters moving to less controlled ones.

• Lack of policies' consistency and prior experimentation as well as exclusive planning zones approaches are potential urban sprawl drivers.

• Failure to implement and enforce the planning policies is a main driver for sprawled UG in developing countries.

• Public regulations failure to control compact growth as well as it's variance from the centre and the peripheries foster developers preference to develop on the peripheries and their disregard of planning policies. This generates bigger impact if the city regulations decrease with moving outwards from the city centre.

• Competition of development demands and expectations between the government and the private sector, as well as the independence of decision lead to uncoordinated, uncontrolled and unplanned development. This constitutes bigger concerns with the city's lack of master plan (Harvey and Clarks in Bhatta, 2010).

Those drivers explained set the framework for investigating possible drivers of UG in the selected case study area. They are used in the field visit investigation after their categorisation according to the urban ecosystem categories; social, environmental, economic, spatial, planning and institutional.

2.6 Impacts of Urban Growth:

UG and especially it's sprawled forms have several impacts, it may: alter the urban ecosystems, lead inflation in infrastructure and public services expenses, result in inefficient energy supply, disparity in welfare and financial status, disturbing the wildlife and ecosystem, fragments the landscape mosaic into patches, foster the loss of farmlands and its possible attributed economic instability coupled with transforming the lifestyle and altering the green spaces. Moreover, uncontrolled UG leads to rise in temperatures, reducing the quality of air, water and influencing the public and social health (Bhatta, 2010). The impacts of UG patterns in the case study area are investigated on site as they differ with the processes and patterns generated. They are also categorised similar to the drivers according to the urban ecosystem categories.

In conclusion, this chapter has introduced the needed concepts and definitions used for investigating the selected case study of Siwa Oasis. Then, it presented the frameworks needed for investigating the patterns, processes drivers and impacts of the UG in Siwa. The next three chapters present the result of the case study investigations that relied on the deduced frameworks from this chapter. The next chapter with introducing the structure of the urban ecosystem and actor groups that interact under the governing rules of Siwa system.





Structures of Urban Ecosystem and Actors in Siwa

(C) Halawa. 2015

3 Urban Ecosystem and Actors Structures in Siwa

This chapter presents the urban ecosystem structure of Siwa oasis and the actors and users system in their static form. It starts with introducing the subsystems structure of the Siwa Urban Ecosystem: spatial, environmental, social, , economic , institutional and planning subsystems and their governing rules. Then, it presents the structure of its mapped actors and user groups. Hence, it presents three mapped actor groups in Siwa; the society actor group, the state actor group and the external forces. Finally, this chapter concludes with Siwa's system-structure reproductive model after investigating its specific systems, subsystems and governing rules that reproduce its structure over time.

3.1 Planning and institutional subsystem:

Siwa Oasis is located in the western desert of Egypt, 40 km from the Libyan borders, 300km from the Mediterranean coast and 600 km from the Nile valley (ElDmeiry, 2005 and Salheen, 2011).

According to the planning and institutional hierarchy of Egypt, Siwa is part of Siwa region that is a section of Matrouh Governorate, affiliated to Alexandria region as seen in Fig. (20 to 25) based on the GOPP plans.

Siwa Oasis Municipality and Centre (Markaz) are composed of Siwa City and five affiliated villages. These are El Zeitoun and Abou Shrouf villages located eastern Siwa city, El-Maraqi and Bahy El Din villages located Western City Siwa, and El Gara as in Fig. (21). El Gara is the only inhabited Oasis affiliated to Siwa as seen in Fig. (20).

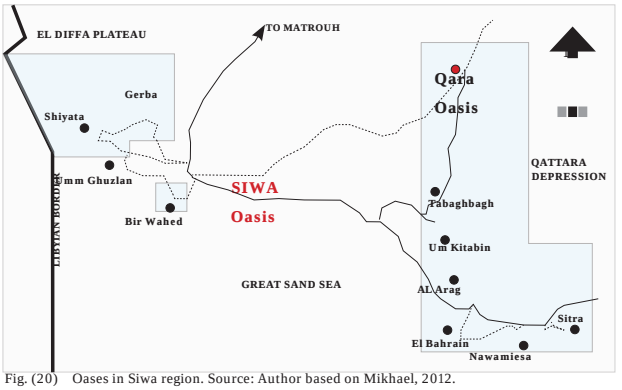


Fig. (20) Oases in Siwa region. Source: Author based on Mikhael, 2012.



Fig. (22) Siwa in National Plan

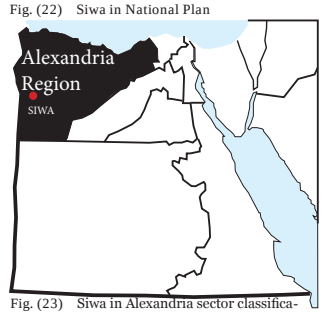


Fig. (23) Siwa in Alexandria sector classification. Source Author based on GOPP plans.

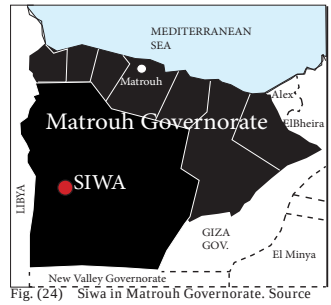


Fig. (24) Siwa in Matrouh Governorate. Source Author based on GOPP plans.



Fig. (25) Siwa adminastrative region. Source Author based on GOPP plans.

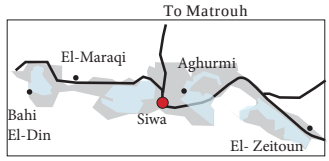


Fig. (21) Villages affiliated to Siwa. Source: Author based on GOPP plans.

3.2 Spatial sub-system:

3.2.1 Geographic location:

Siwa is one of five Oases formed by natural depressions in the Egyptian Western Desert. It lies 18m below sea level. It is accessible from Cairo in land through the costal road to Matrouh then a 300 km asphalt road into the western desert as in Fig. (26).



Fig. (26) Siwa geographical location in Egypt.

3.2.2 Physical Geography and terrain:

Siwa Oasis extends over an area of 1088 km2. The depression stretches over 80-100 Km length East to West, 5-9 Km width at the West and 29 Km at the East as seen in Fig. (28). Siwa has four lakes. These are El Zeitoun to the East, El Maaser North East, Siwa lake western the centre and El-Maraqi Western the Oasis as seen in Fig. (28).

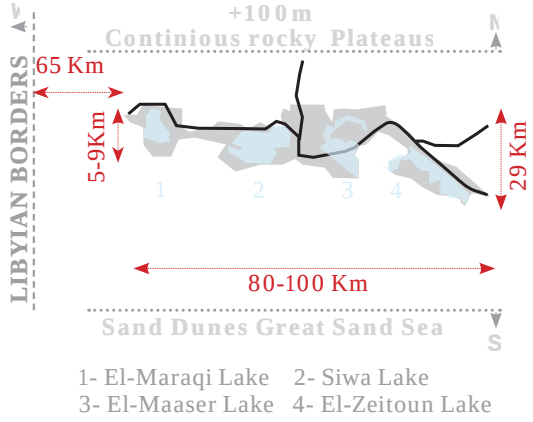


Fig. (28) Siwa dimensions and bounding terrain
Source: Author based on Dmeiry, (2005)

Siwa city centre is the lowest part in Siwa depression cross section as seen in Fig (27). Siwa is lined from the north with a series of Limestone Hills Plateau that is elevated 100m above Siwa, while the South borders are the Sand dunes which extend towards the Great Sand Sea.

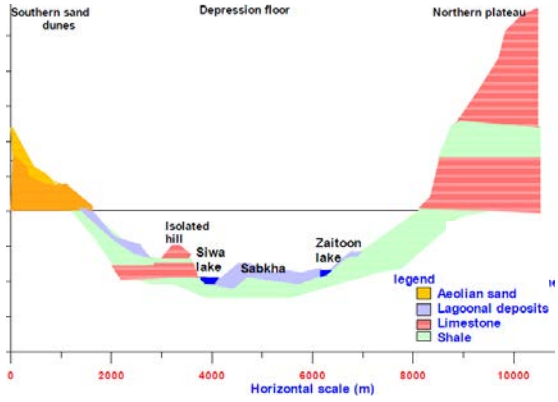


Fig. (27) Siwa North - West cross section.

3.3 Socio-Cultural Sub-system

3.3.1 Siwa historic evolution:



Fig. (29) The oracle temple in Siwa.



Fig. (30) Shali Mountain in Siwa

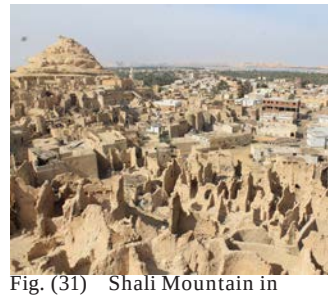


Fig. (31) Shali Mountain in Siwa



Fig. (32) Concrete structures in Siwa during urbanisation.

The first settlements in Siwa dates back to the 10th millennium BC, which gives the place a historic significance. Amon Oracle has its origins in the Old Kingdom in Fig. (29). Romans used the oasis for banishment of exiles. It also played an important role for the pilgrimage of Muslims on their way to Mekka. Siwans built Shali (old city in Siwi Language) as a fortress on a hill around 1200 AD to seek security as in Fig. (30). It is enclosed in high walls and traversed with narrow streets and having only one gate to avoid enemies penetration back then. It is all constructed from mud i.e Kerchief: a fossilized salts rocks of high clay percentage. Shali structure hosted Siwis for eight centuries until the 1820, when Siwa became affiliated to the Ottoman Empire. They started feeling secure to build outside Shali as in Fig. (31). The structures around Shali were guided and controlled by the local traditions of the Siwa tribe to ensure the material, heights, openings and building conditions. The structure of Shali still stands at Siwa city centre until today, yet it suffers deterioration due to time and other historical events such as the flood rain events in the 1980s. This long history offered Siwa a rich spectrum of historic and cultural heritage sites (Dmeiry, 2005, Vivian 2008, Shetawy etal. 2008, salheen 2011).Until the beginning of the 19th century, Siwa was relatively isolated even after its exposure to the rest of Egypt as in Fig. (33). The only trade links to the outside were camel tracks. However, in the 1980s this isolation was broken by the construction of Siwa-Matrouh asphalt road. This event fostered the immigration from the Nile valley to Siwa, land reclamation projects and Tourism industry boost in Siwa (Shetawy etal. 2008). Thus, an urbanisation process is fostered that is still traced as in Fig. (32) .

Figure 5: Timeline showing the main events in the history of Siwa Oasis

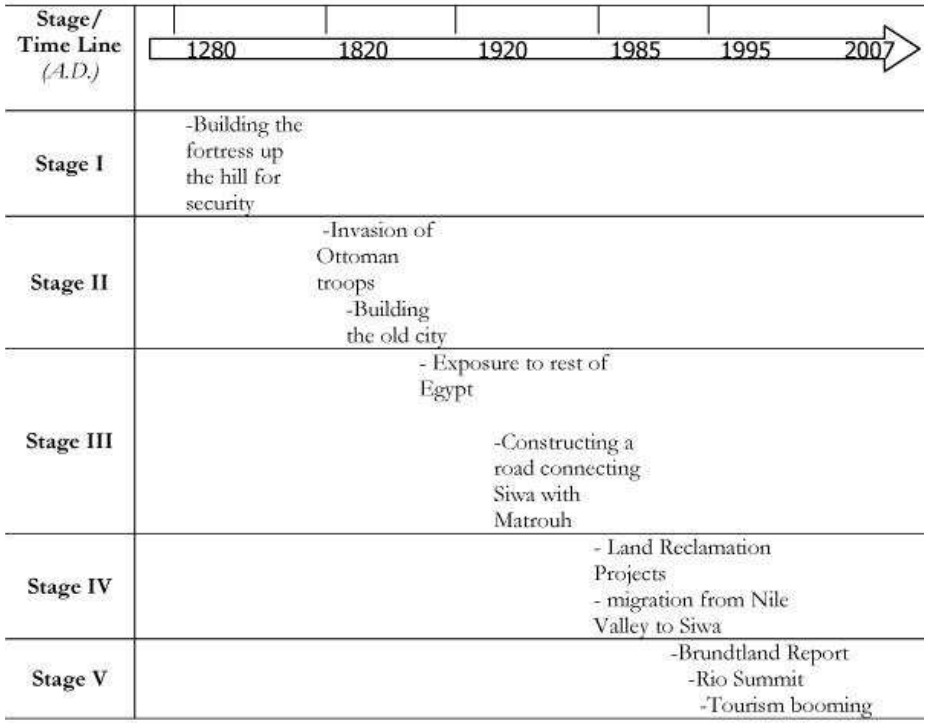


Fig. (33) Time line of main events in the history of Siwa Oasis.Source: Shetawy et al. 2008.

3.3.2 Demography of Siwa:

The population of Siwa Oasis was estimated to be 21482 in 2006 (Samy, 2010). Due to the population growth it reached 27, 008 inhabitants in 2015 according to the statistics of the local municipality; where 19,683 inhabitants reside in Siwa city only.

3.3.3 Ethnicity:

Siwa is a tribal community of unique ethnic background that survived until today due to Siwa's isolated location in the Egyptian context. Siwa inhabitants are descendants of Berber tribes which roamed Tunisia to Morocco in early ages. These tribes are known for their high value of independence, being defiant and having a strong attachment to North Africa. They sometimes prioritize their ethnicity as Amazigh than not considering themselves Egyptians (Vivian, 2008). They still use the Amazighi word "Tamesret" i.e Egyptian to refer to fellow Egyptians sometimes in their daily life.

3.3.4 Language:

Until today, the local Siwan population use the Amazighi Language for daily communication. It is the only used language among the locals even though it is not understood by other Egyptians. It sustains the strong bonds among Siwan tribe members yet it creates a challenge for non-siwis in the community. They use Arabic to communicate with Non-Siwans. In Siwa it is spoken only language and it's alphabet are used in decorating the traditional costumes that Siwan individuals use in events such as weddings or on the local handicrafts products as seen in Fig.(35). The Amazighi language use is a challenge for non-Siwis who try to integrate into the community.



Fig. (35) Siwan Amazighi alphabet used on local handicrafts products in Siwi markets.

3.3.5 Culture and traditions

Siwa's isolation has been broken through many events over time and is challenged by the urbanisation processes today. However, Siwa's tribal community strive to preserve their unique culture and traditions that survived its long history through different eras. They still practise many traditions, use their traditional costumes, language and maintain strong social and tribal bonds.



Fig. (34) Siwan traditional clothes displayed in Siwan House.

Siwa maintain its conservative nature as part of its culture and tradition. The culture enforces a male dominant community. It preserves a clear gender seperation with many restrictions on females' access to the city, pulic spaces and streets. It supports early age marriages and abandoning education after the age of maximum 15 years old. Siwan ladies are rarely observed in the streets even in their traditional costumes as seen in Fig. (34 and 36).



Fig. (36) Siwan woman in traditional clothing on streets.

This gender separation influences the typology of the buildings, the urban fabric of the city and it's dynamics. It requires attached outdoor spaces for Siwi houses and it influences abandoning vibrant parts of the city to ensure privacy; where some locals abandoned the market area to maintain privacy.

3.4 Governance in Siwa:

The tribal governance in Siwa is still dominant until today even though it is embeded under the Egyptian State governance system. The tribal governance in Siwa Oasis persists due to their ethnic background as descendants from the Berber tribes of Zanatah who are characterised by their high value of independence, aggression and resistance (Cassandra, 2008). Siwa's tribal governance of the indigenous Berber that started as early as the 10,000 B.C, yet it has been influenced by several transitional phases. They were invaded by Arabs in the seventh Century, then the Berber became Bedouin themselves in the twelfth century until lately when Siwa became influenced by the Egyptian State governance (Cassandra, 2008).

Today Siwa is composed of 11 tribes according to Mr. Ismail (2015); Head of Siwi House and culture centre and Cassandra (2008). A clear division used to exist between the tribes of Siwa due to a conflict that categorised them as Eastern and Western tribes. Accordingly, Siwa is composed of 3 Western tribes, 7 Eastern ones and one tribe of Matrouh Bedouin settlers who settle in Bahy EL-Din Village. According to Cassandra (2008) the Western tribes include Awlad Moussa and EL Sarahna, the Eastern tribes include Hadadin, El-Gawasees, El-Sharamta, El- Zanayen, Lehmodat, Bawna (In Aghurmi). The Qara village has one tribe. The Eastern tribes are bigger in number and constitute the majority of the Oasis. The biggest tribe in Siwa is El-Zanayen Eastern tribe. The Eastern and western division between tribes is still traced in Siwa yet it still discussed at ease from the community members. This division has influenced the UG in Siwa Oasis and still affects it until today.

Each tribe has a head (Sheikh) who is responsible for the matters concerning their tribe member. He solve conflicts among tribe members, initiate and manage needed gatherings for crucial issues. According to El-Dmeiry (2005), it is rare that the tribe heads solve problems among two different tribes.

The tribe heads are chosen by the tribe members. A representative is selected from each family of the tribe to form a group of "Wise Men" for it. The "Wise Men" assist the tribe head and act as his consultants. The only tribe with two heads in Siwa is El-Zanayen as it is the biggest one. Immigrants to Siwa has to register himself with one tribe head to be responsible about addressinng any issues about him in Siwa.

The Siwan local community prefer until today to rely on their tribal system in managing the Oasis. They do not prefer to depend on the state legislative system to solve any conflicts as experienced. However, Siwa tribal governance system has been influenced by the Egyptian Government trials to further align Siwa with the Egyptian traditions and system. These trials included establishing several development programs, industrial investments and other projects. This process required sending governors, officials, teachers, labourers from the Nile Valley to intermingle with the community (Cassandra, 2008).

It can be concluded that Siwa today is governed by the Egyptian state with an underlying persisting tribal governance that undergoes transition due to the rapid urbanisation processes in the Oasis. This transitional governance phase induced Youth activists groups in the community who seek representation that they miss in the two governance systems. The Youth activists groups form recent initiatives to address issues in the community that evolve without being addressed by the other governing systems. Finally, Siwa's tribal governance and it's transitions influence its spatial configurations, urban typologies, environmental qualities and economic activities. This influence will be emphasized by the emerging patterns and processes in the Oasis in the following chapter.

3.5 Economic sub-system:

Siwa is witnessing an economic development and is attracting more investments in all sectors. The economic base of Siwa is based on agriculture as the main activity, in addition to a growing tourism sector, food and beverage industries and recent mining activities. The structures of these sectors are as follows:

3.5.1 Agriculture:



Fig. (39) Agriculture lands in Siwa

Agriculture is the backbone economic base of Siwa Oasis (Salheen, 2011). It is also a dominant scenery feature that maintain Siwa's identity to locals and visitors in Fig. (39). The cultivated areas reached 87.95 Km2 (20940 Feddans) (Samy, 2008). Palm and olive trees are the dominant crops in Siwa, due to their high endurance for salinity condition in the Oasis (El Dmeiry, 2005 and Abdel Shafy, et.al, 1992). Siwa is famous for the quality of dates and olive trees and is referred to as the stock market of dates reference to Eng. Mohamed Abbas (2015) the manager of El Nasr company one of the biggest investment companies in Siwa.



Fig. (37) Local Siwan practising agriculture as a side job.

Siwa lands are cultivated by locals Fig. (37), external individual investors or big investments companies Fig. (38). The locals cultivate the lands using the local tradition of flood irrigation and no chemicals usage yet it requires big water resources and human resources to produce organic products. They could reach up to 300,000 palm trees and 70,000 olive trees in Siwa (Salheen, 2011). However, the big investors use modern technology in the cultivation, drip irrigation and harvesting to yield crops with lower costs and bigger amounts. The investors cultivation methods and products compete with the locals limited yet organic production with traditional methods.



Fig. (38) Express land reclamation project southern Siwa.

The agriculture lands in Siwa are threatened by other environmental challenges due to the underground water problems such as salinity and water lodging (Samy,2008). Nevertheless, the agriculture sector is still growing in Siwa by local and investors. Most of the locals practise agriculture as a side job and own cultivated lands as part of their culture and tradition. Accordingly some lands are reclaimed with the increase in population. Furthermore, Siwa attracts more individuals and big investment companies to reclaim lands

due to the cheap land and water availability. Most of the mapped large agriculture investments like Express and EL Nasr companies are located near Abou Shrouf village away from Siwa centre to avoid the water environmental challenges in lower lands closer to the city centre.

3.5.2 Tourism sector:

Tourism is a relatively new important economic base in Siwa Oasis (Salheen, 2011). Siwa offers a diversity of cultural and natural landscape attractions in that includes its natural landscape, archaeological sites, medical and cultural tourism activities. It offers monumental sites from the different ages such as the oracle temple in Fig. (41). It also has diverse desert adventurous activities such as safaris, medical tourism such as sand baths and natural springs as seen in Figure (40) and (42).

Moreover, Siwa is a niche market for Eco-tourism that attracts many national and international tourists. Siwa offers two types of tourist facilities, small uncategorised popular hotels and Ecolodges that serve the growing Eco-tourism in Siwa. *The Environmental Quality initiative* EQI is the proactive pioneer of the Eco-tourism in Siwa. It established this market with the Adrere Amelal Eco-lodge seen in Fig. (43) in El-Maraqi village that is awarded by the united nations. EQI established two other ecolodges in Siwa centre.

Many investors were attracted to start new projects to serve the Eco-tourism market in Siwa such as Taziry Ecolodge in figure (44), Galliete Ecolodge and others. However, the tourism industry is a vulnerable one that is affected by the political instabilities in Egypt especially with Siwa's location.



Fig. (41) Oracle temple in Siwa Oasis. Source: Author



Fig. (40) Desert Safari tourism in Siwa. Source: Author



Fig. (42) Bir Wahed natural spring. Source: Author



Fig. (43) Adrere Amelal Ecolodge. Source: Author



Fig. (44) Taziry Ecolodge in Siwa. Source: Author.

3.5.3 Industry sector in Siwa

Most of the industries in Siwa oasis are food and beverages based industries. Siwa food industries are primarily based on the lands cultivated with olives and palm trees. The water industry depends on the underground water reservoirs in Siwa. In addition to a recent Salt industry that is under construction by the military. Siwa also offers small local handicrafts industries by some locals. The industrial sector is growing in Siwa. More investments expand in different areas in the Oasis that has no specified industrial zone. However, some investments are currently on hold until the investments law modification (Emad, 2015). The industrial sectors mapped in Siwa are:

Mineral water industry: Siwa has currently five water factories in Siwa Oasis, these are: Siwa, Aman Siwa, Aqua Siwa, Hayat and Safi. Two of them are located inside Siwa city, while the others are located in About Shrouf Village. Most of the water companies in Siwa are owned by external investors except Aman Siwa, established in 2009 by a local Siwi fig. (46).



Fig. (46) Aman Siwa mineral water manufacturing. Source: Author

Dates Industry: Siwa has a growing dates industry such as El-Wadi, Shali, El-Negma factories. This industry is based on the Palm trees agriculture in Siwa, then sold in siwa markets Fig.(45) or exported.



Fig. (45) Dates and olive oil products. Source: Author

Olives oil industry: According to Emad (2015); new Olives pickles industry is established in Abu Shrouf Village. In addition to the small local industries by the families in Siwa, where each area has one pickles industry unit. Furthermore, three olive oil industry places were established two years ago by locals.

Mining industries: Reference to Eng. Emad (2015) a new salt industry is under construction in Siwa Oasis by the military. It is based on 40,000



Fig. (47) Salt in Siwa Oasis. Source: Author

Salt Feddans, with one of the best qualities in the world seen in Fig. (47). In addition to the unexplored high quality sand, green clay quarries, marble and Alabaster potentials.

Local Handicrafts: Some locals in Siwa produce some Handicrafts that sustain their culture and are sold to the tourists as seen in Fig. (48).



Fig. (48) Local handicrafts products in Siwa. Source: Author

3.6 Environmental sub-system:

Siwa has rich environmental and ecological systems. However, it is challenged by several environmental problems that risk its beauty and environmental balance. The following sections present the Siwa's main environmental aspects and challenges.

3.6.1 Climatic conditions of Siwa:

Siwa is characterized by an arid climate. The average temperatures are 19.7 degree Celsius in January and 39 degrees Celsius in July. The average rainfall in Siwa is 8.56 mm, while the evaporation rate is 16.6 cm/day in June and 5.5 cm/ day in December. Some rain events occur occasionally, with some flood rain events every 15-20 years. One flood rain event took place in Siwa at the beginning of 20th century and again in 1985. The later event destroyed many Kerchief houses in Shali area and El Maraqi, it even flooded the road connecting Siwa Oasis to Matrouh city. The wind directions are North western and north eastern, with speed that reach 40 km/ hour mostly in Winter or spring time (El Dmeiry, 2005).

3.6.2 Siwa protected zones and natural habitat:

Siwa region is one of Egypt's most spectacular desert landscapes. Siwa region natural heritage is of high importance in Egypt and at global level. This is due to its the value of highly endangered species and ones of restricted distribution worldwide in it. The protected areas has only one inhabited oasis which is El Gara; one of many oasis in siwa region as seen in Figure (49). Three sections of the region are declared as protected areas by the EEAA in 2002 (Mikhael, 2002). However, the three section do not include the Oasis areas.

They expand over an area of 7800 Km. The first section lies between Siwa and the borders with Libya, the second Eastern Siwa Oasis on the way to Qattara depression, the last section of Bir Wahed area is located south towards the great sand sea (Mikhail, 2002) as seen in Figure (49).

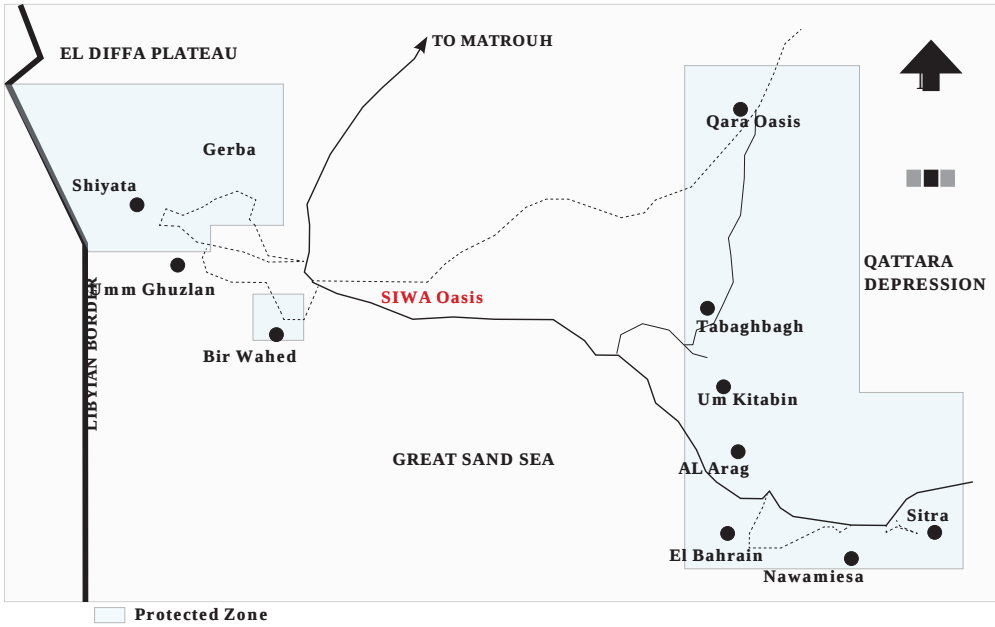


Fig. (49) Siwa protected area zones relevant to Siwa Oasis. Source: Source: Author based on Mikhail, 2012.

3.6.3 Water in Siwa:

While Egypt suffers a threat of water shortage, Siwa suffers a threat of water excess. Aside from the four lakes in Siwa elaborated in the physical geography section, Siwa relies on the natural underground water reservoirs that supply Siwa with water through different sources (El Dmeiry, 2005). However, the underground water constitutes a threat due to the imbalance between its extraction and its discharge.

3.6.3.1 Underground natural reservoirs in Siwa

The first underground natural reservoir is the limestone layers from the Miocene era. This layer is formed of water accumulated in the voids that occurred due to the dissolved limestone layers as a result of terrestrial moves or voids in-between the layers. The depth ranges from 256 to 100m, with salinity range of 1600 to 8200 PPM, while the temperature is between 26-30 C (ElDmeiry, 2005). Most of Siwa water comes is extracted from this depth. The

second water layer is extracted from the Nubian sand stone layer at 600 to 1500m depth, with salinity level of 300-400 PPM. It provides the fresh water to Siwa and is used by the water companies in the oasis. Finally, a recharge water layer is located at a depth of 1-2 m, yet is not considered a water source for Siwa. The salinity of water defines its suitability for drinking or irrigation purposes (El Dmeiry, 2005).

3.6.3.2 Siwa water sources:

The natural underground reservoirs supply Siwa with water through different sources. The water sources in Siwa can be classified to three categories, deep and shallow wells and naturally flowing springs (El Dmeiry, 2005). Each source varies in its depth, salinity and recharge rate as seen in Fig. (50,51,52).

Aspect	Deep Wells	Shallow Wells	Natural springs flow
Number	6 Main	1200	220
Depth	923 to 1250m Deep	50-220m	-
Salinity	100-320 PPM	500-7000 PPM	1600-8000 PPM
Recharge rate	300-500 m3/hour	-	700-13000 m3

Fig. (50) Siwa underground water sources. Source: Author based on Dmeiry (2005)



Fig. (51) Abou Shrouf well. Source: Author



Fig. (52) Hot water spring. Source: Author

3.6.4 Water availability shaping the agricultural lands in Siwa:

Since ages and up to 90 years ago in Siwa, the cultivated lands were in clustered groups with wide distances in between them. A cultivated land cluster (i.e Hateya in Siwi Language) existed around a water source and ranged from 3 to 180 Feddans. The wide distances between clusters were a result of relying on the old Roman wells only. However, in the 1940s, the technology of well digging process started to be used in Siwa and enabled the digging deep wells anywhere in the Oasis, so the cultivated lands area increased and got connected to form a heterogeneous mosaic as shown in Fig. (53 and 54).

The main crops in Siwa today are the olives and dates from the distinguished palm trees in Siwa landscapes.



Fig. (53) Siwa cultivated clusters development with the well digging. Source: Author



Fig. (54) Siwa cultivated lands view from mountain of death to Aghurmi oracle temple. Source: Author

3.6.4.1 Water supply for Agriculture lands in Siwa:

Irrigation of the agriculture lands from the old Roman springs used to be managed by Siwi tradition "Ourf". The irrigation was controlled by a person (Hasab) assigned for each Cluster (Hateya). The Hasab's role is to coordinate the water distribution from the water source to the different plots of the Hateya by a calculated schedule. He was selected based on his honesty and the process was documented as part of the tradition (ElDmeiry, 2005). However, this process changed with introducing the well digging technology to the Oasis and the urbanisation processes. According to Eng. Hussein (2015); Head of Irrigation Water drainage Guidance department in Siwa, and Mr. Ramzi (2015); Vice head of the underground water resources department in Siwa Oasis, after the well digging technology introduction in the oasis and its overuse after the 1980s, more wells were dug and the cultivated areas reached 5000-6000 Feddans. The irrigation water supply in Siwa is currently provided by wells dug by the authority of underground water resources supervision in Siwa or informally dug by the local individuals. The local individuals need a land tenure proof for approving the well digging process from the authority of the underground water resources. However, due to the blocked land tenure and registration channels in Siwa since 8 years, the locals rely on their local know to supply the lands with water from informally dug wells.

The informal wells digging process have several impacts on Siwa oasis. It contributes to the problem of underground water table rise problem, the overflow of water discharge to Siwa lakes and several environmental problems such as salinity, water logging and other problems (Samy, 2010).

3.6.4.2 Water Discharge from cultivated land in Siwa Oasis:

The agriculture water discharge system existed since Pharaonic, Greek and Roman eras yet it was modified and expanded due to the present transformations in the Oasis. The water drainage canals constitute today veins through the urban fabric of the Oasis as seen in Fig. (55).The agricultural water discharge network is composed of secondary channels Fig. (58) that receive the water drained from the agricultural lands channels Fig. (60), then deliver it to the main channels which discharge the water into Siwa lakes Fig. (56 and 57).

Several water irrigation discharge channels have become part of Siwa city's urban fabric. In Siwa one main channel starts from Aghurmi lake passing through the cultivated lands, then between the Oracle and Um ABaida temples and continues towards the west until it reaches the mountain of the dead area and Siwa City centre. From there this main channel splits into several secondary smaller channels. The second main channel starts at Siwa centre then passes through cultivated clusters to reach Siwa lake. Another main discharge channel reaches at Mshendet area, and discharges the water to the lake East. For the Eastern side of Siwa, a drainage canal passes from El Zeitoun Hateya (Cultivated cluster) towards the East of Siwa and discharges the collected water in El Zeitoun Lake. Another one serves three other Hateyas in Zeitoun Monumental site. The agricultural water discharge channels form a dominant feature in the city's landscape and urban fabric.


Fig. (55) Secondary water discharge channel within the urban fabric. Halawa (2015)


Fig. (56) Main discharge channels to siwa lakes. Halawa (2015)


Fig. (57) Agriculture water discharge in Siwa lakes.. Halawa (2015)


Fig. (58) Secondary discharge water channels in Siwa urban fabric. Halawa (2015)

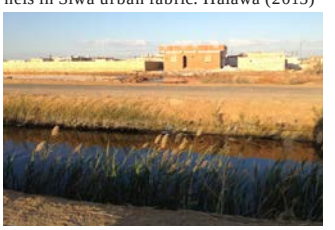

Fig. (59) Discharge water secondary channels in Siwa urban areas. Halawa (2015)


Fig. (60) Discharge water channels in cultivated lands in Siwa. Halawa (2015)

Even though water in cultivated land in Siwa can be found 50 cm, 50-100 cm or 100-200 cm below the land surface, yet this level changes with the current increase of the underground water level. Hence all agriculture lands in Siwa need well constructed water discharge systems (ElDmeiry, 2009). However, this is not the case, these old discharge channels and their expansions are still lagging in capacity compared to the amounts of water extracted for irrigation. Most cultivated lands owner whether locals or investors consider the irrigation water supply and disregard the discharge water network until late stages.

The increase in cultivated lands and fluctuations in the water discharge can be seen in Fig. (62). The cultivated lands area was 43,251 km2 in 1930 and reached 62 km2 during the period of the 1970s to the 1990s due to the wasted water and uncontrolled wells. The cultivated areas further expanded over 2500 Feddans in 1960 (10.5 km2) (El Dmeiry, 2005).

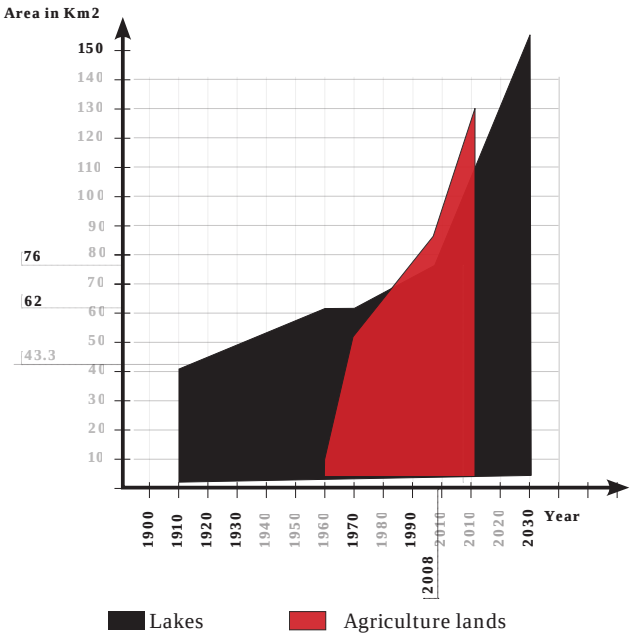


Fig. (62) Siwa cultivated lands and lakes fluctuations in Area.
Source: Author based on El Dmeiry, (2009) and Aboragab (2010) data.

In correspondence with the increase of the cultivated lands area, the area of the lakes reached 76 km2 in 2008 and is projected to reach 153 km2 approximately according to Abo Ragab (2010). The salt marshes reached an area of 470 Km2 with a cultivated land area of 88 km2. These Lakes exists since old ages and offer Siwa a unique scenery however, their expansion threatens the urban areas today.

The government implemented several interventions since Mubarak visit in 1996 as a ministry reaction to his presidential decree. The urgent plan strategies included limiting the water flow by uncontrolled wells closure and insulating the irrigation channels bottoms along 150 Km to decrease the water

loss. It also included building bridges contouring the lakes and purifying the water drained into the main drainage canals to be re-used (ElDmeiry, 2009). However, these interventions did not prove success in solving the problem. Until today, informal wells are dug by some locals and water is extracted from 1199 wells and springs in Siwa. The surplus is estimated to be 33 million cubic meters discharged into Siwa natural lakes. This surplus contributes to the rise of underground water table, increase of the lakes area. In addition to contributing to the soil salinity, water logging and decreasing the land productivity and other agricultural problems(Samy, 2010). The agricultural discharge water re-use remains only as an idea experimented by the DRC in Siwa.

Siwa has a unique sociocultural and environmental qualities that categorize it as a sensitive urban ecosystem. Siwa local municipality has applied to Matrouh Governorate to acknowledge it as an environmentally sensitive area. However, the underground water table rise as well as the expansion of Siwa lakes and marshes constitute a real challenge to Siwa urban fabric and residents lives. Siwa is also under the pressure of the rapid urban growth.

3.7 Users and actors shaping UG in Siwa urban ecosystem:

This section presents the mapped structure of Siwa users and actors who shape the UG dynamics in Siwa urban ecosystem. They are categorised into three main groups: local Siwan, external forces and the State actor group as seen in Fig. (63). The Local Siwan actors group include the Siwan tribe members, the proactive land developers, the Tribe Heads, the Youth Activists groups and the NGOs. The State actor group include the state representatives on three levels: local level in Siwa Oasis, Matrouh Governorate level and State Central level. The state representatives on the state central level are the ministries and their attributed entities, on the intermediate level: Matrouh Governorate and it's office representatives for the ministries, while the local level state representative are: Siwa local municipality, popular council and the ministries' representative offices. Finally, the external forces actor group include four categories. The permanent immigrants category to Siwa either Egyptian immigrants or international ones, the temporary visitors category to Siwa whether for work or tourism, the investors category and the Fund donors category. Each actor group is explained in the following sections.

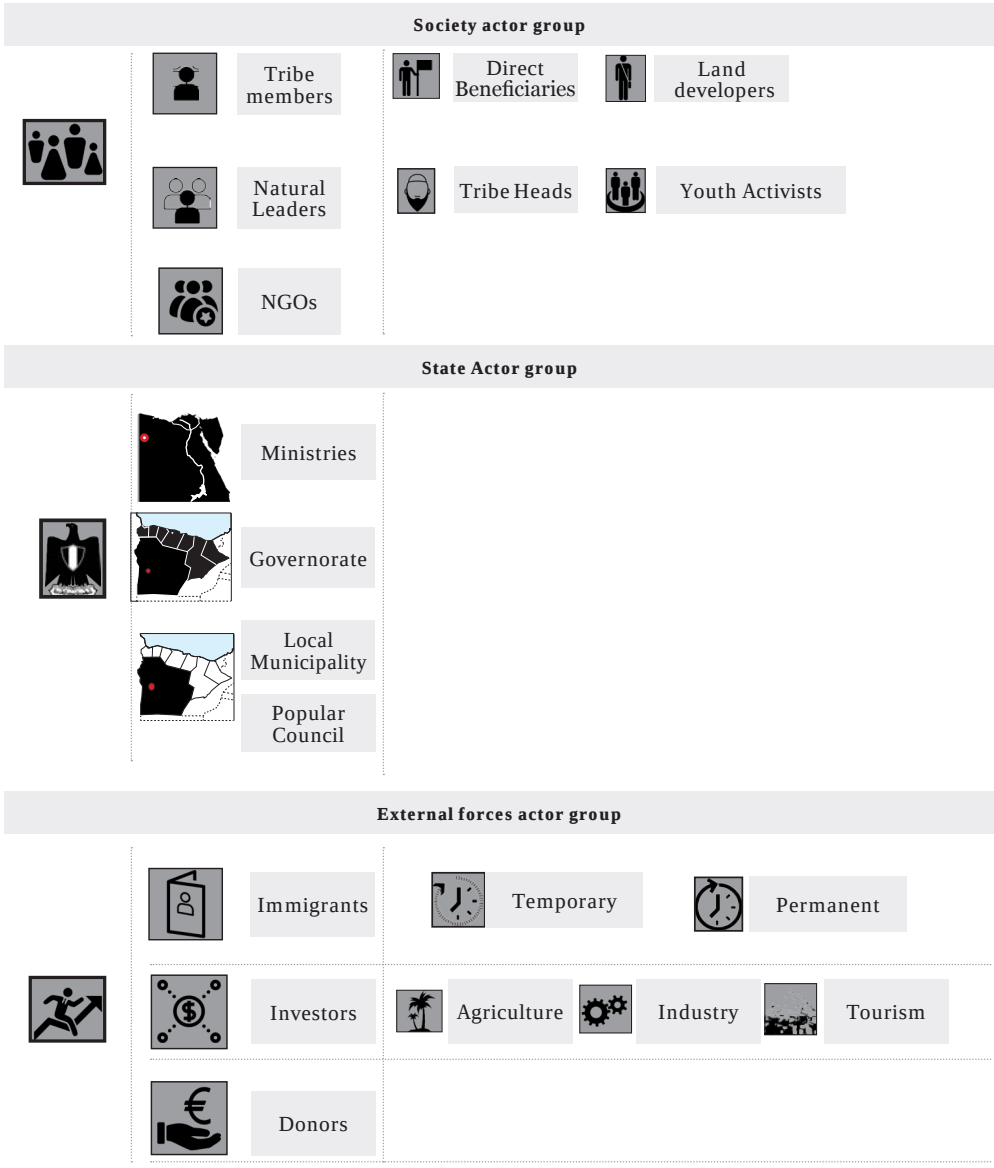


Fig. (63) Actors shaping land uses in Siwa. Source: Halawa (2015)

3.7.1 Local Society Actors Groups:

3.7.1.1 Tribe members:

This group represents the majority of the Siwan society. These are members of the 11 Siwan tribes who are descendants of the indigenous Amazighi tribes. This group includes members of the Eastern and Western tribes of Siwa and the Tribe of Matrouh Bedouin settlers. The local Siwans used to practise ag-

riculture as a main economic activity. However, due to the urbanisation and modernisation processes in Siwa their economic activities are now diversified. Some of local Siwan community work at the present time in administrative positions in governmental institutions, in tourism activities, in industrial factories and in commercial activities for locals or visitors. Nevertheless, the agricultural activity remains a responsibility for locals beside their other jobs. The local Siwans persist to sustain the agricultural practise as part of their culture. However, the urbanisation drives the new youth generation apart from this tradition gradually. According to the locals, Siwa has a lot of potential, job opportunities and almost no unemployment.

The local Siwan community is perceived in a spectrum, from locals who have no contact with externals forces group to ones who work with them on daily basis. A disparity is mapped between the two ends of the spectrum. The adherence to the local tradition (Ourf) and the degree of openness to dealing with external actors varies among individuals over this spectrum. The ones with no contact with external forces actors tend to be more conservative and more adhering to Siwan traditions. The ones with often contact with external forces actors often act as their mediators to facilitate their access to the community especially with the projects of land development or tourism. The local individuals are very much influenced by the external forces actors in this case.

3.7.1.2 Tribe Heads actors group:

The actors in this group are the natural leaders in Siwa tribal community. These are the tribe heads of the 11 Siwan tribes that govern the Siwan community in reference to their local traditions (Ourf). They are assisted by the wise men who represent the tribe families. Siwa tribe heads play an important role in the Siwan community due to the dominance of the tribal governance in Siwa and its acceptance within the community. The tribe heads address the needs of their tribe members and solve the conflict that arise amongst them or with other tribes.

3.7.1.3 Youth activists actors group:

The youth activist groups are result of recent collective initiatives by the local community members. They are formed by proactive local groups who come

together to address the needs of the Youth community segment that are not tackled by the state or tribal governing actors. These groups have emerged recently with the urbanisation and modernisation processes that foster a gradual dilution of the tribal governance under the Egyptian state one.

3.7.1.4 Proactive land developers:

The proactive land developers are an emerging actor group in Siwa Oasis as a result of the ongoing urbanisation processes. These are proactive community members who take the initiative of conducting land development projects to address the needed housing supply in the community. The lagging supply for the community's need by the government or other community leaders created a niche market for those developers. They took the economic opportunity to provide the community with the needed supply and get revenue for themselves. This group has developed some housing projects in Siwa Oasis that will be presented in the processes chapter.

3.7.2 Non-Governmental Organisations (NGOs):

NGOs in Siwa play the role of the mediator between the international Fund Donors and Siwa community. One type of the NGOs in Siwa are those established by local community members initiatives. The other type are established at the end of some international development projects to carry on the projects' objectives after their termination and ensure their sustainability. The Native Siwan Association (NSA) for example was established at the end of Siwa-Tanja project to sustain the project after its termination.

Not all the NGOs are equally active in their role as mediators between international fund donors and the local community. Most of the activity of the donors were focused with two or three active NGOs in the community. The donors supply the funds and operate their projects through the local NGOs of the community. In the UG and construction projects, SDREC NGO managed the distribution of loans to the Youth from European Union funds. However, this was not sustained due to the youth inability of the loans repayment, according Mr. Anwar Sarhan,the head of SDREC NGO. Nevertheless, SDREC still supply the youth with construction materials to help in their houses construction phases.

3.7.3 State Actor Groups:

This section presents the investigated state actor group. It starts from the central government level, then moves to Matrouh governorate intermediate level and ends with the state actor group on Siwa local level.

3.7.3.1 Central state ministries and their local representatives:

This section shows the roles of the mapped central state ministries in the processes of urban growth dynamics in Siwa Oasis and their affiliated entities.

i- The ministry of Housing, Utilities and Urban Development:

The ministry of housing is a key role player in the UG dynamics in Egypt. It is the main responsible ministry for the role of complete development in the country, including the social, urban and economic sectors. Furthermore, it is concerned with the study of urban spaces in Egypt, investigating their capabilities and preparing full required structural plans for development (Ministry of Housing Website, 2015).

The ministry of Housing in Egypt is assigned for:

> *".. Putting the complete and structural plans takes place for the development and that is translated into detailed plans from networks to the infrastructure and that contains the ways, bridges and the stations of drinking waters and sewerage to the suitable house and the different services necessary for the success of development and its continuation." (Ministry of Housing website, 2015)*

The ministry structure has some affiliate entities that manage it's role. These are the GOPP and the Infrastructure holding companies; the Egyptian water holding company and the Egyptian sewage holding company. The structural affiliation and roles of these entities are explained in the following sections.

- **The General Organisation of Physical Planning (GOPP)**

The GOPP is the affiliate organisation to the ministry of Housing in Egypt. Thus it is supervised, directed and monitored by it. The GOPP is assigned

for setting the basic policies for the urban planning, preparing the plans and programs of the urban development Egypt. In addition to its role of co-ordination with the national production and public services programs that satisfies the current needs and set the base for the future. It also practices its role in the supervision of assuring the implementation of these plans (General Organisation of Physical Planning website, 2015). The GOPP has a representative office in Matrouh Governorate and it coordinates its tasks on the local level through the local municipality. The Holding companies for physical infrastructure in Egypt are affiliated to the GOPP.

