PART 1

Arriyadh Province is centrally located in the heart of the Kingdom. The area of the region is estimated to be 375,000 square kilometres and includes 47 cities and 1,383 residential communities that are located outside of the Arriyadh metropolitan area.

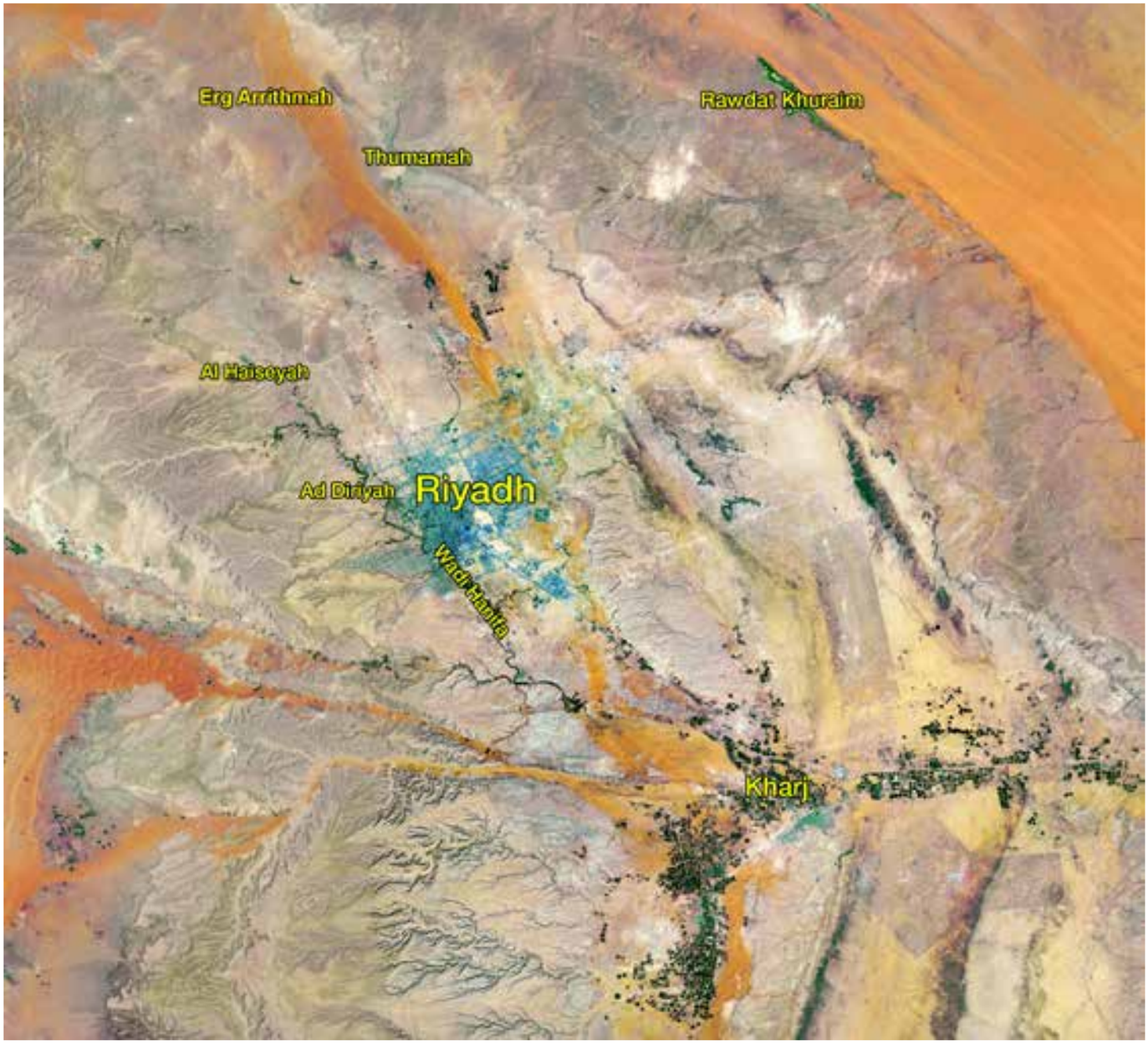
Arriyadh Province is characterised by the diversity of its environmental features. The most significant of these is the Najd plateau and in addition is Wadi Hanifah, Wadi Addwasir and the Tuwaiq Escarpment in the north. The region forms a relatively harmonious geographical formation comprising unique flora and fauna habitats.

