A study into hawler botanical garden (h.b.g) in comparison to some other botanical gardens of the world

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Abstract. The aim of establishing botanical garden (B.G) in any place, has now been well expanded. It is confined to creation of an aesthetically pleasant refuge form of life as perfect as possible. In fact, it is an outdoor and indoor living museum of plant. Recently it becomes a multi-purpose area in contrast to any traditional gardens, park or greeneries. However, such botanical garden is not found in Iraq and it is almost not available in whole Middle East countries. The present project is a first attempt to establish a botanical garden under the name of Hawler botanical garden (H.B.G) in Iraq. Its structure, design and composition are forward and discussed in the present paper. However, (H.B.G) goal is planned to be extended for creation of a herbarium, seed bank, gene bank, conservation of energy, also country local specific gardens and especially Kurdish gardens, all of which are not exist or found so far in the area. Undoubtedly, this will encourage establishing more such gardens in the region in order to increase greenery area and refresh the environment.

Keywords: Botanical Garden, Greenery, Conservation of energy, Hawler (Erbil), Kurdish Garden

1. Introduction

Botanical garden is a well-known term as well as concern for almost many scientists in the field of agriculture, it is in fact, a permanent institution or a natural environment for acquiring, preserving facilities and opportunities for expertise investigation and researching about plant and its life.

Such information and knowledge about plant world is becoming essentially valuable and necessary for almost all aspects of life, such as education, scientific, medical, economical and other aspects of life. Also, it extends to natural history background knowledge [1, 2, 3]. However, such natural area involves all sorts of plants (flowering, nonflowering, grasses, shrubs and trees) nevertheless, it supposed to include most known plants in the world. On the other hand, whenever botanical garden is confined to only trees (including shrubs) it called Arboretum, both of which (Botanical Garden and Arboretum) have not been established in Iraq so far.

Amongst different greeneries found within urban spaces in our planet, botanical garden is actually unique in the way that it normally serves multidimensional purposes. Botanical garden goal may well be confined to plant collections designed for display, scientific research, educational recreation [4]. Botanical gardens have also conceptualized to other purposes such as its use as sites for conservation particularly of endangered plant species. Finally, it can be served as a model for collaborative relations between human beings and nature [5].

Botanical gardens can also be used to achieve various goals for individuals [6]. For example, it may encourage individuals to visit it as a part of their outdoor recreation [7]. In this sense, botanical gardens may perform various goals such as utilitarian in respect to, entertainment, cultural, educational, and spiritual purposes, beside scientific research and finding.

Connell, reported that people consider botanical gardens as places for tourism they perceive botanical gardens to stay as a pleasant and fresh environment [7]. A majority of botanical gardens availability in the UK demonstrate a general interest on botany as hobbies and knowledge. In any case, botanical gardens offer suitable, valuable, and secure, social areas to comfort people who visit them and parameters have been reported as human needs [8]. Beioley showed that the main difference between
botanical garden and parks or any other natural greenery in the world may be in their structure, goal composition and design as well as learning and entertainment areas.

All these progresses in botanical gardens throughout their history had led to the present status of them. Nowadays, the purpose and functions of botanical gardens has been demonstrated to be for preserving the plant biodiversity, educational, scientific, research, economic, conservation, culture, entertainment, Medical Plants, religion, tourism, picnic, the land for kids and retired people in order to establish aesthetically pleasing refuge form of modern life in our planet [3].

The goal of botanical garden actually consists of many different aspects, in order to interact with the community. B.G will provide an educational, conservation area, ecological consideration area and scientific research site, for the visitors, tourists, students, researchers, also will be a place for retired persons and others [3, 6, 7].

Hawler botanical garden is designed to stand alone, in order to provide a beautiful and functional botanical site for Erbil city and Kurdistan region of Iraq.