The Egyptian Electricity Holding Company

The role of the Egyptian Electricity Holding Company according to the its website (2015) is:

"The Egyptian Electricity Authority was granted the exclusive right to produce, transmit, and distribute the electric power throughout Egypt".

According to Eng. Ali Abd El Nabi; the head of the Electricity company local branch in Siwa, the central company is attributed to the GOPP and it has a set of affiliate distribution and transmission companies. Siwa has a local branch attributed to El Beheira Distribution Company. The local branch is assigned for the electricity service provision. Due to Siwa's isolated location and its unconnected status with the Egyptian national grid it is considered an underprivileged special case. Furthermore, a partnership is established between Matrouh Governorate and the local company branch to ensure the subsidisation of service prices.

The Egyptian Water and Sewage Holding Company

Reference to the website of the Egyptian Water Holding company (2015), the company is assigned for the role of purification, desalination, transmission, distribution and sale of potable water. It is also responsible for the collection, treatment and safe disposal of the Sewage water. According to Youssef Bakrein, the head of the local water and sewage company branch in Siwa Oasis (2015), the company is affiliate to the Ministry of Housing section that is concerned with the potable water and sewage water systems.

The company consists of two sections, one has a managerial responsibility and the other has an implementation one. These two sections either have separate local branches in the Egyptian Governorates or a representative section attached to the local municipality. Siwa has a separate local branch since 2008. Moreover, due to Siwa's isolated location it is considered an underprivileged area of a special case. Thus, a partnership between Matrouh Governorate and the Company is established to ensure the subsidisation of services for Siwa.

According to the Website of the Egyptian water holding company (2015), the governmental bodies concerned with the quality of the potable water in Egypt are the ministry of environment, the ministry of water resources and irrigation, the ministry of Health and Population, the holding company for water and sewage system as well as the Coordinating authority for the Potable water and sewage system and consumer protection.

ii- The ministry of Environment: Egyptian Environmental Affairs Agency

According to the Ministry of Environment website, (2015), the ministry has the EEAA as the executive body. It has the role of:

> *"Formulating environmental policies, Preparing the necessary plans for Environmental protection and Environmental development projects, following up their implementation, and undertaking Pilot Projects"*

The ministry also has a coordinating office that represents it in Matrouh Governorate. It has a representative office in Siwa Oasis yet according to the field investigation, it is only concerned with the natural protectorates sections that are located outside Siwa Oasis boundaries. The office of environmental affairs in the local municipality in Siwa, is concerned with some buildings' aesthetics and administrative work according to Mr. Ali the head of this office, the case that needs further investigation.

iii- The ministry of Agriculture and land reclamation:

The ministry of agriculture according to its website is concerned with :

"Advancement of agricultural policy and land reclamation policies that would ensure coordination and integration in line with the national development plans, link and work on its development with the latest scientific methods and technology on the basis of economic optimum. ..Development of agricultural resources, increase the area of reclaimed land and promoting rural economics by various means."

At Siwa local level, the ministry of agriculture has a local administrative office in Siwa that is affiliated to a the agriculture administration office in Matrouh Governorate. The ministry of agriculture has also an affiliate research Centre that is the Desert Research Centre DRC which has a local branch in Siwa. It has two location in Siwa; one in El Maraqi Village and the other is in Tagzerty. The desert research centre in Siwa has some activities yet its role is still limited in Siwa in experimentation of cultivation technologies, irrigation techniques in addition to recycling the agriculture waste on small scale recently. The DRC has also some projects for recycling the agriculture water discharge in Siwa, yet they remain at small scale experiments level.

iv- The ministry of Irrigation and Water resources :

The ministry of irrigation and water resources in Egypt have 5 sections that are represented in Siwa Oasis according to Eng. Ramzy (2015); the head of the guidance and supervision department. These are the mechanisms section, agriculture discharge water department, agriculture discharge water research institute, underground water research institute, Water resources section: Irrigation canals responsible. The Ministry was responsible for some interventions to solve the water problem in Siwa after the president visit in 1996. However, the methods in addressing the problem did not solve it yet.

v- The ministry of Industry:

The mapped role of the ministry of industry in Siwa is issuing the licenses needed for the industrial projects initiated by investors in Siwa Oasis.

vi- The ministry of Tourism:

The mapped role of the Ministry of tourism investigated in Siwa is the practised through the TDA's representative office in the Oasis. According to Mah-

dy Hweity (2015); head of Siwa tourism information centre, Siwa has two types of tourism facilities; Ecolodges and popular hotels. The TDA has the role of issuing the licenses for the Tourism projects. The TDA also regulates the Ecolodges in Siwa through a developed Criteria for them, however the popular hotels are not rated and have no defined criteria.

vii- The ministry of Antiquities:

The ministry of antiquities has two types of cultural heritage sites in Siwa, ones that can not be used for other purposes, and the other one that can be re-used needs investigation in case of need for infill policies in the city. The ministry has a representative office win Matrouh governorate that is concerned with Siwa region as part of the area it covers. The re-use of the cultural heritage site in Siwa has been proposed yet has many challenges according to Dr. Demeiry (2015) the head of antiquities in Matrouh.

3.7.3.2 Matrouh Governorate

Matrouh Governor-ate is the intermediate level between the central state actors and the authorities at the local level. It has with departments that represent the different ministries and co-ordinate with local representative ones.

3.7.3.3 Local Municipality:

The local municipality of Siwa is a key role player in the UG processes in Siwa. It co-ordinates the processes between the different stakeholders in Siwa. It is a key mediator between the state different entities on the three levels, the local society and the external forces actors. Its role in the different processes is emphasized in the next chapter.

3.7.3.4 Popular Council

The popular council is the communication channel between the local society and state. However, it is inactive since four years due to the political instabilities in Egypt.

3.7.4 Actors Groups of External Forces:

This group of actors is represented by non-Siwan population that influence the community. This actor group include immigrants to Siwa Oasis; either emigrating from other areas in Egypt or international immigrant. This group also includes temporary visitors to Siwa Oasis either for work or tourism purposes. The third category in this group is the investors who establish agriculture, industrial, Tourism investment projects in Siwa. The fourth category in this group are the international fund donors. The roles of these actors categories are explained in the following sections.

3.7.4.1 Investors:

i- Agriculture sector investors:

Agriculture is the backbone economic base of Siwa Oasis (Salheen, 2011). It is practised by Siwan locals using local tradition of flood irrigation and no chemicals to produce organic high quality olives and palm trees. Due to Siwa's cheap land, available water, growing agriculture market and the quality of the products, the agriculture and reclamation sector attracts the private sector to invest in it. The agricultural sector investors in Siwa are either individual or big enterprises. The Egyptian government support the investment projects in Siwa as part of its efforts to bring Siwa to further alignment wit the Egyptian context.

The investors use modern technology in the cultivation, irrigation and harvesting as well yielding lower costs and bigger amounts crops. They construct residential units for the labour they need from outside the Oasis who have skills and know-how not available in the Oasis. They also need attract temporary labour during harvest time. The big enterprises compete with the locals' production in fewer quantities, higher water consumption in the irrigation and human resources efforts. This competition encourages more locals gradually to shift from the agriculture and convert the agriculture lands to other land uses that raise the land value. The biggest investors projects mapped in this section are located on Siwa Oasis peripheries where the land is cheap and the underground water problem is less challenging. These are:

- Express company reclamation investment: Reference to Eng. Emad (2015), it expands over 3000 Feddans that are totally reclaimed for olives plantation; near EL Tebtah Mountain-Abu Shrouf village (South Eastern peripheries of the Oasis). The land acquisition took place in 2007 by the owner who comes from Alexandria, while most of the labour are from Siwa. The land reclamation process was finished in 2014 and it's currently producing.

- El Nasr reclamation investment: According to Mr. Abbas (2015), El Nasr company reclamation investment expands over 500 Feddans of Palm trees and olives plantation in Siwa. It is located also on South Eastern peripheries of the oasis, before the Tebtah Mountain on Abu Shrouf village road. The Labour is from Siwa while the owner company is not.

ii- Industrial sector investors:

The industry sector of Siwa attracts food and beverages based investments. They are based on olives and palm trees as the dominant crops or Siwa's underground high quality water in Siwa. Most of the external actors group in this sector are active in the mineral water industry, while the dates, olive oil and pickles industries tend to be more initiated by Siwan locals. Siwa has currently one water initiated by a local which is Aman Siwa and another four factories initiated by external investors, these are; Aqua Siwa, Siwa, Hayat, Safi. Two of them are located inside the city of Siwa Oasis, while the others are located in About Shrouf Village, because there is no industrial zone in Siwa.

iii- Tourism sector investors:

According to Mr. Mahdi Hweity (2015), the head of the Tourist information Centre in Siwa Oasis, the tourism investors are either small investors who start small uncategorised popular hotels or big investors who start rated ecolodges. The popular hotels are not rated by the TDA and have no criteria for their projects construction. The ecotourism investors have to construct according to specific guidelines and standard by the TDA and target a different customers category.

The tourism sector in Siwa Oasis is growing and it attracts most external investors. The biggest investor in Siwa Tourism sector is Mr. Mounier Neamatallah; who introduced the eco-tourism in Siwa Oasis through Environmental Quality International EQI establishment of Adrere Amellal Ecolodge in El Maraqi Village. EQI now runs another two Eco-lodges in Siwa city centre. The EQI initiative attracted more international investors to Siwa Eco-tourism sector such as a Morrocan Owner of Taziry Ecolodge in El-Maraqi Village and a Saudi Owner of Ghaliette Ecolodge near Siwa city centre and others.

3.7.4.2 International Fund donors actor group:

The actors in this group are international organisations that fund development projects in Siwa. They co-ordinate and manage their projects through the local NGOs as mediators in the process. The COSPE that funded Siwa Tanja Project, the European Union, Ricerca e Cooperzione NGO (Italy) are active actors in this group.

3.7.4.3 Permanent immigrants actor group:

This group of actors is represented by the immigrants who leave their homeland to settle in Siwa. Some of the immigrants in Siwa come from the Nile Valley and other places in Egypt to Siwa to settle for work. Furthermore, Siwa attracts international immigrants who seek retreat, isolation and Natural landscape. They build their isolated homes at the peripheries of the Oasis and get access to the community through local individuals who facilitate their integration into it.

3.7.4.4 Temporary visitors actors group:

This group is composed of individuals who have temporary stay in Siwa either for tourism visits or as seasonal labour for any economic sector.

i - Tourists:

The tourist group is represented in the international or national tourists who visit the oasis temporarily for enjoying the different natural and cultural landscape and tourist activities. The high season of tourism in Siwa is in winter,

while some tourists enjoy medical sand bathing activities in summer as well.

ii- Temporary Labour:

Siwa is undergoing a fast urbanisation process after its long isolation periods over time. Many activities that developed with this process need external labour to supply the needed know-how and expertise that is missing in the local community. The following sections emphasize this process in the different sectors in Siwa.

- **Agricultural sector seasonal labour** are usually hired by the big investment companies in the Oasis that modern technology agriculture techniques. The local Siwan community lack the skill to carry out these jobs due to its difference from their traditional methods. Accordingly, the investors rely on non-locals rather than train the locals for this seasonal requirements. Moreover, some investors stated the challenge of hiring locals during harvest time due to their occupation with the harvesting their own lands .

- **Construction sector seasonal labour** travel to work in Siwa as a result of the modernisation of the building techniques and abandoning the construction with the local tradition. The urbanisation process and immigrants flow to Siwa has induced new building styles and concrete structures that needs construction know how that is still not developed by Siwa locals.

- **Tourism sector labour** are needed in Siwa to cover the skills missing in the local community. They are hired most of the time by hotels not Ecolodges in Siwa, since they are not constrained to locals employment according to the TDA guidelines.

- **Industrial sector seasonal labour** are not a bid segment in the Oasis due to the relatively limited industrial activities in it. However, these actors also have temporary stay to provide missing expertise in the local community.

3.8 Siwa System Structure model:

In conclusion to this chapter, the system structure model of Siwa can be updated according to the findings presented as seen in Fig. (64). The physical and infrastructure subsystems of the urban ecosystems are explained in their dynamic process in the next chapter to avoid duplication. Thus, the next chapter emphasize how the users and actors groups mapped in Siwa shape the Urban growth dynamics in its sensitive urban ecosystem over time. It present these dynamic processes that are governed by the tribal governance embedded in the state governing rules to reproduce the system structure over time.

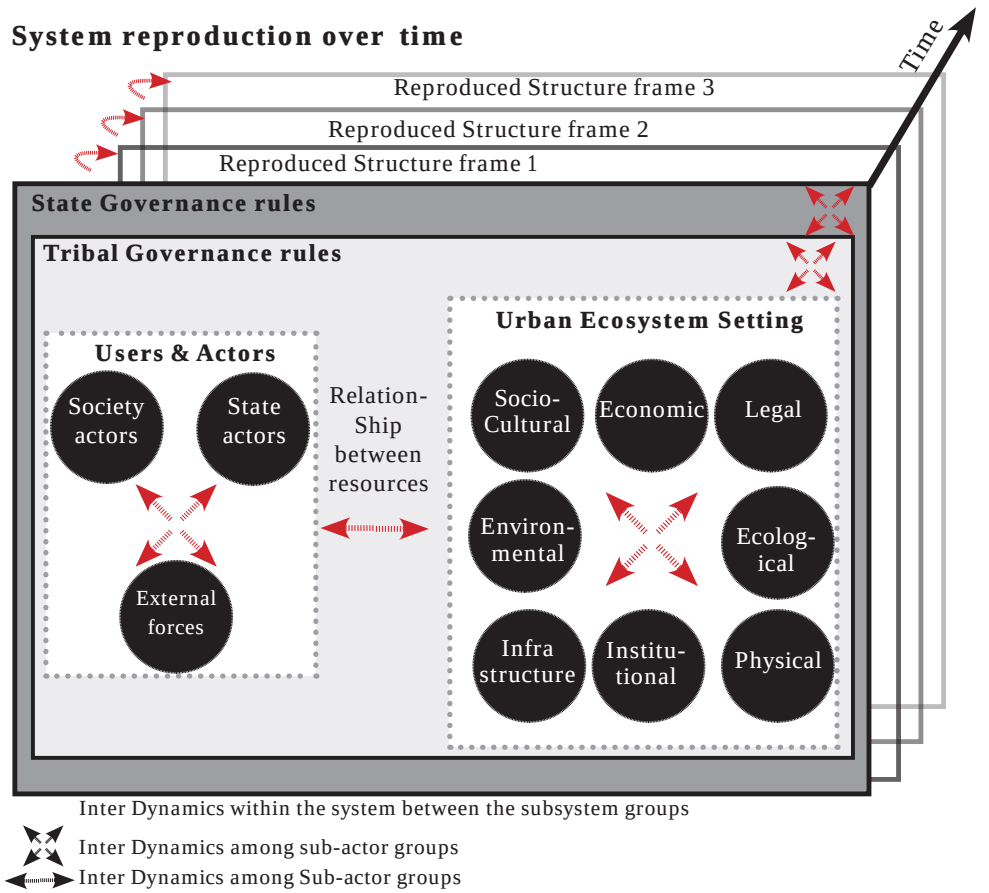
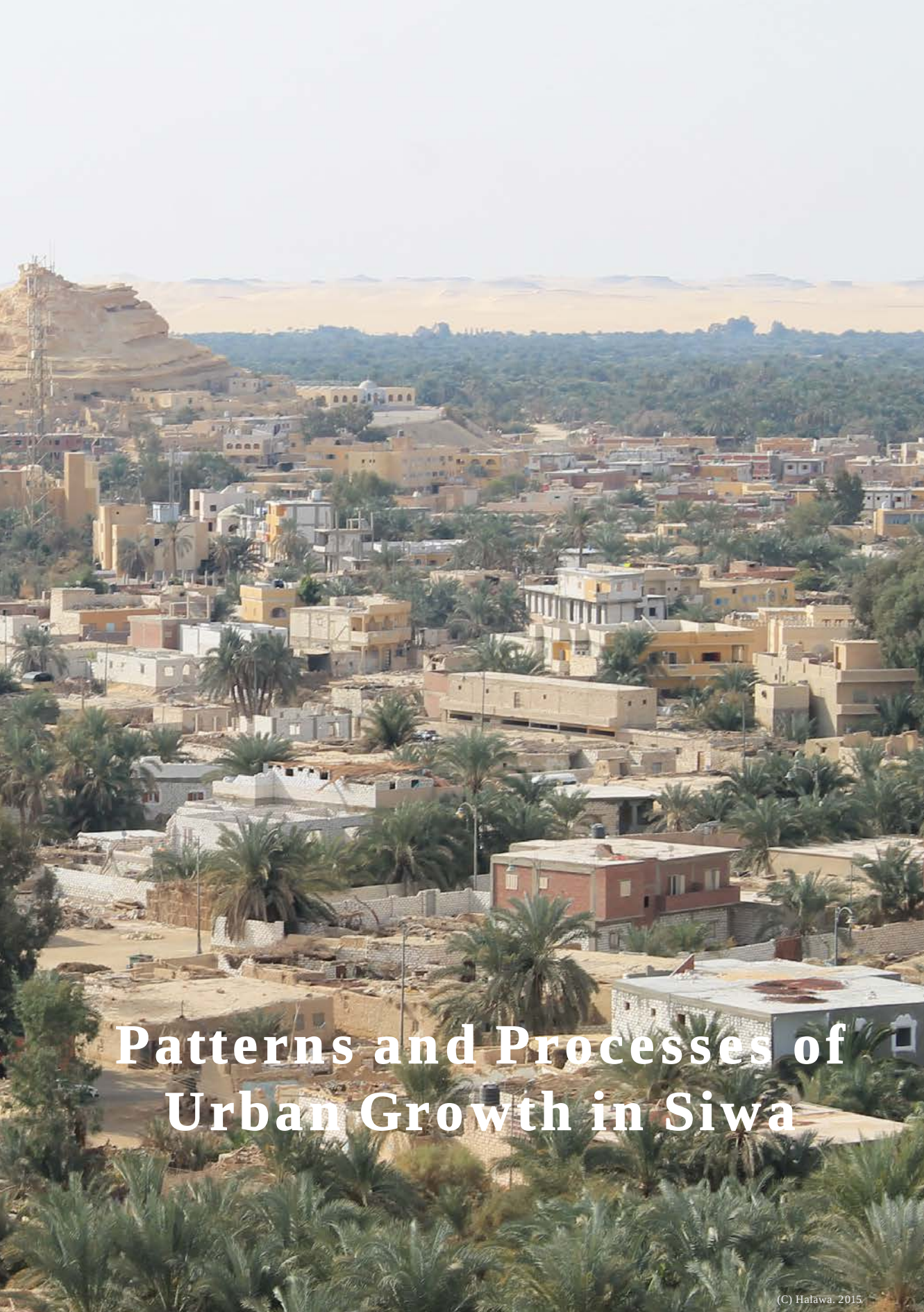


Fig. (64) Structure-System model adapted framework for the investigation in Siwa. Source: Halawa (2015)





Patterns and Processes of Urban Growth in Siwa

(C) Halawa. 2015

4 Processes and Patterns of Urban Growth in Siwa

In this chapter, the patterns and processes of UG in Siwa oasis are presented . The chapter starts with the chronological process of Siwa's patterns development over time under the ruling governance. Then it moves to the analysis of the snapshots of Siwa's development over a multi temporal time line. The patterns of each snapshot are analysed to draw a holistic understanding of the city development. Afterwards, the chapter presents the UG process shaped by each of the users and actor groups mapped. Hereafter, it draws a deeper look over the settlements development in Siwa and the patterns they generate.

4.1 Tribal governance shaping Siwa Oasis Urban Growth :

The tribal governance of Siwa has remarkably influenced the processes of Siwa's UG and shaped its patterns. Even with the Egyptian state's constant trials of bringing Siwa into alignment with the Egyptian culture, the tribal governance remains dominant until today in shaping its UG patterns of UG.

Siwa's tribal structure and its division into Eastern and western tribes has shaped the UG flows in the Oasis and generated the patterns in Siwa city, villages and neighbourhoods. According to Mr. Abobakr (2015), the 11 tribes that form the Siwan community were divided in earlier times into 3 Western tribes (Gharbyeen), 7 Eastern tribes (Sharqeyeen) and one tribe of Matrouh Bedouin settlers. The Eastern and Western tribes used to live in Shali fortress which is the historic urban core of Siwa today. Shali's deterioration ain later stages by sudden rain floods and other factors fostered its abandonment and the tribes descent. After their descent, the Siwan tribes sought alternative high lands to settle. However, their division into Eastern and Western tribes generated two opposite expansion flows from Siwa's historic core i.e Shali forming the city as seen in Fig. (65). In addition to other outlying flows that generated the historic cores of Siwa's affiliated villages as follows.

Siwa city was developed by two expansion UG flow patterns in two directions by the western and Eastern tribes due to the conflict that used to be between them as seen in Fig. (65). The first expansion flow pattern started by the Eastern tribes towards Turart area in the East (Hills in Siwi language) to escape the water accumulation at lower lands. This pattern flow expanded further as the Eastern tribes' population increased to occupy more settlements Northern, Eastern and Southern Shali maintaining the strong tribal bonds. The second flow started by the western tribes after their descent from Shali towards El-Gharbeyeen mountain western Siwa and then further on to the West forming these neighbourhoods as in Fig. (65).

These two flows from Siwa's historic core generated an expansion pattern that formed tribes' exclusive settlements. However, the tribes' exclusive settlements decreased over time and more outlying UG patterns were generated later as seen in Fig. (65). The resolution of conflict between the Eastern and western tribes and their infusion through social interactions is one factor that

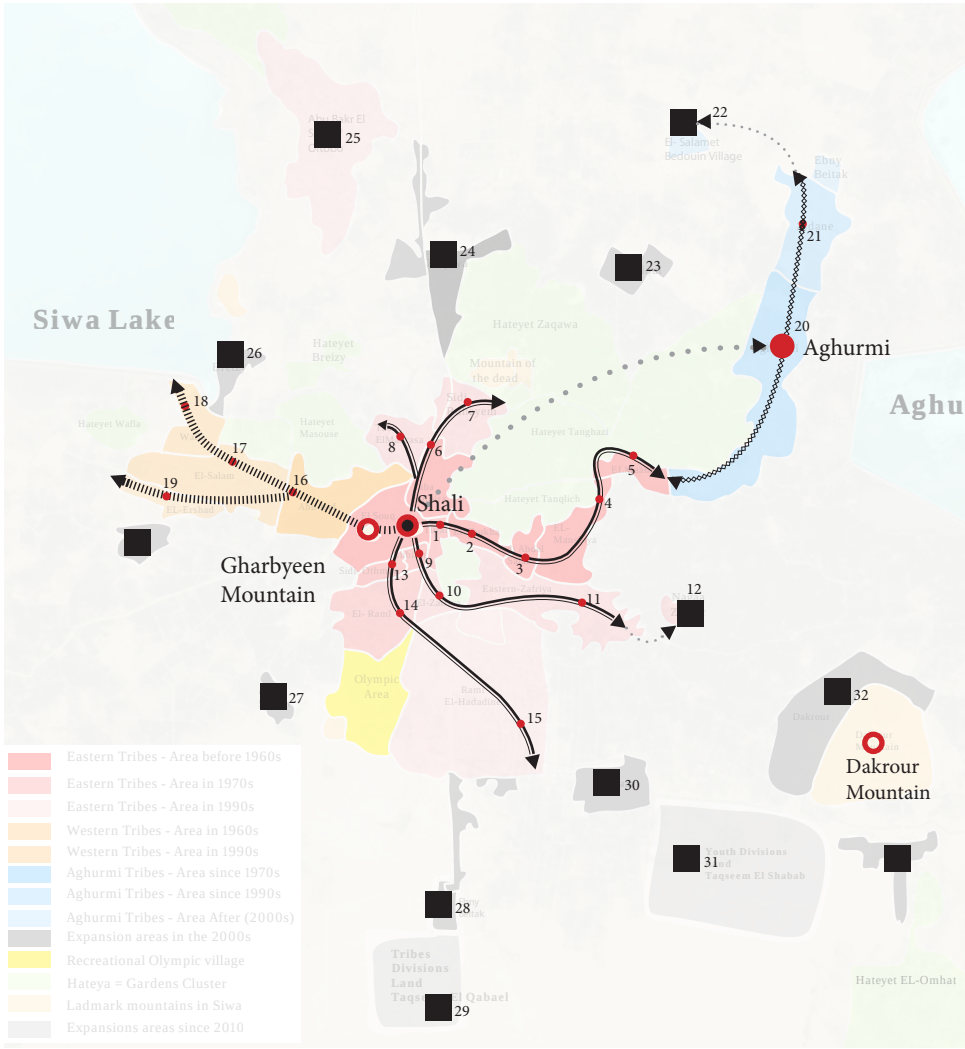


Fig. (65) Flows of urban growth patterns in Siwa city shaped by governance. Source: Halawa (2015)

influenced the change in the patterns generated. The social restructuring processes by the urbanisation processes in addition to the efforts of the state into bringing Siwa more in alignment with the Egyptian culture by encouraging investments also contributed to this change.

Aghurmi village is the closest village in the Oasis to Siwa city and is projected to be part of Siwa city in GOPP 2027 strategic plans. Aghurmi historic urban core was established by one tribe; El Shuhaybat, that immigrat-

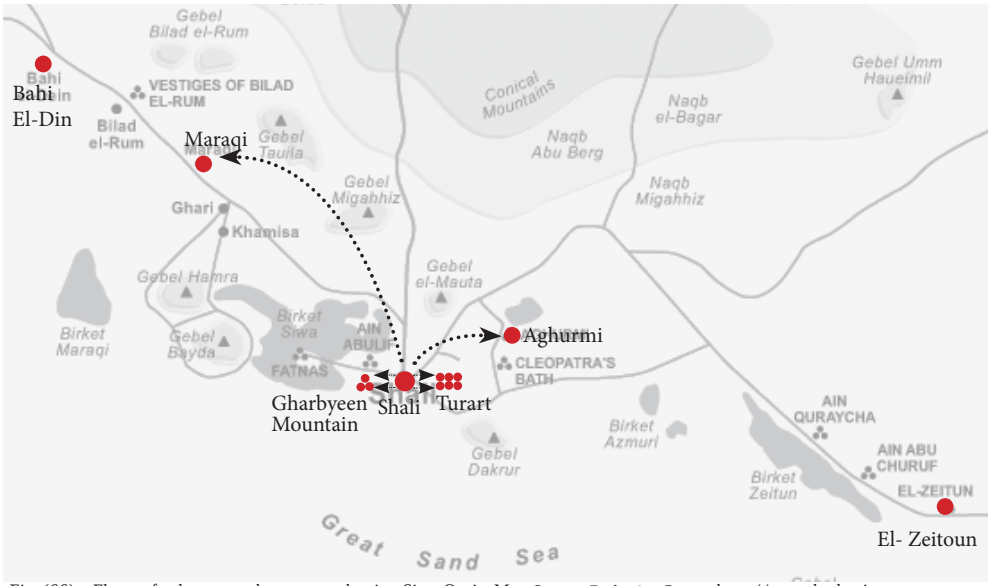


Fig. (66) Flows of urban growth patterns shaping Siwa Oasis. Map Source: Badawiya Group: http://www.badawiya.com modified by author.

ed from Shali historic urban core after their descent from it. They formed a tribe exclusive settlement in Aghurmi for their tribe. However, the settlement developed due to the social interactions over time to include other tribes' members. Aghurmi village then expanded to the North in El-Zidane area and South along the road connecting it to Siwa centre. Recently an attached outlying settlement of El-Salamet was established by the Egyptian government as in Fig. (65) and Fig. (66)

Bahy El Din village is an outlying settlement at the western edges of Siwa Oasis as seen in Fig. (66). It was formed by Matrouh Bedouin who settled in Siwa according to Mr. AboBakr Ismail (2015) and constitute 80-90 % of the settlers there until today.

El-Maraqi village used to be composed of temporary settlements for farmers who need these temporary structures for caring after their agricultural lands in this area. Afterwards, with the population growth and consequent urban expansions in Siwa Oasis these settlements were converted into permanent residence places formulating the outlying EL-Maraqi village as seen in Fig. (66).

ElZeitoun Village was established by one rich farmer who owned massive agricultural lands that needed big number of farmers to work on it according

to Mr. Ismail (2015) and other locals. Hence, he constructed their outlying settlements of Kerchief to ensure them a residence as seen in Fig. (66).

Nevertheless, after his death, the lands were less managed after their inheritance and the settlement structures were abandoned. The old structures went through several conflicts and shift of ownership with the government during Abdel-Nasser times until they became now a property of the ministry of Antiquities and are not used, yet they are undergoing a deterioration process.

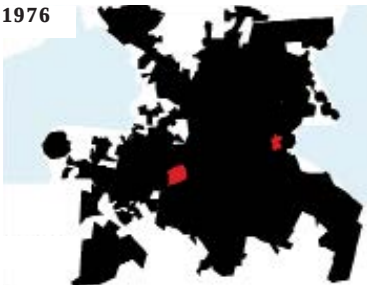
El-Qara is the fifth affiliated village to Siwa Oasis, and the furthest from Siwa city. It is a settlement of one tribe according to Vivian (2008).

It can be concluded from these two maps presented that Siwa tribal governance has been a dominant force in shaping Siwa oasis UG patterns and processes. This dominance is mapped in the past and at the present time on the Oasis level and city scales. Nevertheless, the generated patterns of Siwa today are influenced by other drivers with changes in Siwa's governance, actors and urban ecosystem structures. These changes contributed to generating the outlying patterns mapped in Fig. (65). Furthermore, according to Herold et al. (2005), the study of UG can not be analysed only through a static snapshot of the city patterns with disregard to the dynamic process of UG over time. The process involves consecutive spatial configurations and patterns that evolve overtime and need to be analysed for assessing UG and sprawl. Accordingly, the following section presents the multi temporal snapshots' time-line for the UG patterns development in Siwa city and Aghurmi village.

4.2 Multi Temporal Snapshots time-line for Urban growth in Siwa city:

This section presents Siwa's patterns of UG from 1976 to 2012 and a prospect on the growth patterns in 2027 in Fig. (67). It is based on the GOPP strategic plans for Siwa in 2027 and an interview with Mr. Abo Bakr Ismail (2015). The analysis emphasizes the UG process of Siwa city and the generated patterns snapshots over the time intervals. The time intervals in between are not fixed due to the lack of available data and it's accessibility.

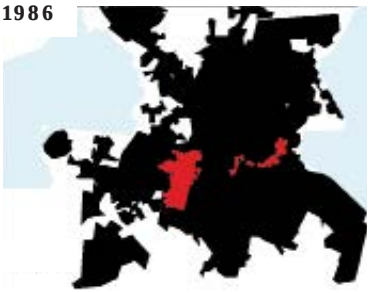
1976



1976 : Initial Historic urban Core:

The snapshot for the Siwa urban pattern in 1976 shows Siwa's historic urban core in Shali mountain and it's surrounding market area (El Souq) in red. The outlying isolated pattern towards the north east ; that represents Aghurmi village historic urban core. Aghurmi villlage core is a result of a Siwi tribe's (Al-Shuhaybat) immigration after their descent from Shali mountain to start their tribe exclusive settlement.

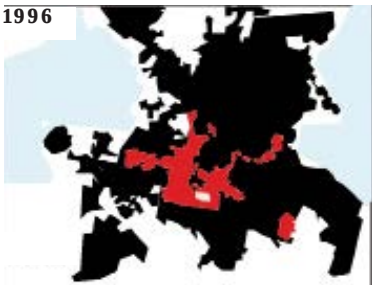
1986



1986 : Expansion:

The snapshot for Siwa urban pattern in 1986, reveals a diffused expansion growth pattern of Shali and the market historic core towards the East and South west. It also shows a linear branch expansion pattern of Aghurmi historic core towards the South west along the road connecting it to Siwa historic core**.** In addition to some isolated dispersed patterns.

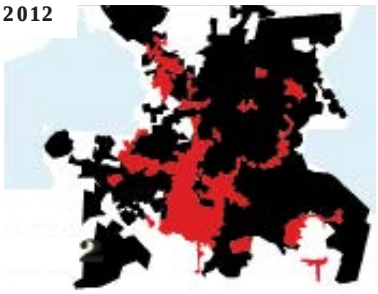
1996



1996 : Growth, Diffusion and Dispersion:

Siwa's historic core expanded in a linear branch pattern towards the North and the West. This was influenced probably by the roads. Aghurmi historic core expansion in a linear branch pattern into El-Zidane new area north east and the diffusion of the dispersed patterns along the road that connects it to Siwa historic core south west. An outlying clustered pattern in the South East of El-Dakrour Mountain evolved.

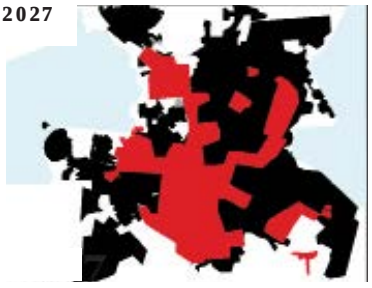
2012



2012 : Diffusion and New Urban Cores

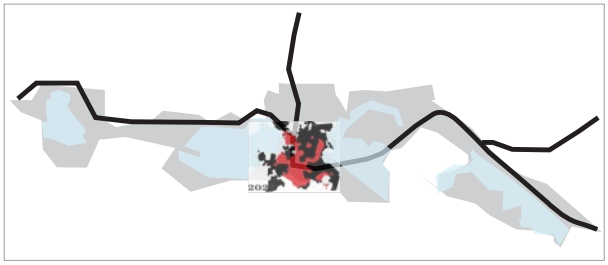
The Historic core of Siwa Oasis expanded in all direction. Nevertheless, outlying growth patterns can be detected in the Linear branches towards the North along the road to Matrouh in Zaqawa, an Outlying Clustered pattern towards the South of Matrouh Road in Ebny Beitak Settlement and El Eza'aa and an Outlying isolated patterns are mapped in Tribes and Youth divisions land (South), Breizy and Oltobo (North-West), El Salamet and Malloul (North-East).

2027



2027 : Projected Coalescence

This projected coalescence pattern is based on the permitted urban built up land boundaries designed in the GOPP 2027 strategic plans (Appendix 1.28) and Abo-Ragab (2008) study of Siwa urban growth. The dispersed outlying patterns in Siwa are expected to fuse with the original cores into a coalescence growth pattern. This diffusion might need longer time to include the isolated outlying settlements in the southern suburbs like Dakrour area or Youth divisions lands. It might be hindered by the physical terrain.



Scale up
The last phase of the multi temporal time-line suggested by Herolds (2005) is this scale up. This snapshots shows a zoom out from city level to present the new coalescence result as a projected new historic core for further UG processes. This projection varies with changes in the ruling governance system, the urban ecosystem structure or and its users and actors.

Fig. (67) Siwa city multi-temporal patterns snapshots in from 1976 to 2027. Source: Halawa (2015)

It is concluded from the multi-temporal snapshot time line of Siwa city that the last twenty years in Siwa witnessed rapid UG processes and generated sprawled patterns in some intervals. The built up area is almost doubled every ten years with a remarkable expansion starting 2012.

These processes developed in the chronological order in Fig. (68) to generate the present pattern of Siwa city and Aghurmi village seen in Fig (69) .

Until 1960s	Until the 1960s, the settlements existing were EL Souq (the market area), Taba, Belleef (western tribes), Lehberat, Torart, ElSbokha, El Mansheyyah, Sidi-Abdelsalam.
in the 1970s	El Raml, Eastern Zafereya, Sidi Rohayemm were developed.
By end 1980s	By the end of 1980s: AboBakr/Oltobo started to evolve.
In the 1990s	El Salam, Waflah, Malool, Raml El Hadadeen expanded in Siwa City. And Aghurmi village, expanded to El Zidane area.
In the 2000s	Raml El Eza'ah was developed. Breizy. In 2004, Ebny Beitak provided further expansion.
In 2015	The field investigation in 2015 mapped the ongoing expansion towards the South that included the Tribes land divisions land (Ard Taqseem EL Qaba'el) and Youth land divisions (Taqseem El Shabab). And Aghurmi expanded El Salamet village (The Bedouin village) as well as El Dakrour area and its southern expansion.

Fig. (68) Time line of Siwa's neighbourhoods development.

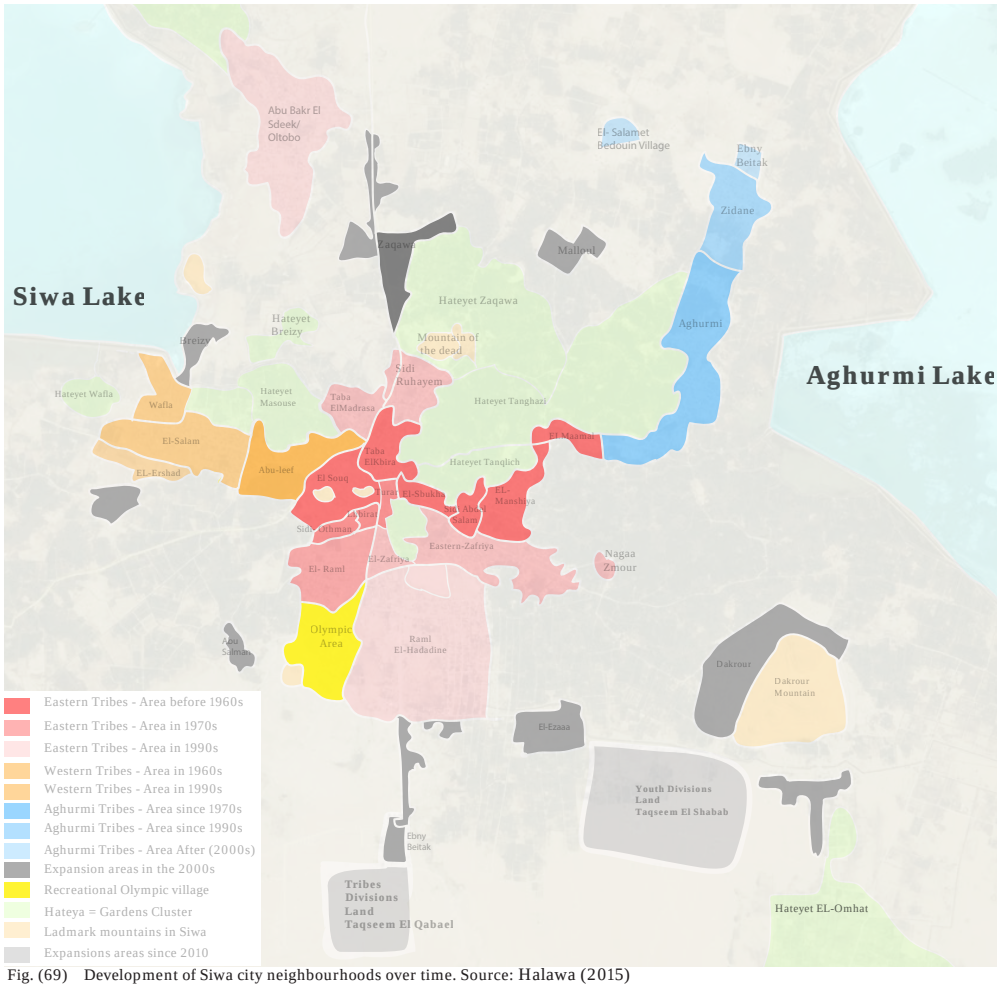


Fig. (69) Development of Siwa city neighbourhoods over time. Source: Halawa (2015)

The spatial configuration of these settlements differs from each other as seen in figure (70). The difference is clear between the old historic core patterns, the new areas evolving in agricultural lands, and new areas developed at the suburbs of the city. Accordingly some are classified by the GOPP and locals as informal areas (Appendix 1.29) due to their spatial configurations that limit the access to some structures in them. Others are considered as risk Zones (Appendix 1.28) ; these settlements developed in unsuitable lands for construction such as the Salt marshes.

These UG patterns in Siwa are developed by the actors who shape their generation processes. Thus, the next section of the chapter presents how each actor group shapes different UG process and generate various UG pattern in Siwa sensitive urban ecosystem.

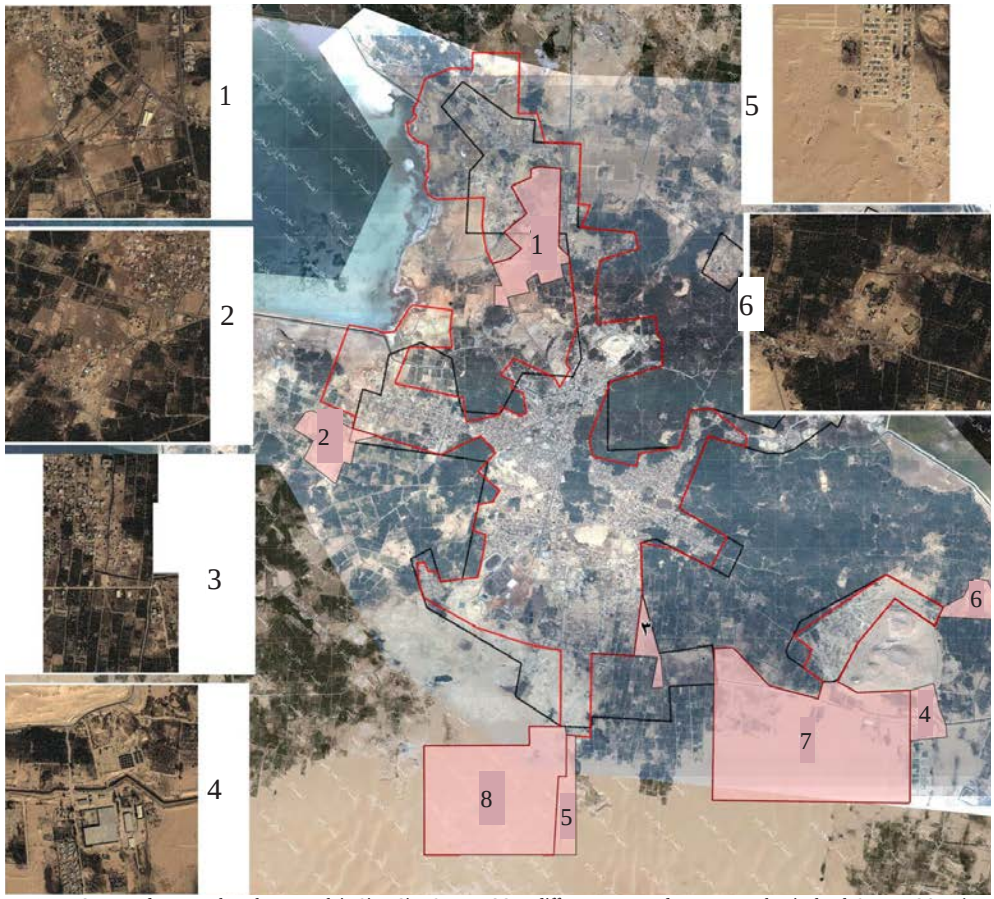


Fig. (70) Generated patterns by urban growth in Siwa City. Source: GOPP different generated patterns on the city level. Source: GOPP (2015)

4.3 Actors shaping UG processes and patterns in Siwa:

Siwa UG processes and patterns are shaped by the three mapped actor group. These are the society, state, and external forces actors groups. The process of UG and its generated patterns depend on the initiator actor group in Siwa. Each process varies in terms of its initiator, the flow of interaction between the initiator and other actor groups and the land use it generates. It also varies in the settlement location, its mode of generation, its the infrastructure supply and expansion. These aspects determine the UG dimensions in terms of time, density and land use and accordingly its generated patterns and risks. Figure (71) presents the mapped process of UG initiated by the different actors groups in Siwa and their generated land uses that are emphasized in the following sections.

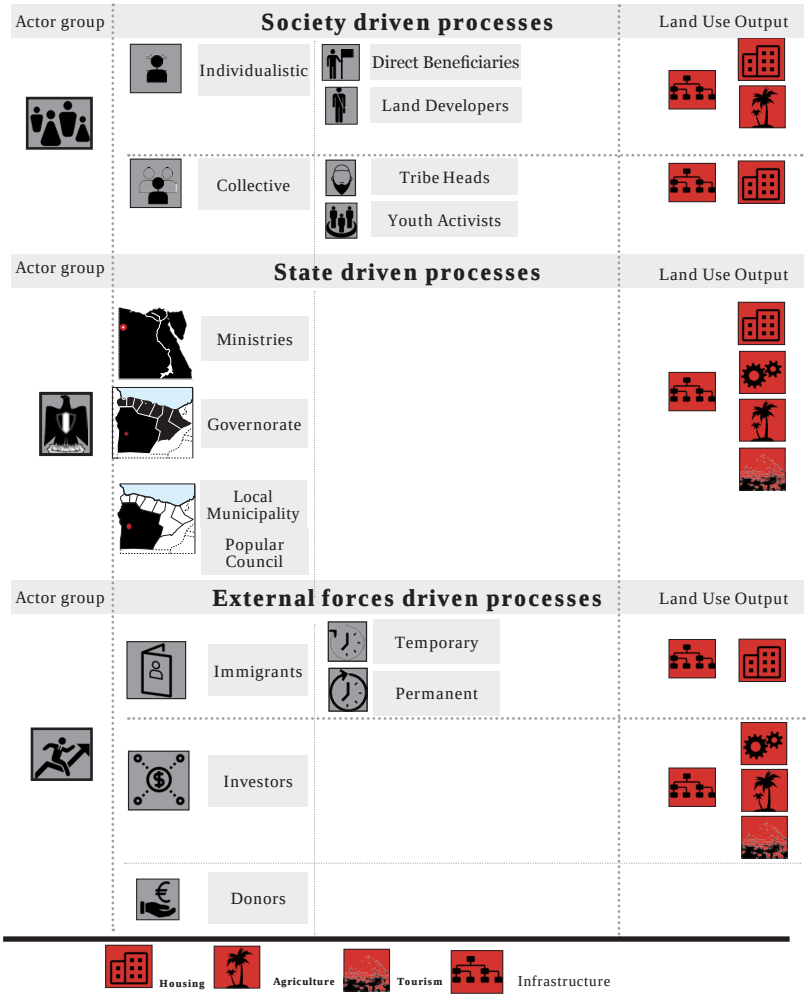


Fig. (71) Actors shaping land uses in Siwa. Source: Halawa (2015)

4.4 Society Driven Processes:

Society driven processes of urban growth is the prevalent type of urban growth in Siwa Oasis. There are two types of society driven processes as seen in Fig. (71); one is initiated by individualistic initiatives and the other by collective initiatives. The individualistic initiative either starts by a local direct beneficiary or a local land developer. While the collective initiative led processes either start by natural community groups leaders either tribe heads or Youth activist groups. The involvement of the state actor group come at later stages of the these processes that are initiated by the local society. This is interpreted considering that 95% of Siwa built up lands are state owned ones according to Eng. Emad (2015); head of Siwa local municipality engineering department.

4.4.1 Individualistic local society driven Processes:

The initiators of this society driven processes type are either local direct beneficiaries or land developers. The mapped direct beneficiaries led processes generate residential land use settlements either as first process output or after an intermediate agriculture land use phase. The land developer processes mapped generate residential land use as a direct output. The next sections present the examples for each of these processes.