The environmental system has been adversely affected over time by urban expansion and its related activities such as industry, mining, agriculture, grazing and forestry.

Within the Arriyadh Urban Limits area the vegetation takes a variety of forms including formal landscaped areas, gardens and green spaces. Beyond the Urban Limits natural vegetation is present in rangelands, green lands (Rawdha) and across the valleys and plains. Plant cover is found within both rural and agricultural areas.

Given the importance of vegetation as a critical environmental element necessary to sustain human life there is a strong recognition of the need to strengthen the efforts to restore vegetation and rehabilitate and reclaim degraded areas with plant cover.

It is therefore important to cultivate more trees, shrubs and plants in natural areas and to expand vegetation cover in urban areas having regard to the environmental constraints including water availability, soil composition and climatic influences.



Vegetation habitats

Vegetation habitats are divided into two groups:

First: Manmade environment including:

» **Urban areas (cities and metropolitan areas):** These comprise the urban communities, which include towns and villages. They often include urban landscapes and surrounding farmlands.

» **Agricultural areas:** These comprise the vast areas of agricultural lands which cover the southern, middle and northern parts of the region. They are considered an important part of the geo-environmental map.

Second: Natural environment comprising the original habitat for the indigenous plants in Arriyadh region including:

» **Sand Dunes:** Bulk density of sand found in low-lying areas in the east and west of Arriyadh region where scattered local plants may be found.

» **Sand Sheets:** Are sand covered plains spread widely across the Arriyadh region. They cover extensive areas often several square kilometres in unspoiled landscapes.

» **Rocky Plains:** Most rocky plains are composed of solid rocks (Cretaceous limestone) where vegetation is generally sparse.

» **Gravel Plains:** These comprise plains of gravel, which cover the western part of Arriyadh region. Savanna type plants are dispersed across these plains and associated small shrubs and ground covers may also be found.

» **Rocks/ Rocky Outcrops/Mountains:** Rocks in Arriyadh region are categorised as resistant rocks such as Granite non-resistant/rocky outcrops. They are located in isolated parts of the region. Associated vegetation includes trees and shrubs, which are generally found in the lower areas and around water streams.

» **Mud Plains:** These plains are typically located in low-lying areas comprising soft sand. Shrubs and perennial herbs and ground covers predominantly grow in these areas.

» **Marshes:** These comprise desert areas with a characteristic flat crust as a result of the high intensity of salt in the soils. They do not naturally support vegetation because of these high saline levels. They can be utilised for cultivation of a limited variety of plants and weeds.

» **Alluvial Fans (Alluvial Sediments):** These areas are comprised of alluvial sediments transported from the mountains, which are widespread in the western area of Arriyadh. A number of trees, shrubs and grazing herbs are found on the alluvial fans.

» **Wadis:** these are the arid valleys, with mud plains generally located along their banks. The valleys contain significant vegetated areas, particularly trees and perennials. They also provide important habitats for several fauna species.

» **Main Escarpment:** These are rugged cliffs, which are considered as important tourism areas because of their high scenic values. They are usually covered by a weather resistant limestone layer. Vegetation includes mainly shrubs and ground covers.

Plants and Climate:

Almighty Allah has provided for a large range of plant species that exist and have adapted to the relevant local environmental conditions. Among these are species suitable for the urban landscapes of the cities and towns within the Arriyadh region.

One of the most important considerations for the success of greening and afforestation works is the selection of the suitable plant species that can withstand the harsh environmental conditions of the Arriyadh region. The selection criteria for plant species needs to take account of the suitability of the local habitat including ground and climate conditions. Particularly important is the soil quality and the extent and availability of irrigation water.