Thus, this paper provides a brief review of the Hawler botanical garden in comparison to some other distinct botanical gardens of the world. It explains a general definition of B.G and discusses the contribution of knowledge to goal and design of B.G in our planet. Structural and composition wise it includes country gardens, green house, open green spaces, pavilions, in fact its designed in order to involve herbarium, seed bank also.

However, establishment of such project in such a way to be as close as possible to the standard botanical gardens requirements in the world will undoubtedly lead to fill the existing gap between Hawler and other parts of Iraq and the whole Middle East [9, 10]. Although Al-Kaisi, 2004 had forwarded the design of a park and a botanical garden in Al-AArass tourist island, in Baghdad but it has not been established yet [11].

![Hawler Botanical Garden in Erbil Provence.](image)

**Figure 1:** Hawler Botanical Garden in Erbil Provence.

### 2. Methodology

An area of more than half a million-meter square (500,000 m²) have been allocated in north east of Erbil city. Figure 1 presents the project of Hawler botanical garden (H.B.G), all formal and official procedures have been approved through Erbil governorates office.

The final designs of (H.B.G) were the outcome of the consultant with many international commercial and scientific institutes as well as companies, opinion of international scientific experts such as Professor I. A. Shahbaz from Missouri botanical garden in USA and Professor T. Millar from Scottish Royal botanical garden in Edinburgh and their advice had been taken and considered, then after the selected choice among many proposals from different companies has been approved and performed. Figure 2 shows the master plan of Hawler Botanical Garden which was approved after many comprehensive
meetings and discussions within the high committee of H.B.G board that involve academic and official experts. Then official order had been issued through Erbil governorate since 2012.

![Figure 2: Proposed Master Plan of Hawler Botanical Garden.](image)

3. Result and Discussion
The allocated area (see Figure 1) has been fenced and the proposed design (Figure 2) have been established. It was planned that four pavilions representing plants of various regions of the world according to Table1 will be performed.

Plant type and species in various locations within the botanical garden have been proposed. Nursery, water channels and water resource have been designed. One of the distinctive features of H.B.G is assurance of water supply to the area through three underground water tanks (reservoir) each with the size of (800 M3) (see, Figure 3). The design of the two main gates and receptions have been performed the detail can be found in reference [3].

The argument will be confined to variation in respect to the size, structure design and the goal of H.B.G to other gardens of the world especially Missouri in USA [12, 13] and Kew in London British [1, 12, 14] as shown in (see Table 2 and Figure 4 A, B).
The Hawler botanical garden outline design includes four pavilions which are specified to distinct environment and plant communities, that is not found in Kurdistan region of Iraq. Additionally, one of the pavilions will be confined to orchids and butterfly garden as shown in (see Table 1). The Botanical garden is considered as an almost perfect and one of the most distinct improved advanced and important so far, type of gardens in our planet [13, 14, 17]. It may be "defined as an institution for holding documented collections of living plants for the different purposes" [18] in fact; it is a landscape project for learning, training, also educational, recreational institution that organizes and coordinates with different kinds of plant species and environment.

The greenery area at present plays an important and the main role in master planning of cities all over the world. It became a mast for a strategic importance in the urban design and establishment [19]. However, many cities and towns are currently dominated by building structures and increase of citizen population in urban areas. Because of that, the clean areas currently becoming limited in the region that will face pollution and congestion [19].

Any green areas whenever are planned to be established normally is preferred to be a reflection of natural areas of the region. In general, any greenery area or green built is continuation of landscape design around the town and cities in the world, in order to face ecological factors [20, 21].

In order to monitor and implement the agenda of botanical garden (B.G), botanical garden conservation international (BGCI) have pointed out their mission and vision since 2008 to ensure the world-wide conservation of plants in general and threatened plants in particular and promote research and education. Actually, its target confined to regulate and supervise botanical gardens of the world [22, 23, 24]. The aim of BGCI is extended to guide leader and discussion makers of B.G to understand, use and conserve plant diversity and promote building capacity for conservation of plants beside encouraging and allowing education and awareness [22, 24].