4.4.1.1Direct beneficiary driven processes:

4.4.1.2 Residential land use:

The majority of residential neighbourhoods initiated by direct local beneficiaries are classified as informal areas by the GOPP due to their generated patterns and impacts. Breizy, El Wafla and Oltobo areas are examples of developed areas by this type of processes presented in this section.

Breizy area generation process:

Breizy area development process is an example for individualistic society driven type of processes as explained by Abo-Bakr Ismail (2015) who was the first proactive settler in this area as seen in Fig. (72).

Choice of Location:
Local individual chooses the location of the land with rocky nature and higher altitude than Siwa center to avoid the underground water problem in Siwa.

Land acquisition and Housing Unit Construction:
Local individual acquires the land by hand claim due to unavailable land tenure alternatives by the state and start a housing unit construction.

Informal infrastructure Supply:
Local individual supply the needed infrastructure in an incremental order.
Electricity connection to the nearest electricity network supply by the state; (the local individual bear the connection costs approximately to 40,000 LE).
Potable Water connection to the existing water network or tanks distributed by the trucks.
Sewage by construction of a cesspool attached to the housing unit.

First settler inhabitance of the area:
The local individual move with his family into the house after the infrastructure supply.

Area expansion and land value increase:
Six months later, neighbors follow the proactive first settler, motivated by the available electricity connection that increase the land value in the area.

Residential cluster formation:
The new settlers continue the constructions in the area and expanded until the edge of the lake. It continued until a residential cluster is formed.

Application for Formal infrastructure:
Locals residents form a cluster to make the area eligible to apply for infrastructure provision by municipality.

Formal infrastructure provision:
Electricity was officially provided to the area as it met the criteria of Siwa Electricity company branch according to it's head Eng. Ali Abdel-Nabi (2015).

Probability of formal land registration:
If the land registration channels are re-opened by the government, the local residents might apply for official land registration (Taqneen).

Fig. (72) Breizy area generation process by direct local individual beneficiaries. Source: Halawa (2015)

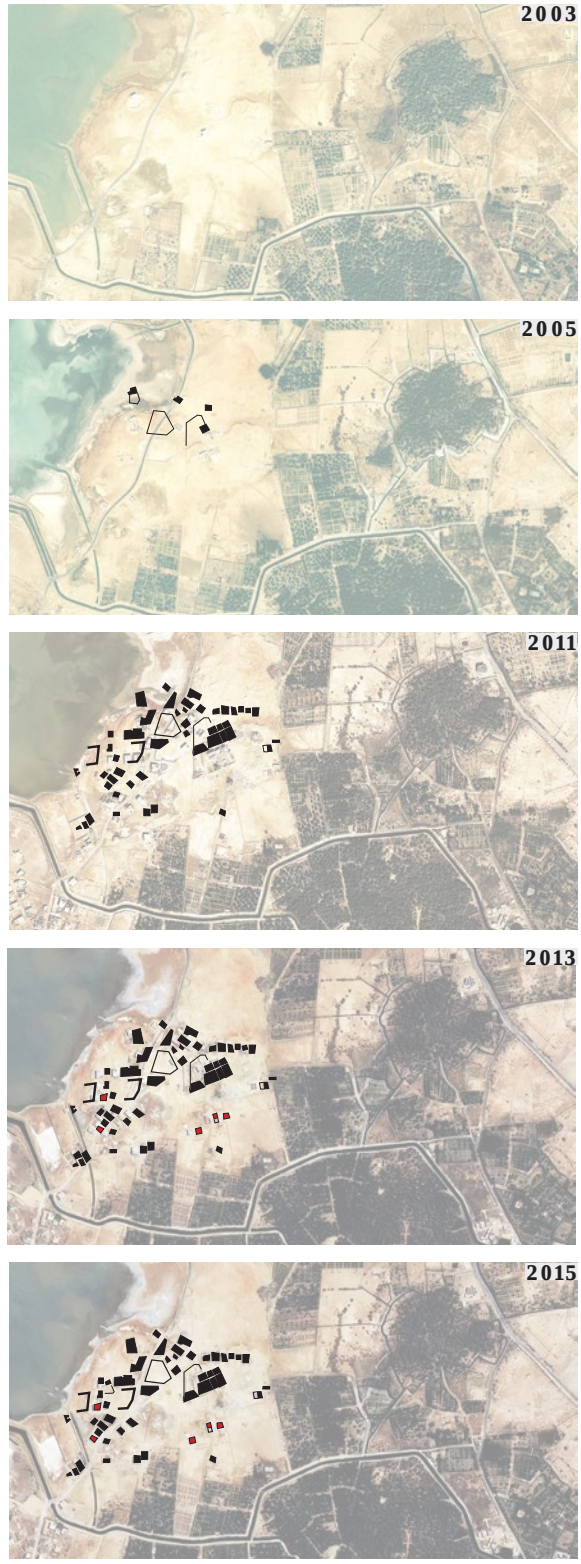
Patterns generated and their consequences:

Breizy area incremental development process has generated an outlying urban growth settlement pattern in Siwa city western Shali historic urban core as seen in Fig. (74). It has also developed a spontaneous or random spatial configuration in the settlement that is classified as informal by the GOPP as seen in Fig. (73). The area has no clear accessible road network, which results in some inaccessible zones in it even for needed emergency transportation. It is expanding towards Siwa city's risk zones defined by the GOPP, where

Breizy Area pattern development



Fig. (74) **Breizy area location in Siwa**
Source: author using Google Earth maps



Urban expansions
New expansions

Fig. (73) Patterns development snapshots for Breizy area towards Siwa salt marshes. Source: Google Earth modified by the author.

the settlers expand the construction in the salt marshes of Siwa lake. This expansion constitute a risk to the houses construction deterioration and their residents' lives.

Oltobo and El Wafla areas are another examples of the individualistic society driven processes. They are initiated by local Siwan direct beneficiaries. Oltobo development process generated another outlying pattern North western of Siwa city as seen in Fig. (77) that developed over the process seen in Fig. (78). While El-Wafla development process generated an expansion pattern towards the west of Siwa city in a further expansion to the areas of the western tribes expansions as seen in Fig. (79).



Fig. (76) Housing expansions in Salt marshes in El Wafla Area.

The two areas are classified as informal zones by the GOPP due to their generated spatial configuration. Some parts of El Wafla expansion zones are allocated in the salt marshes of Siwa lake defined risk zones as seen in Fig. (76 and 80).

Actors interaction flow:

These processes involve the interaction between the local society, state and possible external forces actor groups. It starts by a proactive local individual's initiative; who then stimulate other local settlers to move to the area after him in a ripple effect. This local society group then interacts with the state local representative actors to formalise and supply their needed infrastructure. The local society residents group then use the constructions for themselves, rent or sell it them to external forces actor group such as for labour or immigrants. The rental or sale process might need the involvement of the state actor group for legal and administrative necessities.

Oltobo/ Abu-Bakr El-Sedeeq Area development



Fig. (77) Oltobo or Abo Bakr El Sedeeq neighbourhood location in Siwa city. Source: Google Earth maps modified by author











Fig. (78) Patterns development snapshots for Oltobo area. Source: Google Earth modified by the author.

El-Wafla Area pattern development



Fig. (79) Elwafla neighbourhood location in Siwa city. Source: Google Earth maps modified by author



Fig. (80) Patterns development snapshots for El Wafla area towards Siwa salt marshes. Source: Google Earth modified by the author.

4.4.1.3 Agriculture to Housing direct beneficiaries:

Generation process:

This process is initiated by the local direct beneficiaries, yet the residential land use is generated after an intermediate agricultural land use phase. Hence, it generates nuclei for housing clusters within the cultivated areas. The housing cluster nuclei are developed in this process in an incremental order as seen in Fig. (81).

- ***Choice of Location:***
  Local individual chooses the location of the land where underground water is available for agricultural land irrigation.
- ***Land acquisition and informal well digging:***
  Local individual acquires the land by hand claim due to unavailable land tenure alternatives by the state. Afterwards the local start digging an informal well for irrigating the land because a formal well requires a land registration license, which is not possible due to the blocked land tenure.
- ***Agricultural land development***
  Local individual irrigates the land using the informal dug well and develops an cultivated agricultural land.
- ***Informal infrastructure Supply:***
  Local individual provides water discharge channels for the land.
- ***Temporary residence construction for land check:***
  The local individual constructs a temporary residence structure to accommodate his needs for occasional visits to check on the land.
- ***Informal infrastructure Supply:***
  Local individual provides needed infrastructure for the temporary residence; potable water, cesspool for the sewage discharge and electricity through connection to the nearest available grid.
- ***Temporary residence turns into a permanent one***
  The local individual moved with his family into the house after the infrastructure supply.
- ***Housing nucleus cluster formation***
  More structures are transformed into residential permanent use inside the agricultural land mosaic forming a residential settlement nucleus.
- ***Application for land registration:***
  Local individual apply for land registration (Taqneen) by the Municipality that might legalize the land, yet, this process is blocked since 8 years.

Fig. (81) Local driven individual locals processes of converting agriculture lands into residential settlements.

Patterns generated and their consequences:

This process generates low density urban settlements due to the mixed agriculture and residential uses and it needs long time span. This pattern is not confined to one area in Siwa, instead it is detected in several spots within

the existing cultivated lands clusters in different parts of the city and in the recently reclaimed one as seen in Fig. (82). This process constitutes a threat to the cultivated areas heterogeneous mosaic. It fosters the agricultural lands fragmentation by the housing clusters evolving in them, affects their productivity and ecological values. The outgrowth of the housing nuclei over the agricultural areas threatens Siwa's agricultural identity and economic base.



Fig. (82) Patterns developed from converting agricultural lands to residential use in Siwa. Source: Halawa (2015)

4.4.1.4 Land Developers driven process

Process of generation:

This process is initiated by an individual land developer who seeks profit. He uses the niche market created by the lack of housing supply and increase in it's demand with the growth in population and youth needs. It is a recent initiative mapped in Siwa which did not use to be common, yet it is developed with the ongoing urbanisation and modernisation. The process of generation of this society driven processes is seen in fig. (83).

Patterns generated and their consequences:

This process generates outlying settlements southern the city of Siwa inducing a sprawl phase in Siwa urban growth. However, the choice location is justified by the hindered expansion to the North due to the mountain plateau,

Land developer find niche market
Local developer find the Niche market in the lack of housing supply and the increase in the demand due to the increase in population and youth needs for housing.

Choice of Location:
Local developer chooses vacant lands southern Siwa city for expansion. They are of higher altitude than Siwa center to avoid the underground water problem in Siwa. Expansion to the North is hindered by Plateaus.

Land acquisition and road network development:
Local developer acquires the land by hand claim due to unavailable land tenure alternatives by the state and start to subdivide it into plots by a road network.

Land division into 20*20m plots
The road network divides the land into 20*20m land plots and the developer start to sell them to the Youth.

Youth buy the land plots and Housing unit construction
Youth individuals start buying the land plots and residential units' construction.

Infrastructure Supply:
Each Unit owner supply it with cesspool system for sewage to make it eligible for potable water supply.

Residential cluster formation:
More land plots are developed with constructed units forming a residential cluster.

Application for Formal infrastructure:
After a cluster is formed the land developer apply to the municipality for the needed infrastructure provision; potable water and electricity.

Eligibility for infrastructure provision criteria
If the residential area cluster meets the criteria for electricity and water infrastructure provision, the municipality approves the supply.

Ineligibility for infrastructure provision criteria
If the residential cluster did not meet the criteria for the infrastructure provision, the land developer construct the missing residential units to make it eligible and re -apply afterwards

Re-Applying for provision:
After constructing the missing residential units the municipality approves the infrastructure provision if it meets the criteria.

Infrastructure provision:
Electricity was officially provided to the area as it met the criteria of Siwa Electricity company branch according to it's head Eng. Ali Abdel-Nabi (2015) and potable water is supplied by the Siwa water holding company branch.

Eligibility Consequences
The land and units value increase after the electricity provision, and the developer sells the units he constructed with higher prices.

Ineligibility Consequences
If the cluster did not meet the criteria of infrastructure provision, it is not provided by the state and the locals have to provide it themselves.

Probability of formal land registration:
If the land registration channels are re-opened by the government, the local residents might apply for official land registration (Taqneen).

Fig. (83) Process of Housing settlements generation by land developers in Siwa.
Source: Halawa (2015)

While the expansion of existing urban fabric in the city centre is challenged by the underground water table rise and unavailable land for tenure.

This process generates low density residential settlements over relatively faster time spans than the direct beneficiaries led processes. The spatial configuration of this settlement type is regular shaped grid, outlined by roads network. The roads network widths are implemented with consideration for the minimum dimensions required by the municipality to ensure the eligibility for infrastructure provision in later stages. Hence, the generated settlements do not have inaccessible zones similar to the direct beneficiaries led processes. Also, it overcomes the challenge of expansion in risk zones around Siwa lakes. Nevertheless, they generate a sprawling pattern in Siwa city as seen in Fig. (84).



Fig. (84) Outlying settlements expansion southern Siwa Oasis. Source: Halawa (2015)

4.4.2 Collective society driven process

This type of processes are initiated by the tribe head or youth activist groups. Their collective initiatives seek meeting the community's need for housing supply and new areas development.

4.4.2.1 Tribes Land Division (Ard Taqseem El Qaba'el)

Process of Generation:

This settlement generation mode is recently developed in Siwa. It is initiated by three tribes in Siwa; El-Adadsah. The three tribes developed this land that they own by old tribal hand claim in response to their tribe members' need for housing supply. The process of generation is seen in Fig. (85).

The tribes land division are still in the development process until today. The are has some units constructed. It has no sewage like else where in Siwa. The potable water is supplied by Siwa water company trucks, that provide water to areas that are not covered with the potable water network. The electricity is still not provided in the area officially, yet is planned to follow the application process according to Eng. Ali Abdel Nabi (2015); the head of Siwa local electricity holding company branch.

The area designed to be allocated for the services by Mr. Maaref is not implemented. It is designed to be a common zone formulated from the total of excluded shares from each tribe member's land. However, according to the discussion between Mr. Maaref (the designer and current municipality head) and Mr. Hamza (Planning committee member, this technique was not successful as it relied on optional will for individuals to give up portions of their lands for common benefit.

Choice of Location based on tribal hand claimed lands:
Tribe heads choose the location of land: an old tribal hand claimed land owned by those three tribes.

Fund raising from tribe members:
Tribe heads collect 100 LE from the tribe members, especially the youth, to have to a share of a land plot in the developed settlement.

Establishment of Planning committee
The tribes establish a committee to be responsible for the planning and development of the settlement.

The committee assigns the task of urban design
The committee assigned the urban design of the land to Mr. Maaref; current municipality head, previous Vice Head of municipality. His choice for the task is not based on his position yet due to his expertise in land development regulations and academic background in geography and land surveys.

The assigned person put a design for the land development
Mr. Shaaban designed the land plot divisions with consideration to Siwa local culture, tradition, needs and municipality criteria for infrastructure provision.

Adapted context and regulation Design production
Land is divided into 20*20m land plots to fit the local area and privacy needs. Each plot overlooks 4 streets to ensure accessibility even with projected possible street squatting. Each street width is 3-4m wide to ensure the eligibility for infrastructure provision by the municipality and local companies. Services zone is designed from the sum of small shares from each tribe member's land plot to form a common service zone.

Road network implementation and plot division
The fund raised from the tribe members is used to implement the road network and divide the land into 20*20m land plots, one for each tribe member.

Tribe members development of acquired land plots shares
Each participating tribe member acquires his share as a 20*20m land plot and start his residential unit construction.

Infrastructure Supply:
Each Unit's owner supply it with cesspool system for sewage to make it eligible for the potable water criteria by the municipality.

Residential cluster formation:
More tribe members develop their plots into residential units forming a residential cluster.

Application for Formal infrastructure:
After a cluster is formed the tribe heads apply to the municipality for the needed infrastructure provision; potable water and electricity.

Eligibility for infrastructure provision criteria
If the residential area cluster meets the criteria for electricity and water infrastructure provision, the municipality approves the supply.

Infrastructure provision:
Electricity is officially provided to the area if it meets the criteria of Siwa Electricity company branch according to it's head Eng. Ali Abdel-Nabi (2015). Potable water is supplied by the Siwa water holding company branch according to it's head Mr. Bakrein (2015). Implementation is assigned to contractors by the concerned companies.

Ineligibility Consequences
If the cluster did not satisfy the criteria of infrastructure provision, it is not provided by the state and the locals have to provide it themselves for the area.

Probability of formal land registration:
If the land registration channels are re-opened by the government, the local residents might apply for official land registration (Taqneen).

Fig. (85) Tribes divisions land generation process in Siwa. Source: Halawa (2015)

Patterns generated and their consequences

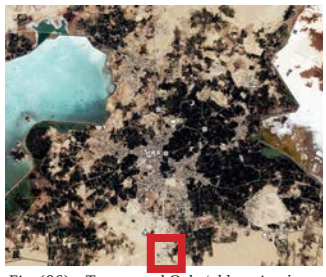


Fig. (86) Taqseem el Qaba'al location in Siwa city.
Source: author using Google Earth maps

The tribe lands divisions process generates low density residential clusters over relatively shorter time spans compared to the long time interval needed in the direct beneficiaries areas development. It generates an outlying isolated settlement in southern Siwa city as seen in Fig. (86). It's location is justified by the land availability and water problems challenges in Siwa centre. In addition to the restricted expansions to the North due to the lime stone plateaus.

The settlement spatial configuration is a clear grid, which eliminates the probability of inaccessible zones development that is mapped in zones classified as informal areas. Nevertheless, the land plot areas results in low density settlement and land resource consumption that is justified by the need to adapt for Siwa's cultural needs. The Siwan culture necessitates an outdoor attached area. This private outdoor areas are needed for raising animals habits and for family interactions especially for the females who have limited access to public spaces. However, this needs to be considered with some locals perception of the land as an infinite resource in Siwa due to its location.

The tribe land division process is perceived by the locals as a successful initiative that needs to be built on and replicated by the government. It is also included in Siwa 2027 strategic plan by the GOPP as seen in Fig. (87). It is officially acknowledged, unlike the informal classified zones initiated by the direct beneficiary local individuals.

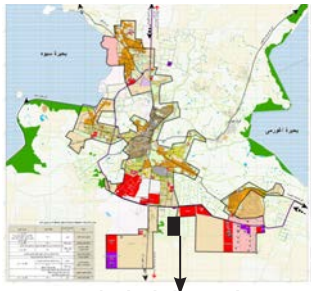


Fig. (87) Tribes lands divisions location in GOPP 2027 Strategic plan for Siwa city.
Source: GOPP strategic plan

Some of the positive mapped aspects in this recent initiative is the coordinating between the tribes to establish a planning committee to develop the settlement. The committee's assignment of the development task to a local with expertise in the society's culture and tradition as well as the state's regulations helped in developing a settlement that responds to both needs. It eliminated the risks of developing irregular patterns with inaccessible zones.

It met the cultural privacy and economic needs and considered the criteria for state infrastructure supply.

Nevertheless, the tribe land divisions has some shortcoming that needs to be considered. The fund raising step by collecting 100LE from each tribe member to ensure his land plot share burdened some financially incapable youth and arose some sensitivities between the community members. The services zone is missing in the design implementation due to relying on individualistic free will to share portions of the land plots. The missing services challenge burdens the residents considering the lack of services in proximity due to the settlement isolated outlying pattern. This also increases the dependence on the Siwa city centre. The Tribes land's isolated pattern also increase the costs and time required for state infrastructure supply as well as the need for transport.

Flow of interactions among actors involved in the process:

The actors involved in this process are the local society group and state actor group primarily as understood. There is a possibility that the external forces group get involved at later stages when the land value increases and some society members offer their lands for sale or rental.

4.4.2.2 Youth Divisions lands (Ard El Shabab)

Process of Generation:

The Youth land divisions are developed by youth activists' group that collaborate together to provide the needed housing that is lagging or not by other actors. This is another recent mode of generation initiative for the settlements in Siwa Oasis. It is interpreted to bea result of the urbanisation processes as well as the needed Youth representation in the society. The process of developing this settlement is emphasized according to Eng. Emad (2015); head of Engineering Department in the municipality as seen in Fig. (88).

Choice of Location:
Youth activists group chooses the land location southern Siwa city due to lands availalbility with higher altitude than Siwa center to avoid the underground water problem. Expansion to the North is hindered by lime stone hills Plateau and military owned lands.

Land acquisition:
Youth group acquires a vacant land by hand claim due to unavailable land tenure alternatives by the state.

Road network development and Land Sub-division into plots:
The youth start to subdivide the land into 20*20 plots by basic mud 3-4m wide road network. The network ensure access to the plots and eligibility for infrastructure provision by the state. The basic roads may be paved later by the municipality social development box or investment plan when funds are available.

Land plot development by housing unit construction
Youth individuals start the construction of residential units in their land plots.

Infrastructure Supply:
Each Unit owner supply it with cesspool system for sewage to make it eligible for potable water supply. Potable water is supplied in tanks distributed by Siwa water company trucks. The electricity might be supplied through informal connection to the nearest main network line until the legal supply is available which might take several years.

Residential cluster formation:
After the development of more housing units, a residential cluster is formed that corresponds to the municipality conditions for infrastructure provision.

Application for Formal infrastructure:
After the residential cluster is formed the youth group apply to the municipality for the needed infrastructure provision; potable water and electricity. Sewage infrastructure is not yet developed in Siwa.

Eligibility for infrastructure provision criteria
If the residential area cluster meets the criteria for electricity and water infrastructure provision, the municipality approves the supply.

Ineligibility Consequences
If the cluster did not satisfy the criteria of infrastructure provision, it is not provided by the state and the locals have to provide it themselves.

Infrastructure provision:
Electricity is officially provided to the area if it meets the criteria of Siwa Electricity company branch according to it's head Eng. Ali Abdel-Nabi (2015) and the provision process might take several years. Potable Water is supplied by the Siwa water holding company branch by Siwa water company branch according to it's head Mr. Bakrein (2015). Implementation is assigned to contractors by the concerned companies.

Probability of formal land registration:
If the land registration channels are re-opened by the government, the local residents might apply for official land registration (Taqneen).

Fig. (88) Youth land divisions driven process steps. Source: Halawa (2015)

Patterns generated and their impacts:

This process generates similar patterns and consequences generated by the tribe land divisions explained in the previous section. The youth land divisions is located southern Dakrour mountain as an outlying settlement in Siwa

city as seen in Fig. (91). It is also acknowledged in Siwa 2027 strategic plan by the GOPP as seen in Fig. (90).



Fig. (91) Youth land divisions location in Siwa city.
Source: Google Earth modified by the researcher

The Youth land divisions have similar consequences of the tribes land division. However, it is not managed by a tribe established committee yet by the Youth activist group. Accordingly, this eliminates sensitivities that arise among the tribe members in the fund raising stage of the tribe heads initiated processes. Also, the design task assignment to a local is not found in this initiative unlike the tribe land divisions. Nevertheless, the land divisions generated followed the same grid of the tribe divisions land which considers the local culture and municipality infrastructure regulations. This grid pattern is also mapped in the land developer driven processes. Hence, it can be considered as a common agreed pattern recently developed by Siwa community to compromise between the society needs and state regulations as in fig. (89)

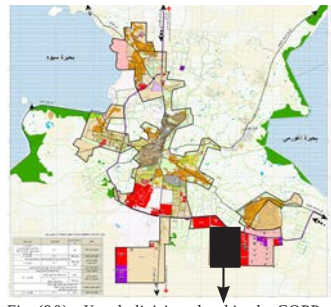


Fig. (90) Youth divisions land in the GOPP 2027 Siwa strategic plan.
Source: GOPP strategic plan modified by author.

Flow of interactions among actors involved in the process:

The actors involved in this process are similar to that in the tribes land division model except that this process is initiated by youth activist group.



Fig. (89) Siwa South expansions Southern Dakrour mountain into the sand dunes. Source: Halawa (2015)

4.5 State driven processes

4.5.1 Housing state driven processes

Process of Generation:

State driven processes are initiated by the State actor group to address the need for housing supply in Siwa Oasis. . GOPP manages these processes as the responsible body for urban planning of cities and villages in Egypt. Two projects of this type of processes are mapped and presented in this section. These are Ebny Beitak Project southern Siwa City and El-Salamet project north western Aghurmi village as seen in Fig. (92 and 93). The process of generation of Ebny Beitak is seen in Fig. (94).

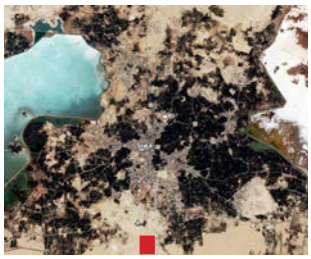


Fig. (92) Ebny Beitak location in Siwa. Source: author using Google Earth maps

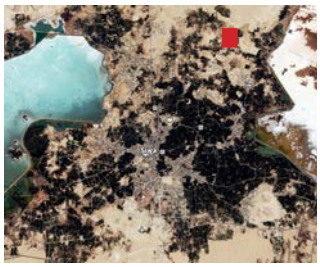


Fig. (93) ElSalamet location in Siwa. Source: author using Google Earth maps

- ***Project design and land allocation by state representative***
  State representative body puts the design for the settlement and allocates a land for the implementation.
- ***Road network development and Land Sub-division into plots:***
  The project starts with the road network implementation so the construction of the housing units can start.
- ***Housing Units Construction***
  The next phase of the project is the housing units construction. Each 3 floors high with apartments that are 60-70 m2.
- ***Infrastructure supply***
  After the housing construction, the local municipality co-ordinates with the local infrastructure companies. Then, electricity is provided by the Siwa local electricity company, potable water is provided by the water network. The sewage, is discharged to a cesspool system attached to each housing block, since the sewage infrastructure is not yet available in Siwa. Nevetheless, in case of Ebny Beitak project, the electricity was delayed and supplied after the citizen acquisition of the housing units.
- ***Services supply***
  In El-Salamet (Bidouin village) in Aghurmi village the services such as the school and the mosque were included in the project and implemented. However, in Ebny Beitak projects they were not.
- ***Urban cluster development and supply for local citizens***
  After the urban cluster construction, implementation and services supply, each local citizens who applied for the project receive his housing unit (approx. 60-70m^2 in Ebny Beitak project).
- ***Locals rental of units to external actors***
  In Ebny Beitak project, it is mapped that most of the housing units are rented to Temporary or permanent labor coming to Siwa, because the small apartment sizes does not fit the needs of the Siwi lifestyle. Some units were abandoned, then revitalized by the influx of labor in need for rental spaces during the solar power station implementation in Siwa.

Fig. (94) State driven generation processes of housing projects. Source: Halawa (2015)

El-Salamet project is established by the authority of desert reclamation according to Mr. Ahmed Ali; Siwa municipality local secretary (2015). It is perceived as a successful state driven housing process and as more successful than Ebny Beitak project. This is justified by the infrastructure supply to the project prior to handing over the constructed units to the residents. Moreover, the services such as the schools and mosques provided in El-Salamet project are not provided in Ebny Beitak project even though both projects are located in relatively isolated locations from the city centre.

Ebny Beitak is a housing prototype that is replicated in several places in Egypt as a blue print form that lacks context adaptation and considerations. Thus, it has been ctiticized in Siwa where it is considered by many residents as temporary house before moving to a traditional Siwi houses. Some of its apartments are abandoned and many locals rent their apartments to immigrating labour to Siwa. Many abandoned units in this project were revitalized by the influx of labour that existed in Siwa for the new Solar power station construction works according to Eng. Ahmed Ismail (2015).

Pattern development and consequences:

Ebny Beitak and El-Salamet projects are outlying isolated settlements in Siwa as seen in Fig. (95) and Fig. (99). Their choice of location needs further investigation state actors.

Ebny Beitak project expansion is toward Southern Siwa city. It can be justified by seeking higher land to avoid the high water table rise problem in Siwa city centre. It may be also influenced by the challenged expansion to Northern Siwa city due to the limiting limestone hills plateau. The resulted pattern in Ebny Beitak project is a clear grid, that ensures accessibility of all zones in the settlement unlike the challenges in some society driven processes and classified as informal areas.

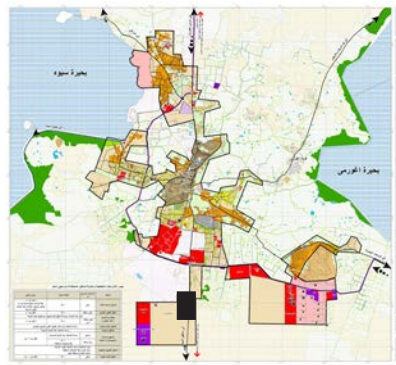


Fig. (95) Ebny Beitak location in Siwa 2027 strategic plan.
Source: GOPP , 2015

There is no expansion of Ebny Beitak project after the generation process, since the residents have shares in apartment not in the land plot itself. Thus, the pattern of the settlement remains static after the implementation of the grid pattern as seen in Fig. (100). Unlike the settlements initiated by direct beneficiaries in the society driven, which keep expanding even sometimes in risk zones.

Ebny Beitak process and pattern is more efficient in terms of density, and its progress over time than society driven processes. However, its typology does not conform to the socio-cultural needs of Siwa, which results in the abandonment of many of its units remain abandoned unless they become rented by external actor groups due to the housing typology seen in Fig. (96,97,98). Its typology and 60-70 apartment sizes do not address the locals need of bigger spaces to fit their needs. Locals require outdoor attached areas to the house where they raise some animals or ensure a place for social interactions that are limited by the females' restricted access to public areas. .



Fig. (99) Ebny Beitak project Urban pattern in Siwa.
Source: Google Earth modified by author


Fig. (97) Ebny Beitak typology in Siwa Source: Author


Fig. (98) Ebny Beitak street patterns in Siwa .Source: Author


Fig. (96) Ebny Beitak building patterns in Siwa .Source: Author

El Salamat project is an outlying settlement that is affiliated to Aghurmi village. It is perceived by the locals as much better experience than Ebny Beitak project. The services and infrastructure provision prior to delivering the units to the locals and the better adaptation of the housing typologies to Siwa's context and Socio-cultural needs are reasons for the locals' perception of El-Salamet as a better model. Both projects are included in Siwa City 2027 strategic plan by the GOPP as the city is expected to grow further.

Flow of interactions among actors involved in the process:

This process of settlements generation is initiated by the state actors group then provided to the local society group of actors. Afterwards, it moves from the local society to the external forces group who rent the apartment.

4.5.2 Agriculture State driven processes

The Desert Research centre (DRC) has two stations in Siwa Oasis; one in Tagzirty and the other in Beld El-Rom El Maraqi. However it's activity and the urban clusters developed for the labour on its cultivated lands are small. The research centre activity focuses on the experimentation of some crops and reuse of agriculture of discharge water. Hence this process is not influencing a big change in the land use or the land cover in Siwa like the similar agriculture lands developed by the Society actor group.

4.5.3 Industry State Driven Processes

The Development Centre in Siwa is an example of the industry state developed processes in Siwa Oasis. The centre was developed by Matrouh Governorate in collaboration with the military. It is composed of two main sections, one for the local handicrafts training and industry section and the other for dates industry and preservation. According to Mabrouka Beshir, the head of the Handicrafts section, the centre is not fully occupied by employed Youth or trainees. This id due to its unattractive salaries rates as well as the socio-cultural restrictions that limits the work of ladies after early age marriages. According to Mr. Hmeid head of the dates industry and preservation section, the dates industry and preservation fridges section has a full hired working force yet the work did not start due to missing administrative procedures.

The process generates urban land uses that are not fully used due to institutional, administrative or socio-cultural challenges. Such challenges need to be addressed in the pattern generation process to avoid land consumption with unproductive urban structures.

4.5.4 Physical Infrastructure and services:

The physical infrastructure is a crucial aspect to be considered in the analysis of urban growth. Urban areas experience more crucial impacts of rapid UG when the infrastructure supply is lagging behind or when the UG occurs at a pace that is beyond the capacity of the community and the governing actors. This section presents the physical infrastructure investigated in Siwa Oasis to reflect on the urban growth processes led by the three actor groups identified. The physical infrastructure presented includes the electricity, potable water, sewage and roads investigated in Siwa field visit.

4.5.4.1 Electrical Energy

• Electrical energy Sources in Siwa Oasis:

The electrical energy is a crucial physical infrastructure that affects the prices of the land in Siwa Oasis. It is the most challenging compared to the available potable and irrigation water due to the underground water availability and possible independent supply and the independent cesspool system used as an alternative for the missing sewage infrastructure. Thus, the supply of electricity increase the price of lands remarkably and fosters the area's development.

Siwa has currently has two sources of electrical energy; a Diesel power station and a recently constructed solar power station. According to Eng. Emad; head of municipality Engineering department and Eng. Ali AbdelNabi; Siwa electrical company branch head, Siwa has witnessed a noticeable transformation in the last 5 years that increased the electricity loads from 4.5 KVA to 7 KVA. This resulted from the urban growth, urbanisation demands and the economic boost by the new investment projects. Furthermore, several investment projects in Siwa were put on hold until their needed electricity supply are provided. Hence, a new solar power station is constructed and opened in March 2015 in Siwa to provide Siwa with 8 Mwatt above the current electrical

supply to secure the needed electrical energy for the on-hold investments. The project is a donation from the Emirates government.

• Electrical energy coverage and subsidisation in Siwa Oasis:

In the last two years, a big expansion has been done in the electrical energy network to cover most areas in Siwa reference to Eng. Ali AbdelNabi(2015). Most of the areas in Siwa are provided with electricity except for the new expansion areas such as: the Tribes and Youth land divisions by the society as well as the dispersed isolated houses on the outskirts of Siwa Oasis by the international immigrants who prefer to supply their units with solar panels. The villages are all connected to Siwa grid, they were earlier only provided by electricity from 7pm to 12 am.

Due to Siwa's isolated location, it is not connected to the national grid of Egypt. A partnership is made between Matrouh governorate and El-Beheira company for electricity to subsidise the costs of electricity to the residents. Thus, the prices received by the end users in Siwa do not correspond to the actual costs of the infrastructure supply, which foster the urban growth in Siwa.

• Electricity supply process:

In society driven urban settlements: The electricity is based upon the fulfilment of a criteria by the local municipality. This criteria is developed since 2007 and it influences shaping the urban settlement to ensure supply with electricity. The criteria requires that the residential cluster is not less than 10 houses, is located within Siwa city urban boundary defined by the GOPP and has an electricity Box. It also regulates the street widths to be of minimum 10m wide, according to law 119 and of 6m wide at the old city parts. It also requires that the houses are habitable and have at least 2 rooms, 1 bathroom and 1 kitchen.

In the society driven housing generation processes, the cluster residents apply for the electricity provision to the municipality. Upon the cluster fulfilment of the criteria the municipality approves a tender request from Matrouh Governorate. If the tender request is approved, Siwa local electricity company branch supplies the urban settlement

with electricity. This process takes long time to be processed. Thus, many residents supply their houses with illegal connection to the main electricity network in the city until the process is done to increase the price of the land.

In State driven housing generation processes: the electricity supply is coordinated by the municipality yet without the criteria for the society driven process fulfilment as they are previously considered.

In External Forces driven urban settlements: The electricity supply for investment projects in Siwa is different from the Delta and Wadi in Egypt. Investment companies have to provide electricity for license acquisition, whereas in desert communities like Siwa the authority over people is less. The international immigrants groups in isolated areas on the Oasis edges, supply their houses with solar panels.

4.5.4.2 Water Infrastructure

Siwa is a desert community that faces a real challenge with the water cycle that threatens the urban settlements and shape the UG processes in it. In addition to the existing underground water table rise problem in Siwa, the water supply and discharge infrastructure develop in slower pace than the urban settlements and agricultural lands growth. This lag results in bigger threats of water related problems to Siwa. The Water physical infrastructure addressed in this research are the potable water supply, sewage discharge in the urban settlements. The irrigation water supply and discharge in agricultural land are explained in the previous chapter as part of the urban ecosystem structure in Siwa. Nevertheless, they can not be disregarded due to the overlap and intermingled land uses in Siwa's urban fabric that results in mutual influence between the agricultural and residential land uses.

4.5.4.3 Potable Water Infrastructure

• Potable water Sources in Siwa Oasis:

The potable water and Sewage infrastructure sections are based on interviews with the Mr. Bakrein: Head of the water and Sewage holding company

branch. The underground water availability in Siwa secures the water supply for the different uses in Siwa Oasis. Potable water is supplied in Siwa from deep well near Dakrour mountain.

• Potable water coverage in Siwa Oasis:

The potable water supply network does not expand at the same pace of the urban settlements expansion in Siwa. Accordingly, the new expansion areas developed by the society such as the Youth and tribes division lands or Oltobo area still miss the water infrastructure network.

• Potable water supply process: The supply of the potable water infrastructure depends on the generation process of the urban settlement as follows:

Society driven urban settlements: The potable water is supplied to society driven urban settlements in Siwa when their residents form a cluster and apply to the local municipality a provision request. The municipality approves the supply request upon the eligibility of the cluster to a criteria that regulates the pattern of the settlements and the water supply network is provided by Siwa water company branch. The criteria of eligibility requires that the main street width are 8-10m wide while the secondary streets are 4m Wide. The potable network implementation requires one to two years depending on the available budget. If the urban cluster streets are less wide than these dimensions the residents have to bear the costs of implementing a network inside the urban cluster and its connection to the nearest government water supply grid. If a near connection to the main grid is not available, potable water can be purchased in tanks by Siwa local company trucks. The trucks also sells potable water in tanks to areas awaiting the infrastructure network implementation.

In State driven processes: The street widths are designed with consideration for the criteria of the municipality. So the service provision is planned and it depends on the required time for the administrative work.

• Potable water pricing and subsidisation in Siwa Oasis:

The prices of potable water in Siwa are low due to the water availability. Moreover, the prices are subsidized to be 50% lower than other places in Egypt due to its isolated location. The price of the potable water supply is 0.35 LE/m for Houses, 1.8 LE for Factories, 2.4 LE for Hotels. However, this pricing guidelines are not implemented since there are no water meters to calculate the consumption. An alternative tariff of 35 LE/ Month for residential usage and 22.5 LE for the sold water Tons in tanks provided by the distribution cars. So, the potable water consumed has low and subsidized prices with no estimation of the consumed resources in Siwa. This release the burdens about resource consumption's considerations during urban growth process.

4.5.4.4 Sewage System Infrastructure

Even though Siwa is witnessing a rapid UG and urbanisation processes, it has no sewage network infrastructure until today. Accordingly, Siwa relies on the Cesspool system for Sewage discharge to cope with the modernisation, after abandoning the use of the dry toilet system in the traditional Kerchief houses at earlier times. The cesspool system has several environmental impacts and is prohibited in several places in the world.

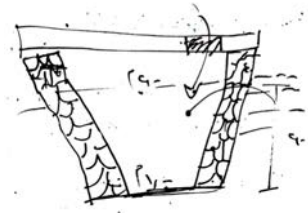


Fig. (100) Siwa Cesspool cross section, hand sketched by Siwa local municipality head of Engineering department on 8.3.2015 Source: author

In Siwa, the installation of the Cesspool system is a condition of the municipality to approve the potable water supply by Siwa water company branch. Siwa local municipality regulates the size and materials of the cesspool installed with the guiding design seen in Figure (100). The sewage water collected in the cesspool is collected by trucks provided by the Siwa potable water and sewage company branch for tariffs that vary according to the Buildings use. Afterwards, the collected sewage water is disposed without treatment in the sand dunes southern Siwa. The cesspool design suggested by the municipality is as seen in the Fig. (100): where



Fig. (101) Uncovered cesspool in Siwa. Source: Halawa (2015)

rubble are used on the sides and a concrete cover shall be constructed with an opening to allow the sewage water collection. However as seen in Fig. (101) the construction does not abide by this regulations.

Furthermore, the cesspool sewage system used in Siwa imposes several environmental risks on its environment. The cesspool system used is of primitive uninsulated design which results in the leakage of the sewage water into the sand directly before it's collection. This occurs in most places in Siwa except for some areas of rocky ground nature that resist the leakage to some extent. Moreover, the collected sewage water's disposal into the sand dunes southern the city threatens the environment. Those risks area multiplied with the increase of population and Siwa UG.

A sewage infrastructure network was planned for Siwa and the project started the first phase of implementation in 2007. However, the construction works started in a small area, then it stopped and was never completed until the field visit in 2015. It was hindered by several challenges in Siwa amongst were the conflicts over the need for houses demolition in narrow streets to create clearances for the network installation; the houses residents could not be compensated due to their hand claim ownership. Nevertheless, according to Mr. Shaaban Maaref; head of Siwa local municipality, a new sewage infrastructure project is signed with a new contractor in Siwa and is expected to be implemented.

4.5.4.5 Roads infrastructure

The roads and transportation infrastructure are one of the biggest influential aspects in Siwa UG and urbanisation processes. Siwa has always been an isolated area in the western desert of Egypt and the road connecting it to Matrouh city on the Mediterranean coast is a turning point in the Oasis development history. Before constructing Siwa-Matrouh road, Siwa was connected to the surrounding areas by five rammers used since pharoanic, Greek, and Roman era. Siwa-Matrouh road used to be one rammer (Mesreb El Stable) of 300 Km length that took 7-8 days trip by camels. The rammers routes were chosen based on the underground water availability; on this road 5 wells were located in addition to rain water reservoirs as shown in Fig. (102). The second

rammer connected Siwa to El Gara Oasis north East then to ElGrawla, 20 km Eastern Matrouh. The third rammer connects Siwa to El Salloum city passing through El Khamsa well. It is 310 km long known as Deknasa rammer. The fourth connects Siwa to Gaghboub Oasis in Libya passing through Shyata and Gerbet. And the last rammer connected Siwa to Bahariya Oasis passing through El Arag, EL Bahrain, and Sitra of 420 km length (ElDmeiry, 2005) as seen in Figure (102).

Due to the rapid UG and urbanisation processes in Siwa, the rammers connecting Siwa to Gaghboub and Bahariya Oasis are transformed into express ways and the other rammers are asphalt roads. Moreover, a civil airport is under construction in Siwa Oasis adjacent to the existing military airport. Inside the Oasis, most of the primitive mud roads are being transformed into asphalt roads to cope with the modern transport modes and bigger travel distances between the sprawling urban settlements in the Oasis. Finally, it can be concluded that these roads and transportation infrastructure are expected to further break the isolation of Siwa, increase the number of visitors and immigrants and foster its urban growth.

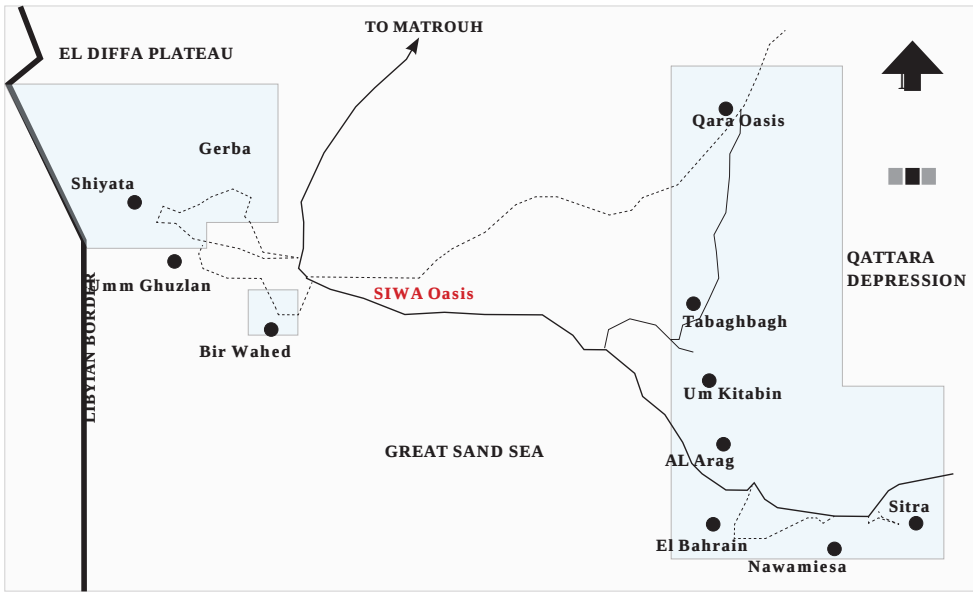


Fig. (102) Roads in Siwa region. Source: Halawa (2015) based on Mikhaeil (2012)

4.6 External Forces Driven Processes

4.6.1 International immigrants Driven Processes

• Process of generation:

These processes are generated by the international immigrants who settle in Siwa. Few international immigrants renovate some of the deteriorated Kerchief houses that were abandoned by the locals and settle in them. While the majority of the international immigrants in Siwa seek the isolation and interaction with nature away from the busy Siwa centre, so they choose the location for new houses in Siwa at the peripheries of the Oasis. Veona is a British architect who immigrated to Siwa and explains the generation process that is common in her ex-pats network as seen in Fig. (106). She relies on solar panels as seen in Fig. (103), constructed a wetland and an attached cultivated area in fig. (104 and 105).



Fig. (103) Solar panels used in residential units generated by international immigrants to Siwa. Source: Halawa (2015)



Fig. (105) Cultivated lands attached by international immigrants to Siwa. Source: Halawa (2015)



Fig. (104) Residential units generated by international immigrants to Siwa. Source: Halawa (2015)

- ***Choice of Location***
  International immigrants choose the location of the land on Siwa perepheries seeking isolation and integration with nature.
- ***Land Acquisition***
  International immigrant buy the land from a local Siwa who can sell his hand claim ownership that is the tradition of land tenure in Siwa tribal culture.
- ***House construction and attached agricultural land***
  The international immigrant starts the construction of the residential unit and digging a well for an attached cultivated land with the local labor and know-how.
- ***Infrastructure supply***
  The international immigrants supply the house with a cesspool or a wetland for the Sewage, a solar panel for electricity supply and rely on Siwa water company trucks for the potable water supply.
- ***Residing the house and reclaiming an attached agricultural land***
  After the construction and well digging and infrastructure phase, the immigrant resides in the house and rely on the local labor to reclaim the neighboring piece of land.
- ***Land registration***
  The external forces group of immigrants might try to register the land but that was not the mapped case in the Oasis during the Field visit.

Fig. (106) Process of Residential units generation by international immigrants to Siwa.

• Patterns generated and their consequences:

This process generates outlying isolated settlements on the edges of Siwa Oasis fostering sprawled urban growth. The generation process is slow due to the small number of international immigrants in Siwa according to Eng. Emad (2015). Moreover, the isolated locations of such settlements disturbs the unique natural habitat in Siwa region. This phenomena needs consideration to avoid further sprawled growth with the increase of immigrants to Siwa.

• Flow of interactions among actors:

This process is initiated by the external forces group who get access to the community through locals. The locals act as the mediators in this process by providing their local know-how to facilitate the process .

4.6.2 Investors Driven Processes:

• Process of generation:

Investors driven processes in Siwa include projects of agriculture, industry and tourism. The process of generation model is as seen in Fig. (107). However, the process varies according to the investors choice of location. In some of the mapped cases, the investors chose agricultural land to be converted into Tourism land use i.e. an Ecolodge after offering the local owners higher price for the land. This process is mapped in some Ecolodges in Siwa such as Galliete Ecolodge where the previous land use was integrated into the design. This constitute a pressure to the agricultural lands in Siwa. It is a common challenge in Egypt, yet a recent one in Siwa. This is due to the higher land value and economic returns of built up lands than the agricultural ones.