This manual includes a list of the plants which are considered suitable for the conditions of Arriyadh region. It has been based on the results of landscape designs undertaken by agencies for some of Arriyadh›s major urban development projects including:

» **Wadi Hanifah:** Wadi Hanifah runs from the north to the south of Arriyadh through the western part of the city. It has regular water flow throughout the year with larger flows during the seasonal rains. The Wadi plays the leading role in plant species biodiversity, containing many thousands of trees, shrubs and ground covers. In addition to the large agricultural areas, there are gardens and major parks which significantly affect the local climate in the Wadi and surrounding areas.

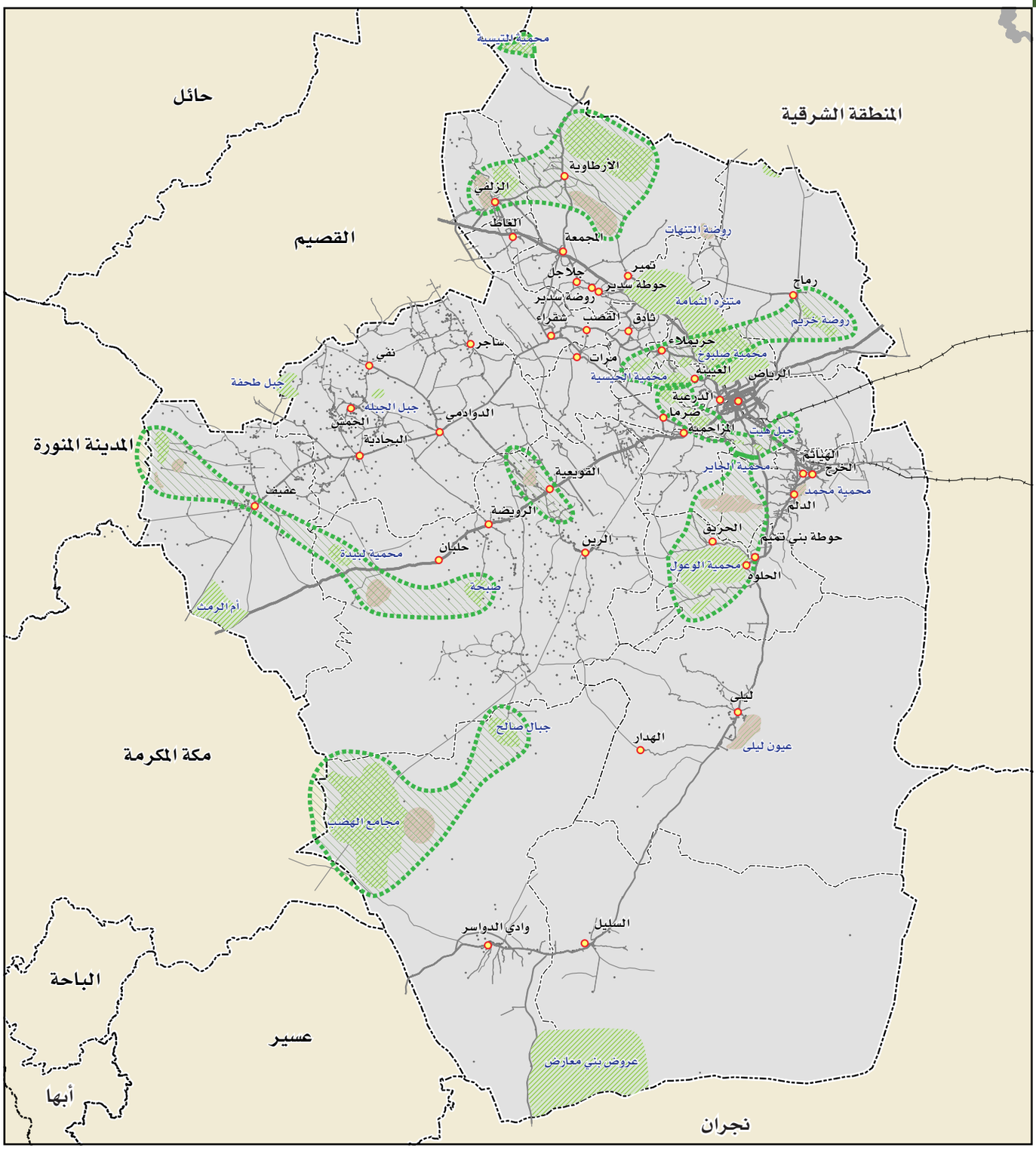
» **Diplomatic Quarter:** The Arriyadh Diplomatic Quarter was built to exploit the natural characteristics of the site represented by many small tributaries that flow into Wadi Hanifah. The Diplomatic Quarter comprises an estimated 25.7 hectares of landscaped parks and gardens, including sixteen public parks, which together amount to 30% of its total area. Of this, 24 hectares of parks are designated for public use. In the parks and gardens a variety of different trees, shrubs and ground covers have been cultivated. Native plants have been favoured as well as some additional plants imported from other similar suitable environments. Climatic and social influences, particularly privacy requirements have been an important consideration in designing the Diplomatic Quarter parks and gardens and also in the selection of plants, shrubs, trees and the irrigation systems.

