



On Site Review Reports

2258.SAU

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Wadi Hanifa Development Plan

Riyadh, Saudi Arabia



Planner

Arriyadh Development Authority

Client

Arriyadh Development Authority

Design

2001

Completed

2004 - 2007

Wadi Hanifah Development Project

Riyadh, Saudi Arabia

This report is based on the Project Review prepared by Professor Yildirim Yavuz for the 2001 cycle of the Aga Khan Award for Architecture. It updates and elaborates upon the information provided by Professor Yavuz in his report.

I. Introduction

Wadi Hanifah (the Hanifah Valley) is the longest and most important valley near Riyadh. It is a unique natural geographical feature in the dry region of Najd in central Saudi Arabia. The valley, which is fed by a number of tributaries, is a natural water drainage course for an area of over 4,000 square kilometres. It runs from the north-west to the south-east, passing through the western edges of Riyadh in its middle part. From this middle point, the valley includes a continuous watercourse resulting from the daily discharge of 650,000 cubic metres of treated and untreated water. This continuous flow of water has created a unique phenomenon of year-around lush areas in an arid environment.

Until very recently, segments of Wadi Hanifah, especially those bordering Riyadh, had been exploited in an aggressive and environmentally destructive manner. Parts of the valley were used as dumping grounds for rubbish; other parts were quarried for stone or sand. Consequently, a substantial part of the valley has been scarred and polluted and segments of its topography have been extensively modified. The natural flow of water in some locations has been obstructed, creating stagnant pools and swamp-like environments.

The wetlands to the south of the valley are particularly popular for recreational uses such as picnicking, fishing and swimming. The picnickers have unfortunately littered the area. Since the waters discharged into the valley include polluted waters (about 200,000 cubic metres per day), fishing and swimming there can be hazardous.

The Arriyadh Development Authority (ADA, also known as the Higher Commission for the Development of Arriyadh) has carried out studies of Wadi Hanifah since the 1980s. A development strategy plan was put forward and officially accepted in 1994. In 2001, a comprehensive development plan was commissioned for the valley. The study was completed in 2003 and its implementation was initiated in early 2004. The plan is a continuous, long-term one, but its basic components are expected to be completed by 2007.

II. Contextual Information

A. Historical background

Wadi Hanifah is of considerable historical importance. It is named after the tribe of Bani Hanifah, which inhabited the valley during the fifth century AD. The valley is a sizeable fertile strip that historically served as a centre of agricultural activities, supporting the human

settlements located in its vicinity. It also contains a large number of heritage sites (human settlements, individual buildings, defensive walls and towers, and dams), which were documented in a 1987 ADA study. Many of the historical structures of the valley are constructed of sun-dried mud brick, but locally quarried stone is also widely used. One of the most important heritage sites located in the valley is Al Dir'iyyah, the hometown of Al Sa'ud, the ruling family of Saudi Arabia.

B. Climatic conditions

Rainfall in this region is very limited and averages about 85 millimetres a year. More than half that amount occurs during the months of March and April. Temperatures in the Riyadh area range from a low average of 6.4°C in January to a high average of 42.9°C in July.

C. Site and surroundings

Wadi Hanifah extends over 120 kilometres in length. Its depth ranges from 10 to 100 metres and its width ranges from 100 metres to 1,000 metres at its widest extremities. It provides a natural drainage course for over 4,000 square metres of open area located along its length. A series of about forty smaller tributaries, known as *sha'ibs*, drain into Wadi Hanifah and these can be up to about 25 kilometres long. Most of these tributaries are located along the western side of the valley: for example, Al Ubaytah, Al 'Ammariyyah, Safar, Al Mahdiyya, Wabir, Laban, Nammar, Al Awsat and Laha. The eastern tributaries include Al Aysan and Batha'.

In cross-section the lowest part of the valley is in the centre, where the watercourse is located. This is bordered on both sides by a flat area characterized by clay soil deposits resulting from flooding in the valley and capable of supporting numerous agricultural and grazing activities. The flat areas are wider in the northern and middle parts than in the south. This area is in turn bordered by the sloping edges of the valley, which rise to the upper planes that drain into the valley.

The development strategy plan for Wadi Hanifah divides it into five zones, based on differences of ecosystem and levels of recent exploitation and resulting environmental damage. The two northernmost zones are located north of Riyadh. They are the least developed parts of the valley and include a number of traditional settlements and farmlands. The farms belong to wealthy owners, including members of the Saudi royal family. The traditional town of Al Dir'iyyah is located in this area. In general these zones are well taken care of and have not suffered as much as other parts of the valley from dumping, quarrying and pollution because they primarily consist of private farms, because they are not subject to the polluted water that flows into the valley further south, and because of their relative distance from Riyadh.

The third zone passes through the western parts of Riyadh. The urban section of the valley extends from Al 'Ilb Dam in the north to the area of Al Masani' in the south. This is the most damaged part of the valley as a result of the various environmentally destructive activities that have taken place there. As well as quarrying and dumping, these include the establishment of various light industrial projects, the existence of various uncontrolled construction activities, and also the discharge of polluted water into the valley.