Table 1: Pavilions in Hawler Botanical Garden.

| No. | Pavilions Description                           | Location               |
|-----|------------------------------------------------|------------------------|
| 1.  | Pavilion -1 Orchids Garden and Butterfly Garden | South of H.B.G         |
| 2.  | Pavilion -2 Temperate Forest, North America and North Europe | North of H.B.G         |
| 3.  | Pavilion -3 Tropical Forest Singular Habitat   | West of H.B.G          |
| 4.  | Pavilion -4 Singular Habitat of the World      | West of H.B.G          |

Figure 3: Underground Water in Hawler Botanical Garden in Erbil.
Figure 4. Master Plan of: A. Missouri Botanical Garden in USA, B. Royal Botanic Gardens in UK [15, 16].
Table 2: General information about H.B.G in contrast to Kew in UK and Missouri in USA

| No. | Name of Botanical Garden | Established Date | Average Area (ha) | Country-City | Estimated No. of Plants | Location | Climate | Country Gardens & Plant Collection | Pavilion | No. of Visitors (Annually) | Continent |
|-----|--------------------------|------------------|------------------|---------------|-------------------------|----------|---------|-----------------------------------|----------|-----------------------------|-----------|
| 1   | Missouri Botanical Garden | 1859             | 32               | U.S.-Missouri | 7,500                   | St. Louis | Zones 5a-5b | 12 | Palm House | Around 1,850,000 | America-USA-Missouri |
| 2   | Royal Botanic Gardens-Kew | 1759             | 121.5            | England-Suriney | 30,000                  | southwest London | Temperate | 12 | Palm House | Around 1,500,000 | Europe-UK |
| 3   | Hawler Botanical Garden   | Initiated 2009   | 56               | Kurdistan Region-Iraq-Erbil | 12,000 So-fir | Kasmazan-Erbil | Subtropical (Iraq Turfan) | 10 | Four Pavilions | Not Yet | Asia-Middle East |

The history of Erbil city goes back to more than 6000 B.C [25]. However, the green space was under normal proposed (Figure 1) similar to other cities of Iraq or most of Middle East countries. In Erbil however, greenery areas had occupied only about 4.5% of the total area [26] up to last few decades. However, recently more attention has been given to greenery area not only in Erbil but had extended to the whole Kurdistan region. Since its the policies of local Kurdish government. An increased number of public parks and gardens have been established around the town recently. This had led to increase the greenery area of Erbil to more than 15% and in many other towns in Kurdistan [27, 28]. Therefore, the greenery area in Erbil is going to be much closer to international standard.

When The Hawler Botanical Garden will be accomplished, it will also play an important role in expanding greenery sites with its area of more than half a million-meter square.

The main task of the present project will be establishing a distinguished B.G in the country and the area, as well as attracting tourism. The purpose and the mission will extend to educational, conservation, scientific research as well as biodiversity. Meanwhile protecting of local threaten plants will also come within its mission.

History of the region is known to apply alternative medicine and it’s a traditional treatment for most disease depending on ethno-botany [29] Therefore, cultivation of medicinal plants will also be within the target and the goal of H.B.G. A playground for kids will be pointed out as well as a sport site such as a golf field and hopefully will serve participants to stress relief and relaxation for retired people ultimately improve their lives [30].

4. Conclusion
Attempts to establish a Botanical Garden in Iraq for the first time was achieved. Official approval of the project of Hawler Botanical Garden (H.B.G) on an area of more than half a million-meter square in north east of Erbil Kurdistan of Iraq have been issued in 2011 by Erbil governorate.
Its master plan has been performed and chosen through consultant with various international scientific and specialist institution and companies, selection and final design have been approved after a number of meetings of local and international consultants with the H.B.G board.

The goal of H.B.G will be extended to includes education, conservation, tourism, scientific research center, and greenery city. Comparison and contrast of Hawler botanical garden to Kew and Missouri botanical garden have been referred to in the present paper.
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