The land acquisition by the investor has to involve the locals and the state most of the time. Even-though most of Siwa lands are hand claimed by the locals according to their tribal tradition (ourf), 95% of the lands in Siwa are state owned lands according to the Eng. Emad (2015), head of the engineering department in the Local municipality. Accordingly, the license for the investment economic activity can only be given to the investor upon official land registration in the land registration authority.

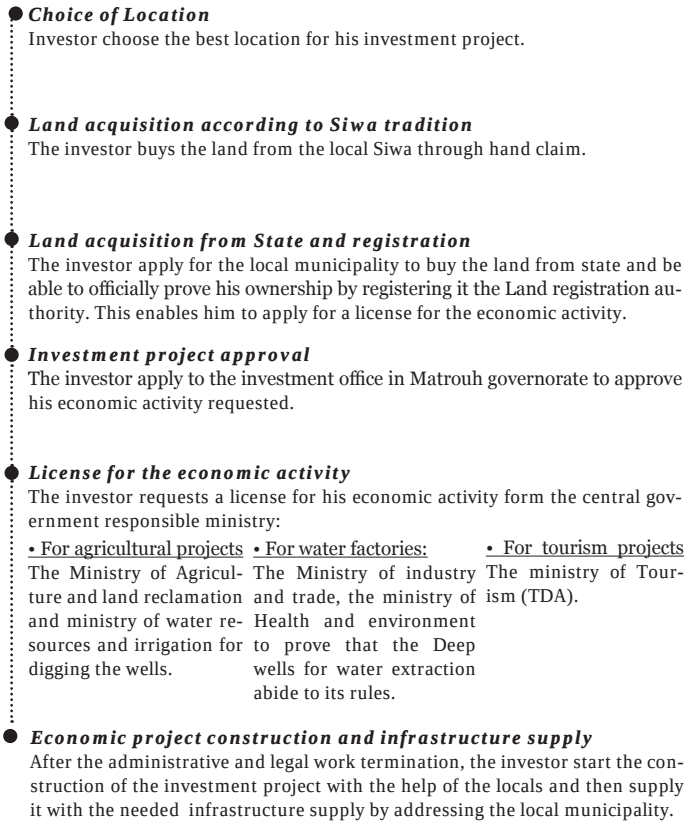


Fig. (107) Process of economic projects generation by investors in Siwa.

The process also varies according to the land use of the investment as seen in Fig. (107). Some examples of the agricultural investments in Siwa are El-Nasr and Express. Examples of the water factories is Siwa water company, Aman Siwa if the only water factory established by a local so it follows a different process. Examples of tourism projects are EQI ecolodges such as Adrere Amelal or popular hotels in Siwa.

Finally, it is noticed that the Egyptian state supports the development and investments in Siwa where several infrastructure projects are in process to facilitate the requirements of these projects. This include a new civil airport under construction, a cross border road from Siwa to Gaghboub Oasis in Libya, another one that connects Siwa to Bahariya Oasis. These roads enhance the accessibility of Siwa and increase the influx of out comers. Also , the Solar power station launched in March 2015 supplies the investments that were put on hold with their needed electrical energy.

• Patterns generated and their consequences:

The patterns generated from the investors driven processes depend on their land use as well. However, most of these processes occur on relatively short time span due to the facilitation of the state to the investments processes.

- The land reclamation projects mapped in Siwa are characterised by their isolated outlying patterns on the peripheries of the Oasis, such as Express and El Nasr projects. This is due to the environmental constraints of the increasing underground water table level. Hence, most of the expansions target higher areas, which are currently being oriented towards the South of the Oasis in addition to the dispersed small investments at the edges of the Oasis at Abou-Shrouf, Ain Safi Area or Quraishet.

The projects require small density for attached housing and services for their labour. This is because most of the new investments projects apply modern agriculture and harvesting techniques that do not need big working forces.

- The industrial investments projects develop in dispersed isolated patterns so far in the Oasis, because there is no defined industrial zone. Some industrial investments are located at the heart of the Siwa City urban fabric such as Aman Siwa for Water industry or El-Lo'Lo'aa for Olive Oil. The others are located in the neighbouring villages such as Safi in Abou Shrouf village. Their density is still low. However, their dispersed pattern withing the residential urban fabric projects a risk as the urbanisation process keeps in progress without a regulated industrial zone.

- The tourism investments projects that are developed from agricultural land use have a dispersed pattern in Siwa city and their density is low. They are located in Siwa city close to the city centre. While the tourism projects that start on vacant lands are located in an outlying isolated patterns outside Siwa city such as Adrere Amelal and Taziry Ecolodges. They seek open landscape and nature for their guests.

The tourism projects developed on agriculture lands have low density yet they pose a risk of fragmenting the cultivated lands on Siwa city scale. In addition to the environmental, social and economic impacts of losing the agricultural land use and their production. These impacts include lowering the lands productivity, shift of labour from agriculture activity and loss of social habits attached with the agricultural lands in Siwa.

• Flow of interactions among actors involved in the process:

This process starts from an investor, then it flows to the local community to involve the authorities afterwards at different levels of the state actor group,. It includes the local municipality, the investment office at Matrouh Gorvernorate level then to the central state level.

4.6.3 Donors

The mapped donors projects in Siwa Oasis are carried out through the mediating local NGOs. Some of the projects targeted renovating old deteriorated housing in the city centre in an infill trial. Other included some loans for the youth to facilitate their housing construction such as the EU funds to SDREC NGO. Hence, no mapped project targeted direct construction of land uses.

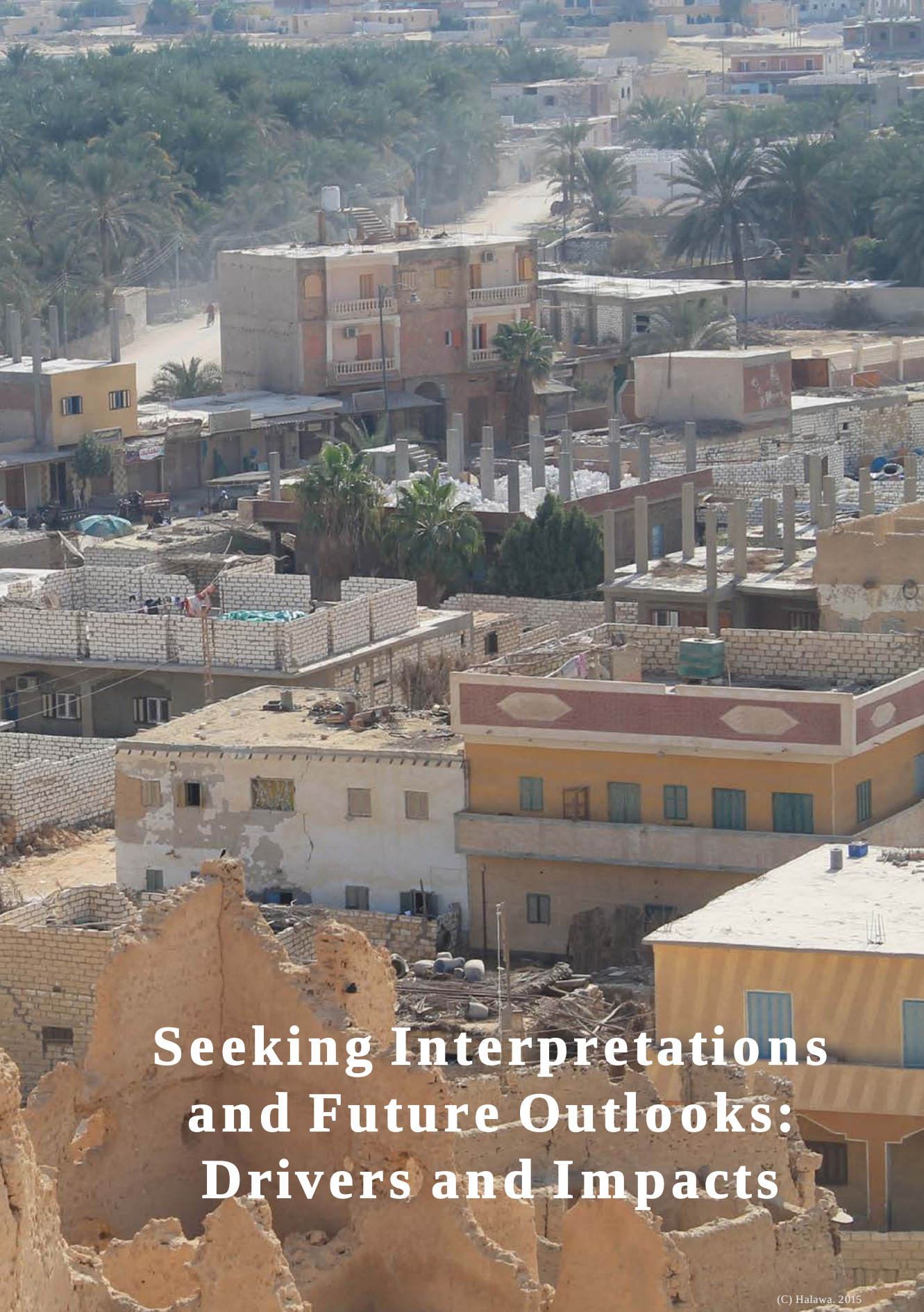
In conclusion to this chapter, it can be noticed that Siwa is undergoing a rapid urban growth processes that are beyond the capacity of the local community. They generate different patterns that come with several challenges. Some are developed in risk zone posing life threats to their residents, others develop in spontaneous patterns that generate inaccessible zones and hinder possible infrastructure supervision or emergency access. The society driven processes have shown some recent initiatives such as the Youth and tribes land divisions that had a self organised management and planning considerations. They generated patterns and typologies adapted to the local context needs and they also considered the state regulations. Nevertheless, they lacked some expertise in planning and implementation due to the missing skills and personnel expertise in those fields among the locals. Such local initiatives need to be considered by the state as they are perceived by the locals as success models more than the state driven processes.

It is mapped that the society driven processes are the dominant modes of settlements generation in Siwa, in the past and at the present. At earlier times, the tribal governance had a major influence on shaping the oasis and it still continues until today. The state driven processes have developed small pixels in the Oasis even though the state owned land are 95% of the built up lands according to the municipality. This land tenure issue, fosters more urban growth and expansion to ensure hand claim ownership by the locals. Moreover, the residential land uses developed by the state need to consider the local needs and context in its typology to avoid being abandoned by the locals. El Salamet project (The Bedouin village) however, was perceived by the locals as a successful model that needs to be considered for further settlements developments.

Even though the UG processes in Siwa are developing rapidly as elaborated, the infrastructure provision by the state is lagging behind them. This lag results in several impacts and challenges. The missing infrastructure in the Oasis which is the most crucial is the sewage system. It is hindered due to several reasons, and its absence renders several impacts on the sensitive urban ecosystem of Siwa Oasis. The missing infrastructure are water supply and discharge infrastructure for residential and agricultural land uses. Their absence elevate the challenge of the chronic water problem of Siwa Oasis. It needs further consideration.

The external forces driven processes have generated several outlying patterns in Siwa on its peripheries. The Oasis is witnessing a fast development in infrastructure development that supports further investments and development. The infrastructure provision will foster more investments in the Oasis. The growth in these type of processes needs to be regulated to avoid the sprawled UG that has started with the isolated outlying patterns in the Oasis. They also generate the mixed land use of industrial uses within the residential areas and built up areas that could have higher potentials and suitability for reclamation. Thus, an industrial zone and a regulated development plan needs to be developed and implemented in Siwa. Finally, this chapter presented the processes and patterns of UG shaped by Siwa actors. The next chapter presents the interpretations for these dynamics processes by elaborating the driver and impacts of UG and outlining a locally developed future outlook for Siwa.





Seeking Interpretations and Future Outlooks: Drivers and Impacts

(C) Halawa. 2015

5 Seeking Interpretations and future outlooks : Drivers and Impacts

This chapter gives interpretations to the patterns and processes of UG in Siwa oasis in two sections. The first section presents the drivers and impacts of urban growth in Siwa oasis. The second section previews a future outlook for Siwa Oasis developed by the local community. The first section findings were developed over the four phases of the research methodology. The drivers and impacts frameworks were derived from the literature review and gathered secondary data then categorized. These frameworks were investigated and contextualized by primary data collected in the field study through the interviews and mapping phase. Afterwards, it was validated and calibrated through the questionnaires and focus group discussions after their presentation to the local community sample in the participatory workshops. The questionnaires responses were categorised according to their degree of significance to pinpoint the significant drivers and impacts of urban growth in Siwa Oasis as perceived by the local community using Likart scale** (Appendices 1.14 to 1.27). Hence, the processed drivers and impacts its degree of significance on Likart scale and source either from literature or mapped on site are presented in this chapter. The chapter's second section presents the locals' future outlook for Siwa developed through the questionnaires and discussions in the participatory workshops conducted.

**Likart Scale: A scale used in statistics to interpret the frequencies number into a degree of significance. It has 4 distances elaborated in the research methodology section.

5.1 Socio-Cultural Drivers and Impacts of UG in Siwa Oasis:

5.1.1 Socio-cultural Drivers

The socio-cultural drivers investigated in Siwa are presened in Fig. (108). and appendix (1.15). Natural population growth and change in youth habits from marriage in extended family housing to individualistic single houses are perceived by the locals as the highest effective socio-cultural drivers as seen in Fig. (108) and detailed in table (1.15) in the appendices. These two socio-cultural drivers are not Siwa specific; they are part of the undergoing urbanisation phenomenon in most Egyptian destinations (Halawa et al., 2015). On the other hand, the reclamation of lands as an effective driver for creating new housing communities around them is not a prevalent driver in Egypt. Thus, it can be perceived as specific potential in Siwa community.

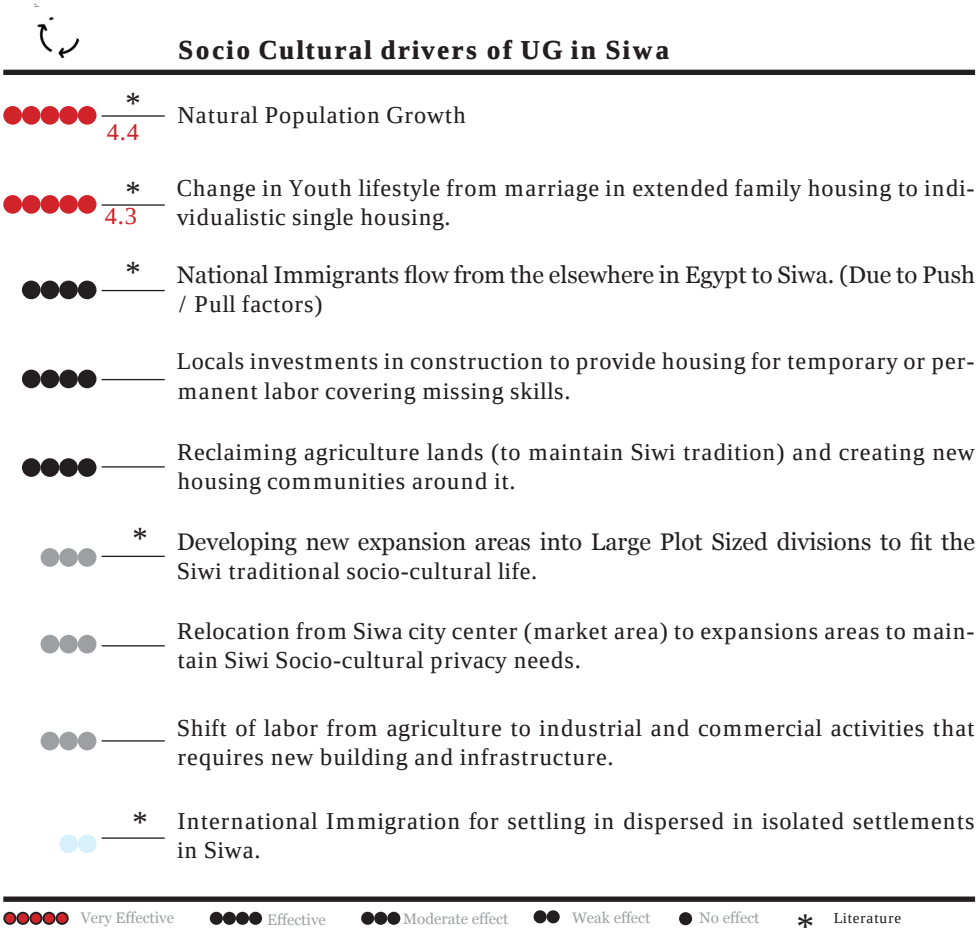


Fig. (108) Socio-cultural drivers of UG in Siwa Oasis rated on Likart scale.

The international immigrants' settlements in Siwa are perceived by the locals of weak effect compared to the Siwi population. Their influence is perceived to be weak compared to the influential immigration from other Egyptian destinations to Siwa. The International immigrants settlements in Siwa are easily noticed by visitors due to their dispersed isolated patterns on the edges of the Oasis; where they seek isolation and integration with nature. This finding comes in contrast to the prevalent visitors' assumption of bigger influence for these settlements. However, the weak effect of the international immigrants' settlements is worth consideration to avoid it's conversion to a threat with the ongoing investments and infrastructure projects' expansion that attracts more out comers.

The large plot divisions in Siwa (20*20m), the relocation from the Siwa core to the suburbs seeking privacy and the shift from the agriculture to other industrial activities are perceived of moderate effect UG drivers in Siwa. Finally, the total of the presented Socio-cultural UG drivers in Siwa are of effective contribution to the urban growth in Siwa Oasis on Likart scale as detailed in table (1.15) in the appendices.

5.1.2 Socio Cultural Impacts:

None of the investigated impacts are perceived by local community sample as very effective as seen in Fig. (109) and(appendix 1.21). However, the two

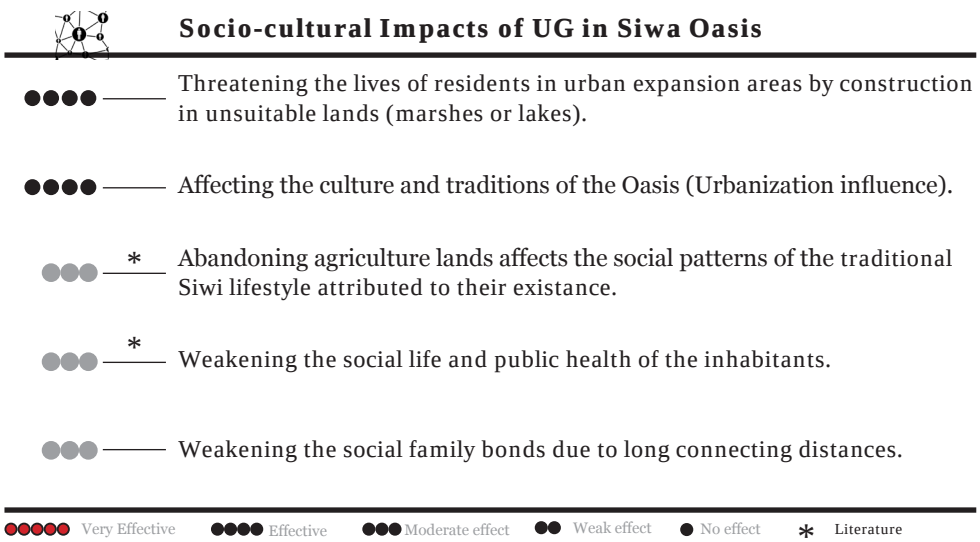


Fig. (109) Socio-cultural impacts of urban growth in Siwa Oasis rated on Likart scale.

rated as effective drivers of UG are related to the water and culture sensitivity of Siwa Oasis. The first is the threat imposed to the lives of residents in unsuitable expansion lands i.e salt marshes surrounding the salt lakes in Siwa. The effect on the unique culture and traditions by the sprawled urban growth in Siwa is the second effective socio-cultural impact perceived by locals. The rating of the impact of UG on culture and tradition comes before the impact on the social life, public health and social bonds or patterns, emphasizing the persistence of the locals to preserve their culture and traditions. This also reflects the dominance of culture and traditions' factor in shaping the Oasis and it's UG processes. Finally, the mean of the investigated socio-cultural UG impacts corresponds to an effective degree on Likart scale as detailed in table in the appendices section (1.21).

5.2 Environmental Driver and Impacts of UG in Siwa

5.2.1 Environmental Drivers

It can be noticed in Fig. (110) and in detail in Table (1.16) in the appendices that none of investigated environmental UG drivers are perceived as very effective by the locals' sample. The three effective environmental drivers of UG are consequences of the underground water table rise problem in Siwa. It influences the abandonment of deteriorated buildings and lands due to construction challenges. The three environmental UG drivers which are not related to the underground water table rise problem in Siwa are perceived of moderate effect as seen in Fig. (110).

5.2.2 Environmental Impacts

The most significant environmental impacts of UG in Siwa oasis perceived by the local community are related to the underground water table rise problem in Siwa Oasis as seen in Fig. (111) and are detailed in table (1.22) in the appendices. The most significant environmental impact of UG is the increase in the risk of the untreated sewage water risk with the increase of the UG and its ad-jointed cesspools used due to the missing Sewage infrastructure in Siwa. This environmental impact scores 4.7 on Likart scale; the highest score recorded in all the investigated drivers and impacts.

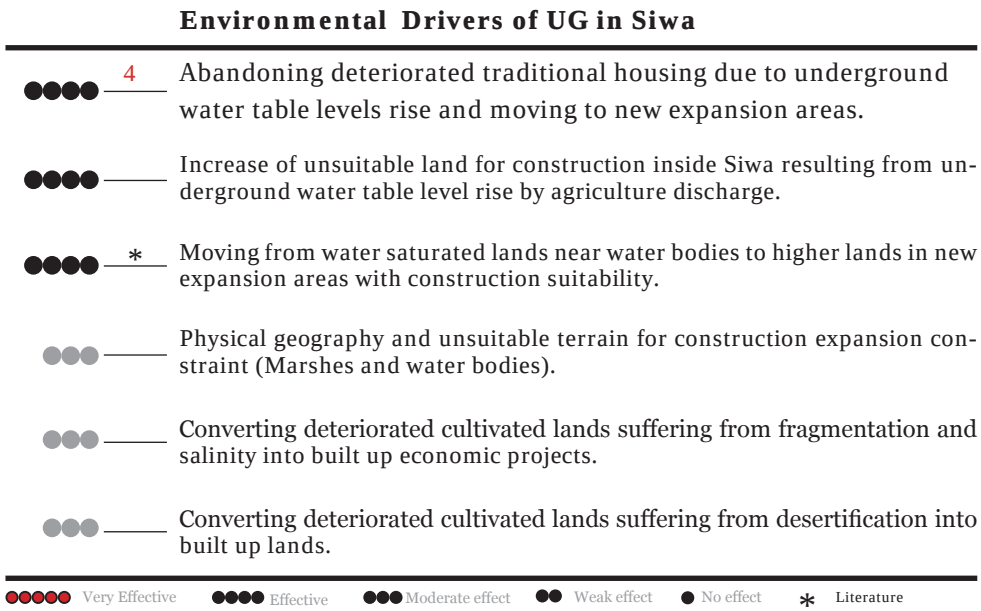


Fig. (110) Environmental drivers of urban growth in Siwa Oasis rated on Likart scale.

This reflects its significance and the local's perception of this threat and it's needed consideration. The second significant environmental impacts of UG is the increase in the consumption rates of the underground water resources affecting its quantity and quality. The increase of the sealed surfaces i.e asphalt roads proportional to the urban expansion is the third significant environmental impact of UG investigated.

All other investigated environmental impacts of UG in Siwa are perceived by the locals as of effective influence are found to be directly related to the underground water table problem in Siwa as seen in Fig. (110).

Finally, it can be noticed from cross-checking the perceived significance scores of the environmental drivers and impacts of UG in Siwa Oasis, that the community perceives the environment as a recipient of the impacts and undermines it's influence as a driver shaping the urban growth processes and patterns in the Oasis. The total mean of the investigated drivers and impacts corresponds to an effective significance on Likart scale (detailed in section (1.22) in the appendices). Hence they need to be considered by the stakeholders.

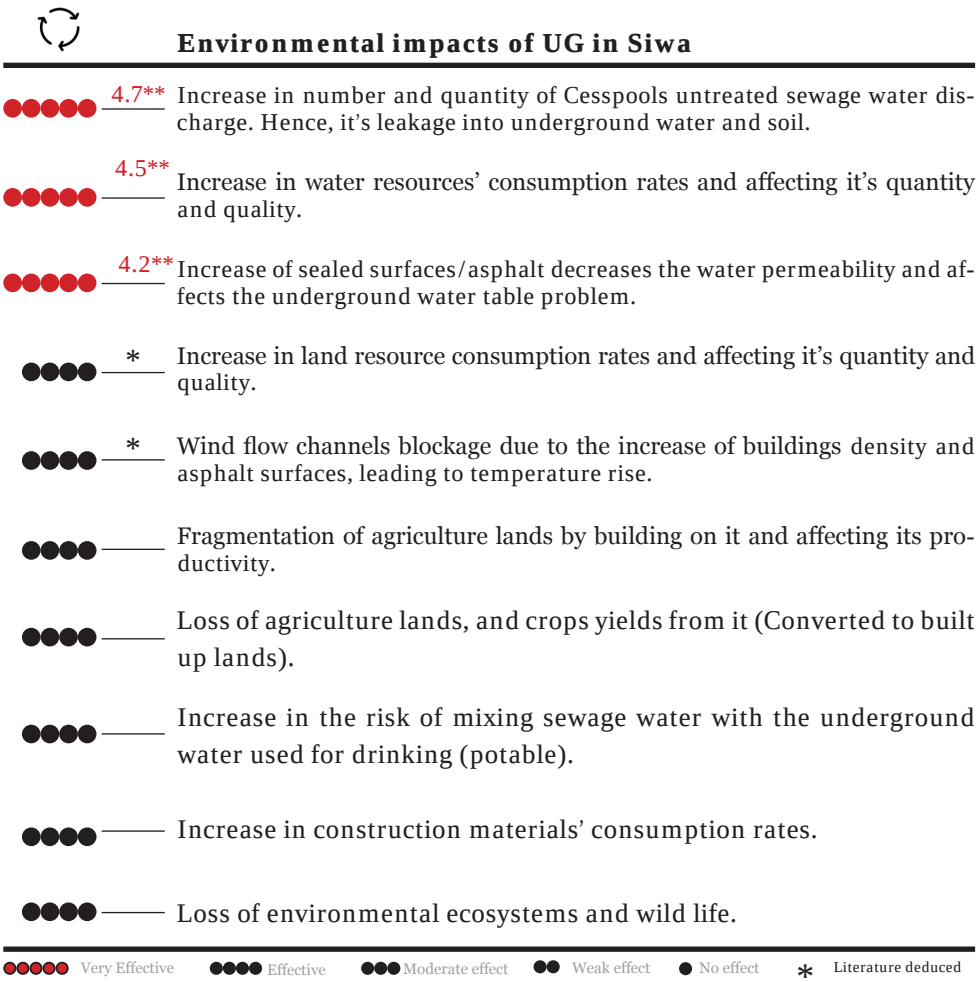


Fig. (111) Environmental impacts of urban Growth in Siwa Oasis rated on Likart scale.

5.3 Economic drivers and Impacts of UG in Siwa

5.3.1 Economic Drivers

Six economic drivers are rated as effective UG drivers in Siwa Oasis and four are percieved as moderately effective, yet none are of "very effective" significance on Likart scale as seen in Fig. (112) and detailed in appendix table (1.17). The increase of individuals' income as well as speculation of land value increase and government policies are effective economic drivers. This UG driver is not only in Siwa but in other places in Egypt and worldwide as reported by other researchers. However, the Siwa specific phenomenon is its attraction to immigrants to settle in it, unlike the centralized outwards immigration flow from other places in Egypt to Cairo. This is linked with the lack of

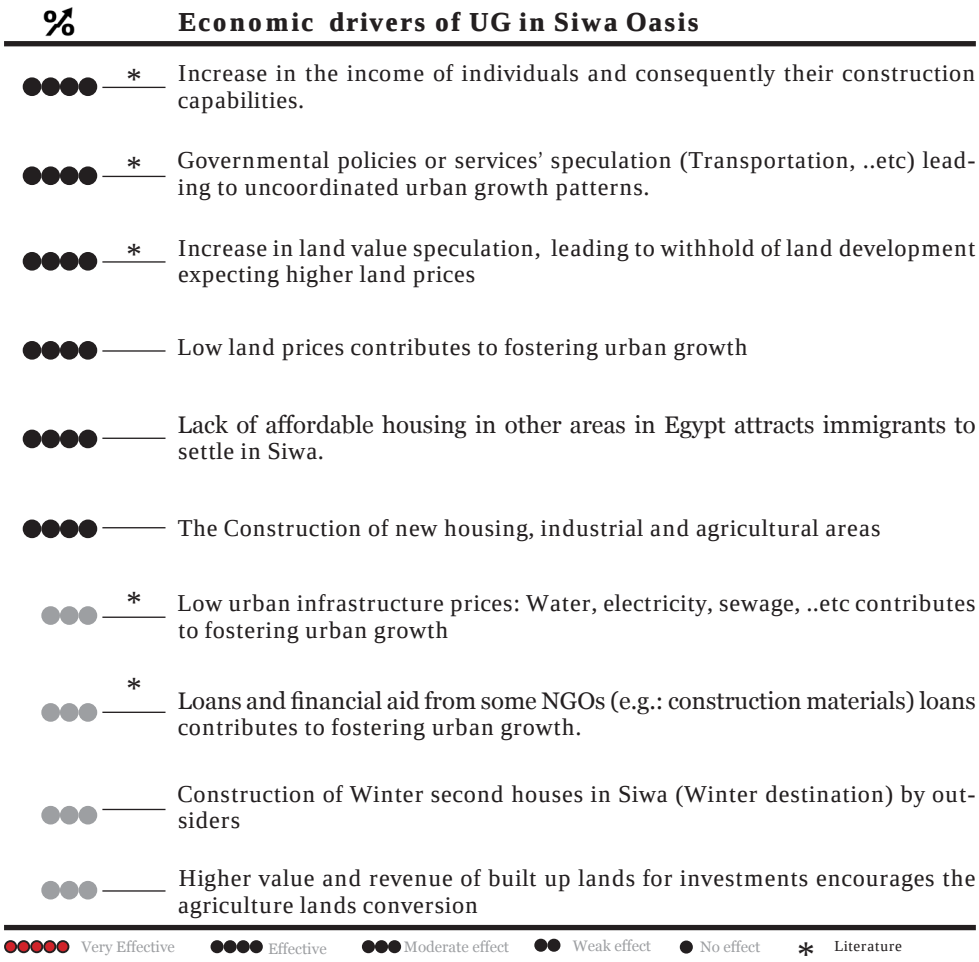


Fig. (112) Economic Drivers of Urban Growth in Siwa Oasis rated on Likart scale.

affordable housing in other places in Egypt in conjunction with the low lands and urban infrastructure prices in Siwa found to be effective driver of UG in Siwa. In addition to the job opportunities created by the new projects.

5.3.2 Economic Impacts

Three of the investigated economic impacts of UG in Siwa are rated as very effective as seen in Fig. (113). These are the increase in income rates, job opportunities and costs of urban infrastructure respectively. The loss of agricultural land and it's influence on the economic stability and self sufficiency as well as the shift of agriculture labour to other economic activities are perceived as effective drivers. The rating of the agriculture land and labour loss

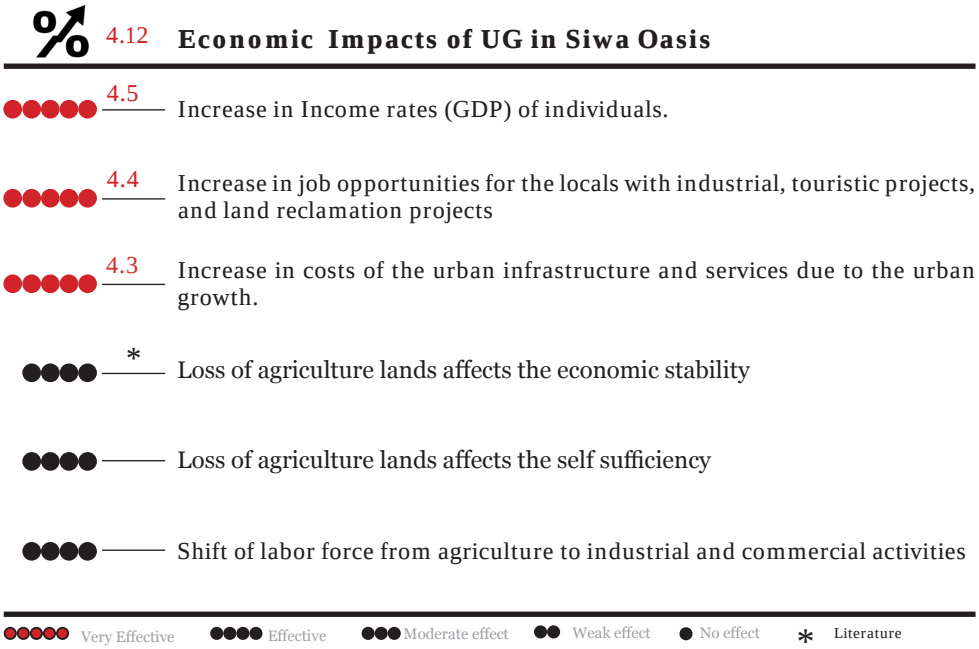


Fig. (113) Economic impacts of urban Growth in Siwa Oasis rated on Likart scale..

as an economic impact can be linked to Siwan persistence to the preservation of the agriculture lands as part of their culture and identity. Nevertheless, this is a threat that needs consideration with the ongoing urbanisation processes. It is concluded from the perceived significance of the economic drivers and impacts that the community tend to perceive the economic impacts significantly and undermine the economic drivers. The economic impacts total mean is the highest among all other investigated drivers and impacts. Finally, the total economic drivers and impacts means correspond to an effective degree on Likart scale; detailed rating are in appendix table (1.23).

5.4 Spatial drivers and Impacts of UG in Siwa

5.4.1 Spatial Drivers

The two significant spatial drivers of UG investigated in Siwa are the increase of the transportation routes and modes as seen in Fig. (114) and as elaborated in appendix table (119). Siwa is witnessing the development of new express roads connecting it to the North Egyptian coast, Bahariya neighbouring Oasis in Egypt and Gaghboub neighbouring Oasis in Libya in addition to a civil airport under-construction. This is accompanied by the expansion of asphalt

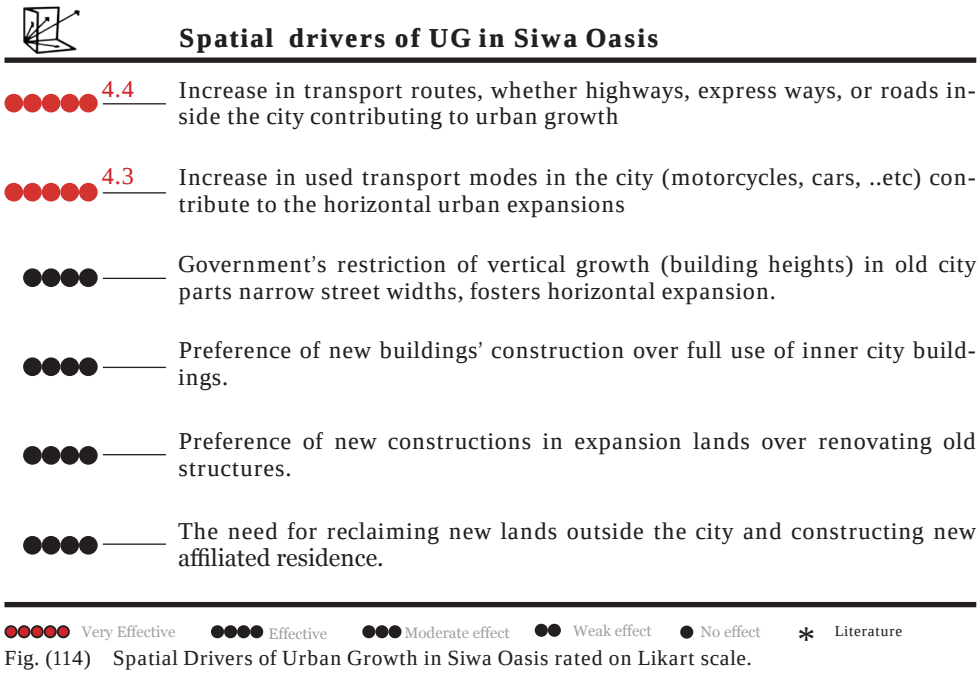


Fig. (114) Spatial Drivers of Urban Growth in Siwa Oasis rated on Likart scale.

routes inside the oasis to connect the centre to the evolving suburbs. This development in transportation routes is ad-joint with the replacement of primitive donkey wagons with Toktoks, motorcycles and other transportation modes.

The other four effective spatial drivers of urban growth investigated are factors that influence the horizontal expansion rather than vertical urban growth as seen in Fig. (114). These are: government height restrictions in Siwa i.e. 11m, the relocation of locals from Kerchief deteriorated buildings instead of renovating them, the locals preference to constructing new residential units affiliated to the reclaimed lands . In total, the investigated spatial drivers mean is rated as effective on Likart scale (details appendix table 119).

5.4.2 Spatial Impacts

The significant spatial impact of UG rated by the local as very effective is the threat imposed to Siwa water and culture sensitivity by Siwa's underground water table rise problem as seen in Fig. (115) (detailed in appendix table (1.24)). Siwa's water problem threatens the monumental and cultural sites and foster their deterioration. This is a perceived urgent risk and is rated higher than the other effective spatial impacts of influences on Siwa's natural

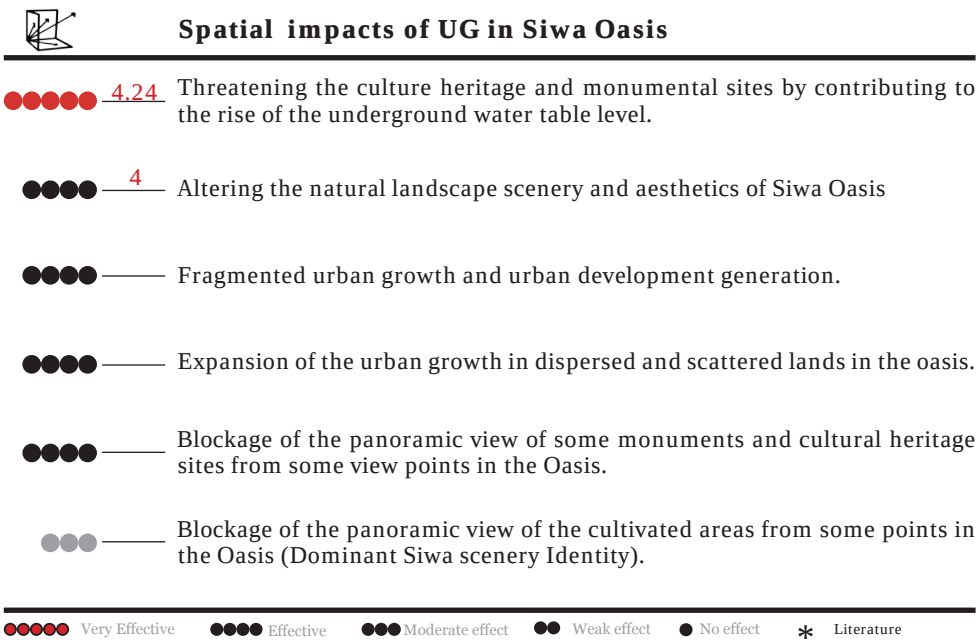


Fig. (115) Spatial Impacts of Urban Growth in Siwa Oasis rated on Likart scale.

scenery, panoramic views and altered landscape. In total, the investigated UG spatial impacts are rated as effective on Likart scale which states their need to be considered.

5.5 Institutional and planning UG drivers and Impacts in Siwa

5.5.1 Institutional and planning drivers

The significant planning and institutional drivers of UG is the missing land tenure channels as seen Fig. (116). This is a specific driver mapped in Siwa that is stressed in the focus group discussions. The land ownership and registration is blocked by the state since eight years, this leads to hand claim ownership by the locals as the only alternative. The other investigated planning and institutional drivers of UG in Siwa pinpoint the lag in planning and policies coordination and their implementation. In total, the mean of the investigated institutional and planning drivers scored effective (detailed in Appendix table 1.18) emphasizing the need for their consideration.

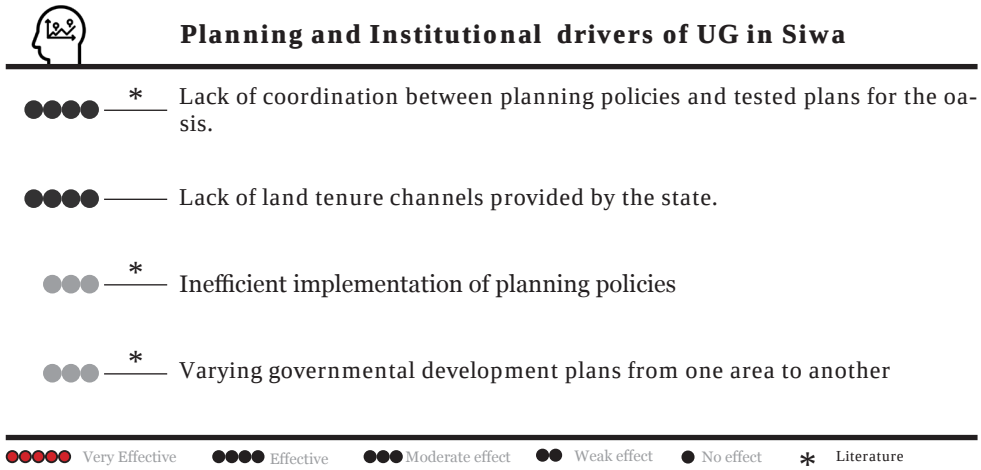


Fig. (116) Planning and institutional drivers of Urban Growth in Siwa Oasis rated on Likart scale.

5.5.2 Institutional and planning impacts

Four institutional and planning impacts of UG are as effective rated by the local community as seen in Fig. (116). The lag of legal and planning policies implementation contributes to the inconsistency in development plans and accordingly the developers' intervention areas. It also fosters the hand claim ownership and its affiliated legal disputes among the involved stakeholders. In total the investigated institutional and planning impacts are effective on Likart scale, hence they need to be considered.

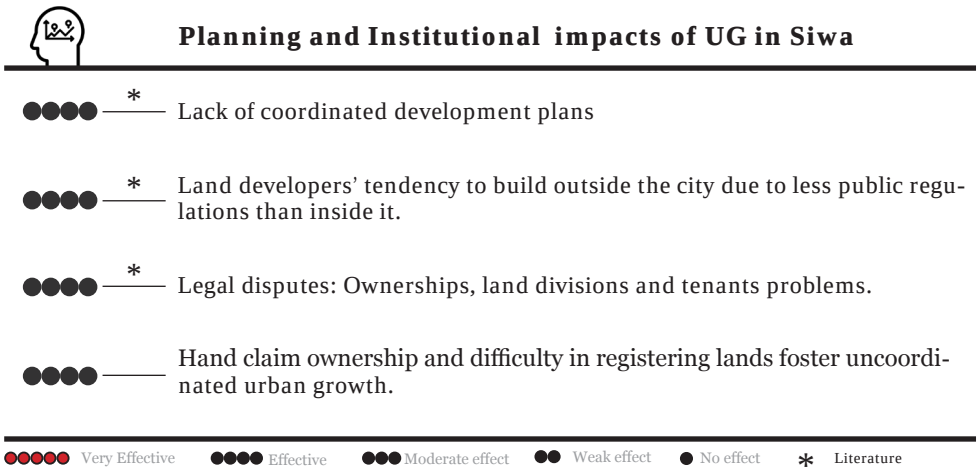


Fig. (117) Planning and institutional impacts of Urban Growth in Siwa Oasis rated on Likart scale.

5.6 Future Drivers and Impacts of UG in Siwa:

5.6.1 Future drivers

The transportation infrastructure is the significant future driver of UG in Siwa perceived by the local community as very effective as seen in Fig. (118) and emphasized in appendix table (1.20). This includes the civil airport under-construction and the ongoing express roads which connect Siwa to coastal cities and neighbouring Oases (Gaghboub in Libya or Bahariya in Egypt). The urban services and different economic development projects are rated as effective future drivers of urban growth in Siwa, yet not of the same influence as the transportation infrastructure.

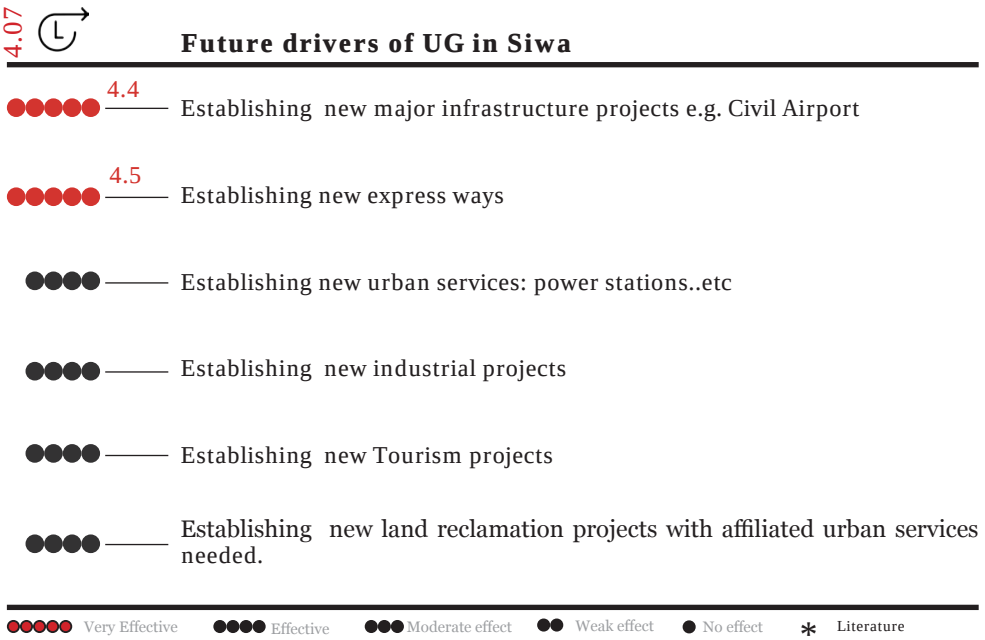


Fig. (118) Future drivers of Urban Growth in Siwa Oasis rated on Likart scale.