The fourth and fifth zones extend from the area of Al Masani' southwards. Although less polluted than the third zone, the fourth zone nonetheless suffers from the discharge of polluted water, which results from a number of activities, including those of the tannery located in this zone. The fifth zone extends from Al Ha'ir Dam, which will have a holding capacity of 2,000,000 cubic metres, to the end of the valley and is known as the 'Lakes Area'. This section of the valley receives a continuous discharge of water. Since the construction of Al Manfuha treatment station, Riyadh's primary water treatment plant, in the early 1980s, about two-thirds of the discharged water in the valley has been treated to tertiary levels, which makes it suitable for agricultural purposes. Untreated water also makes its way into the valley. However, by the time the water reaches this zone, it is relatively well filtered and much of its organic waste has been removed through natural oxygenation processes. This is partly the result of the growth of reed beds along the watercourse, which provide physical filtering and oxygenate the water. However, there is a problem of water stagnation in these areas of the fourth and fifth zones and the resulting creation of swamp-like conditions. The area ends in a series of sizeable interconnected lakes.

A variety of paved and unpaved roads pass along and across the valley. Some of the roads act as throughways connecting areas along the two sides of the valley. The relatively high level of traffic in the valley has caused air pollution problems. Various vehicle lubricants have also been inadequately disposed of, especially in the central part of the valley.

The valley has tremendous potential as a recreational space for the people of Riyadh. In fact, the southern parts of the valley are very popular with picnickers. Unfortunately, no services are provided for the picnickers and no controls have been put in place regarding issues such as hygiene and cleanliness and parts of the valley, especially in the south, show the effects of heavy littering from picnickers. Developing services for picnickers is one of the important components of the comprehensive development plan. This includes providing a 70-kilometre-long pedestrian path for them.

A number of drought-tolerant native plants grow in the Wadi Hanifa. These include *Calotropis procera* (ushar), an evergreen shrub with poisonous sap that grows up to 4 metres high. Trees such as *Tamarix aphylla* (ithil) and various species of acacia are also found there. In the southern part, a variety of non-native tall water reeds such as *Phragmites australis* (ghab) have spread as a result of the continuous discharge of water and serve to treat the water running through the valley.

Various types of wildlife include migratory birds that stop in the valley on their way between Eastern Europe in the north and Africa in the south. There are also various native bird species. The numerous types of fish found there include carp and tilapia and parts of the valley are popular with people who come for recreational fishing. It is believed that the fish were introduced to the valley through spawn carried by migrating birds. In addition, the valley has leopard frogs and insects such as dragonflies and spiders, as well as butterflies. Domestic animals such as sheep, goats and cows graze there and rats and stray dogs are also present.

III. Programme

A. *What conditions gave rise to the formulation of the programme?*

The programme for this project is based on addressing both challenges and opportunities. The challenges result from the considerable environmental degradation to which the valley has been subjected over the past quarter of a century, especially in its middle parts bordering Riyadh. Also, the continuous discharge of water both treated and untreated that begins in the middle part of the valley's course has altered the ecosystems that traditionally existed in the central and southern parts of the valley. Although this has had the positive impact of bringing a continuous source of water to the valley, there is nonetheless a need to study and assess the ecological alterations resulting from the introduction of water to an arid area and to decide how best to deal with such alterations.

The valley also offers numerous opportunities. It provides a spectacular and sizeable green area that includes numerous heritage sites. It has the potential of providing high-quality and easily accessible cultural, recreational, touristic and environmentally preserved areas that would serve the inhabitants of Riyadh and even tourists from other areas. If sustainable policies for the development of the valley are put in place, the resulting arrangement would greatly enhance the quality of life for the people of Riyadh. The valley could support income-generating activities related to tourism and recreation, which would provide considerable employment opportunities. It also supports significant agricultural activities, which provide a source of income and also of food, and there is clearly a need to protect the valley's agricultural areas from urban sprawl.

In 2001, a number of engineering, architectural and environmental consulting offices were invited to participate in a closed competition for putting together a comprehensive development plan for Wadi Hanifah that would build upon the various studies for the valley carried out since the 1980s. The project was awarded to a joint venture by the British firm Buro Happold Engineers and the Canadian firm Moriyama & Teshima Architects. The plan was completed during the second half of 2003 and implementation was initiated in early 2004.

IV. Description

The comprehensive development plan consists of five interconnected components. The first is that of environmental classification. This component aims at identifying the ecological characteristics of the various zones of the valley, providing mechanisms that would guarantee its ecological sustainability, and creating a framework for positive and sustainable interaction between the valley and the city of Riyadh.