» **Public parks and Gardens:** Parks and Gardens are located across Arriyadh city such as Salam park, King Abdulaziz historical center parks, King Abdullah Park in Malaz, and Prince Salman Park in Banban. These parks and gardens provide ecosystems that establish optimal conditions for plant growth.

» **Reserves:** these are sites that provide some of the main natural habitats for indigenous plants within the city of Arriyadh that have been protected in a variety of different ways. Reserves are widely dispersed and include natural protected areas that are reserved by military authorities or reserved by private land owners.

» **Open Space:** These are natural parks such as Thumama, Al Haysiya, Rawdat Khuraim, Alwasea and other related parks. They include areas in which various levels of vegetation management are practiced. Some are subject to full management and protection such as Thumama and some are partially managed such as Al Haysiya. These areas include basic natural habitats with the inclusion of some limited varieties of exotic species. These environments are protected in various ways against grazing, overuse and vehicle entry.

» **Private Farms:** Most of the private farms are located within Wadi Hanifah or other agricultural areas on the outskirts of the city. They are exposed to harsh or desert conditions. They play a minor role in providing plant species, but they are important for improving the visual and aesthetic environment, in addition to the positive effect they have on the local climate.



Environmental & Reserves Area in Arriyadh Region

- City
- Village
- Existing, Dual Carriageway
- Existing, Dual Carriageway
- Existing, Undivided Bi Directional Road
- Environmental Protected Areas
- Areas of Environmental Sensitivity
- Environmental Priority Area
- Railways
- Provincial boundaries
- Provincial boundaries

Plant Characteristics:

Basic guidelines and information have been set out in this manual in order to clearly explain plant characteristics and the extent of their adaptation to local environmental conditions as follows:

» **Frost Tolerant Plants:** Defined as « the ability to withstand frost in winter» where plants have been classified as follows:
- Low ability of frost tolerance: 0° C - 2° C.
- Medium ability of frost tolerance: -2° C - 5° C.
- High ability of frost tolerance: less than -5° C.

» **Drought and salinity:** Indicates the degree of plant resistance to the extent of extreme climatic conditions such as high temperatures in summer and the possibility of completely dry leafs. The degree of salinity tolerance refers to the plants tolerance to irrigation water characteristics.

Salinity is measured by parts per million of total dissolved solids (TDS) as follows:
- Low saline: less than 1000 ppm.
- Medium saline: less than 2000 ppm.
- High saline: less than 3000 ppm.
- Intense saline: more than 3000 ppm.

Native plants use:

Almighty God has granted the native plants the unique manner to adapt to the extreme climatic conditions of the region. Plants avoid heat during peak daily temperatures and leaves bloom when the temperatures are cool in the evenings. They also have functions related to the storage of water in their root systems to resist drought.

The use of drought tolerant species, especially native/indigenous plants is a more feasible and viable alternative to importing exotic species which can be very expensive in terms of both irrigation and maintenance.

Native/indigenous species not only adapt to the climate, but they are also resistant to diseases and pests and easier to maintain. They are considered a mirror of nature and increase the biodiversity of the Arriyadh region

In the region native seasonal plants appear after rainfall. This typically occurs in valleys or low-lying areas (Rawdha), where there are relatively good soil conditions and groundwater.