5.6.2 Future impacts

The local community expects further expansion and urban growth in the future as seen in Fig. (119) and as emphasized in appendix (1.9.1). The expected urban growth is adjoined with further breakage of Siwa's isolation and its linkage to neighbouring areas. This implies: expected increase in immigrants flow to Siwa, a need for further construction and expansion vertically and horizontally. These expansions generate bigger stress on the lagging existing

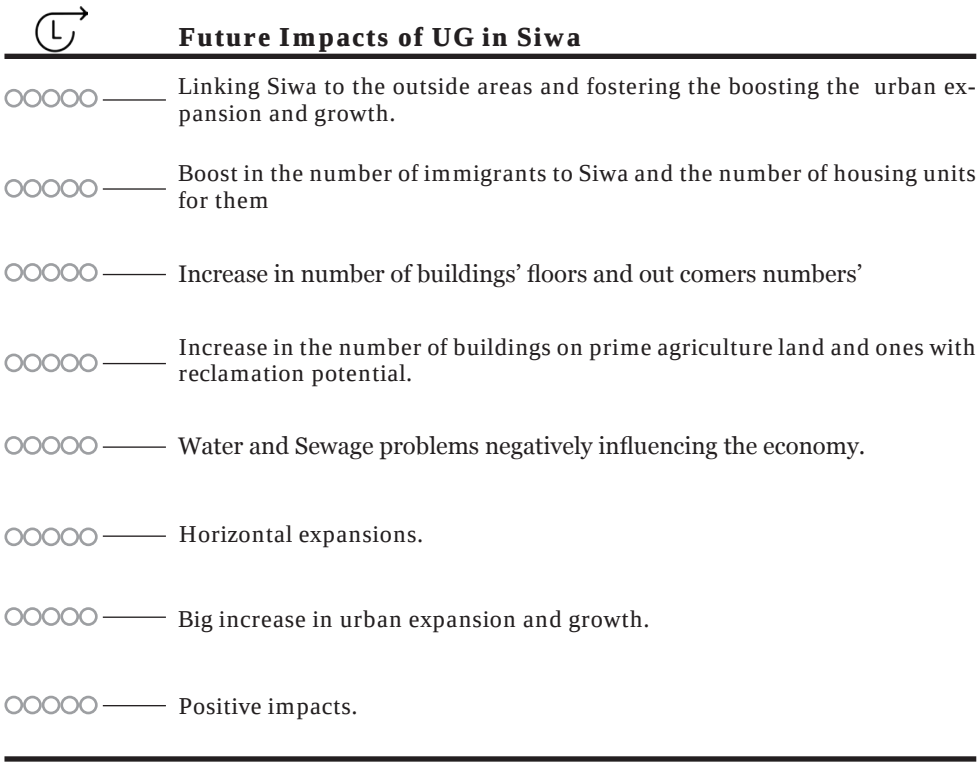


Fig. (119) Future projected impacts of Urban Growth in Siwa Oasis rated on Likart scale.

infrastructure and risks with the missing infrastructure such as the sewage infrastructure. The future impacts are not measured with scale questions ones. Thus, they have no frequencies rated on Likart scale as the previous present and past driver or impacts sections. They are locals' projections collected through open ended questions in questionnaires and discussions. These are indications of potential opportunities and threats to be considered.

5.7 Correlations between drivers and impacts of UG in Siwa

A correlation study is conducted in this research between the drivers and impacts of urban growth to better understand the relations between them. The significant correlation is found between the economic drivers and the environmental impacts of 0.72 Pearson correlation value and 0.00 significance as seen in Fig. (120). This finding needs to be interpreted with the community's undermined perception of the economic drivers for UG in Siwa, where none of the investigated economic drivers scored a significant effect on Likart scale, nor the total mean of the total economic drivers. Nevertheless, the economic

impacts scored the highest mean among all investigated drivers and impacts. The environmental impacts was rated second with highest investigated impacts significant frequencies. It can be assumed that the economic drivers undermined rates are due to Siwa conservative culture in sharing and interpreting the data.

Correlations

		TD_S_social drivers	TD_E_Environmental Drivers	TD_C_Economic_Drivers	TD_PL_Planning/Institutional Drivers	TD_SP_Spatial Drivers
TD_S_social drivers	Pearson Correlation	1	.493**	.465**	.379*	.488**
	Sig. (2-tailed)		.003	.004	.023	.003
	N	37	34	36	36	36
TD_E_Environmental Drivers	Pearson Correlation	.493**	1	.633**	.682**	.521**
	Sig. (2-tailed)	.003		.000	.000	.002
	N	34	34	34	34	34
TD_C_Economic_Drivers	Pearson Correlation	.465**	.633**	1	.631**	.429**
	Sig. (2-tailed)	.004	.000		.000	.009
	N	36	34	36	36	36
TD_PL_Planning/Institutional Drivers	Pearson Correlation	.379*	.682**	.631**	1	.402*
	Sig. (2-tailed)	.023	.000	.000		.015
	N	36	34	36	36	36
TD_SP_Spatial Drivers	Pearson Correlation	.488**	.521**	.429**	.402*	1
	Sig. (2-tailed)	.003	.002	.009	.015	
	N	36	34	36	36	36
TI_E_Environmental Impacts	Pearson Correlation	.358	.555**	.719**	.460*	.594**
	Sig. (2-tailed)	.052	.002	.000	.010	.001
	N	30	28	30	30	30

Fig. (120) Correlation between drivers and impacts of urban growth in Siwa Oasis.

The environmental drivers could be undermined due to the lack of awareness of it's influence in shaping the UG processes. Finally, the correlation emphasizes the undermined perception of the community to the environment and economy as drivers of UG. Instead it highlights their tendency to value their significance as recipient of impacts of urban growth. This correlation illustrates the two main poles influencing the UG processes in Siwa, which are: the economy as a main driver and the environment as a main recipient of impacts. These two poles need due consideration for a balanced UG and development.

5.8 Socio-cultural influence on Siwa's interpretations:

The investigated urban growth drivers and impacts were validated through two participatory workshops; one for men and another for women. This is due to the gender separation requirement in Siwa conservative community. Even-though the sample diversity was targeted in both workshops, the gender separation influence could be mapped in the responses of each group as seen in Figure (121).

On one hand, the ladies group responses tend to be more clustered in the highlighted elliptical zones of the graphs as seen in fig. (121). This reflects the ladies' enclosure in reality and confined opinions due to their limited interactions and exposure in the conservative Siwan community. On the other hand,

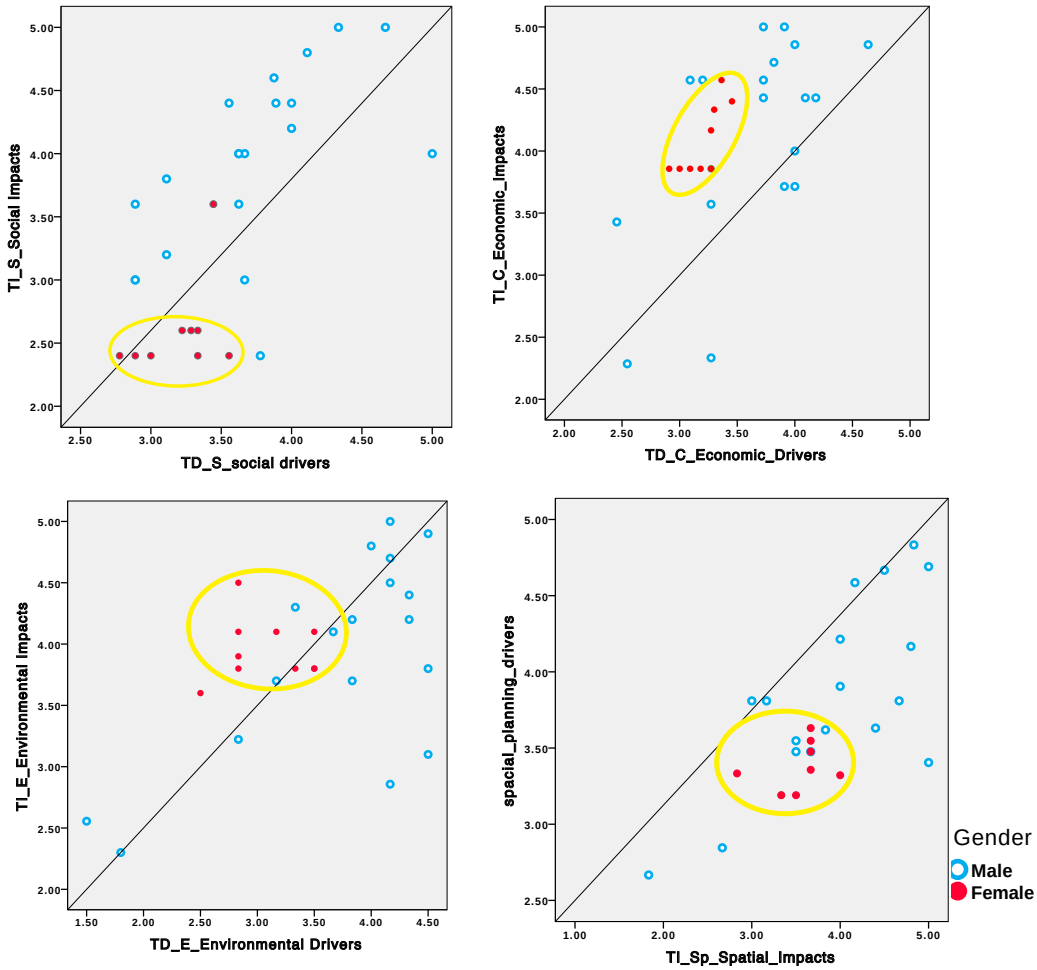


Fig. (121) Scatter diagrams of drivers and impacts revealing disparities in responses as a result of females confined exposure in Siwa.

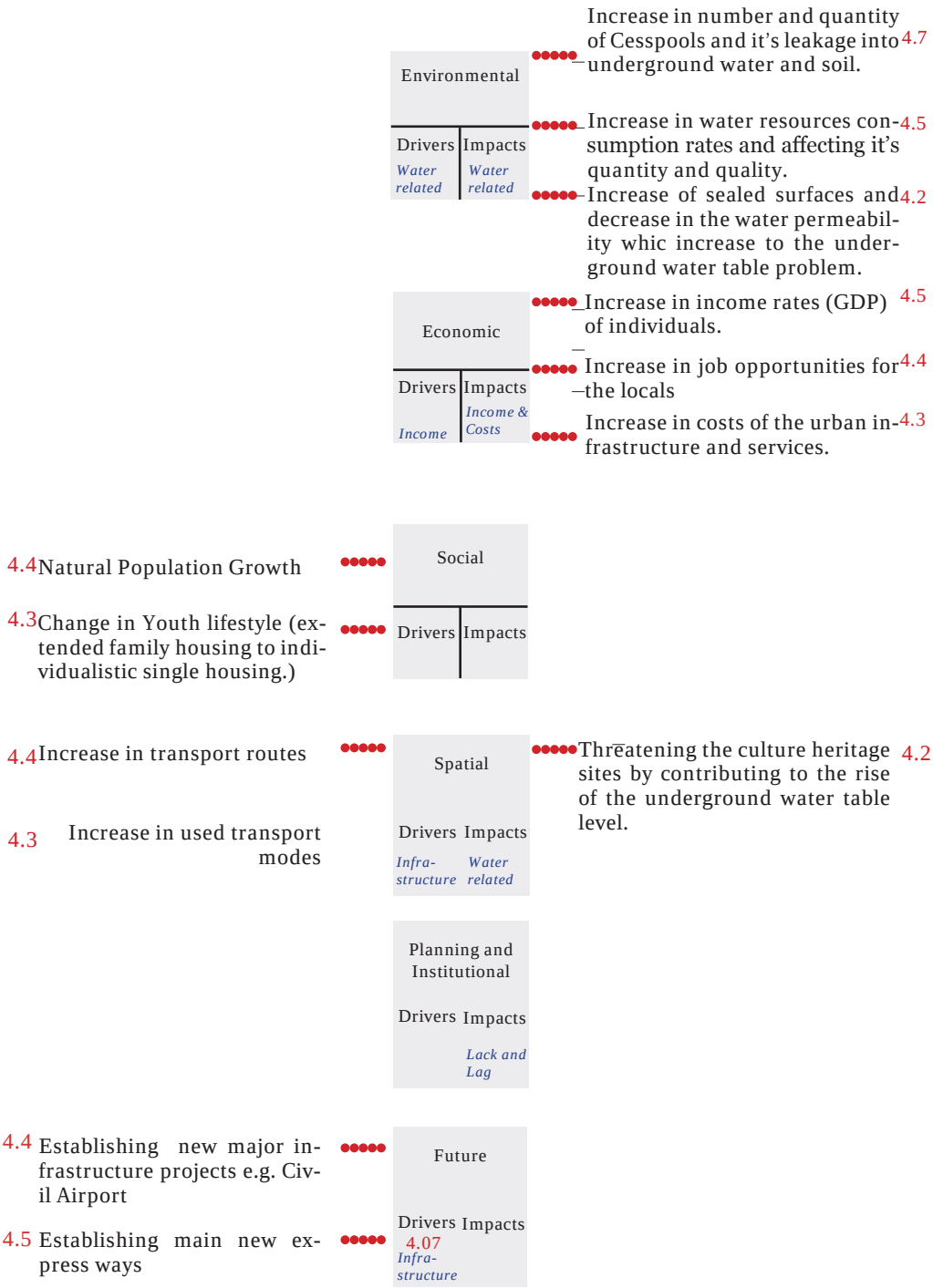


Fig. (122) Cascaded significant Drivers and Impacts of UG in Siwa Oasis.

the men group's responses tend to be more scattered; this reflects the diversity in men group opinions in Siwa due to their diverse exposure, interests perceptions and agendas in responding to the questionnaires. The disparity in exposure, awareness, accessibility to the city and social interactions between the two genders in Siwa are mapped through these scatter diagrams. It was also mapped during the discussions over the two workshop. Furthermore, they have influenced structure of the workshops as seen in appendices (1.4 and 1.5). They emphasize the need for due considerations of the strong tribal culture of Siwa that shapes the oasis and its dynamic processes.

5.9 Cascading significant drivers and impacts of UG in Siwa:

The investigated drivers and impacts of UG in Siwa Oasis were cascaded as seen in Fig. (122). The cascade targets cross linking them to pinpoint the critical rated ones that need consideration according to the local community. The natural population growth and the socio-cultural changes in the community with the urbanisation process are the main pinpointed UG drivers by the local community. The transportation infrastructure development is a main driver that foster UG in Siwa at the present and in the future. On the other hand the missing water infrastructure including the sewage and agriculture discharge network increase the threats and impacts of the Urban growth with the underground water table rise problem in Siwa. These negative environmental impacts and threats by the UG are compromised with the positive economic impacts; the increase in income rates and job opportunities.

5.10 Locally developed future outlook for Siwa :

This section presents the local community suggestions gathered over the two participatory workshops conducted in Siwa through the questionnaires (appendix section 1.10) and the focus group discussion. The suggestions by the local community for the five addressed urban ecosystem subgroups socio-cultural, environmental, economic, spatial, planing and institutional are grouped into six main points. Each of these points is emphasized as follows:

1- Coordination between stakeholders: The common suggestion of the locals in all five urban ecosystem groups is the co-ordination between the actors. For the socio-cultural preservation and development: the co-ordina-

tion between locals, tribe heads, authorities and NGOs is recommended. For the environmental preservation and development: the coordination between the natural protectorates areas and the locals is recommended. An authority is suggested to manage the environmental preservation inside Siwa Oasis in collaboration with the natural protectorates authority which is assigned for three declared protected zones outside the Oasis borders. For the economic development: the coordination between the tribe heads and investors is recommended. Finally for the spatial, planning and institutional development: a needed co-ordination between the locals, tribe heads, municipality and governorate is pinpointed. The tribe heads are key stakeholders in Siwa. Consideration for it's tribal governance is an emphasized necessity by the community. Yet, the co-ordination between the tribe heads and local youth segment and it's evolving activists involvement needs due consideration.

2- Raising awareness of the local community: The suggestions pinpointed the need for raising the awareness of the locals on the green areas necessity, agricultural lands critical situation, public streets squatting challenges, cultural and environmental preservation and the need for the integrated plans.

3-Infrastructure development: The water problem in Siwa is a critical challenge to the community and needs to be addressed. The local puts the need for Sewage system and agricultural water discharge networks at the forefront of the needed infrastructure development.

4- Economic development: Siwa has a potential for economic development and a need for increasing the individuals income and ensuring job opportunities for the youth. The locals suggest prioritizing the agricultural lands development, along with introducing untraditional industries and more tourist projects. Nevertheless, the economic development needs to be balanced with the environmental preservation for Siwa's specific culture and nature.

5- Addressing planning and land tenure challenges: The need for ensuring prior planning, land plots division and allocation is the most stressed aspect by the local community. This comes in contrast to the drivers and impacts questionnaire results, where none of the investigated planning or institutional drivers or impacts is scaled for particular significance.

The locals pinpointed their needs for:

- Prior planning, land plot allocation, infrastructure and services provision by the state at a pace that copes with the growing community needs. The lag in plans development, induces self organized developed zones by the community plans' with several impacts.

- Consideration of the local needs, culture, space and nature during plans development. This need is emphasized with critique to projects like Ebny Beitak housing project which is perceived of disregard to Siwa's context, culture or needs.

- Support and replication of successful self organised zones that fit Siwa needs and context. This includes the tribes and youth divisions' of lands that are locally developed by the community and needs consideration.

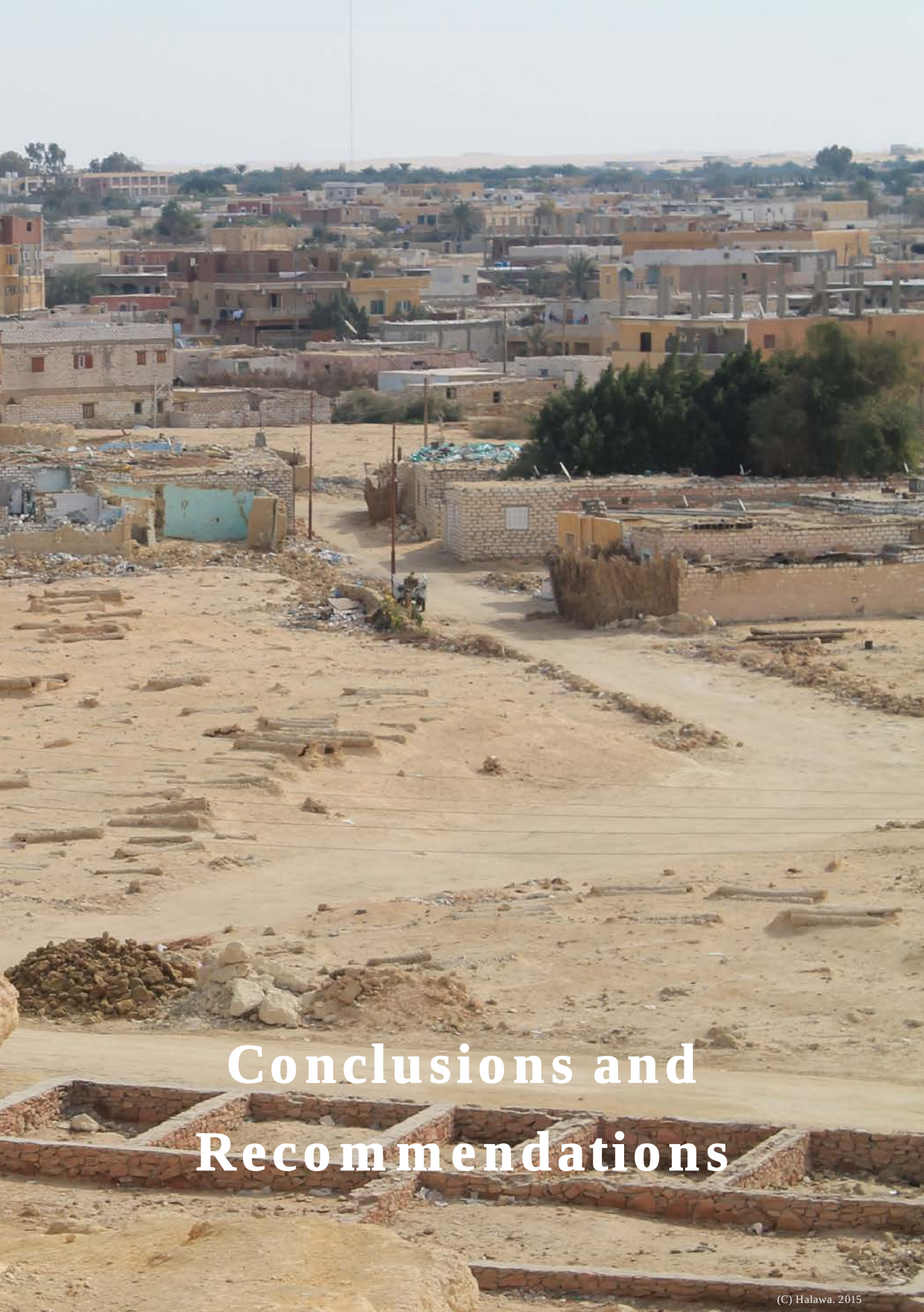
- Allocation of an industrial zone for the Oasis to overcome the interference of the growing industrial zones within the agricultural or residential urban fabric.

- Development of land use plan for the oasis. The need is stated even with an existing land use plan. This states a crucial need for co-ordination between the central government and the local levels to ensure data accessibility and use.

- Re-opening land tenure and ownership channels for the local community. This will limit the hand claim frauds and legal disputes arising from its blockage. In addition to the chain of informal land use complexities resulting from its blockage.

In conclusion, this chapter has presented the driver and impacts of UG in Siwa oasis and the ones rated as the most significant. They need to be considered in Siwa's future plans and outlook by all the users and actors. The chapter has also presented a future outlook for Siwa Oasis developed by the local community. The issues pinpointed for Siwa's future need to be considered from all users and actors and they also need to be regulated by the governing systems to ensure that the replicated structure by the reproduction system are adapted to the community's needs and sustainable development.





Conclusions and Recommendations

(C) Halawa. 2015

6 Conclusions and Recommendations

In this chapter the research concludes the investigated findings presented in response to it's objectives and questions. The research reflect on its methodology and objective to be developed by locals engagement and being shaped by them as presented in the last three chapters. Then, it shed some light on possible further research that need further investigation in Siwa.

6.1 Significance of Siwa Oasis conclusion:

The growth dynamics in Siwa are developing rapidly in the form of social restructuring as an urbanisation process and a spatial expansion that constitute the Urban Growth. The rapid growth dynamics alter Siwa's sensitive urban ecosystem. Siwa's region is characterised by geographical, ecological, environmental and historical features. It maintains regional and local biodiversity, human centred and environmental functions, and its resources are of regional importance. However, it is threatened by unrestricted development and major public facilities. These features threatens Siwa's cultural and environmental sensitivity and it's nature based economy.

6.2 Governance in shaping UG dynamics in Siwa conclusion:

Siwa is witnessing a change in the governing rules that frame the interaction between its urban ecosystem and its users and actors. Siwa's tribal governance has been a main force of shaping the oasis's Urban growth processes and its generated patterns. Over the past decades, the tribal governance in Siwa generated two expansion flow patterns from Shali area as a historic core. The two flows went in two different directions due to the tribal structure division i.e 3 western tribes and 7 Eastern tribes. Then, the tribe exclusive settlements idea generated the outlying pattern of Aghurmi village historic core. Bahy El-Din village is also composed of one tribe of Matrouh Bedouin settlers. More outlying patterns were generated at later stages over time. Thus, Siwa has passed three main phases of urban growth patterns; a historic core, an expansion pattern that is currently to sprawled outlying patterns development.

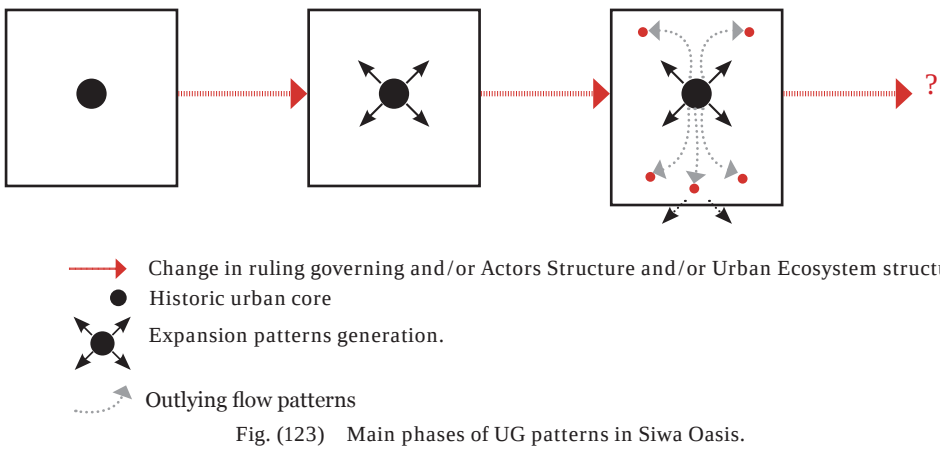


Fig. (123) Main phases of UG patterns in Siwa Oasis.

• The change in the UG patterns' and flows over time occurred as a result of the change in the structure of the actors, the urban system or their governing rules. In Siwa, the expansion flow patterns were mainly influenced by the division of the actors structure into western and Eastern tribes and their governance. The outlying patterns generated in the third phase were influenced by the change in the urban ecosystem structure and the change in governance with the ongoing modernisation processes in Siwa .The governance structure today in Siwa is as seen in Fig. (124), it is an embedded tribal governance within the state governance. In addition to the emergence of some youth activists groups. The three structures shape different process of UG in Siwa today and accordingly they generate different patterns.

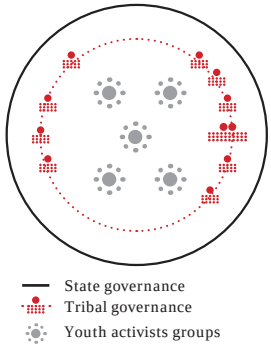


Fig. (124) Governance structure in Siwa

6.3 Processes and Patterns of Urban Growth in Siwa:

The processes of UG in Siwa are driven by three mapped actor groups: local society actor group, state actor group and an actor group of external forces.

6.3.1 Conclusions of Society driven processes:

• The society actor group generate two types of urban patterns; random and grid. The spontaneously developed random patterns are initiated by direct beneficiaries. The grid pattens (20*20m land plot divisions) are either initiated by individual initiatives of land developers or collective initiatives of tribes heads or youth activist groups.

• The direct beneficiaries driven processes generate residential land uses directly or after an intermediate agricultural use of the lands. The dispersed patterns of residential uses within the cultivated lands threatens Siwa's agricultural lands mosaic.

• The random patterns generated by the direct beneficiaries have several consequences. Some develop inaccessible zones within the settlements, and the

streets are squatted on. They resulted in legal disputes. Accordingly, the infrastructure provision is hindered. They are classified by the GOPP most of the times as informal areas. They expand in areas classified as risk zones, due to their unsuitability for construction such as wet lands and salt marshes.

• The processes started by the land developers, tribe heads, and Youth activist groups has generated land divisions of large plot sizes yet of regular grid patterns. They are developed with consideration to the locals' needs and culture as well as the state's regulations. Thus, the infrastructure provision by the state is planned at beginning of the process.

• The grid patterns developed by the society actors groups are all expanding to the south of Siwa city towards the Sand dunes. That came as a result of physical geography constraints that limit expansions to the North by the Hills plateaus as well as the military owned lands. In addition to the underground water problem that fosters seeking higher lands southern the city for expansion away from the city centre lower lands.

• Breizy, El Wafla and Oltobo areas are examples of local direct beneficiaries driven processes with random patterns. The tribe and youth land divisions southern Siwa are examples of collective initiatives driven processes that generate regular grid patterns.

• Almost all the lands developed by the local society actors have the challenge of the land tenure due to its blockage since 8 years. Thus, 95 % of the built up are state land owned by hand claim which stems from Siwa's tribal tradition.

• The society driven processes are the dominant type of settlements generation until today in Siwa. They mainly generate residential and agricultural land uses and their infrastructure. In addition to few industrial land uses.

• The local community tribe members and heads are key stakeholders in the society driven processes. The local municipality and the local branches for the Holding companies for infrastructure in Siwa are a secondary ones followed by Matrouh governorate and the central state ministries.

6.3.2 Conclusions of State driven processes:

• The state driven processes are not a prevalent type of residential land use generation in Siwa. Even though 95% of the developed lands are state owned.

• The state driven processes generated few residential, agricultural, industrial land uses. In addition to the physical infrastructure.

• The research investigated two residential settlements generated by state driven processes; Ebny Beitak in Siwa city and El Salamet in Aghurmi village.

• Ebny Beitak has a clear grid pattern, multi-storey blocks and 60-70 m2 apartments. The infrastructure was supplied after the units delivery to the locals. It's typology is not adapted to the locals needs as perceived by the community. Hereafter, some of its unit are abandoned or used by external forces.

• El Salamet village is a state driven project that is positively perceived by the locals. It's typology is adapted to the locals' needs. It's infrastructure and services were provided in the project prior to delivering it to the local community.

• The agricultural and industrial land uses generated by state driven processes are few in the Oasis. Siwa has no industrial zone, thus the prevalent pattern of these land uses is dispersed.

6.3.2.1 Infrastructure state driven processes:

• The state driven processes provide the physical infrastructure for Siwa Oasis. This include the electricity network, potable water network, irrigation water from wells and agricultural water discharge network in addition to the transportation infrastructure. There is no sewage infrastructure network in Siwa, so the locals rely on Cesspool systems.

• The electricity and transportation infrastructure provided by the state in Siwa are developed in a relatively fast pace. They facilitate the development and investments in Siwa.

• Most of Siwa is currently supplied by electricity except for the recent expansion areas developed by the society and the isolated patterns developed by the

actors group of external forces. Moreover, a solar power station is recently developed in Siwa to address the increase in needs for electricity supply especially for investments that were put on hold.

• The transportation infrastructure is witnessing fast development in Siwa. A new civil airport is under construction as well as highways that connect Siwa to Gaghboub Oasis in Libya and to Bahariya Oasis in Egypt. This development will boost the accessibility to Siwa Oasis and foster its development.

• The water supply and discharge infrastructure in Siwa Oasis are critical due to their lag behind the ongoing rapid urban growth dynamics. The lag of the water infrastructure in Siwa is threatening due to escalation of Siwa's underground water problems. Unlike most of areas in Egypt that are threatened with water shortage, Siwa is threatened by water surplus. This is due to the imbalance between the supply of the water from the informal dug wells and its discharge to the lakes of Siwa. This imbalance leads to the increase of the underground water table level and generate water saturated lands that are unsuitable for construction at lower lands in Siwa close to the city centre. This also generate lands that are challenging for agricultural land use.

• The potable water infrastructure covers most areas in Siwa. However, potable water is supplied in tanks to areas that are not yet covered yet.

• The agricultural water supply in Siwa is provided by the state through formal wells. However, the informal wells digging process still persists in Siwa and is even fostered by the land tenure blockage.

•There is no sewage system infrastructure in Siwa. Thus, the locals rely on the cesspool system that renders complex environmental impacts on Siwa's sensitive urban ecosystem.

• The agricultural water discharge network is lagging behind the expansions in agricultural land uses and the informal wells digging processes. This lag generates several impacts not only to the agricultural land uses but also to the residential and industrial ones.

• The interventions by the state representatives to solve the water problems in

Siwa have not succeeded yet and the problem needs to be addressed. It will be more challenging with further expansions fostered by the development of the other infrastructure and failure to implement the planning policies.

• The local municipality and the local branches of the infrastructure holding companies are key actors in the state driven processes. Matrouh governorate is a secondary stakeholder in this process as well as the central government ministries.

6.3.3 Conclusions of external forces driven processes:

• The actors of the external forces actor group include out-comers, investors and donors. The out-comers choose Siwa as a destination either for permanent or temporary stay. These are immigrants either international or Egyptians and visitors for tourism or work purposes. This investors in siwa develop agricultural, industrial and tourism projects. The donors have not yet generated particular land uses, instead they have collaborated with the local NGOs in some development projects.

• The processes driven by the actors of external forces groups generate dispersed patterns of urban growth in Siwa Oasis. They contribute to a sprawled urban growth patterns.

• The international immigrants prefer isolated locations on the Oasis peripheries to settle. They rely on independent infrastructure such as solar energy, potable water tanks and cesspools or wetlands for discharge.

• The investors are not bounded by an industrial zone. So the industrial investments in Siwa are dispersed within the residential land uses and urban fabric. This states an crucial need for it's definition considering the fast urbanisation and ongoing industrialisation processes.

• The agricultural land use investors seek high lands away from the city centre which are cheaper and with less challenges with the water problems in Siwa.

• The investors in Tourism prefer isolated locations in Siwa away from the vibrant city centre to serve the concepts of Eco-tourism. Also , the lands are cheaper and the challenges with the underground water problems are less.

• Most external actor groups have to involve the locals in the processes to negotiate the land ownership which is owned by the hand claim for the locals according to their tribal traditions. However, the external forces actors group have to buy the land from the state and register it to get the licenses for their investments and prove their ownership. This shows the duality of the land registration processes for out-comers in Siwa. This challenge generates some land monopolies and frauds that challenge the development in Siwa.

6.3.4 Land tenure influencing processes and patterns of UG in Siwa:

• It is concluded that the land tenure is a key challenge that influence the three types of driven processes in Siwa. Its blockage complicate the impacts of the generated patterns.

In the society driven processes, it contributed to a vice versa logic for the services and infrastructure provision. The informal areas are developed to ensure the hand claim ownership of the land plots, their infrastructure are supplied informally then formalized. The wells are dug informally because their licenses are not possible without a land registration. The sewage system project was hindered because the construction works needed some demolishing in inaccessible zones that could not be compensated due to the lack of tenure and reliance on hand claim.

In state driven process, the blockage of land tenure channels generated conflicts for the state driven processes between the locals and the state representatives. It also hindered some crucial projects like the sewage infrastructure.

In the external forces it results in threats to the external forces actors group in Siwa and duplication of land ownership procedures from the locals and the state as owners of the lands.

Accordingly, land tenure is a key knot that needs to be addressed to ensure sustainable urban growth processes and patterns by the three actor groups in Siwa Oasis. This needs to be addressed considering that dominant generation process is driven by the local society on the majority of lands that are state owned ones. Its disregard will subject the Oasis which is rapidly growing

and urbanising to face challenges similar to the chronic informal urban fabric Egypt is facing in it's Capital i.e Cairo. Hereafter, on the long run Siwa might lose its environmental and cultural quality, nature based economy and might shift from a destination that people seek retreat in, into a destination that people escape from.

6.4 Conclusions of drivers and impacts of Urban Growth:

6.4.1 Conclusions of Socio-cultural drivers and impacts of UG in Siwa:

Population growth and change in youth lifestyle are the significant socio-cultural drivers of urban growth in Siwa. These are drivers that are prevalent in Egypt. However, Siwa has a mapped specific driver that is found to be potential in its context and not prevalent in Egypt. This is the reclamation of agricultural lands and creating new housing clusters around them. This potential needs to be developed and guided.

None of the socio-cultural impacts are rated as very effective by the local community. However, those rated as effective are related to Siwa's cultural and water sensitivity. These investigated impacts reflect the persistence of Siwa community to preserve their culture.

Conclusions of Environmental drivers and impacts of UG in Siwa:

None of the investigated environmental drivers of UG in Siwa are rated as very effective by the local community. However, those rated as effective are related to the underground water problem in Siwa. The water problem fosters the abandonment of built up areas, deteriorated structures,expansions in the city and it fosters the generation of outlying sprawled UG patterns. The environmental drivers related to the loss of the agricultural lands and its conversion to built up ones are rated as moderately effective.

The significant environmental impacts of UG rated as very effective are: the increase of underground water consumption and its problem in Siwa, the increase in cesspools' negative impacts and leakage due to the missing sewage infrastructure and the increase in sealed surfaces contribution to the under-

ground water problem. The environmental impacts of UG scored the highest mean among all investigated drivers and impacts. Their significant impacts as well scored the highest frequencies on Likart scale. However, the environment is undermined by the local community as a driver for urban growth and perceived dominantly as the recipient of impacts of urban growth. The issue that states the need for raising awareness of the local community on the environment's role in shaping the oasis urban growth and development.

6.4.2 Conclusions of Environmental drivers and impacts of UG in Siwa:

None of the investigated economic impacts are rated as very effective by the local community. However, the economic drivers of UG in Siwa rated as effective are the increase in income, speculation of land appreciation and land hunger attitude. In addition to the cheap land and infrastructure prices in Siwa that attract investors and out-comers to it as well as the increase in job opportunities.

Three economic impacts are rated as very effective by the local community. These are the increase in job opportunities, individuals income as positive economic impacts. In addition to the increase in the costs of the infrastructure as a negative economic impacts of UG. It can be mapped here that the economic drivers of UG are undermined by the local community yet the economic impacts are appreciated and valued.

6.4.3 Conclusions of Spatial drivers and impacts of UG in Siwa:

The spatial drivers of UG rated as very effective by the locals are the: development in the transportation infrastructure and modes which fosters urban growth. While the significant spatial impact rated as very effective is the underground water problem threat to the cultural heritage sites, while the alternation of Siwa's scenery and identity are perceived of effective rate.

6.4.4 Conclusions of Planning and institutional drivers and impacts of UG in Siwa:

None of the planning and institutional drivers or impacts are rated as 'very effective' by the local community. Even though most of their suggestions for Siwa's future outlook are related to the planning and institutional issues. This states the need of raising of the awareness of the community on their cross linked relations. Nevertheless, some investigated planning and institutional drivers are rated as effective contributors in UG in Siwa. These are : the lag in plans development, implementation and consistency in addition to the land tenure blockage. Furthermore, the planning and institutional impacts of UG rated as effective by the community are: the inconsistent development, Hand claim ownership and the arising legal disputes.

6.4.5 Conclusions of future drivers and impacts of UG in Siwa:

The development in the transportation infrastructure and modes are the main future UG drivers perceived by the local community. Hereafter, they projected the future impacts of UG to include: linking Siwa to the outside and enhancing its accessibility, the increase in number of its users and actors, fostering the horizontal and vertical expansion of Siwa and the increase in environmental challenges of the underground water problems.

6.4.6 Conclusions of cascaded drivers and impacts of UG in Siwa:

The means of all the investigated drivers and impacts are rated as effective which states their validity and needed consideration by the different community stakeholders. The underground water problem, the water infrastructure, transportation infrastructure and economic growth are pinpointed influencers of the drivers and impacts of UG in Siwa by the locals.

6.4.7 Conclusions of correlations between drivers and impacts of UG in Siwa:

The correlations between the investigated drivers and impacts of UG in Siwa Oasis show a strong correlation between the economic drivers and the environmental impacts. Even though the economic drivers are undermined by the local community. This states the need for raising the awareness of the locals on the impacts of the economic growth on the environment if not managed.

6.4.8 Conclusions of socio-cultural influences on local perceptions of UG in Siwa:

The scatter diagrams of the participants' responses to the questionnaires reveal a disparity in perception and exposure between the males and females in Siwa. The men sample population has more diverse opinions indicating their exposure, different interests and perceptions about the drivers and impacts in Siwa. The women sample responses show their confined exposure and limited diversity in perceptions which is emphasized by the limited women mobility in Siwa, their early marriages and restricted education continuation. This disparities have been also noticed in the two workshops conducted separately for each gender to adapt to the confined traditions of Siwa.

6.5 Conclusions of Siwa Future outlook:

The workshop participants have developed some points that guide the future outlook for Siwa, they included:

• Coordination between the local society actors, state society and external actors groups is a the common suggestion for tackling all the challenges according to the locals. The involvement of the tribe heads in all suggested co-ordination between actors reflects the persistence of the tribal governance in Siwa and the its importance for the locals. However, the involvement of the Youth and co-ordination with them is a stated need which reflects the transitional governing rules' state the oasis is passing through. Hence, the structure of ruling governing systems in Siwa needs to be considered to manage a successful participatory development.

• The locals stated the need for raising the awareness of the community on the challenges they face and their capacities to address them.

• For the environmental preservation and development: The locals stated the crucial need for the sewage infrastructure implementation. In addition to the need for addressing the underground water table problem. They also state suggested a new authority to address the environmental problem inside the Oasis apart from the natural protectorates authority that is assigned for the declared protectorates zones outside Siwa Oasis.

• For the economic development: The locals stated their need for new investments that generate job opportunities.

• Even though the planning and institutional drivers and impacts were not significant in the questionnaires, the locals have stated several points to address their lag in the future. They stated their need as follows:

* The need for prior planning and implementation of plans at a pace that keeps with the community's growth in population and needs.

* The need for participatory planning and engagement of the locals.

* The need for the consideration of Siwa speciality, cultural and environmental sensitivity in the designs and plans.

* The need for replication of success models and building on the locals' initiatives such as the tribes and youth land divisions.

* The need for identifying clear land uses especially allocating an industrial zone for Siwa to limit its dispersed pattern within the residential land uses.

6.6 Conclusions on the research methodology and recommendations:

• The methodology used in this research is developed and adapted to fit the local community in Siwa and it's challenges due to the site constraints. The community of Siwa has enriched this research with their participation. Their engagement has shaped the research and it's findings as an objective.

• The established network of stakeholders during the interviews phase has helped understand the actors who shape the dynamics in the community.

• The researcher's accessibility to the female community has widened the research's understanding for the community. This is a privilege that needs to be considered for further research in the Oasis.

• The access to the community through various local stakeholders helps maintain the researcher and the research's impartial stands to all society members and authorities.

• The participatory workshops helps in validating and calibrating the collected data. They ensure the transparency of the research and are positively perceived by the locals. They creates room for discussions among the community members for the challenges they face and raise awareness on possible ways to address them.

• The workshops are more appreciated by the female sample population due to their confined exposure. Their demands for the continuation of such events imply the locals' will for knowing the challenges of their community, and their desire for being informed about them and engaged to address them as well.

• Finally, it has to be mentioned siwa's society norms and traditions are of special nature that require researchers to be well informed about and consider in designing the methodology. The impressions received from short stay visits or workshops are different from long stay ones and that needs to be considered by further researchers. The impressions of the community to foreigner is different from that to Egyptians. The researchers gender needs to be considered as well as it affects the access to the community due to Siwa's tradition. This accordingly influences the access to data and its collection methods. It is a border community with special cultural traditions and political features that require adapted methodologies.

6.7 Notes for further research:

- Scenarios development for sustainable urban growth and development in Siwa sensitive urban ecosystem need further investigation. .

•The informal settlements classification in Siwa by the GOPP is worth considering for further research. The informality topic is discussed often in Egypt on Cairo and the outward migration from the valley and Delta to it. However, informalities in desert communities such as Siwa region is not common and needs further studies for investigating its potential. Informality in Siwa can be detected in settlements built on state owned lands and within agricultural land uses.

• The land tenure as a key influencer of all the urban growth dynamics in Siwa needs further investigation and research.

• The multi-layered governance systems in Siwa needs further study. The oasis is in a transitional phase where the community is influenced by the State, the tribal governance and Youth activists.

• The self organised initiatives by the community such as the tribe and youth land divisions are proactive bottom up techniques invented by the local communities are worth further study for replication and adaptation.

• The social structures of Siwa and the influence of tourism on the "Ourf" and local traditions can be further investigated. In addition to the influence of the exposure to Non-Siwi on the behaviour of the local individuals.

• The Amazighi language survival in Siwa unlike the diminishing Nubian language in Aswan is worth further study. Moreover, its account as language barrier for fellow Egyptians that is threatened on culture and language preservation with the expected growth and urbanisation processes need investigation.

• The influence of the gender separation culture and traditions on shaping the UG dynamics of Siwa need further investigation.

• The application of the Green infrastructure concepts and alternative ways for sewage water treatments, the re-use of agricultural water discharge and the agricultural water discharge networks in Siwa, Sustainable ways for avoiding further distress of the Nubian aquifer in Egypt western desert need further investigation.

•Potential industries from the local natural resources in the Oasis such as Sand, Granite, and other natural resources need to be considered.

• Infill strategies for Siwa abandoned historic core of Shali, re-use of El-Zeitoun village and other vernacular architecture structures and cultural heritage sites in Siwa instead of their deterioration and with-hold need further investigation.

• Influence of immigration from the Nile valley and delta on Siwa's architecture, urban typology and urban fabric need further investigation.

• Questioning extreme scenarios for UG in Siwa need further investigation:

Questioning Extreme Scenarios





So where will the cross road lead the development patterns if the zero scenario is not an option in a needy rapid dynamic context?

(C) Halawa. 2015

Questioning Extreme Scenarios





Will looking up to Cairo as the urbanisation Egyptian reference diminish the agricultural identity of further places even in desert communities?

(C) Halawa. 2015



Questioning Extreme Scenarios



If it is the same governing system, blue printing with context deattachment, will it reproduce the same urban patterns over only longer multi-temporal time lines?

(C) Halawa. 2015

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List of Conferences and papers published from this research:

Two papers to be published based on this research in the proceedsing of conferences:

- Ecocity world summit in 11-13th October 2015, in AbuDhabi, UAE.
- Integrated land and water resources management in the dry areas under climate change, May 11-14th 2015, in Djerba, Tunisia.

Appendices

1.1 Interviews Map of actors

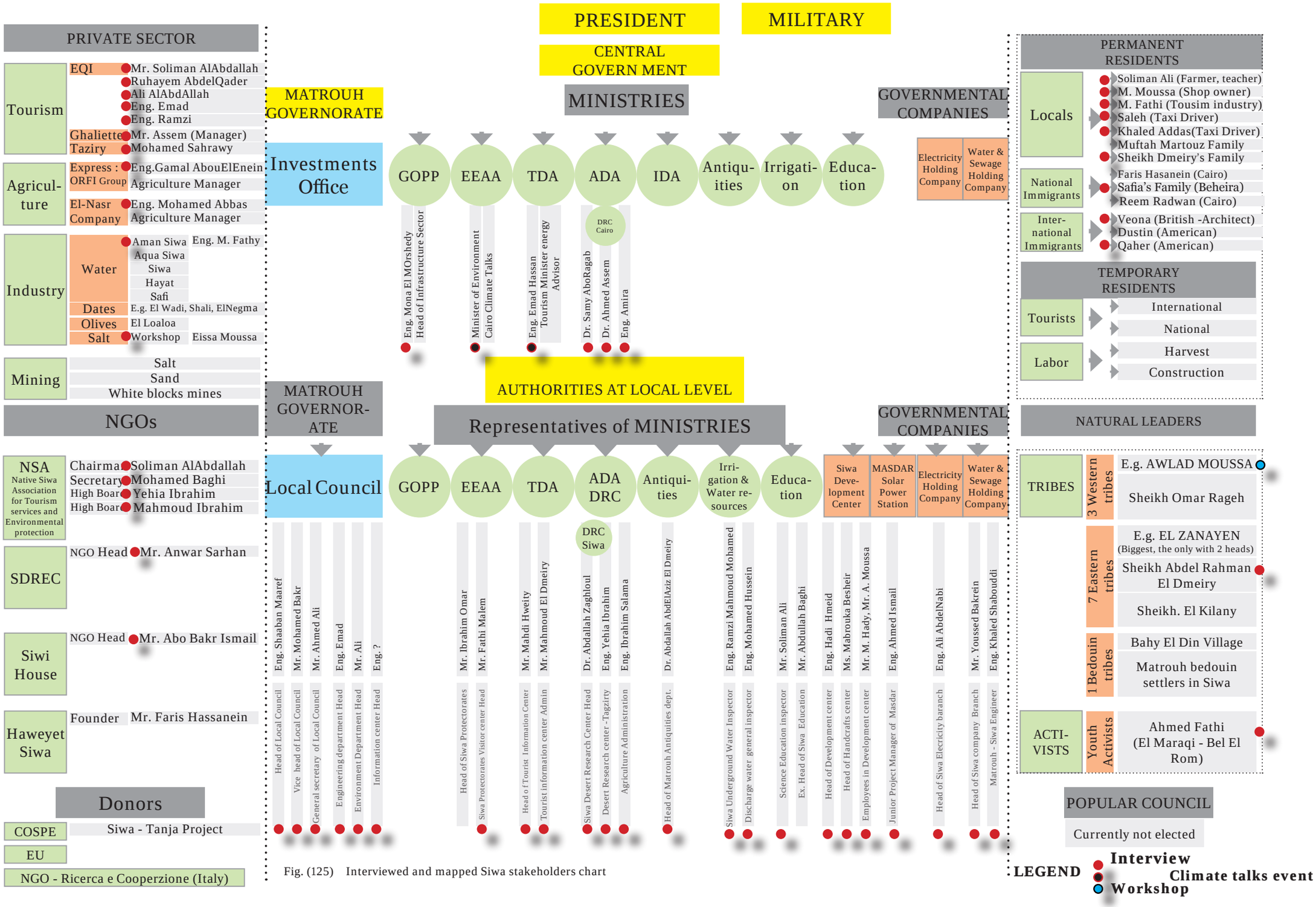


Fig. (125) Interviewed and mapped Siwa stakeholders chart

1.2 Participatory Workshop Program plan:

Location: Popular council Hall
Date:??
Program: *** START RECORDING *** PHOTOGRAPHY RESPONSIBLE

15 min: Registration - Contacts
10 min:
1 min : Introduction about the researcher
2 min : Purpose of the research
2 min : Purpose of the session
**Confirm my logic
**conform to local logic
**To make the people aware of the sequence
2 min : Present Program of the session (Elaborate how long will it last the session)
3 min : Hints & Distribution of Paper for Writing questions during presentation

** Please write any questions you have so I make it clear after the presentation.
** Considering different opinions
** This is not the last meeting, but only an understanding to be continued
** Permission of documenting the session
- Distribution of Questionnaires Papers?

45 min: Presentation:
1 min : Presentation Table of contents
3 min : Defining terms used
2 min : Purpose of the Research
3 min: Methodology in Data collection
3 min : Theory behind
3 min : Siwa Environmental and Cultural Assets brief
5 min : Drivers of Urban Growth in Siwa
1 min : Refer to Questionnaires Drivers paper
5 min : Patterns of Urban Growth in Siwa
1 min : Refer to Questionnaires Patterns Paper
5 min : Processes of Urban Growth in Siwa
1 min : Refer to Questionnaires Processes Paper
5 min : Impacts of Urban growth in Siwa
5 min : Expected further Impacts
1 min : Refer to Questionnaire Impacts Paper
1 min : Wrap up points

5 min: Questions about vague parts in the presentation
5 mins: One Questionnaire fill in sample for elaboration
Further questions please ask, if anything is not clear..! :)
Questionnaire Purpose, only data collection as a routine for research :)

15 mins: Please take 10 minutes now to share your opinion in the Questionnaire then we start the discussion afterwards! :)

————————1.5 hour————————

10 mins: Pause - Serving Catering - Juice and Cakes
45 min : Round Table Discussion
5 min : Pinning most sensitive areas on the map
10 min : Pin up for 2 points in each chart (Drivers, Patterns, Processes, Impacts)
10 min : Concluding findings
5 min : Prioritising Pin ups (labels)
5 mins : Highlighting most impact areas on the map

————————1.5 hour————————

Break 15 minutes :)

Part 2: Suggestions for measures
20 min: Round Table Brainstorming ideas/ proposals
10 min: Proposals cards Pin up in charts
5 min : Feedback on the session how to improve it.
Thanks for your time, see you in the next session :)

1.3 Participatory workshops planned Schedule

Presentation Sequence:

1 min : Presentation Table of contents
3 min : Defining terms used
2 min : Purpose of the Research
3 min : Methodology in Data collection
3 min : Theory behind
3 min : Siwa Environmental and Cultural Assets brief
5 min : Drivers of Urban Growth in Siwa
1 min : Refer to Questionnaires Drivers paper
5 min : Patterns of Urban Growth in Siwa
1 min : Refer to Questionnaires Patterns Paper
5 min : Processes of Urban Growth in Siwa
1 min : Refer to Questionnaires Processes Paper
5 min : Impacts of Urban growth in Siwa
5 min : Expected further Impacts
1 min : Refer to Questionnaire Impacts Paper
1 min : Wrap up points

1- Definitions of Title terms (Research)
* Urban Growth? * Environmentally sensitive Landscapes?
2- Purpose of the Research
3- Brief about Siwa
4- Methodology:
- Theories and Literature
- Books about Siwa
- Previous Field visits
- Interviews 4 Weeks Investigation and meeting locals
- Observations

5.1 Drivers of Growth in Siwa Oasis:
- Text
- Investigation drivers

5.2 Patterns of Growth
- Snapshot
- Developmental
- Sequential
- Macro to Micro

5.3 Processes
- Society driven Processes:
* Hand Claim
* Tribes
* Agriculture
- State Driven Processes
* Ebny Beitak
- "External" / Economic Forces
* Investments

5.4 Impacts of Urban Growth on the environmentally sensitive landscapes
** Previous and current Impacts e.g : Water:
- Environment
- Social
- Economic

** Expected further impacts and projects
- Environment
- Social
- Economic

5.5 Questions-
Missing points?
Suggestions?
Feedback?

1.4 Men workshop timeline



Fig. (126) Men Participatory workshop in Siwa 30.30.2015

Date: 30.3.2015

Location: Popular council

Attendees: 22

Duration: 2 hours and 3o minutes

Scheduled start time: 8.30 pm

Actual Start timing: 9.00 pm

Ending time: 11:30 pm

Invitation method for attendees:

- Phone calls to social network mapped and interviewed listed in Appendix section 1.3
- Personal invitations to some
- Snowballing of invitees to their social network interested or involved.

Presentation method: Prepared Slides projected.

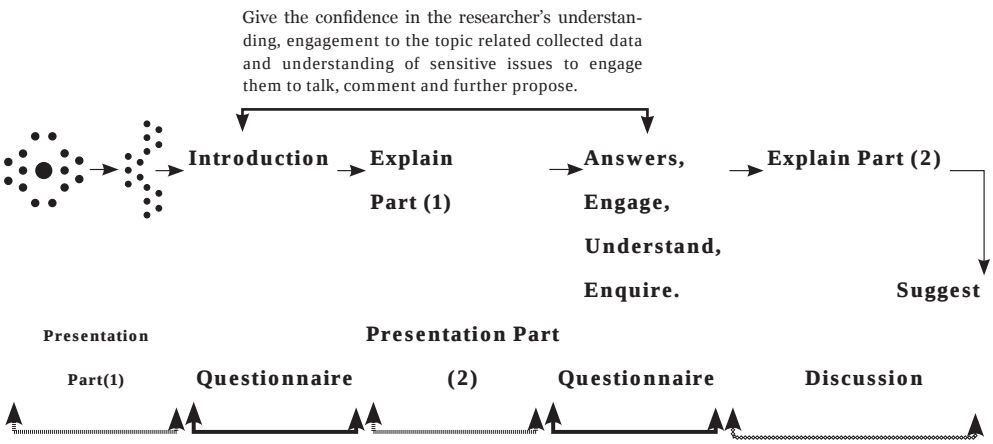
Documentation method:

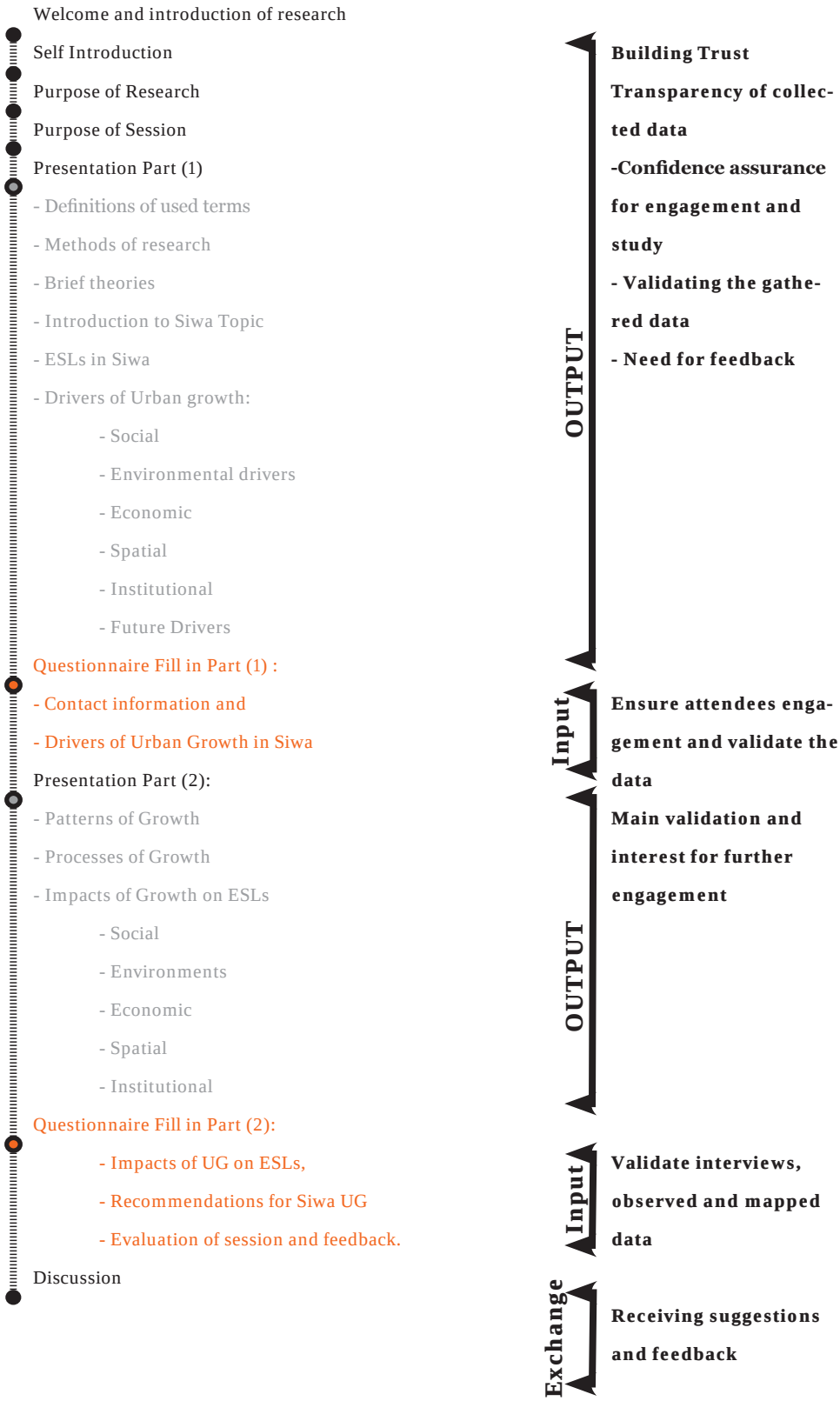
Video recording (Self set up - first 30 minutes)

Voice recording (Self set up- covering the whole workshop)

Photography snapshots (Self set up)

METHODOLOGY:




Welcome and introduction of research
Self Introduction
Purpose of Research
Purpose of Session
Presentation Part (1)
- Definitions of used terms
- Methods of research
- Brief theories
- Introduction to Siwa Topic
- ESLs in Siwa
- Drivers of Urban growth:
- Social
- Environmental drivers
- Economic
- Spatial
- Institutional
- Future Drivers
Questionnaire Fill in Part (1) :
- Contact information and
- Drivers of Urban Growth in Siwa
Presentation Part (2):
- Patterns of Growth
- Processes of Growth
- Impacts of Growth on ESLs
- Social
- Environments
- Economic
- Spatial
- Institutional
Questionnaire Fill in Part (2):
- Impacts of UG on ESLs,
- Recommendations for Siwa UG
- Evaluation of session and feedback.
Discussion
OUTPUT
Building Trust
Transparency of collected data
-Confidence assurance for engagement and study
- Validating the gathered data
- Need for feedback
Input
Ensure attendees engagement and validate the data
OUTPUT
Main validation and interest for further engagement
Input
Validate interviews, observed and mapped data
Exchange
Receiving suggestions and feedback

1.5 Time line for the ladies workshop



Fig. (127) Ladies Participatory workshop in Siwa 30.30.2015

Date: 31.3.2015

Location: Muftah Family House

Attendees: 19

Duration: 2 hours and 3o minutes

Scheduled start time: 3.30 pm

Actual Start timing: 4.30 pm

Ending time: 7:00 pm

Invitation method for attendees:

- Phone calls to one Family Friends

- Personal invitations to some

- Snowballing of invitees to their social network interested or involved.

Presentation method: Prepared Slides projected, printed maps and Charts.Documentation method:

Voice recording (Self set up- covering the whole workshop)

Photography snapshots (Self set up)

METHODOLOGY:

Presentation **Questionnaire**

Welcome and introduction of research

Self Introduction

Purpose of Research

Purpose of Session

Presentation Part (1)

- Definitions of used terms
- Methods of research
- Brief theories
- Introduction to Siwa Topic
- ESLs in Siwa
- Drivers of Urban growth:
    - Social
    - Environmental drivers
    - Economic
    - Spatial
    - Institutional
    - Future Drivers

Questionnaire Point by Point

Fill in Part (1) :

- Contact information and
- Drivers of Urban Growth in Siwa

Presentation Part (2):

- Patterns of Growth
- Processes of Growth

Questionnaire Point by Point

Fill in Part (2):

- Impacts of UG on ESLs,
- Recommendations for Siwa UG
- Evaluation of session and feedback.

Brief Discussion

OUTPUT

Building Trust

Transparency of collected data

-Confidence assurance for engagement and study

- Validating the gathered data

- Need for feedback

Exchange

-Elaborating

-Fill in

- Internal Discussions

1.6 List of men workshops invitees and status

Invitees:

Local Council- Head	Shaaban Maaref
Local Council- Vice	Mohamed Bakr
Local Council- Secretary	Ahmed Ali
Local Council- PR- Info Center	Mohamed Omran
Local Council- Engineering Dept.	Emad
Local Council- Environment Dept.	Sheikh Ali
EEAA - Protectorates	Fathi Malem
EEAA - Protectorates Head	?? Ibrahim Omar?
TDA - Head	Mahdi Hweity
TDA - Reception	Mahmoud Dmeiry
IDA / Investment?	??
Irrigation - Underground water Inspector	Ramzi Mahmoud Mohamed
Irrigation - Discharge water guidance	Mohamed Hussein
Agriculture	Ibrahim Salam
Agriculture - DRC	Dr. Abdallah Zaghloul
Agriculture - DRC	Eng. Yehia Ibrahim
Agriclture - DRC	Dr. Ahmed Assem
Antiquities	Dr. AbdelAziz El Dmeiry
Education	Abdullah Baghi
Electricity Company	Eng. Ali AbdelNabi
Water and Sewage company	Eng. Youssef Bakrein
Water and Sewage company	Eng. Khaled Ali
Solar Power Station	Eng. Ahmed Ismail?
Solar Power Station	Eng. Mustafa??
Development Center - Head	Eng. Hadi Hmeyed
Development Center- Admin	Mohamed Hady
Development Center - Admin	Ahmed Moussa
Development Center - Handcrafts	Mabrouka Beshir
EQI	Eng. Emad
EQI	Bakrein
EQI	Ruhayem Abdel Qader
EQI	Ali
Immigrant - Local (NGO)	Faris Hassanein
Immigrant - Local (Vegetables)	3m Mamoud
Immigrant - Local	Safia's Family
Immigrant - Local residents	Qaher and Reem
Tribe Heads (Zanayen- East)	Sheikh AbdelRahman Dmeiry
Tribe Heads (Westerns)	Sheikh OMar Rageh
International Immigrant	Veona??
International Immigrant	Camilla??
International Immigrant	Dustin??

Ghalliette - Manager	Assem
Ghalliette - previous farmer	Abdel Salam
Taziry	Mohamed Sahrawy
Aman Siwa - General Manager	Mohamed Fathi
Dates Company	?
Olives oil	?
Express	Eng. Gamal
El Nasr Company	Eng. Mohamed Abbas
El Nasr Company -	Admin?
NGO - NSA - Head	Soliman El Abdullah
NGO - NSA - Secretary	Mohamed Baghy
NGO - NSA	Mona
NGO -NSA	Mahmoud Ibrahim
NGO - SCDEC - HEad	Anwar Sarhan
NGO - SCDEC - Head	Leila
SIWI HOUSE-	AboBakr Ismail
Haweyet Siwa	??? Faris
Local - NSA member- Tourism	Mohamed Fathi
Local - Youth activist	Ahmed Fathi
Local - (shop)	Mohamed Mousaa
Local - (shop)	Abdallah Mousa
Local -(shop)	Awam Moussa
Local -(Taxi)	Saleh
Local - (Taxi)	Khaled Addas
Local - (Abdu Restaurant- Safari)	Snoussi
Local - Dakrour - Municipality	Osman Jana
Local - Dakrour - Agr. contractor	Fathi - Etman
Local - Dakrour- Well Digger)	Omar (
Local - Dates Shop - Negma	Ahmed
Local - Print Shop - Negma	Soliman
Local - Artist	Youssef Ibrahim
Local - Kerchief builder	Am Hamza
International Immigrant	Dustin??

1.7 Used Questionnaire format

Urban growth in environmentally sensitive landscapes

تأثير النمو العمراني علي المواقع ذات الطبائع البيئية الخاصة : واحة سيوة

Questionnaire to the local residents of Siwa
Integrated workshop for stakeholders with multidisciplinary

استبيان لسكان سيوة المحليين
ورشة عمل متكاملة لأصحاب الشأن متعددي التخصصات

Name : الإ سم : .....

Age: العمر: .....

Occupation : مهنة : .....

Phone Number : رقم الهاتف : .....

Area of Residence: منطقة الإقامة: .....

Email : البريد الإلكتروني (إن أمكن) : .....

1.Socio-cultural Drivers

١. في رأيك، إلى أي مدى تساهم هذه العوامل الاجتماعية في النمو العمراني في واحة سيوة

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
Natural Population Growth / النمو الطبيعي للسكان	○	○	○	○	○
• National Immigrants flow from the elsewhere in Egypt to Siwa. / المهاجرين المحليين إلى سيوة	○	○	○	○	○
• International Immigration for settling in dispersed in isolated settlements in Siwa. / إنتقال بعض السكان الاجانب والمغتربين للاستقرار في الواحة وبناء مباني في أماكن متفرقة	○	○	○	○	○
• Locals investments in construction to provide housing for temporary or permanent labour covering missing skills / الاستثمار العقاري لتوفير سكن للعمالة المهاجرة الدائمة والمؤقتة إلى سيوة لتوفير المهارات اللازمة	○	○	○	○	○
• Change in Youth lifestyle from marriage in extended family housing to individualistic single housing. / تغير سكن شباب حديثي الزواج من منزل الأسرة الممتدة المشترك إلى المنازل مستقلة	○	○	○	○	○
• Developing new expansion areas into Large Plot Sized divisions to fit the Siwi traditional socio-cultural life / تنمية وتقسيم الأراضي الصحراوية بمساحات قطع أراضي كبيرة	○	○	○	○	○
• Relocation from Siwa city center (market area) to expansions areas to maintain Siwi Socio-cultural privacy needs. / التخلي عن المنازل في مناطق السوق والانتقال إلى مناطق أكثر خصوصية	○	○	○	○	○
• Reclaiming new agriculture lands and creating new housing communities around it. / إستصلاح المزيد من الأراضي الزراعية وخلق مجتمعات سكنية وتوسعات حولها	○	○	○	○	○
• Shift of labor from agriculture to industrial and commercial activities that requires new building and infrastructure. / تحول المزيد من الناس من العمل في الزراعة إلى العمل التجاري والصناعي يتطلب المزيد من المباني والخدمات العمرانية الجديدة لها	○	○	○	○	○

2.Environmental Drivers contributing to UG in Siwa

٢. في رأيك، إلى أي مدى تساهم هذه العوامل البيئية في النمو العمراني في واحة سيوة

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
• Physical geography and unsuitable terrain for construction expansion constraint (Marshes and water bodies). / القيود الجغرافية و التضاريس غير المناسبة للبناء: الأراضي الرطبة والمسطحات المائية	○	○	○	○	○
• Increase of unsuitable land for construction inside Siwa resulting from underground water table level rise by agriculture discharge. / ارتفاع مستوى المياه الجوفية في سيوة بسبب تصريف الزراعة يزيد في الأراضي الغير صالحة للبناء داخل المدينة	○	○	○	○	○
• Abandoning deteriorating traditional housing due to underground water table levels rise and moving to new expansion areas. / هجرة المنازل التقليدية التي تأثرت بالرطوبة والانتقال إلى مناطق التوسعات الجديدة	○	○	○	○	○
• Escaping water saturated lands near water bodies to higher lands in new expansion areas with construction suitability. / الانتقال من الأرض المشبعة بالماء بالقرب من المسطحات المائية إلى أراض أعلى في المناطق الجديدة	○	○	○	○	○
• Converting deteriorated cultivated lands suffering from fragmentation and salinity into built up economic projects. / تحول الأراضي الزراعية التي تعاني من الملوحة والتفكك إلى مشاريع اقتصادية	○	○	○	○	○
• Converting deteriorated cultivated lands suffering from desertification into built up lands. / تحول الأراضي الزراعية التي تعاني من التصحر إلى أراضي البناء	○	○	○	○	○

١٥/٣/٣٠

م . ياسمين أحمد حلاوة

٣. في رأيك ، إلى أي مدى تساهم هذه العوامل اقتصادية في النمو العمراني في واحة سيوة

3.Economic drivers

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
الافتقار إلى خطط التنمية المنسقة Increase in the income of individuals and consequently their abilty for new construction	○	○	○	○	○
زيادة في الدخل و الأشخاص العاملين يتبعه زيادة في القدرة على بناء Government policies or services speculation (Transportation, ..etc) leading to uncoordinated urban growth patterns.	○	○	○	○	○
تكهنات سياسات الحكومة المستقبلية أو الخدمات (النقل ...الخ) مما يؤدي إلى أنماط النمو العمراني الغير منسقة Increase in land value speculation, leading to withhold of land development expecting higher land prices	○	○	○	○	○
توقع ارتفاع القيمة الأرض يؤدي إلى حجب تنمية الأراضي في انتظار تقدير أفضل Low land prices contributes to fostering urban growth	○	○	○	○	○
انخفاض أسعار الأراضي تساهم في المزيد من النمو العمراني Low urban infrastructure prices: Water, electricity, sewage, ..etc contributes to fostering urban growth	○	○	○	○	○
انخفاض أسعار البنية التحتية: المياه والكهرباء والصرف الصحي، .. الخ تساهم في النمو العمراني Loans and financial aid from some NGOs (e.g.:construction mate -rials) loans contributes to fostering urban growth.	○	○	○	○	○
التسهيلات الائتمانية والقروض من قبل الجمعيات الأهلية، مثل تسهيل مواد البناء Lack of affordable housing in other areas in Egypt attracts immigrants to settle in Siwa.	○	○	○	○	○
عدم توفر مساكن بأسعار مناسبة في مناطق أخرى تجذب الأشخاص للانتقال إلى سيوة Construction of Winter second houses in Siwa (Winter destination) by outsiders	○	○	○	○	○
الاستثمار في بيوت الشتاء الثانية في سيوة من قبل بعض الناس Higher value and return on investments of built up land, encourages people to covert the agriculture lands to built up ones.	○	○	○	○	○
ارتفاع قيمة أراضي البناء وعائدات الاستثمار على الأراضي الزراعية، وتشجع بعض الناس على البناء الأراضي الزراعية The Construction of new housing, industrial an agricultural areas	○	○	○	○	○
إقامة مناطق تجمعات سكنية و صناعية وزراعية وصناعية جديدة	○	○	○	○	○

٤. في رأيك، إلى أي مدى تساهم هذه العوامل التخطيطية / المؤسسية في النمو العمراني في واحة سيوة

4.Planning and Institutional Drivers contributing to UG in Siwa

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
عدم كفاية تناسق سياسات التخطيط التي جربت جيدا وتم اختبارها بنجاح في الواحة	○	○	○	○	○
اختلافات خطط التنمية الحكومية من مكان لآخر Lack of coordination between planning policies and tested plans for the oasis.	○	○	○	○	○
عدم فعالية تطبيق المخططات Varying government development plans from one area to another	○	○	○	○	○
يجد مطوري الأراضي اللوائح العامة للمدينة أقل خارجها، بالتالي أكثر ملاءمة للبناء الجديد Inefficient implementation of planning policies	○	○	○	○	○
المنازعات القانونية :مشاكل الملكيات – مشاكل التقسيم- مشاكل المستأجرين Lack of land tenure or registration channels by the state	○	○	○	○	○
حيازة اليد والمطالبة، والصعوبة في تسجيل الأراضي، تعزز التمدد والنمو العمراني غير المنسق. 6.Spatial Drivers	○	○	○	○	○
نقص قنوات تسجيل ملكيات الأراضي	○	○	○	○	○

برنامج ماجستير العمران المتكامل و التصميم المستدام
كلية الهندسة. جامعة عين شمس. القاهرة

٥. في رأيك، إلى أي مدى تساهم هذه العوامل المكانية في الزحف العمراني في واحة سيوة

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
زيادة طرق النقل مثل الطرق السريعة والطرق السريعة والطرق داخل المدينة يساهم في التوسع العمراني. Increase in transport routes, whether highways, express ways, or roads inside the city contributing to urban growth	○	○	○	○	○
زيادة وسائل النقل (للمزيد من الدراجات النارية والسيارات، .. الخ) في المدينة يساهم في التوسع العمراني Increase in used transport modes in the city (motorcycles, cars, ..etc) contribute to the horizontal urban expansions	○	○	○	○	○
ضوابط الحكومة للنمو الرأسي (ارتفاعات المباني) بسبب ضيق عرض الطريق في أجزاء المدينة القديمة مما يساهم في الامتداد الأفقي Government's restriction of vertical growth (building heights) in old city parts narrow of street widths, fosters horizontal expansion.	○	○	○	○	○
الاتجاه للتوسع والبناء أكثر من إستغلال المباني تماماً داخل المدينة قبل بناء الجديد خارجها Preference of expansion and new buildings rather than full use of inner city buildings before building new expansion areas.	○	○	○	○	○
قلة إعادة استخدام الأراضي و الهياكل القديمة، للحفاظ عليها، و تفضيل بناء على أراض جديدة بدلا Preference of new constructions in expansion lands instead of old structures renovation to maintain the old location.	○	○	○	○	○
الحاجة لاستصلاح الأراضي جديدة خارج المدينة والإنتقال أو بناء الإقامة الجديدة المرفقة Need for reclaiming new lands outside the city and constructing new affiliated residence areas to it	○	○	○	○	○

7.Future Drivers contributing to UG in Siwa contributing to UG in Siwa

٧. في رأيك، إلى أي مدى سوف تساهم هذه العوامل المستقبلية في النمو الحضري في واحة سيوة.

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
Establishing new major infrastructure projects e.g. Civil Airport / مشروعات البنية تحتية رئيسية جديدة مطار مدني	○	○	○	○	○
Establishing Main new express ways / مشروعات الطرق الرئيسية السريعة الجديدة	○	○	○	○	○
Establishing New urban services: power stations..etc / مشروعات الصناعات جديدة	○	○	○	○	○
Establishing New industrial projects / مشروعات سياحية جديدة	○	○	○	○	○
Establishing New Tourist projects / استصلاح الزراعات جديدة مع الخدمات العمرانية الملحقة بها	○	○	○	○	○
Establishing New land reclamation projects with affiliated urban services needed / خدمات حضرية جديدة: محطات توليد الطاقة، .. الخ	○	○	○	○	○

How do these future drivers will contribute to the urban growth in Siwa Oasis

كيف تتوقع مساهمة تلك العوامل المستقبلية في النمو والتوسع العمراني في سيوة ؟

- .....
- .....

8.Socio-cultural Impacts

٨. في رأيك، إلى أي مدى قد يؤدي النمو العمراني لهذه التأثيرات الاجتماعية والثقافية في سيوة ؟

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
Threatening lives of residents of expansion area due to con -structing expansions in unsuitable lands (Marshes or Lakes). / التأثير على الروابط الاجتماعية بين أفراد المجتمع، بسبب بعد المسافات بينهم	○	○	○	○	○
Affecting the social life and public health of the inhabitants. / فقدان الأراضي الزراعية، ويكون له تأثير على نمط الحياة التقليدية	○	○	○	○	○
Weakening the social bonds among families due to bigger travel distance between them. / التأثير على ثقافة وتقاليد الواحة	○	○	○	○	○
Affecting the culture and traditions of the Oasis (Urbanization influence) / تهديد سلامة سكان مباني التوسعات في الأراضي الرطبة، بهياكل غير مناسبة و معرضة لخطر الانهيار	○	○	○	○	○
Abandoning agriculture lands affects the social pat terns of the traditional Siwi Lifestyle related to it / التأثير على الصحة العامة والاجتماعية	○	○	○	○	○

9.Environmental Impacts

٩. في رأيك، إلى أي مدى قد يؤدي النمو الحضري لهذه التأثيرات البيئية في واحة سيوة ؟

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
Increase in number and quantity of Cesspools untreated sewage water discharge, it's leakage into underground water and soil. / زيادة عدد وكمية تصريف مياه الصرف الصحي غير المعالجة بالطرق التقليدية، وتسرب أجزاء منها إلى والتربة المياه الجوفية	○	○	○	○	○
Increase in the risk of mixing sewage water with the under -ground water used for drinking (potable). / زيادة خطر خلط مياه الصرف الصحي مع المياه الجوفية الصالحة للشرب	○	○	○	○	○
Loss of agriculture lands, and crops yields from it (Converted to built up lands). / فقدان الأراضي الزراعية والمحاصيل و الناتجة منها	○	○	○	○	○
Fragmentation of agriculture lands by building on it and affecting its productivity. / تجزئة و تفتيت كتل الأراضي الزراعية بالبناء و التأثير على انتاجيتها	○	○	○	○	○
Wind flow channels blockage due to the increase of buildings density and asphalt surfaces, leading to temperature rise. / حجب المزيد من قنوات الرياح، وزيادة في كثافة المباني، والمزيد من مسطحات الأسفلت مما يؤدي إلى زيادة في درجات الحرارة	○	○	○	○	○
Increase of sealed surfaces/asphalt, decrease in it's water permeability adds up to the underground water table problem. / زيادة المسطحات المغلقة / الأسفلت، وانخفاض نفاذية المياه داخل الأرض أو البخر ، مما يضيف إلى مشكلة المياه الجوفية	○	○	○	○	○
Increase in water resources consumption rates and affecting it's quantity and quality. / زيادة نسب استهلاك للموارد المائية، والتأثير على النوعية والكمية	○	○	○	○	○
Increase in land resource consumption rates and affecting it's quantity and quality. / زيادة نسب استهلاك لمورد الأرض	○	○	○	○	○
Increase in construction materials consumption rates / زيادة نسب استهلاك مواد البناء	○	○	○	○	○
Loss of environmental systems and wild life. / فقدان النظم البيئية والحياة البرية	○	○	○	○	○

10.Economic Impacts

١٠. في رأيك، إلى أي مدى قد يؤدي النمو الحضري لهذه التأثيرات الاقتصادية في واحة سيوة.

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
Increase in Income rates (GDP) of individuals. / زيادة في دخل السكان	○	○	○	○	○
الصناعات، والمشاريع السياحية، واستصلاح الأراضي توفر المزيد من فرص العمل للسكان المحليين	○	○	○	○	○
Loss of agriculture lands affects the self sufficiency / تأثير فقدان الأراضي الزراعية على من الاكتفاء الذاتي	○	○	○	○	○
Loss of agriculture lands affects the economic stability / تأثير فقدان الأراضي الزراعية على الاستقرار الاقتصادي	○	○	○	○	○
Increase in costs of the urban infrastructure and services (due to the urban growth/ (sprawl/expansion) / تغير العمالة من الزراعة إلى الأنشطة الصناعية والتجارية	○	○	○	○	○
Shift of labour force from agriculture to industrial and commercial activities / زيادة في تكاليف أنظمة البنية التحتية الحضرية بسبب الزحف العمراني	○	○	○	○	○
Increase in job opportunities for the locals of more industrial, tourist projects, and land reclamation projects / زيادة في تكلفة الخدمات العامة: المواصلات والكهرباء المياه...إلخ	○	○	○	○	○

١١- في رأيك، إلى أي مدى يمكن ان يؤدي النمو العمراني إلى هذه الاثار المكانية و التخطيطية؟

11.Spatial Impacts

	مؤثر جدا	مؤثر	معتدل	مؤثر ضعيف	لا يؤثر
Expansion of the urban growth in dispersed and scattered lands in the oasis. / امتداد الزحف العمراني على أراضي متفرقة ومتناثرة في الواحة	○	○	○	○	○
Fragmented urban growth and urban development / حدوث نمو عمراني مجزأ وتنمية عمرانية مجزأة	○	○	○	○	○
Blockage of the panoramic view of the cultivated areas from some points in the Oasis (Dominant Siwa scenery Identity). / حجب المشهد البانورامي للأراضي المزروعة في واحة سيوة من بعض الموا قع	○	○	○	○	○
Blockage of the panoramic view of some monuments and cultural heritage sites from some view points in the Oasis. / حجب المشهد البانورامي للمواقع الأثرية و التراث الثقافي في واحة سيوة من بعض المواقع.	○	○	○	○	○
Altering the natural landscape scenery and aesthetics of Siwa Oasis / تغييرالمناظر الطبيعية و جماليات واحة سيوة	○	○	○	○	○
Threatening the culture heritage and monumental sites by contributing to the rise of the underground water table level. / المساهمة في ارتفاع مستوى المياه الجوفية ، وتهديد المزيد من المباني ، الأثرية ومواقع التراث الثقافي	○	○	○	○	○

is there any other urban growth impacts that were not mentioned ? If yes, please mention / هل هناك أي تأثيرات أخرى النمو عمراني لم تذكر؟ إذا كانت الإجابة بنعم الرجاء ذكرها

- .....

what are you suggests for managing and dealing with impacts of urban growth for developing siwa on integrated, coordinated development through the different community members of siwa / ما هي اقتراحاتك لإدارة و التعامل مع آثار النمو العمراني وتنمية سيوة تنمية متكاملة متناسقة بين مختلف أفراد المجتمع في واحة سيوة ؟

Social and cultural impacts / الاجتماعية والثقافية
- .....
- .....

Environmental impacts / البيئية
- .....
- .....

Economic impacts / الاقتصادية
- .....
- .....

Spatial impacts / المكانية
- .....
- .....

Institutional and planning impacts / التخطيطية / المؤسسية
- .....
- .....

Evaluation / التقييم :

What this session useful for your understanding to the impacts of urban growth in Siwa Oasis / هل اضافت هذه الجلسة لمعلوماتك عن تأثيرات النمو العمراني في واحة سيوة ؟ ○ نعم ○ لا

No ○ ○yes / اذا كان الجواب نعم ، كيف كان ذلك مفيدا ؟

If yes, How was it useful
- .....

How to improve this session next time / ماذا تقترح لتحسين هذه الدورة في المرة القادمة ؟

1.8 Questionnaire frequencies processed in SPSS:

1.8.1 Workshops participants positions

Frequencies : POSITIONS

Position Statistics

N	Valid	37
	Missing	0

Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Municipality-Head	1	2.7	2.7	2.7
	Municipality-General-Secretary	1	2.7	2.7	5.4
	Municipality-Head of PR&Media	1	2.7	2.7	8.1
	Local-Handcraft ShopOwner	1	2.7	2.7	10.8
	Local-teacher	3	8.1	8.1	18.9
	Local-Driver	2	5.4	5.4	24.3
	Local-Student	8	21.6	21.6	45.9
	Local-Staying home mum	5	13.5	13.5	59.5
	Head of Tribe	1	2.7	2.7	62.2
	Local Activist	1	2.7	2.7	64.9
	NGO-Executive manager ESA	1	2.7	2.7	67.6
	AGR-DRC Agricultural Engineer	1	2.7	2.7	70.3
	AGR-Association	1	2.7	2.7	73.0
	INDUSTRY-Water-AMan Siwa Manager	1	2.7	2.7	75.7
	INFRA-Water&Sewage holding company engineer	1	2.7	2.7	78.4
	Development Center Head (Dates,Handcrafts)& Tourism	1	2.7	2.7	81.1
	EEAA-Protectorates Head or Employee	2	5.4	5.4	86.5
	Environmentalist	1	2.7	2.7	89.2
	CULT-HERITAGE-Beit Siwi Head	1	2.7	2.7	91.9
	Local	1	2.7	2.7	94.6
	Municipality-Admin	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

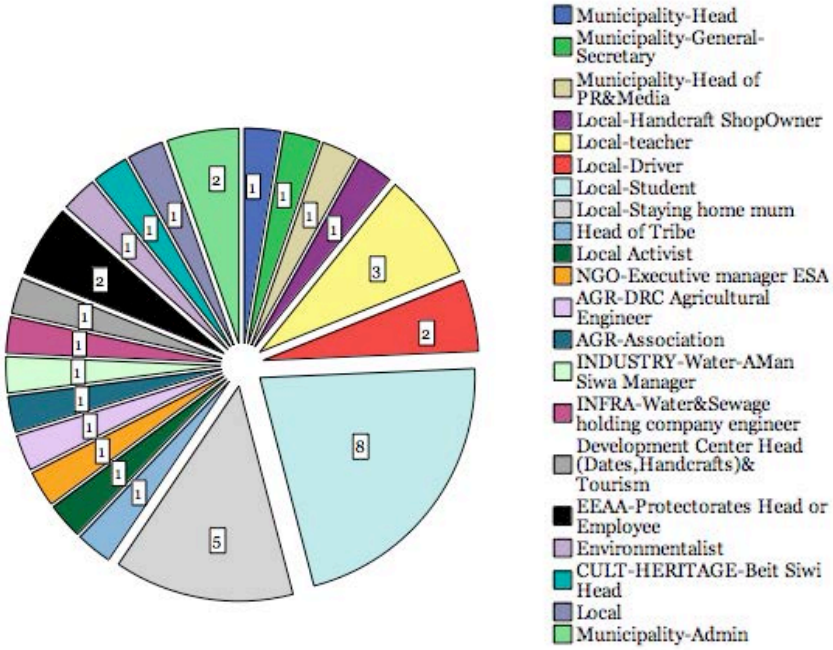
1.8.2 Workshops participants actor groups

Stakeholder

N	Valid	37
	Missing	0

Stakeholder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Municipality	5	13.5	13.5	13.5
	Local	20	54.1	54.1	67.6
	Head of Tribe	1	2.7	2.7	70.3
	Local Activist/Natural Leader	1	2.7	2.7	73.0
	NGO	1	2.7	2.7	75.7
	Agriculture	2	5.4	5.4	81.1
	Industry -Water	1	2.7	2.7	83.8
	Infrastructure-Water&Sewage	1	2.7	2.7	86.5
	Development Center (Local Development)	1	2.7	2.7	89.2
	EEAA- Protectorates	2	5.4	5.4	94.6
	Environmentalists	1	2.7	2.7	97.3
	CultureHeritage-BeitSiwi	1	2.7	2.7	100.0
	Total	37	100.0	100.0	



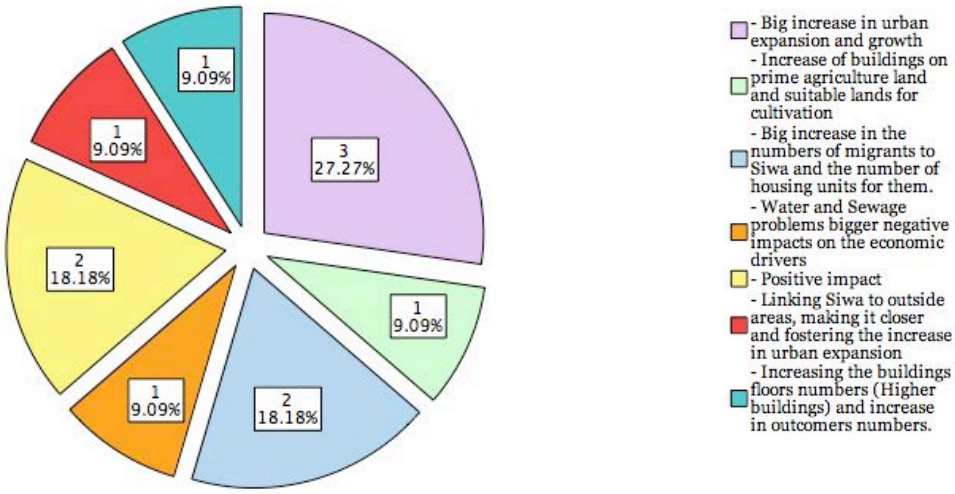
1.9 Open Ended Questions frequencies from the questionnaire

1.9.1 Expected contributions of drivers into future urban growth:

Statistics

OPENQ_Expected contribution

N	Valid	11
	Missing	26

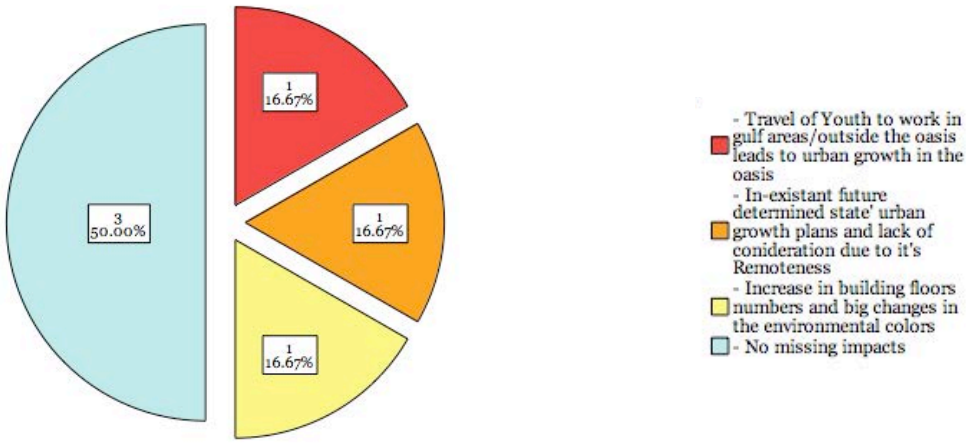


1.9.2 Missing impacts not mentioned in questionnaire

Statistics

OPENQ-Missing Impacts

N	Valid	6
	Missing	31



1.10 Future suggestions open ended questions frequencies

1.10.1 Social local future suggstions

N	Valid	12
	Missing	25

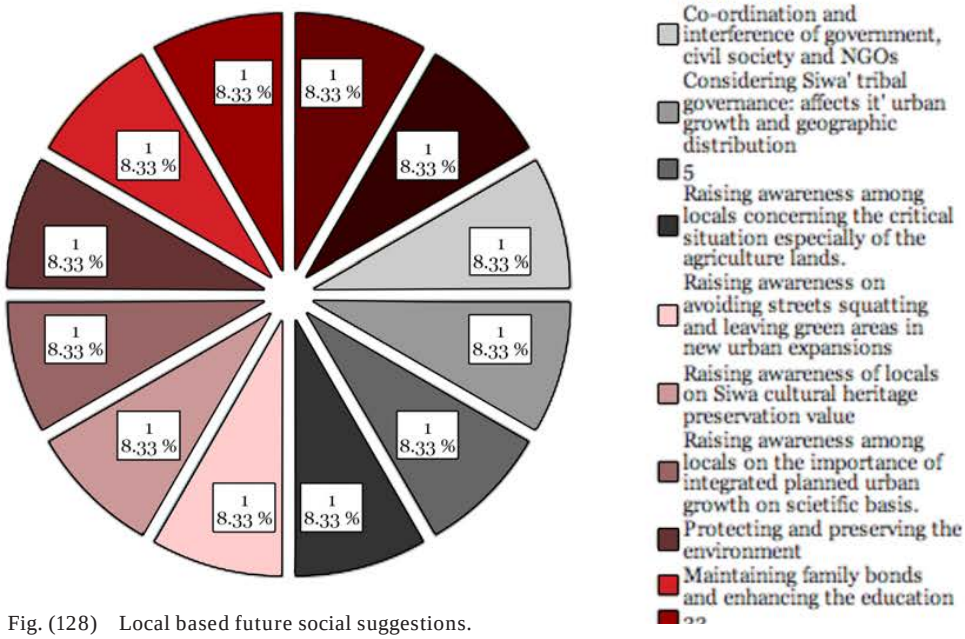
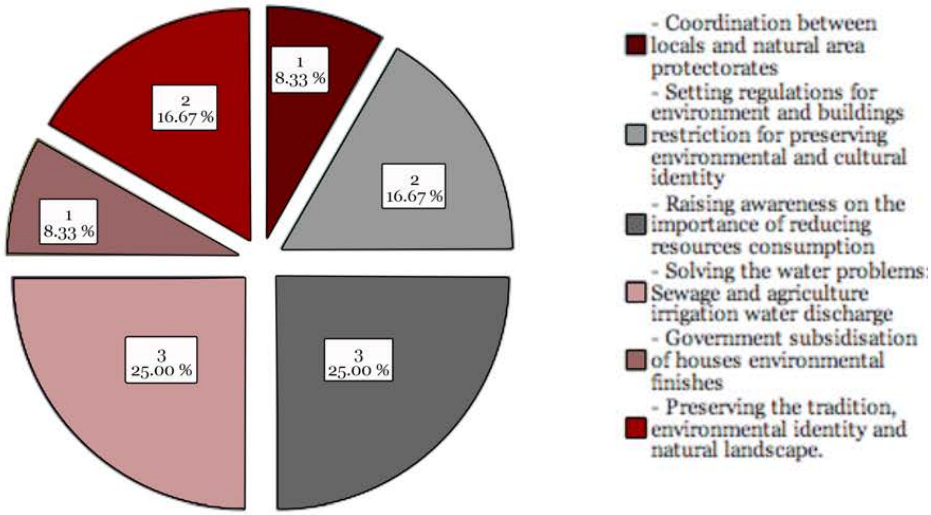


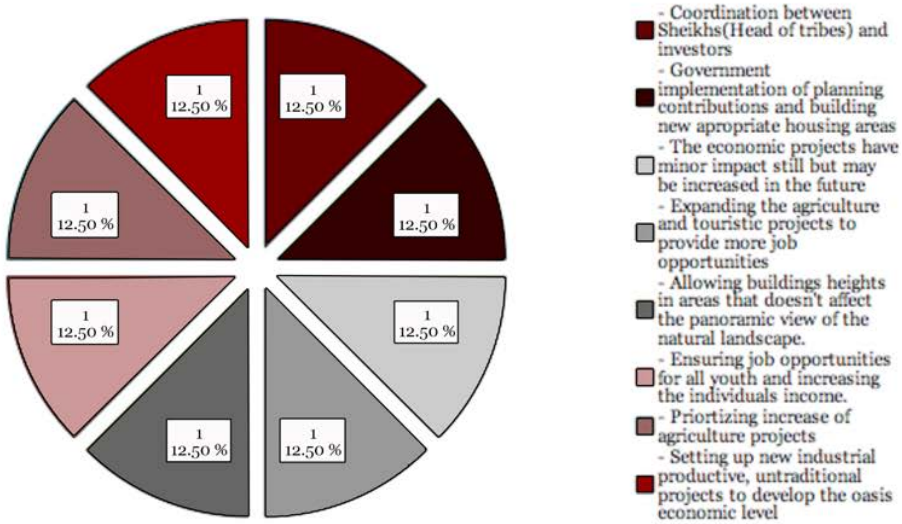
Fig. (128) Local based future social suggestions.