For the above reasons expanding the use of local species in gardening and landscaping in both the short and long terms has many advantages and is hence preferred

Planting native Species:

The natural beauty of the desert plants inspire the creation of quality gardens and landscapes using plants most suited to their local environment. This serves several important purposes including:

- Creating visually attractive landscapes.
- Reducing heat and glare and improving the micro climate
- Ease of maintenance and minimise the water consumption

Landscaping using native desert plants is a preferred process because the plants are best suited to the local soil conditions and availability of water. When planting native plants a natural layout and pattern is preferred. Intensive landscaping projects using exotic plants that require an abundance of irrigation and fertilisation should be avoided.

Native species look their best when planted with gravel mulch beneath them and with random rock placement. This should be carried out so the arrangement appears to be as natural as possible. Unusual shapes and colours should be avoided and the size of rocks should vary according to what occurs naturally in the local environment. Rows or distinctive patterns of rocks rarely look good, especially those placed in circles around tree trunks or distributed haphazardly.

Irrigation Efficiency:

Landscaping works in urban locations require considerable efforts in terms of the costs of water and maintenance.

Landscaping works should be sustainable and efficient, while water minimisation should be basic principle of design. The use of native plants in landscaping in the short and long term is essential, taking into account the diversity of the plants in the city and introducing plants with tolerance to the local environment. Use of exotic plants from other areas should only be considered for specific limited purposes.

The Use of the manual:

This manual is targeted for the use of urban and regional planners, garden designers, landscape designers and those who are seeking guidance on the selection of plant species for urban and regional development projects. The manual provides an overview about species suitable for farming in Arriyadh region.

In part three, planting phase is used to classify the plant, it may include:

» **Annuals :** plants that perform their entire life cycle from seed to flower to seed within a single growing season. All roots, stems and leaves of the plant die annually.

» **Biennials:** plants that require two years to complete their life cycle. First season growth results in a small rosette of leaves near the soil surface. During the second season›s growth stem elongation, flowering and seed formation occur followed by the entire plant›s death.

» **Perennials :** Plants that persist for many growing seasons. Generally the top portion of the plant dies back each winter and regrows the following spring from the same root system. Many perennial plants do keep their leaves year round and offer attractive borders and groundcover.

Perennial Plant is categorized according to its growth nature and vegetative size and branching patterns, as follows:

» **Tree:** trees with an elongated stem, or trunk, supporting branches and leaves in most species.

» **Shrub:** woody perennial plants with multiple stems arising at or near the base.

» **Sub-shrubs:** a short woody perennial plants which are shorter and smaller than shrubs.

The Book was devided into four parts as follows:

» **Part One:** Introduction: this section explains the use of the manual, symbols, colours and any abbreviations used. It also discusses the important aspects of climate and salinity.

» **Part Two:** Ground Covers - Terrestrial Plants From A to Z: this section includes photographs of more than 380 plant species. These plants have been selected for use in landscaping works and are set out in alphabetical order. Taxonomy information is also provided. The trees, shrubs and plants are described in detail, as well as a full description of their use and basic information about origin, nature and growth conditions.

» **Part Three:** Quick Selection Lists: this section includes plant lists for use as an easy guide for designers and researchers seeking plant species for certain specific purposes. The section shows what, when and how to use plants including plants suited for the needs of designers, researchers and other users of this manual.

» **Part Four:** Index: The index includes the plant lists with their scientific names in Latin and English ranked alphabetically with page numbers to facilitate the direct search by plant name.

» **Colour Coding:** Captions and abbreviations have been used where different colours have been used for each category and type of plant as follows:

- Trees
- Shrubs (Sub-shrubs)
- Climbers
- Herbsaceous Plants (Annuals, Biennials, Perennials, Herbs, Grasses)
- Palms, Cycads
- Cacti, Succulents
- Aquatic Plants

» **Photographs:** Four images have been selected for each plant. One large image reflects the complete plant and the remaining three images show leaf, flower and fruit details.