1.10.2 Environmental local future suggestions

		OpenQ-Environmental_Suggestions	OpenQ-Economic_Suggestions	OpenQ-Spatial_Suggestions	OpenQ-Planning/Institutional_Suggestions	OPENQ-Benefits	OPENQ-Recommendations for next sessio
N	Valid	12	8	7	11	18	17
	Missing	25	29	30	26	19	20

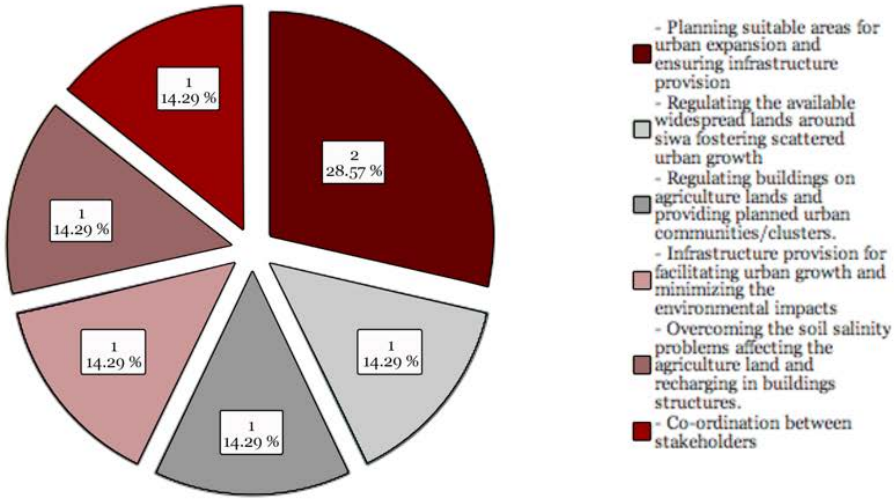


1.10.3 Economic local future suggestions



1.10.4 Spatial local future suggestions

e



1.10.5 Locals future Planning and institutional suggestions:

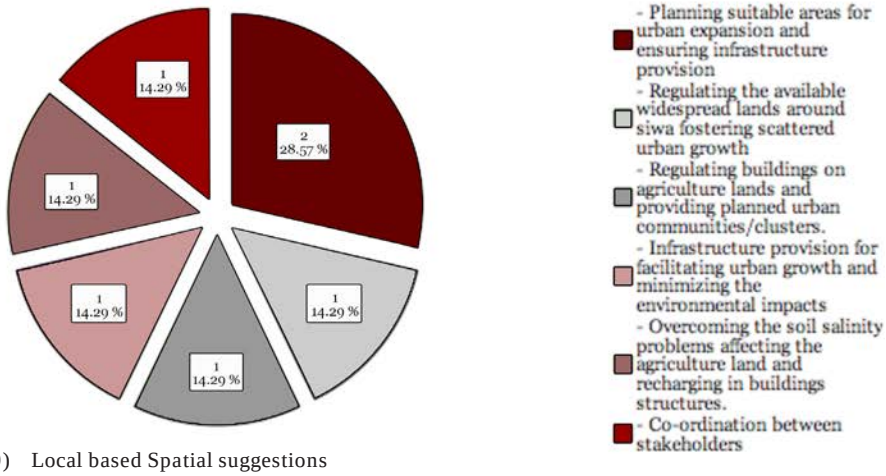


Fig. (130) Local based Spatial suggestions

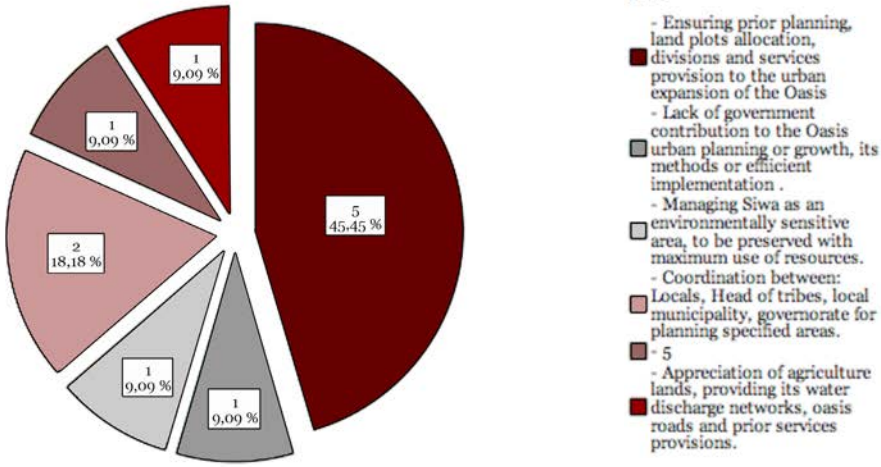


Fig. (131) Local based Planning and Institutional suggestions

1.11 FREQUENCIES OF WORKSHOP BENEFITS EVALUATION

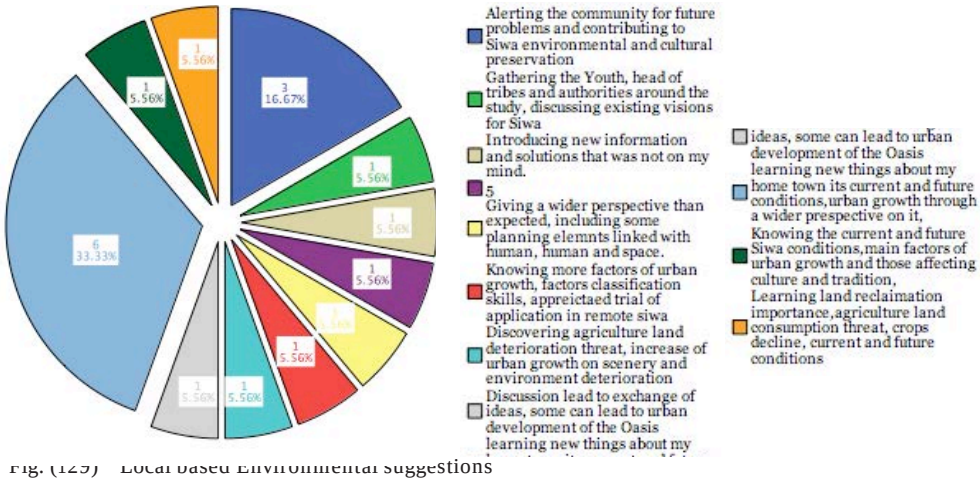
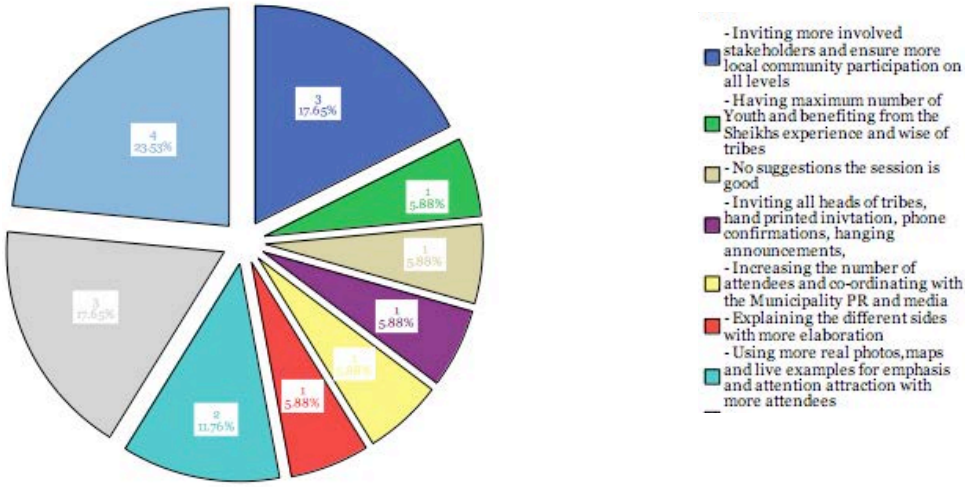
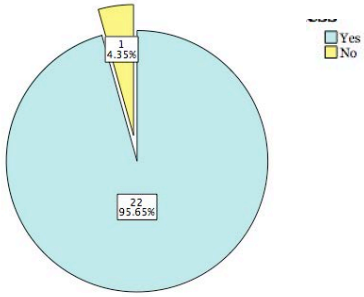


Fig. (129) Local based Environmental suggestions

1.12 FREQUENCIES FOR NEXT WORKSHOPS



1.14 FREQUENCIES OF WORKSHOP USEFULNESS EVALUATION



Statistics

YES_No_Evaluation_Usefulness

N	Valid	23
	Missing	14

1.13 QUESTIONNAIRE total LIKART SCALE ANALYSIS TABLES

1.12.1 LIKART SCALE TABLE

Mean	Likart Scale Level
1 to 1.79	No Effect (Poor)
1.8 to 2.59	Weak Effect (Weak)
2.6 to 3.39	Moderate (Good)
3.4 to 4.19	Effective (Very Good)
4.2 to 5	Very Effective (Excellent)

1.15 Social drivers

Q. #	Variables	Freuencies	Very Effective	Effective	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
1	Population Growth	Count	14	20	1	-	-	2	4.37	Very Effective
		%	37.8	54.1	2.7	-	-			
	Local Immigration	Count	11	17	2	6	-	1	3.92	Effective
		%	29.7	45.9	5.4	16.2	-			
	Foreigners Dispersed Growth	Count	2	5	6	17	7	0	2.41	Weak Effect
		%	5.4	13.5	16.2	45.9	18.9			
	Labor Housing Investment	Count	16	6	10	3	1	1	3.92	Effective
		%	43.2	16.2	27	8.1	2.7			
2	Youth_Invidividualistic_Housing	Count	19	13	2	3	-	0	4.30	Very Effective
		%	54.1	35.1	5.4	5.4	-			
	Large_Plot_Divisions and sizes	Count	10	6	9	9	3	0	3.3	Moderate
		%	27	16.2	24.3	24.3	8.1			
	Abandoning marketplaces for Privacy	Count	9	4	12	9	3	0	3.19	Moderate
		%	24.3	10.8	32.4	24.3	8.1			
	Reclaiming_lands_with_new_expansion_communities	Count	8	5	21	1	2	0	3.43	Effective
		%	21.6	13.5	56.8	2.7	5.4			
	Shift from agriculture to industry/commercial activities, and affiliated urban services and structures	Count	7	5	9	12	1	3	3.15	Moderate
		%	18.9	10.8	24.3	35.1	2.7			
	SOCIAL DRIVERS	Count							3.55	Effective
		%								

1.16 Environmental drivers

Q. #	Variables	Freuencies	Very Effective	Effective	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
	Physical Geography and terrain	Count	9	8	1	12	4	3	3.18	Moderate
		%	26.47	23.53	2.94	35.29	11.76			
	Underground water table level rise	Count	10	9	6	8	-	4	3.64	Effevtive
		%	30.3	27.27	18.18	24.24	-			
	Abandoning deteriorated traditional housing and moving to expansion areas	Count	12	15	4	1	2	3	4	Effective
		%	35.29	44.12	11.76	2.94	5.88			
	Moving from water saturated lands near water bodies to higher lands in new areas	Count	7	18	3	3	3	3	3.68	Effective
		%	20.59	52.94	8.82	8.82	8.82			
	Converting agriculture land suffering from salinity and fragmentation into economic investments	Count	4	9	6	12	3	3	2.97	Moderate
		%	14.71	23.53	17.65	35.29	8.82			
	Converting agriculture land suffering from desertification to built up land	Count	5	7	14	4	3	4	3.21	Moderate
		%	18.18	21.21	39.39	12.12	9.09			
	ENVIRONMENTAL DRIVERS	Count						3	3.46	Effective
		%								

1.17 Economic drivers

Q. #	Variables	Freuencies	Very Effective	Effective	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
	Lacking coordinated development plans	Count	10	10	8	3	5	1	3.47	Effective
		%	27.78	27.78	22.22	8.33	13.89			
	Increase in income of individuals and ability for new construction	Count	11	13	9	1	2	1	3.83	Effective
		%	30.56	36.11	25	2.78	5.56			
	Speculating government policies, services (Transportation..etc) leading to immature urban growth patterns	Count	7	20	4	2	1	3	3.88	Effective
		%	20.59	58.82	11.76	5.88	2.94			
	Speculating increase of land value leading to withhold of land development expecting higher land prices	Count	13	15	4	2	2	1	3.97	Effective
		%	36.11	41.67	11.11	5.56	5.56			
	Low land prices fostering urban growth	Count	11	15	6	2	2	1	3.86	Effective
		%	30.56	41.67	16.67	5.56	5.56			
	low urban infrastrcture prices: Water, electricity, sewage, ..etc fostering urban growth	Count	5	9	16	4	2	1	3.31	Moderate
		%	13.89	25	44.44	11.11	5.56			
	Loans and financial aid from some NGOs, e.g.: construction materials loans	Count	6	11	6	8	3	3	3.26	Moderate
		%	17.65	32.35	17.65	23.53	8.82			
	Lack of affordable housing in other areas attracting immigrants to reside in Siwa	Count	12	11	4	7	1	2	3.74	Effective
		%	34.29	31.43	11.43	20	2.86			
	Investments in Winter second homes by outsiders	Count	3	5	7	18	3	1	2.64	Moderate
		%	8.33	13.89	19.44	50	8.33			
	Higher value of built up land and investments return compared to agriculture landsone encourages people to build on it	Count	4	11	11	8	2	1	3.19	Moderate
		%	11.11	30.56	30.56	22.22	5.56			
	Constructing new housing, industrial and agricultural areas	Count	7	23	1	5	-	1	3.89	Effective
		%	19.44	63.89	2.78	13.89	-			
	ECONOMIC DRIVERS	Count						1	3.55	Effective
		%								

1.18 Planning and institutional drivers

Q. #	Variables	Freuencies	Very Effective	Effective	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
	Lack of coordination between planning policies and tested plans	Count	9	23	1	2	1	1	4.03	Effective
		%	25	63.89	2.78		2.78			
	Varying government development plans from one area to another	Count	5	14	7	3	7	1	3.19	Moderate
		%								
	Inefficient implementation of planning policies	Count	13	5	3	2	13	1	3.08	Moderate
		%								
	Land developers tendency to build outside the city due to less public regulations outside than within the city	Count	5	10	17	1	2	2	3.43	Effective
		%								
	Legal disputes: Ownerships , land divisions, tenants problems	Count	5	14	5	8	1	4	3.42	Effective
		%								
	Hand claim ownership, difficulty in registering lands fosters urban growth and expansion	Count	12	9	2	6	6	2	3.43	Effective
		%								
	Lack of land ownership registration channels	Count	13	12	1	8	-	3	3.88	Effective
		%								
	PLANNING & INSTITUTIONAL DRIVERS	Count						1	3.5	Effective
		%								

1.19 Spatial drivers

Q. #	Variables	Freuencies	Very Effective	Effective	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
	Increase in transport highways, express ways, and roads inside the city contribute to urban growth	Count	19	14	2	-	1	1	4.39	Very Effective
		%								
	Increase in methods of transportation (More motorcycles, cars, ..etc) in the city contribute to the urban growth	Count	16	15	5	-	-	1	4.31	Very Effective
		%								
	Government restriction for vertical growth (building heights) due to narrow street widths in the old city parts fosters horizontal expansion.	Count	5	21	6	4	-	1	3.75	Effective
		%								
	Preference of expansion and new buildings rather than full use of inner city buildings before building new expansion areas.	Count	3	11	16	3	-	4	3.42	Effective
		%								
	S_ Lack of land and old structures re-use for preservation, and preference of constructing in new lands instead.	Count	3	20	4	7	1	2	3.49	Effective
		%								
	S_ Need for reclaiming new lands outside the city and moving or building a new affiliated residence	Count	5	14	15	1	1	1	3.58	Effective
		%								
	SPATIAL DRIVERS	Count						1	3.84	Effective
		%								

1.20 Future drivers

Q. #	Variables	Freuencies	Very Effective	Effecive	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
	Main new infrastructure projects e.g. Civil Airport	Count	21	11	1	1	2	1	4.33	Very Effective
		%								
	Main new express ways	Count	23	11	-	2	-	1	4.53	Very Effective
		%								
	New industrial projects	Count	16	10	6	3	1	1	4.03	Effective
		%								
	New Tourist projects	Count	20	7	6	-	3	1	4.14	Effective
		%								
	New land reclamation projects with affiliated urban services needed.	Count	11	12	2	-	10	2	3.4	Effective
		%								
	New urban services: power stations..etc	Count	13	14	6	2	1	1	4	Effective
		%								
	FUTURE DRIVERS	Count						1	4.07	Effective
		%								

1.21 Social impacts processed in SPSS:

Q. #	Variables	Freuencies	Very Effective	Effecive	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
	Affecting social bonds between community members due to bigger distances amongst them	Count	7	10	1	3	9	7	3.1	Moderate
		%								
	Loss of agriculture lands, affects the traditional lifestyle	Count	7	10	2	1	10	7	3.1	Moderate
		%								
	Affecting the culture and traditions of the Oasis	Count	12	7	2	8	1	7	3.70	Effective
		%								
	Threatening the expansion areas buildings residents, living in wetlands with unsuitable structures, subject to demolition risk.	Count	6	16	6	2	-	7	3.87	Effective
		%								
	Affecting the public and social health.	Count	10	11	4	2	3	7	3.77	Effective
		%								
	SOCIAL IMPACTS	Count						7	3.51	Effective
		%								

1.22 Environmental impacts likart scale analysis

Q. #	Variables	Freuencies	Very Effective	Effective	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
	Increase in number and quantity of untreated sewage water discharge, built with traditional methods, and leakage to the underground water and soil.	Count	21	6	-	1	-		4.68	Very Effective
		%								
	Increase in the risk of mixing sewage water with the underground water used for drinking (potable).	Count	12	8	-	3	7		3.5	Effective
		%								
	Loss of agriculture lands, and crops yields from it.	Count	13	9	5	1	2		4	Effective
		%								
	Fragmentation of agriculture lands by building on it and affecting its productivity.	Count	6	16	2	4	1		3.76	Effective
		%								
	Blocking more wind flow channels, increasing the buildings density, more asphalt areas, leading to increase in temperature	Count	12	10	2	2	4		3.8	Effective
		%								
	Increase of sealed surfaces/asphalt, decrease in permeability for water into the ground or outwards through evaporation, which adds up to the underground water table problem.	Count	15	10	1	1	2		4.21	Very Effective
		%								
	Increase in consumption rates for the water resources, and affecting it's quantity and quality.	Count	17	10	1	1	-		4.48	Very Effective
		%								
	Increase in land resource consumption rate.	Count	10	13	3	2	2		3.90	Effective
		%								
	Increase in construction materials consumption rates.	Count	9	8	7	3	3		3.57	Effective
		%								
	Loss of environmental systems and wild life.	Count	9	10	3	6	2		3.6	Effective
		%								
	ENVIRONMENTAL IMPACTS	Count						7	3.95	Effective
		%								

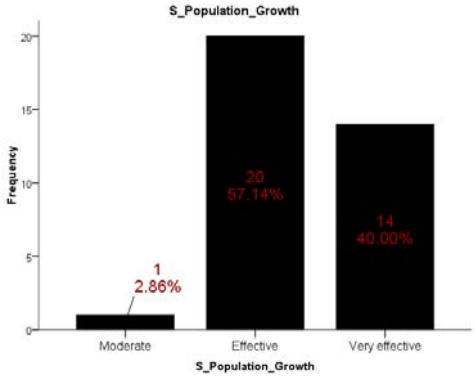
1.23 Economic impacts

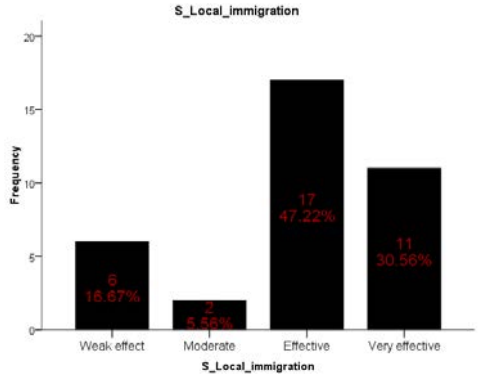
Q. #	Variables	Freuencies	Very Effective	Effective	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
	Increase in Income rates (GDP) of individuals.	Count	17	10	2	-	-	8	4.52	Very Effective
		%								
	Industries, tourist projects, and land reclamation projects increase the job opportunities for the locals.	Count	13	15	1	-	-	8	4.41	Very Effective
		%								
	Loss of agriculture lands affects the self sufficiency	Count	10	12	3	-	3	9	3.93	Effective
		%								
	Loss of agriculture lands affects the economic stability	Count	10	9	-	6	3	9	3.61	Effective
		%								
	Shift of labour force from agriculture to industrial and commercial activities	Count	10	12	2	5	-	8	3.93	Effective
		%								
	Increase in costs of the urban infrastructure and services due to the urban growth/(sprawl/ expansion)	Count	9	13	5	-	-	10	4.15	Effective
		%								
	Increase in costs of public transportation, electricity, water...etc	Count	14	11	1	2	-	9	4.32	Very Effective
		%								
	ECONOMIC IMPACTS	Count						8	4.121	Effective
		%								

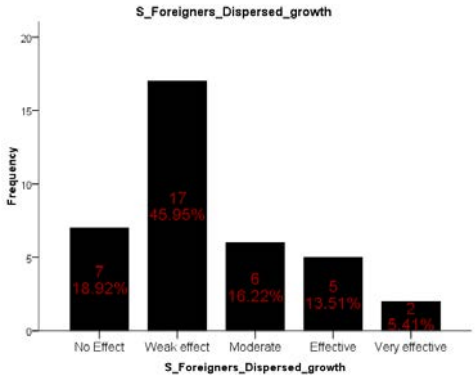
1.24 Spatial IMPACTS LIKART SCALE ANALYSIS

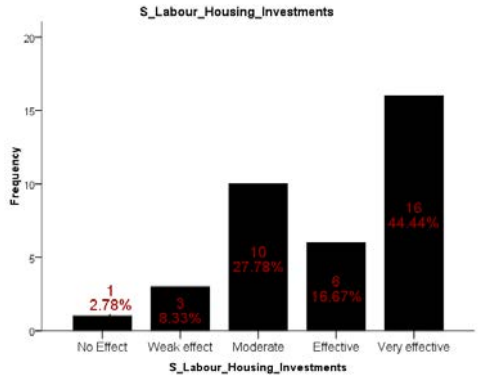
Q. #	Variables	Freuencies	Very Effective	Effective	Moderate	Weak Effect	No Effect	Missing	Mean	LiKert Scale Decision
	Expansion of the urban sprawl in dispersed and scattered lands in the oasis.	Count	8	12	3	3	1	10	3.85	Effective
		%								
	Fragmented urban growth and urban development	Count	8	13	-	4	2	10	3.78	Effective
		%								
	Blocking the panoramic view of the agricultural sites from some points in the Oasis.	Count	5	8	5	8	1	10	3.3	Moderate
		%								
	Blocking the panoramic view for the monumental sites and cultural heritage sites from some points in the Oasis.	Count	5	13	3	4	2	10	3.56	Effective
		%								
	Changing the natural landscape scenery and beauty of Siwa Oasis	Count	9	11	4	1	1	10	4	Effective
		%								
	Contributing to increasing the level of underground water and threatening more buildings and monumental sites.	Count	13	7	3	2	-	11	4.24	Very Effective
		%								
	SPATIAL IMPACTS	Count						10	3.785	Effective
		%								

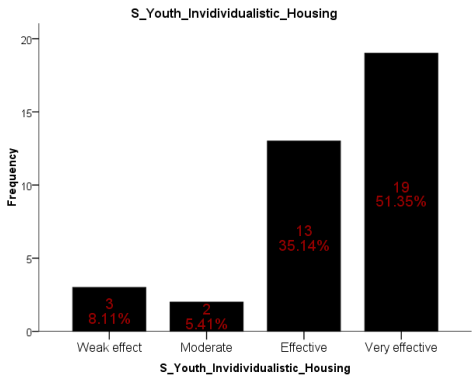
1.25 Bar charts of investigated drivers rated on likart scale

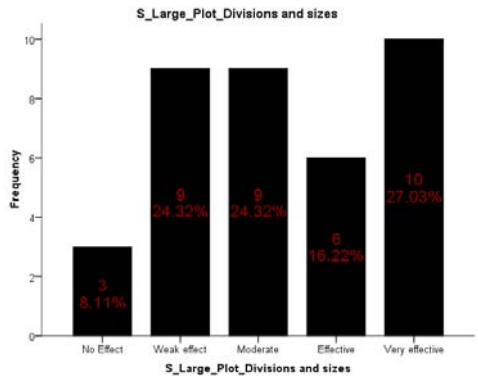


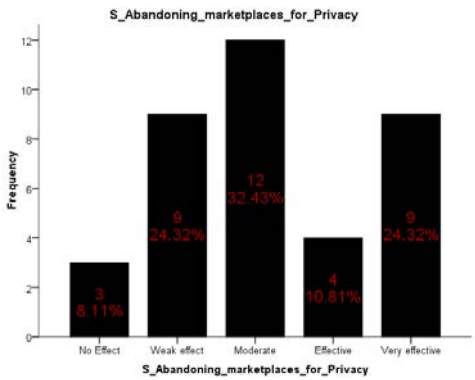


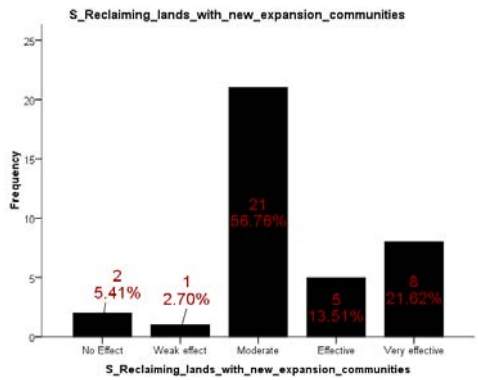


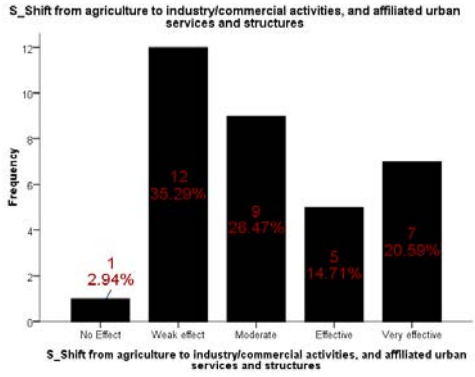


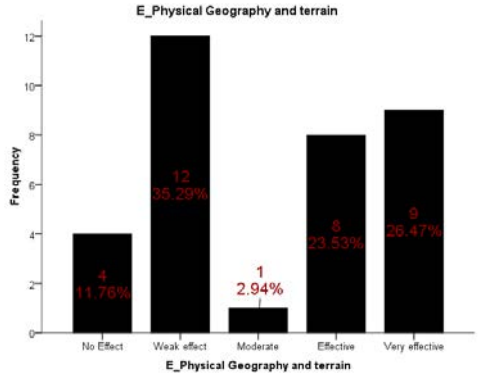


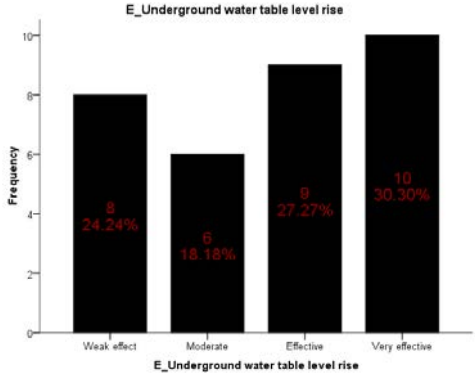


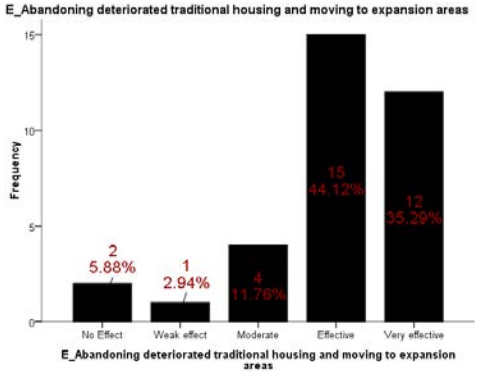


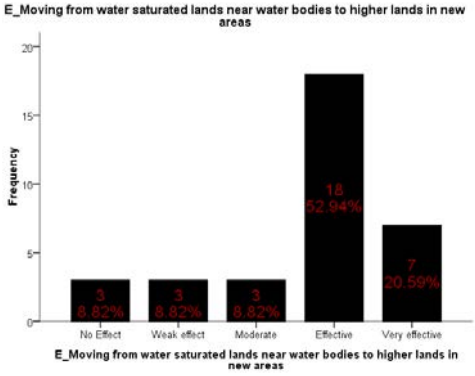


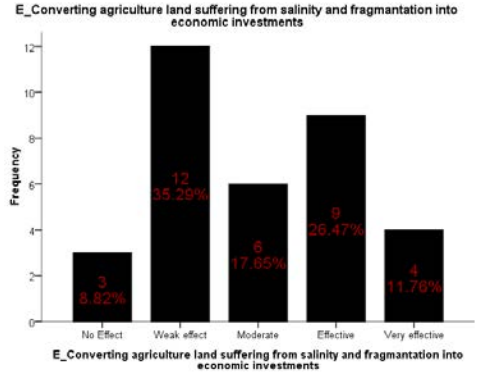

S_Shift from agriculture to industry/commercial activities, and affiliated urban services and structures
Frequency
1
2.94%
12
35.29%
9
26.47%
5
14.71%
7
20.59%
No Effect
Weak effect
Moderate
Effective
Very effective
S_Shift from agriculture to industry/commercial activities, and affiliated urban services and structures

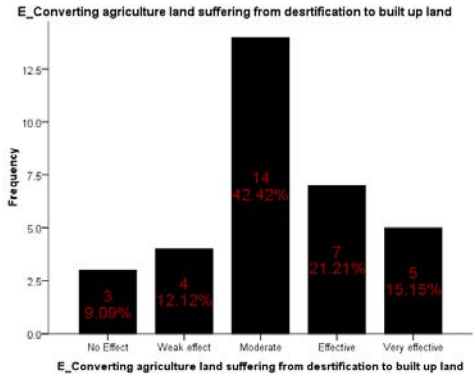

E_Physical Geography and terrain
Frequency
4
11.76%
12
35.29%
1
2.94%
8
23.53%
9
26.47%
No Effect
Weak effect
Moderate
Effective
Very effective
E_Physical Geography and terrain

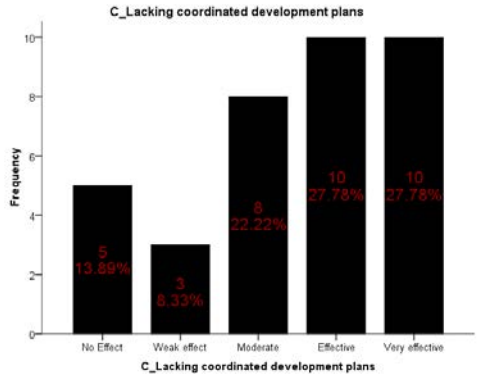

E_Underground water table level rise
Frequency
8
24.24%
6
18.18%
9
27.27%
10
30.30%
Weak effect
Moderate
Effective
Very effective
E_Underground water table level rise

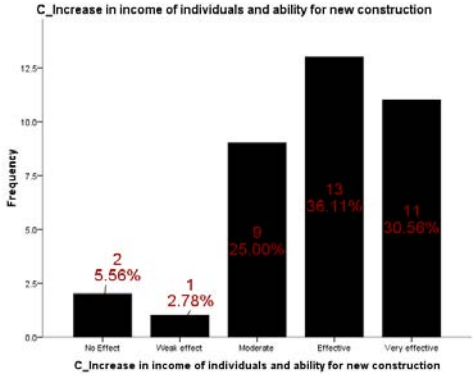

E_Abandoning deteriorated traditional housing and moving to expansion areas
Frequency
2
5.88%
1
2.94%
4
11.76%
15
44.12%
12
35.29%
No Effect
Weak effect
Moderate
Effective
Very effective
E_Abandoning deteriorated traditional housing and moving to expansion areas

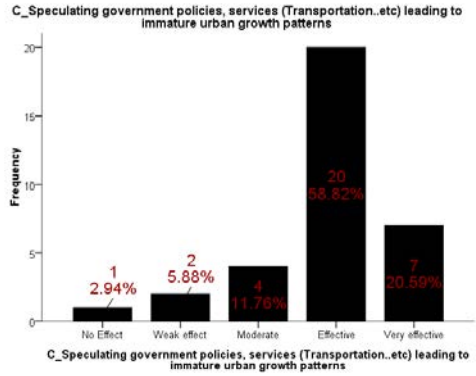

E_Moving from water saturated lands near water bodies to higher lands in new areas
Frequency
3
8.82%
3
8.82%
3
8.82%
18
52.94%
7
20.59%
No Effect
Weak effect
Moderate
Effective
Very effective
E_Moving from water saturated lands near water bodies to higher lands in new areas

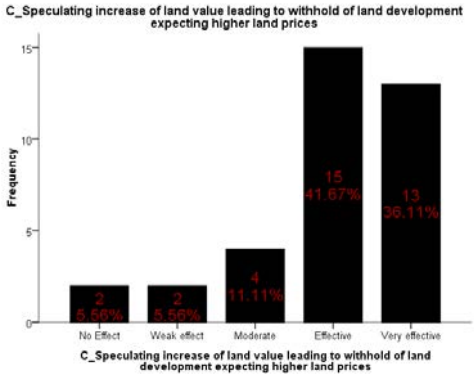

E_Converting agriculture land suffering from salinity and fragmantation into economic investments
Frequency
3
8.82%
12
35.29%
6
17.65%
9
26.47%
4
11.76%
No Effect
Weak effect
Moderate
Effective
Very effective
E_Converting agriculture land suffering from salinity and fragmantation into economic investments

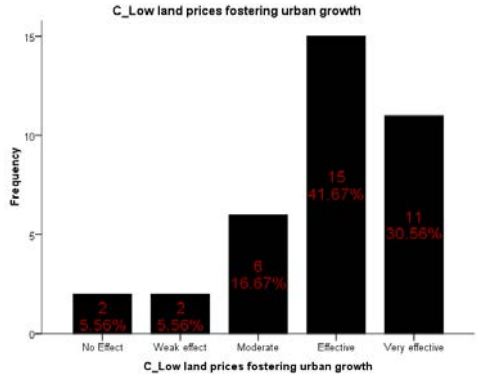

E_Converting agriculture land suffering from desrtification to built up land
Frequency
3
9.09%
4
12.12%
14
42.42%
7
21.21%
5
15.15%
No Effect
Weak effect
Moderate
Effective
Very effective
E_Converting agriculture land suffering from desrtification to built up land

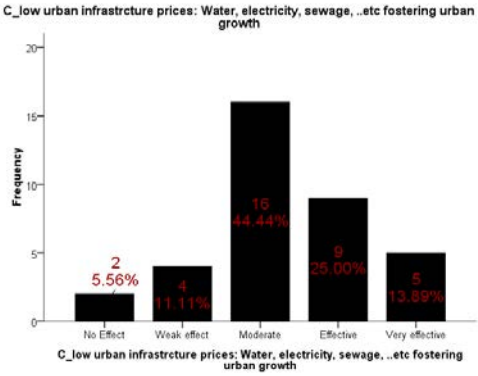

C_Lacking coordinated development plans
Frequency
5
13.89%
3
8.33%
8
22.22%
10
27.78%
10
27.78%
No Effect
Weak effect
Moderate
Effective
Very effective
C_Lacking coordinated development plans

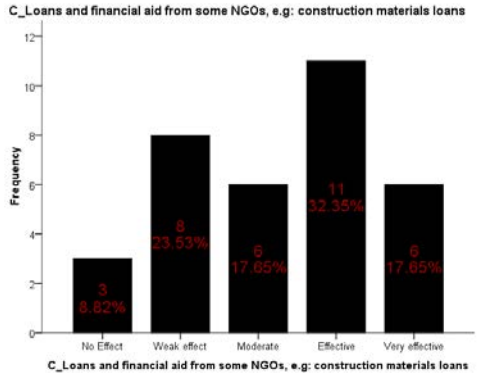

C_Increase in income of individuals and ability for new construction
Frequency
2
5.56%
1
2.78%
9
25.00%
13
36.11%
11
30.56%
No Effect
Weak effect
Moderate
Effective
Very effective
C_Increase in income of individuals and ability for new construction

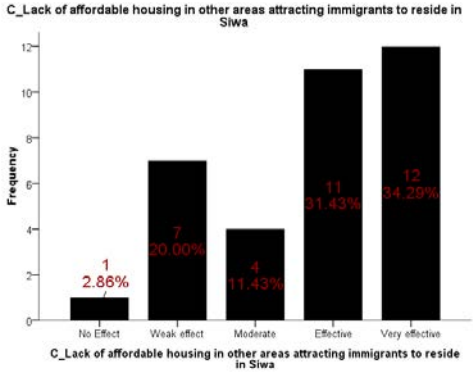

C_Speculating government policies, services (Transportation..etc) leading to immature urban growth patterns
Frequency
1
2.94%
2
5.88%
4
11.76%
20
58.82%
7
20.59%
No Effect
Weak effect
Moderate
Effective
Very effective
C_Speculating government policies, services (Transportation..etc) leading to immature urban growth patterns

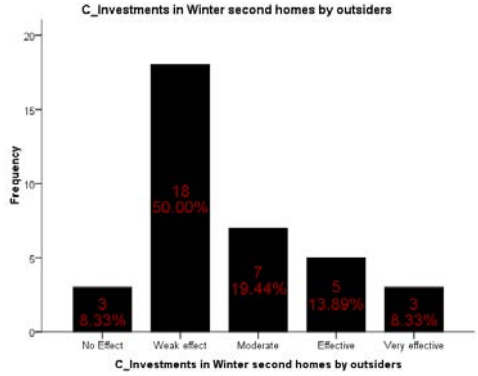

C_Speculating increase of land value leading to withhold of land development expecting higher land prices
Frequency
2
5.56%
2
5.56%
4
11.11%
15
41.67%
13
36.11%
No Effect
Weak effect
Moderate
Effective
Very effective
C_Speculating increase of land value leading to withhold of land development expecting higher land prices

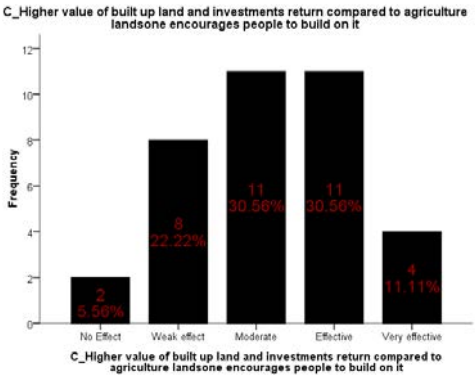

C_Low land prices fostering urban growth
Frequency
2
5.56%
2
5.56%
6
16.67%
15
41.67%
11
30.56%
No Effect
Weak effect
Moderate
Effective
Very effective
C_Low land prices fostering urban growth

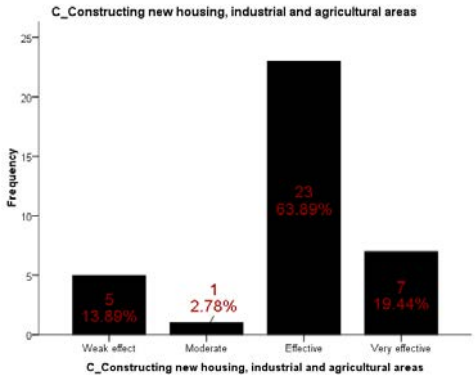

C_low urban infrastrcture prices: Water, electricity, sewage, ..etc fostering urban growth
Frequency
2
5.56%
4
11.11%
16
44.44%
9
25.00%
5
13.89%
No Effect
Weak effect
Moderate
Effective
Very effective
C_low urban infrastrcture prices: Water, electricity, sewage, ..etc fostering urban growth

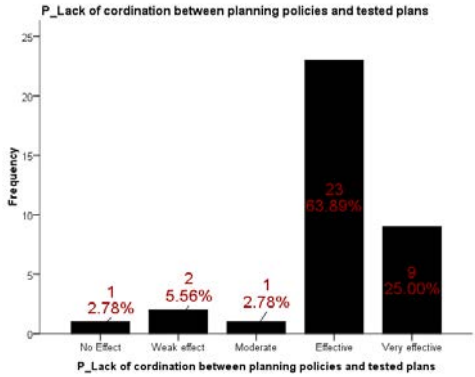

C_Loans and financial aid from some NGOs, e.g: construction materials loans
Frequency
3
8.82%
8
23.53%
6
17.65%
11
32.35%
6
17.65%
No Effect
Weak effect
Moderate
Effective
Very effective
C_Loans and financial aid from some NGOs, e.g: construction materials loans

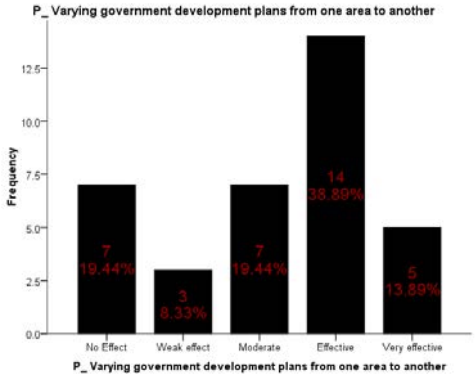

C_Lack of affordable housing in other areas attracting immigrants to reside in Siwa
Frequency
1
2.86%
7
20.00%
4
11.43%
11
31.43%
12
34.29%
No Effect
Weak effect
Moderate
Effective
Very effective
C_Lack of affordable housing in other areas attracting immigrants to reside in Siwa

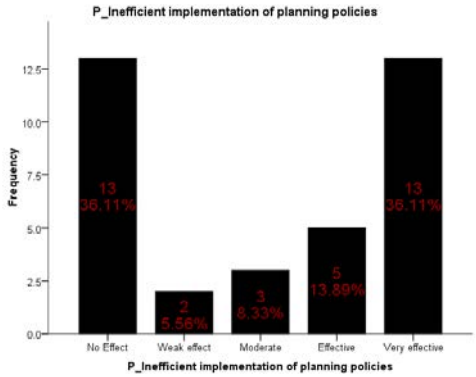

C_Investments in Winter second homes by outsiders
Frequency
3
8.33%
18
50.00%
7
19.44%
5
13.89%
3
8.33%
No Effect
Weak effect
Moderate
Effective
Very effective
C_Investments in Winter second homes by outsiders

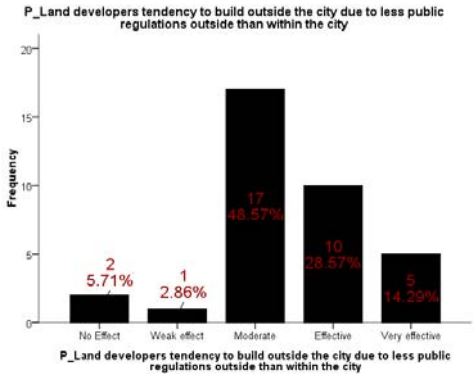

C_Higher value of built up land and investments return compared to agriculture landsone encourages people to build on it
Frequency
2
5.56%
8
22.22%
11
30.56%
11
30.56%
4
11.11%
No Effect
Weak effect
Moderate
Effective
Very effective
C_Higher value of built up land and investments return compared to agriculture landsone encourages people to build on it

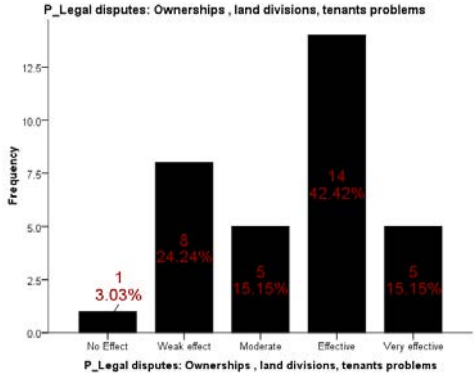

C_Constructing new housing, industrial and agricultural areas
Frequency
5
13.89%
1
2.78%
23
63.89%
7
19.44%
Weak effect
Moderate
Effective
Very effective
C_Constructing new housing, industrial and agricultural areas

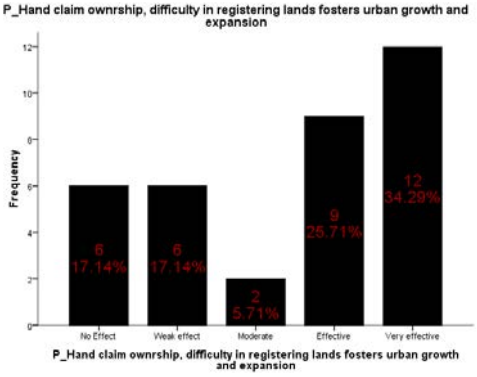

P_Lack of cordination between planning policies and tested plans
Frequency
1
2.78%
2
5.56%
1
2.78%
23
63.89%
9
25.00%
No Effect
Weak effect
Moderate
Effective
Very effective
P_Lack of cordination between planning policies and tested plans

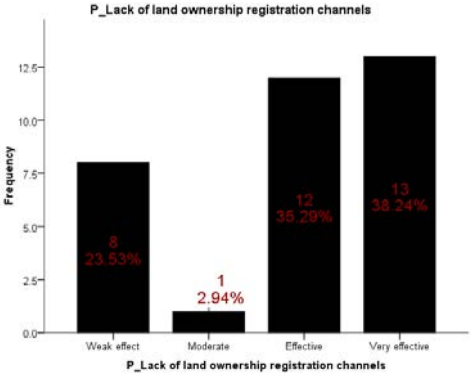

P_ Varying government development plans from one area to another
Frequency
7
19.44%
3
8.33%
7
19.44%
14
38.89%
5
13.89%
No Effect
Weak effect
Moderate
Effective
Very effective
P_ Varying government development plans from one area to another

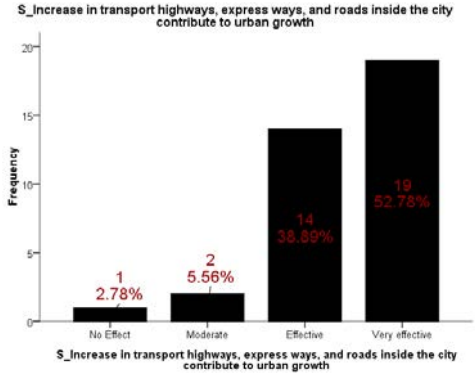

P_Inefficient implementation of planning policies
Frequency
13
36.11%
2
5.56%
3
8.33%
5
13.89%
13
36.11%
No Effect
Weak effect
Moderate
Effective
Very effective
P_Inefficient implementation of planning policies

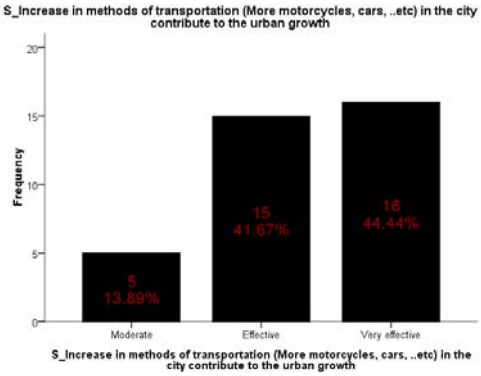

P_Land developers tendency to build outside the city due to less public regulations outside than within the city
Frequency
2
5.71%
1
2.86%
17
48.57%
10
28.57%
5
14.29%
No Effect
Weak effect
Moderate
Effective
Very effective
P_Land developers tendency to build outside the city due to less public regulations outside than within the city

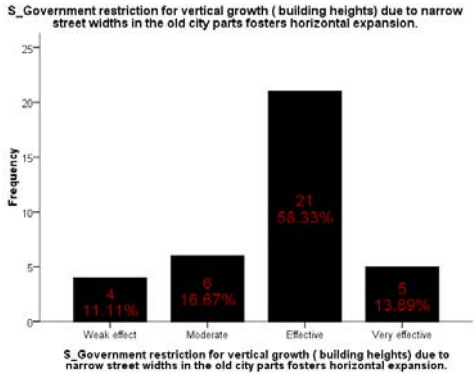

P_Legal disputes: Ownerships , land divisions, tenants problems
Frequency
1
3.03%
8
24.24%
5
15.15%
14
42.42%
5
15.15%
No Effect
Weak effect
Moderate
Effective
Very effective
P_Legal disputes: Ownerships , land divisions, tenants problems

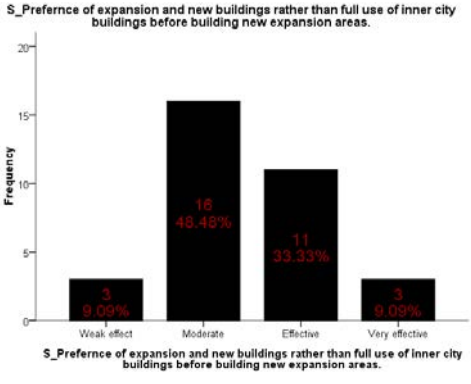

P_Hand claim ownrship, difficulty in registering lands fosters urban growth and expansion
Frequency
6
17.14%
6
17.14%
2
5.71%
9
25.71%
12
34.29%
No Effect
Weak effect
Moderate
Effective
Very effective
P_Hand claim ownrship, difficulty in registering lands fosters urban growth and expansion

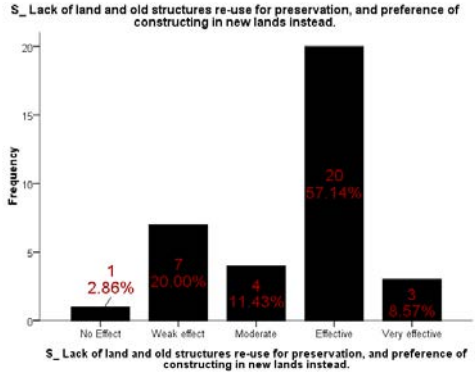

P_Lack of land ownership registration channels
Frequency
8
23.53%
1
2.94%
12
35.29%
13
38.24%
Weak effect
Moderate
Effective
Very effective
P_Lack of land ownership registration channels

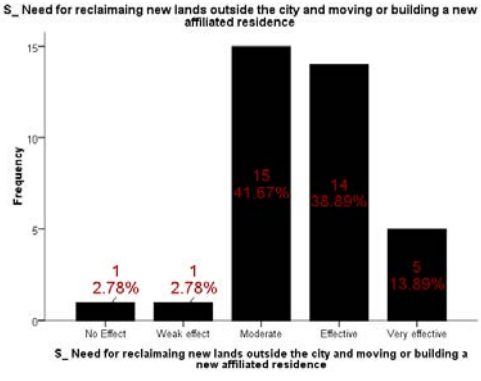

S_Increase in transport highways, express ways, and roads inside the city contribute to urban growth
Frequency
1
2.78%
2
5.56%
14
38.89%
19
52.78%
No Effect
Moderate
Effective
Very effective
S_Increase in transport highways, express ways, and roads inside the city contribute to urban growth

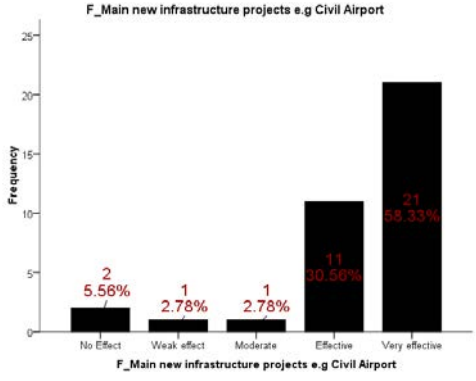

S_Increase in methods of transportation (More motorcycles, cars, ..etc) in the city contribute to the urban growth
Frequency
5
13.89%
15
41.67%
16
44.44%
Moderate
Effective
Very effective
S_Increase in methods of transportation (More motorcycles, cars, ..etc) in the city contribute to the urban growth

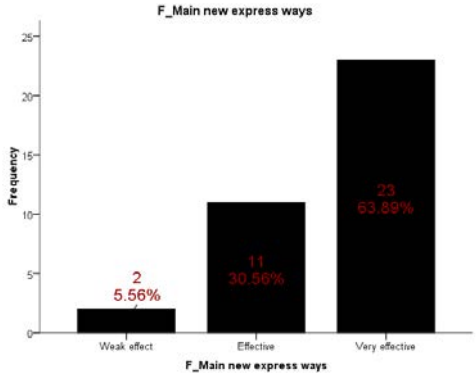

S_Government restriction for vertical growth (building heights) due to narrow street widths in the old city parts fosters horizontal expansion.
Frequency
4
11.11%
6
16.67%
21
58.33%
5
13.89%
Weak effect
Moderate
Effective
Very effective
S_Government restriction for vertical growth (building heights) due to narrow street widths in the old city parts fosters horizontal expansion.

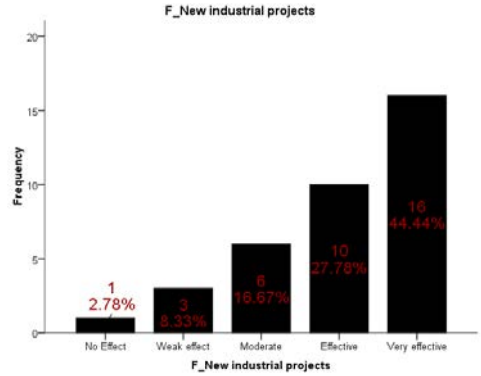

S_Prefernce of expansion and new buildings rather than full use of inner city buildings before building new expansion areas.
Frequency
3
9.09%
16
48.48%
11
33.33%
3
9.09%
Weak effect
Moderate
Effective
Very effective
S_Prefernce of expansion and new buildings rather than full use of inner city buildings before building new expansion areas.

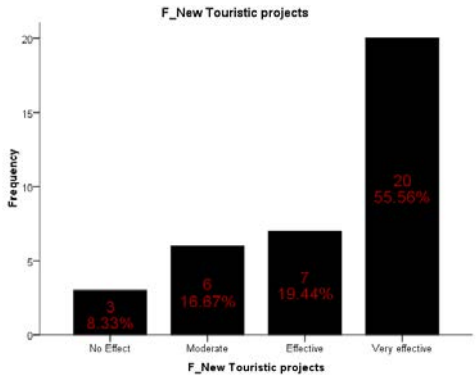

S_ Lack of land and old structures re-use for preservation, and preference of constructing in new lands instead.
Frequency
1
2.86%
7
20.00%
4
11.43%
20
57.14%
3
8.57%
No Effect
Weak effect
Moderate
Effective
Very effective
S_ Lack of land and old structures re-use for preservation, and preference of constructing in new lands instead.

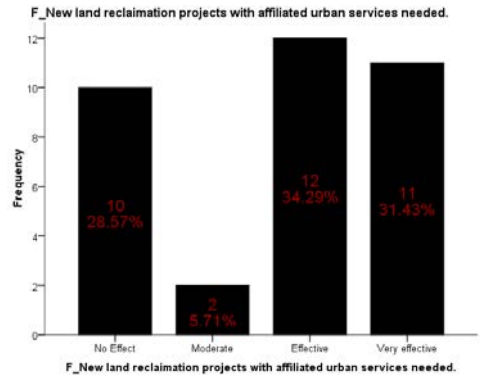

S_ Need for reclaimaing new lands outside the city and moving or building a new affiliated residence
Frequency
1
2.78%
1
2.78%
15
41.67%
14
38.89%
5
13.89%
No Effect
Weak effect
Moderate
Effective
Very effective
S_ Need for reclaimaing new lands outside the city and moving or building a new affiliated residence

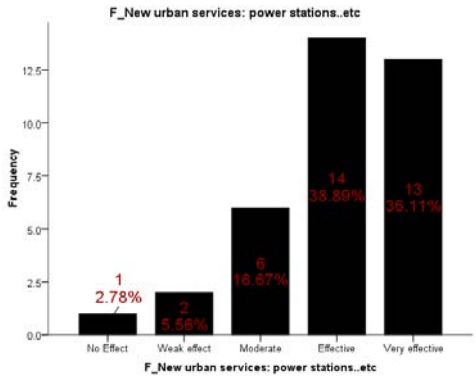

F_Main new infrastructure projects e.g Civil Airport
Frequency
2
5.56%
1
2.78%
1
2.78%
11
30.56%
21
58.33%
No Effect
Weak effect
Moderate
Effective
Very effective
F_Main new infrastructure projects e.g Civil Airport

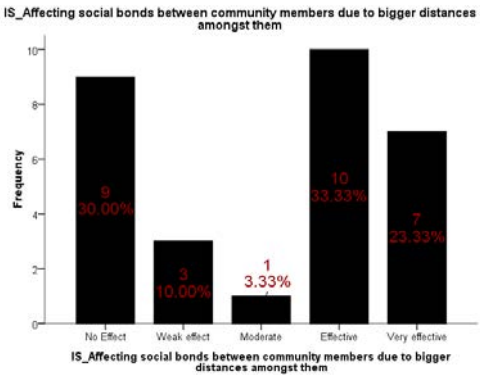




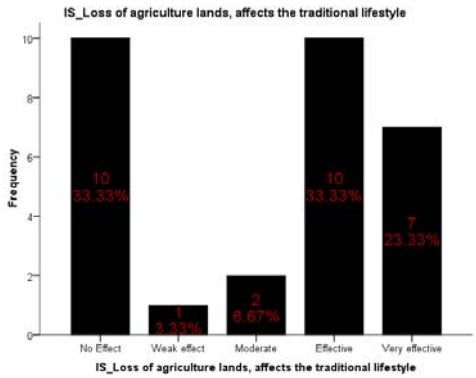


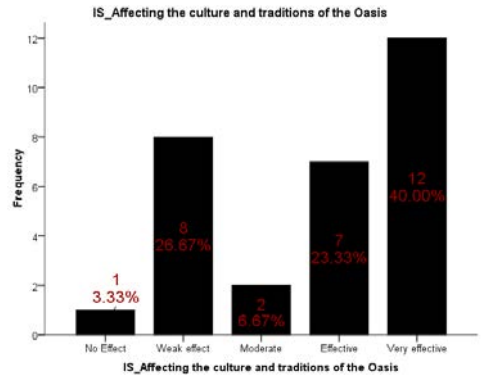




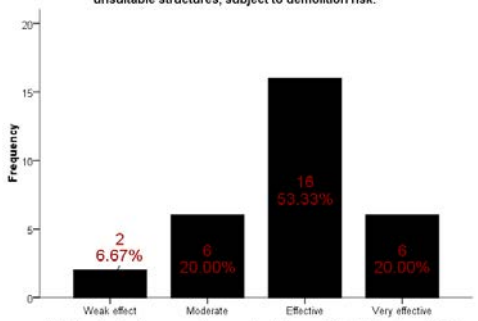


1.26 Bar charts of investigated UG Impacts rated on likart scale



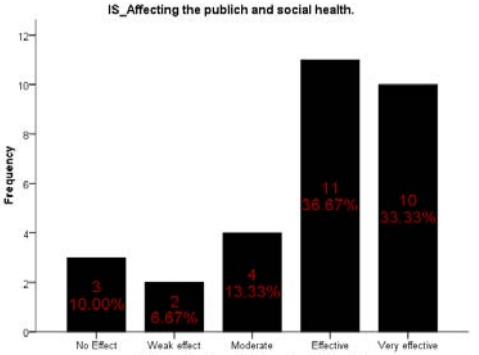


IS_Threatening the expansion areas buildings residents, living in wetlands with unsuitable structures, subject to demolition risk.



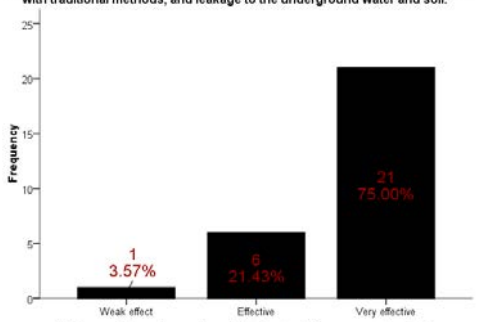
IS_Threatening the expansion areas buildings residents, living in wetlands with unsuitable structures, subject to demolition risk.

IS_Affecting the publich and social health.



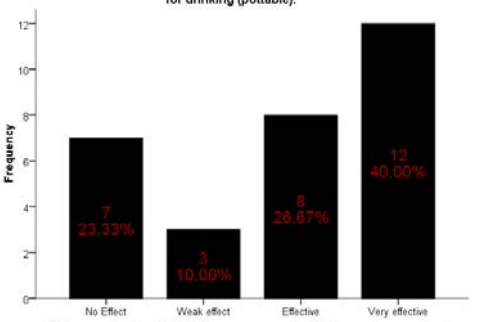
IS_Affecting the publich and social health.

IE_INcrease in number and quantity of untreated sewage water discharge, built with traditional methods, and leakage to the underground water and soil.



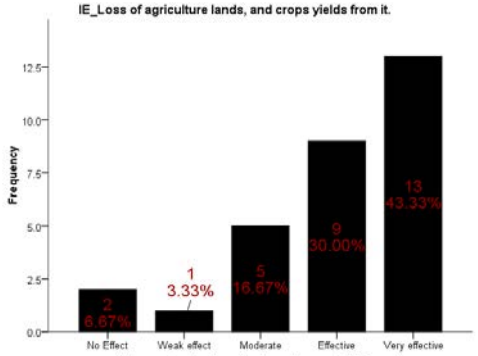
IE_INcrease in number and quantity of untreated sewage water discharge, built with traditional methods, and leakage to the underground water and soil.

IE_Increase in the risk of mixing sewage water with the underground water used for drinking (pottable).



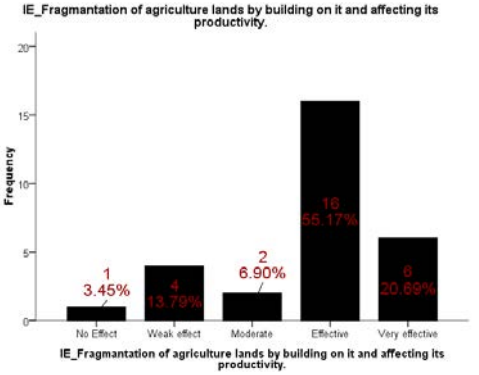
IE_Increase in the risk of mixing sewage water with the underground water used for drinking (pottable).

IE_Loss of agriculture lands, and crops yields from it.



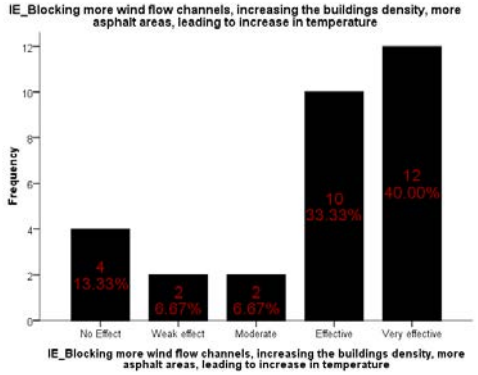
IE_Loss of agriculture lands, and crops yields from it.

IE_Fragmantation of agriculture lands by building on it and affecting its productivity.



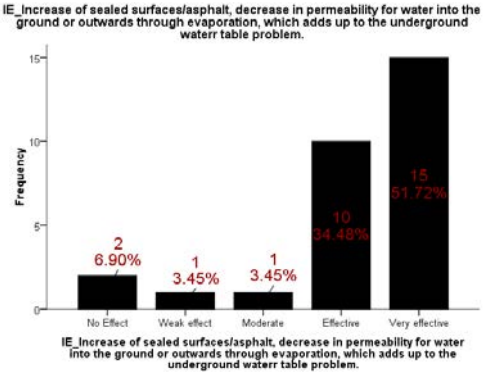
IE_Fragmantation of agriculture lands by building on it and affecting its productivity.

IE_Blocking more wind flow channels, increasing the buildings density, more asphalt areas, leading to increase in temperature

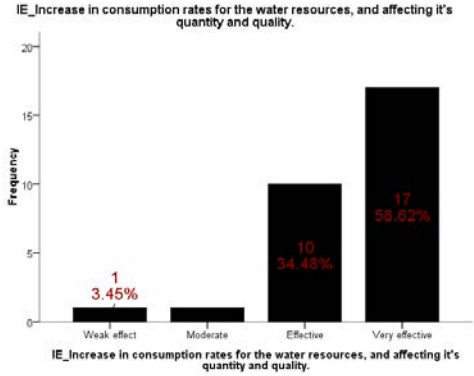


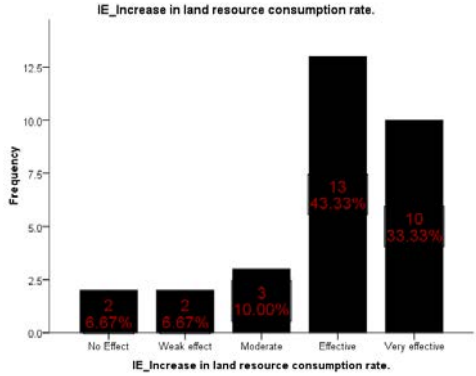
IE_Blocking more wind flow channels, increasing the buildings density, more asphalt areas, leading to increase in temperature

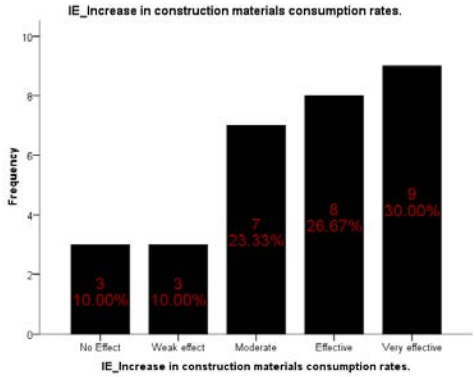
IE_Increase of sealed surfaces/asphalt, decrease in permeability for water into the ground or outwards through evaporation, which adds up to the underground waterr table problem.

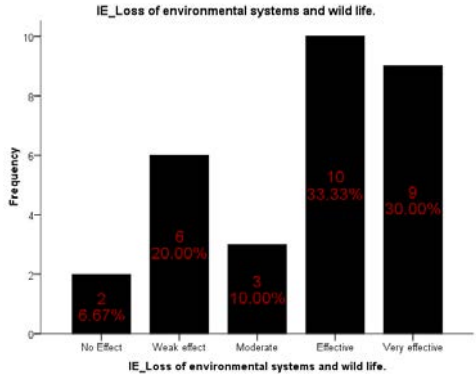


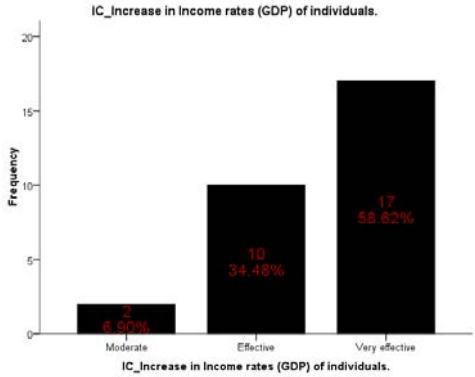
IE_Increase of sealed surfaces/asphalt, decrease in permeability for water into the ground or outwards through evaporation, which adds up to the underground waterr table problem.

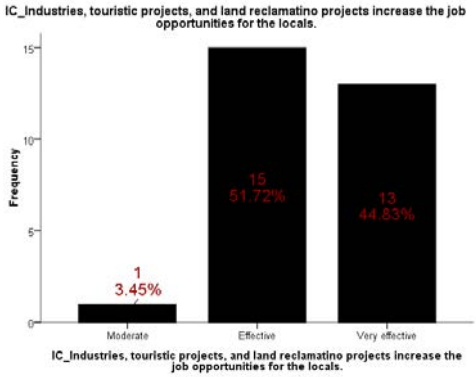

IE_Increase in consumption rates for the water resources, and affecting it's quantity and quality.
Frequency
1
3.45%
10
34.48%
17
58.62%
Weak effect
Moderate
Effective
Very effective
IE_Increase in consumption rates for the water resources, and affecting it's quantity and quality.

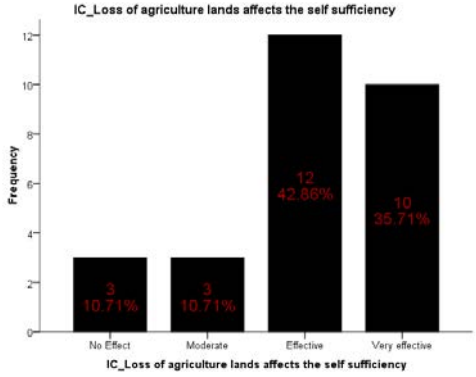

IE_Increase in land resource consumption rate.
Frequency
2
6.67%
2
6.67%
3
10.00%
13
43.33%
10
33.33%
No Effect
Weak effect
Moderate
Effective
Very effective
IE_Increase in land resource consumption rate.

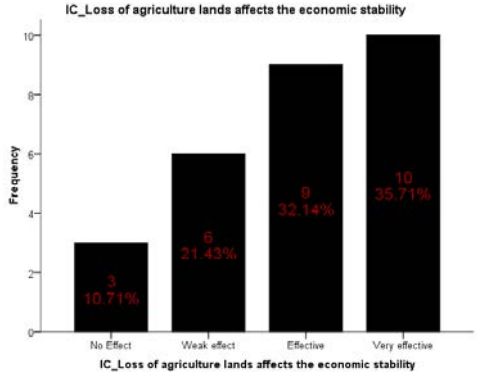

IE_Increase in construction materials consumption rates.
Frequency
3
10.00%
3
10.00%
7
23.33%
8
26.67%
9
30.00%
No Effect
Weak effect
Moderate
Effective
Very effective
IE_Increase in construction materials consumption rates.

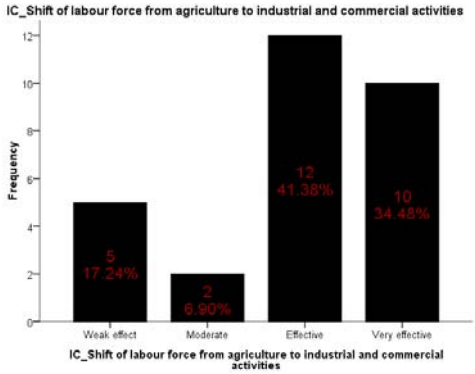

IE_Loss of environmental systems and wild life.
Frequency
2
6.67%
6
20.00%
3
10.00%
10
33.33%
9
30.00%
No Effect
Weak effect
Moderate
Effective
Very effective
IE_Loss of environmental systems and wild life.

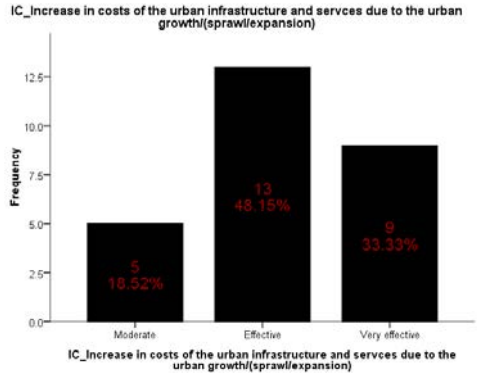

IC_Increase in income rates (GDP) of individuals.
Frequency
2
6.90%
10
34.48%
17
58.62%
Moderate
Effective
Very effective
IC_Increase in income rates (GDP) of individuals.

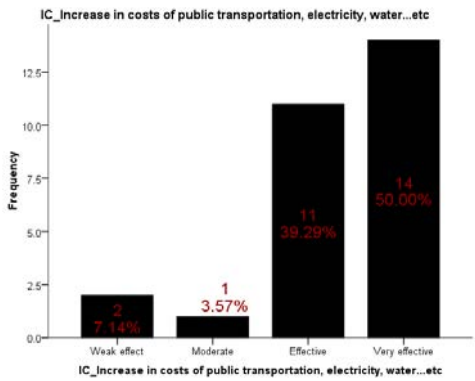

IC_Industries, touristic projects, and land reclamatino projects increase the job opportunities for the locals.
Frequency
1
3.45%
15
51.72%
13
44.83%
Moderate
Effective
Very effective
IC_Industries, touristic projects, and land reclamatino projects increase the job opportunities for the locals.

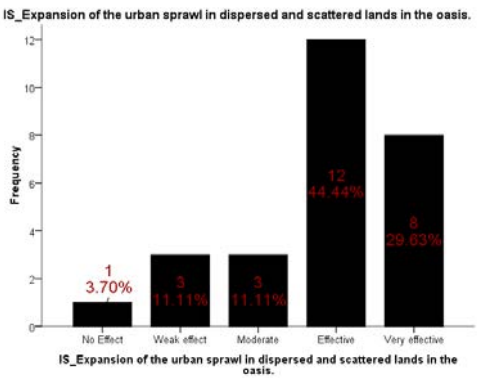

IC_Loss of agriculture lands affects the self sufficiency
Frequency
3
10.71%
3
10.71%
12
42.86%
10
35.71%
No Effect
Moderate
Effective
Very effective
IC_Loss of agriculture lands affects the self sufficiency

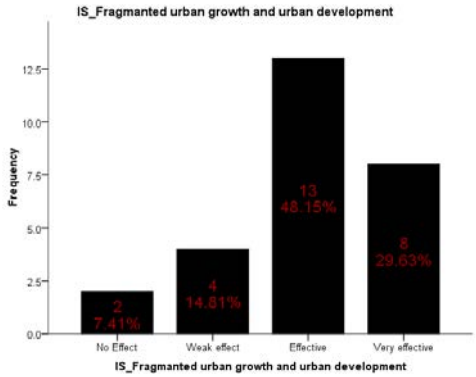

IC_Loss of agriculture lands affects the economic stability
Frequency
3
10.71%
6
21.43%
9
32.14%
10
35.71%
No Effect
Weak effect
Effective
Very effective
IC_Loss of agriculture lands affects the economic stability

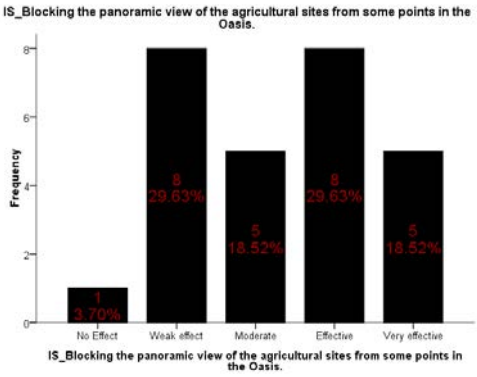

IC_Shift of labour force from agriculture to industrial and commercial activities
Frequency
5
17.24%
2
6.90%
12
41.38%
10
34.48%
Weak effect
Moderate
Effective
Very effective
IC_Shift of labour force from agriculture to industrial and commercial activities

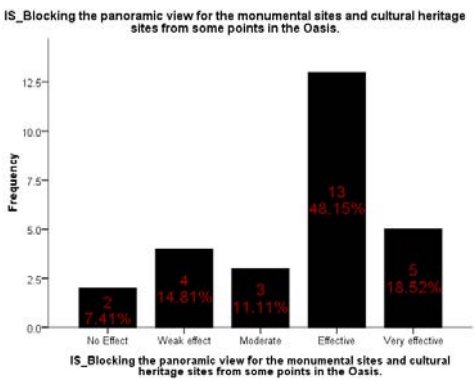

IC_Increase in costs of the urban infrastructure and servces due to the urban growth/(sprawl/expansion)
Frequency
5
18.52%
13
48.15%
9
33.33%
Moderate
Effective
Very effective
IC_Increase in costs of the urban infrastructure and servces due to the urban growth/(sprawl/expansion)

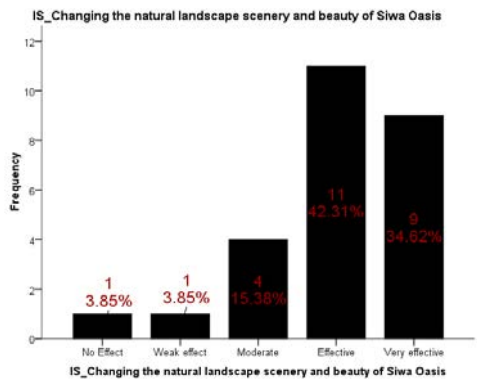

IC_Increase in costs of public transportation, electricity, water...etc
Frequency
2
7.14%
1
3.57%
11
39.29%
14
50.00%
Weak effect
Moderate
Effective
Very effective
IC_Increase in costs of public transportation, electricity, water...etc


IS_Expansion of the urban sprawl in dispersed and scattered lands in the oasis.
Frequency
1
3.70%
3
11.11%
3
11.11%
12
44.44%
8
29.63%
No Effect
Weak effect
Moderate
Effective
Very effective
IS_Expansion of the urban sprawl in dispersed and scattered lands in the oasis.

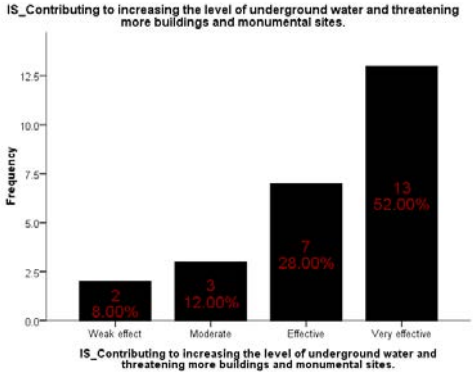

IS_Fragmanted urban growth and urban development
Frequency
2
7.41%
4
14.81%
13
48.15%
8
29.63%
No Effect
Weak effect
Effective
Very effective
IS_Fragmanted urban growth and urban development

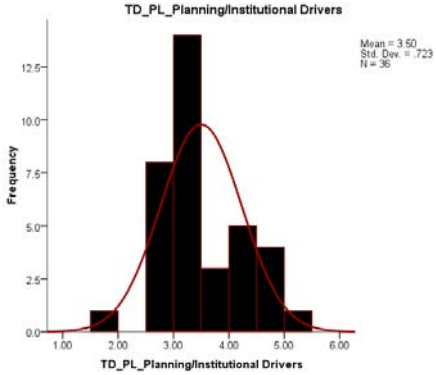

IS_Blocking the panoramic view of the agricultural sites from some points in the Oasis.
Frequency
1
3.70%
8
29.63%
5
18.52%
8
29.63%
5
18.52%
No Effect
Weak effect
Moderate
Effective
Very effective
IS_Blocking the panoramic view of the agricultural sites from some points in the Oasis.

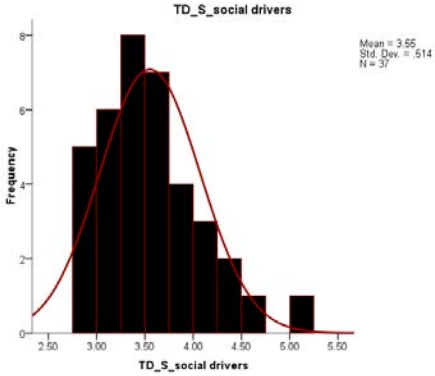

IS_Blocking the panoramic view for the monumental sites and cultural heritage sites from some points in the Oasis.
Frequency
2
7.41%
4
14.81%
3
11.11%
13
48.15%
5
18.52%
No Effect
Weak effect
Moderate
Effective
Very effective
IS_Blocking the panoramic view for the monumental sites and cultural heritage sites from some points in the Oasis.

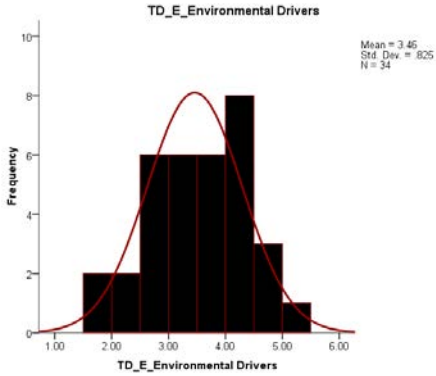

IS_Changing the natural landscape scenery and beauty of Siwa Oasis
Frequency
1
3.85%
1
3.85%
4
15.38%
11
42.31%
9
34.62%
No Effect
Weak effect
Moderate
Effective
Very effective
IS_Changing the natural landscape scenery and beauty of Siwa Oasis

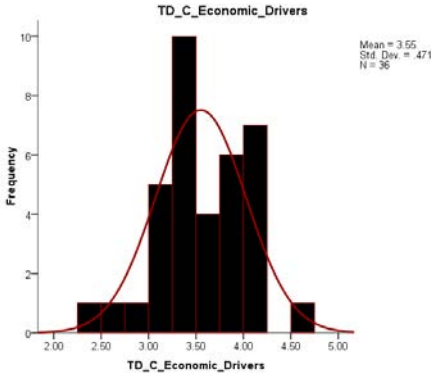
1.27 Histograms of investigated drivers and impacts

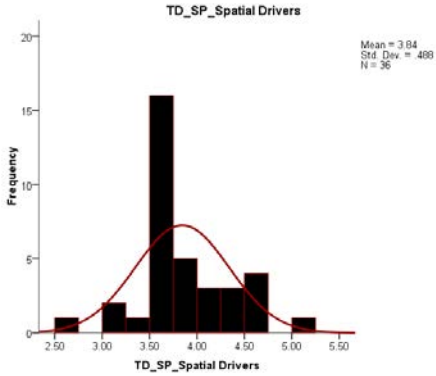


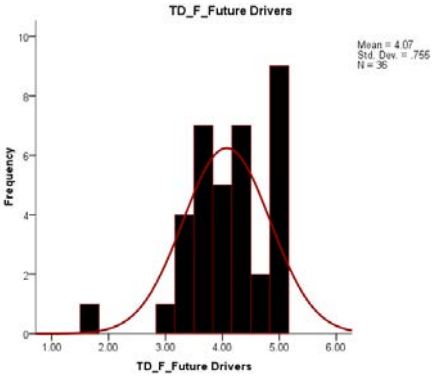


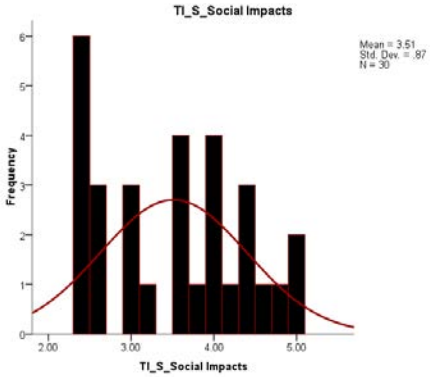


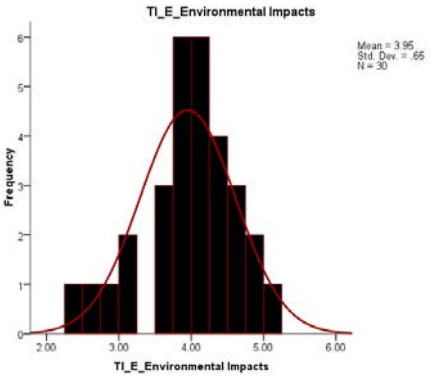


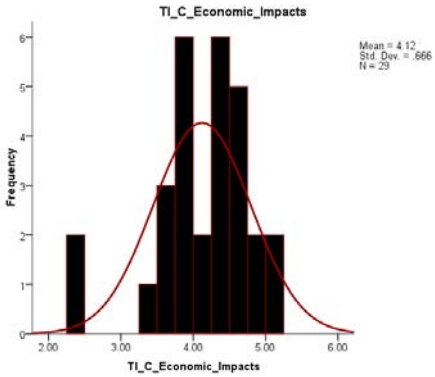


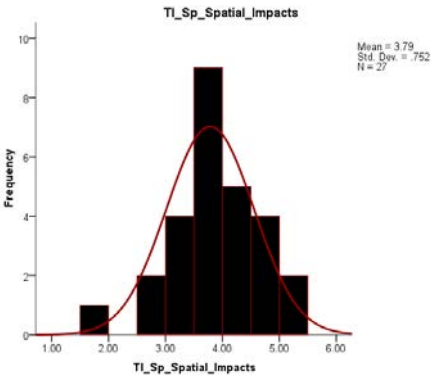



TD_F_Future Drivers
Mean = 4.07
Std. Dev. = .755
N = 36
Frequency
TD_F_Future Drivers

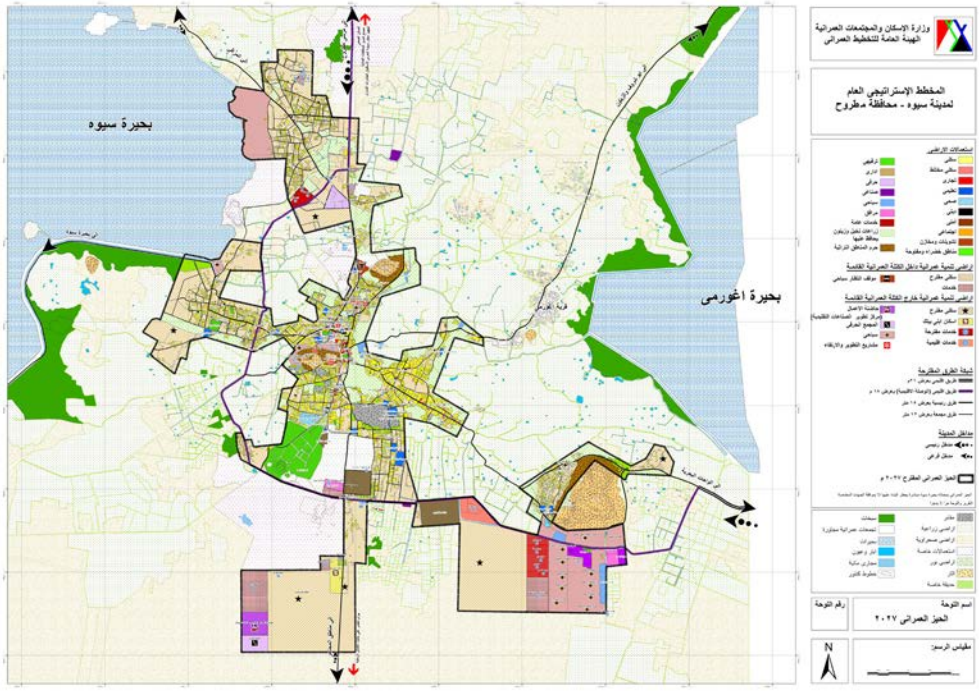

TI_S_Social Impacts
Mean = 3.51
Std. Dev. = .87
N = 30
Frequency
TI_S_Social Impacts


TI_E_Environmental Impacts
Mean = 3.95
Std. Dev. = .65
N = 30
Frequency
TI_E_Environmental Impacts

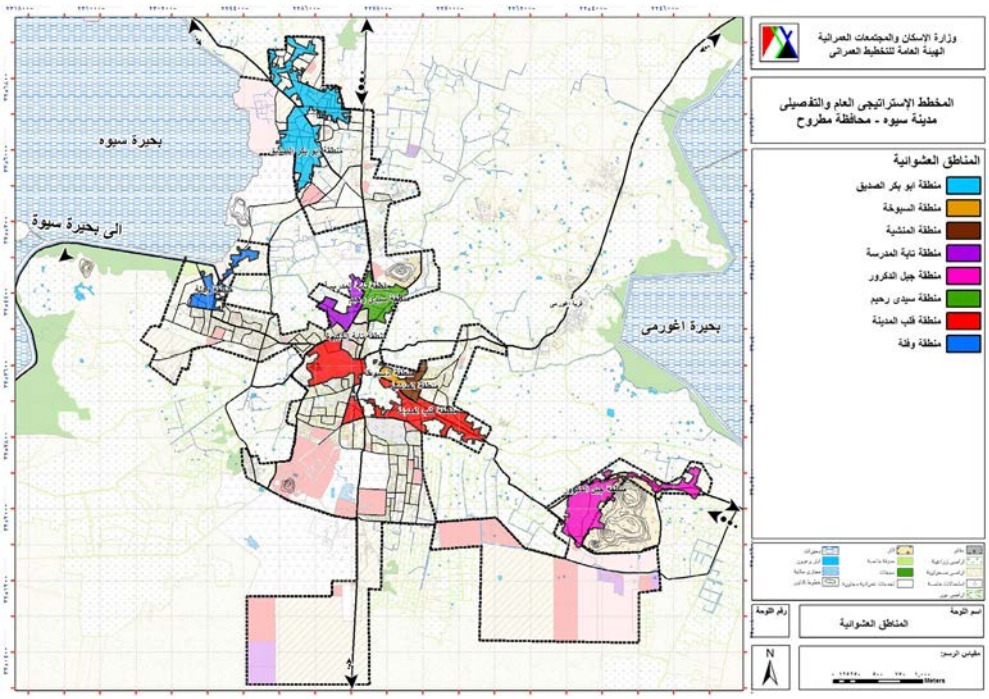

TI_C_Economic_Impacts
Mean = 4.12
Std. Dev. = .666
N = 29
Frequency
TI_C_Economic_Impacts


TI_Sp_Spatial_Impacts
Mean = 3.79
Std. Dev. = .752
N = 27
Frequency
TI_Sp_Spatial_Impacts

1.28 Strategic plan for Siwa 2027 and risk zones



1.29 Informal zones in siwa identified by GOPP



ملخص الرسالة
تتميز واحة سيوة الواقعة في صحراء مصر الغربية بنظام البيئي ذات طبيعة بئية وثقافية خاصة .وهي تتعرض لضغوط من قبل ديناميكيات النمو الحضري السريع التي تغير النظام البيئي لسيوة وتهدد البيئة و الثقافة المميزة للواحة واقتصادها المعتمد على الطبيعة. ومع ذلك، فإن هذا التحدي لا يواجه فقط سيوة بل العديد من الوجهات الأخرى في جميع أنحاء العالم. حيث أن النمو الحضري غير المدار يغير النظم الإيكولوجية الطبيعية والحضرية. (تيرنر وآخرون ١٩٩٠؛ Lambin وجيست ٢٠٠١ استشهد في Bohnet ٢٠١٠ وبهاتا ٢٠١٠).
يتناول هذا البحث هذه المشكلة في سيوة من خلال ستة أهداف. ويبدأ دراساته لديناميكيات النمو الحضري من خلال فهم ظروف النظام البيئي في المناطق الحضرية في سيوة. ثم، التحقق من المستخدمين و المحركين لعمليات النمو الحضري في سيوة . بعد ذلك، يتحقق البحث من العمليات التي تشكلها كل مجموعة من المستخدمين و الجهات المعينة و الأنماط الناتجة من النمو الحضري. ثم يسعى البحث بعد ذلك، لتفسير لهذه العمليات النمو الحضري وأنماطه من خلال التحقق من اسبابها والآثار الناتجة عنها . وأخيراً يسعى البحث لإيجاد إقتراحات و توقعات المجتمع المحلي في سيوة للمستقبل. والبحث له الهدف أن يجري تحقيق و تطوير الأهداف البحثية من خلال المجتمع المحلي في سيوة .
وتتكون منهجية البحث لتحقيق أهدافها من ثلاث مراحل. المرحلة الأولى هي إرساء أساس من مراجعة الأدبيات والبيانات الثانوية التي جمعت للاستدلال على الإطار النظري المطلوب لتحقيق الدراسة والبحث . المرحلة الثانية هي دراسة ميدانية خمسة أسابيع في سيوة تتألف من مرحلتين. واستهدفت المرحلة الأولى من الدراسة الميدانية إعداد قاعدة بيانات اعتمدت في المقام الأول على المقابلات بالإضافة إلى أدوات أخرى ساعدت في رسم الخرائط الاجتماعية والمكانية للواحة . اعتمدت المرحلة الثانية من الزيارة الميدانية على ورشتي عمل تشاركية متعددة التخصصات للتحقق من صحة البيانات الأولية التي تم جمعها w معايرتها وتطوير قاعدة بيانات للمستقبل. المرحلة النهائية من منهجية البحث هي تحليل و معالجة البيانات التي تم جمعها واستخلاص نتائج و أهداف البحث منها .
كلمات البحث: ديناميكيات النمو الحضري، النظام البيئي في المناطق الحضرية، واحة سيوة.

إقرار

هذه الرسالة مقدمة في جامعة عين شمس وجامعة شوتجارت للحصول على درجة العمران المتكامل والتصميم المستدام. إن العمل الذي تحويه هذه الرسالة قد تم إنجازه بمعرفة الباحث سنة ...

هذا ويقر الباحث أن العمل المقدم هو خلاصة بحثه الشخصي وأنه قد اتبع الإسلوب العلمي السليم في الإشارة إلى المواد المؤخوذه من المراجع العلمية كلٌ في مكانه في مختلف أجزاء الرسالة..

وهذا إقرار مني بذلك،،،

التوقيع:

الباحث: **ياسمين أحمد حلاوة**

التاريخ: /١٦ . ٢ . ٢٠١٦



ديناميكيات النمو السريع في المناطق ذات النظم البيئيه الخاصة : واحة سيوة

مقدمة للحصول على درجة الماجستير في العمران المتكامل والتصميم المستدام

أعداد: **ياسمين أحمد حلاوة**

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جامعة شتوتجارت

لجنة الحكم

أ.د .....الممتحن الخارجي
أستاذ.....
جامعة .....

أ.د .....
أستاذ.....
جامعة .....

أ.د .....
أستاذ.....
جامعة .....

التوقيع

تاريخ المناقشة:.....

الدراسات العليا

ختم الإجازة

موافقة مجلس الكلية .../.../...

أجيزت الرسالة بتاريخ:.....

موافقة مجلس الجامعة .../.../...

جامعة عين شـــــمس

جامعة شتوتجارت

MM/DD/YYYY

ديناميكيات النمو السريع في المناطق ذات النظم البيئيه الخاصة : واحة سيوة

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(٢٠١٦ . ٢ . ١٥)