The second component emphasizes issues relating to water-demand management. The discharge of water into the valley is expected to increase from the current 650,000 cubic metres per day to 2,000,000 cubic metres per day over the next twenty years. This component therefore aims to tackle the problem of the increasing amount of polluted water being discharged into the Wadi Hanifa from various sources such as the tannery and slaughterhouse

located there. Strict regulations will be put in place regarding the quality of water that may be discharged into the valley. There is also a need to control pollution affecting the groundwater. The ground table in the area is relatively high and has therefore been easily contaminated by factors such as seepage of pollutants from septic tanks. The water-demand management measures will also provide solutions for the problems of swamping, which in many cases has resulted from quarrying and dumping activities that have severely altered the natural topography of parts of the valley. In addition, this component emphasizes putting in place natural oxygenation processes for water passing through the valley. This is based on physical filtering and also on oxygenating the running water through elements such as reeds to reduce levels of organic contamination. Finally, a rigorous programme for testing the water in the valley will be carried out at various locations and at regular time intervals.

The third component of the plan includes putting in place an effective land-use plan. Here, the aim is to end inappropriate and polluting land uses such as quarrying, dumping and industrial activities that discharge polluted water into the valley. This component would also deal with the serious and recurring problem of private encroachments on public lands in the Wadi Hanifa. At the same time, the plan will allow for agricultural, recreational, touristic and residential uses, as long as they do not result in environmental damage. In addition, considerable parts of the valley would be declared protected natural or historical zones. In developing this component, it should be emphasized that the valley provides the opportunity for creating an easily accessible cultural, recreational and natural zone that runs along the edge of Riyadh. It would therefore provide a much-needed breathing space for the inhabitants of a city that suffers from a shortage of open spaces. There are also plans to enforce, wherever possible, a minimum plot size of 25,000 square metres in the valley to control sprawl. One long-term element of the development plan will allow and even encourage private investors to create certain touristic or recreational projects in the valley. However, environmental impact assessment studies need to be carried out for these projects to ensure that they would not have any negative environmental effects.

The fourth component of the plan concentrates on rehabilitating the valley and reinstating its pre-existing ecological balance. This includes carrying out physical works such as clearing areas that have been subjected to dumping activities and filling up quarries. This component would also implement the redesign of the road network that passes through the valley in order to eliminate through traffic, control air pollution from vehicles and minimize various other negative environmental impacts resulting from the existence of a heavily used vehicular road network. All infrastructure services – electricity, telephone, water and sewage lines – will be consolidated within a four-metre channel that runs through the valley. Currently, such infrastructure networks are haphazardly laid out in various parts of the valley.

The fifth component tackles the issue of controlling development in the valley. This includes putting in place a monitoring programme that follows up on the environmental impact of the various activities taking place in the valley and also monitoring the quality of water there. This component in many ways provides a system of checks and balances for the various other components of the project.

V. Construction Schedule and Costs

The ADA began to carry out studies of Wadi Hanifah in the 1980s, after the negative environmental consequences of Riyadh's spectacular growth in the 1970s became visible in the valley. The Wadi Hanifah area has been placed under the authority of the ADA for some time now. The ADA is coordinating its activities with other institutions connected to the valley, including the municipality of Riyadh and smaller municipalities such as those of Dir'iyyah, and 'Irqa. Implementation of the plan was initiated only a few months ago. At this stage, the work has concentrated on rehabilitating the topography of parts of the valley, which includes clearing dumped materials and filling up quarried areas.

No information is available on costs incurred to date, or on the projected budget for the long-term development plan.

VI. Technical Assessment

Implementation of the project was initiated only a few months ago. The first significant phase of the project is not expected to be completed for another three years. Only after the completion of the project will it be possible to carry out an assessment of its effectiveness. However, if the project is implemented according to plan, the results should be very positive.

VII. Users

Wadi Hanifah serves various segments of Riyadh's population. Currently, the use of the valley is divided between upper-income groups, who use privately owned parts, and lower-income groups, who use the public parts. The farms, primarily in the northern area and, to a lesser degree, in the southern part of the valley, are owned by the upper crust of Saudi society. On the other hand, the open picnic areas are used by lower-middle and lower-income expatriate and Saudi residents from Riyadh. The comprehensive development plan aims at developing the valley in a manner that would serve all segments of Riyadh's society.

VIII. Project personnel

The project is primarily an initiative of the ADA. Various plans and studies have been devised for the valley over the past couple of decades by various consultants under the supervision of the ADA. The latest plan has been developed by Buro Happold Engineers and Moriyama & Teshima Architects, and is based on studies carried out for Wadi Hanifah over the years.

For the Review, contact with the ADA primarily focused on members of its Environmental Management and Protection Department. These include Abd-Allah Al Majid, the head of the department (Saudi national); Dr Mohammad Hamadto, an environmental specialist (Sudanese national); and Ahmad Jawabrah (Palestinian national), a supervisor at ADA, who has carried out considerable documentary fieldwork in the valley. Wael Bakhit (Sudanese national) of

ADA provided considerable help in coordinating with the ADA staff to allow the Review to be carried out.

Mohammad al-Asad
May 2004

Wadi Hanifah Wetlands

Riyadh, Saudi Arabia – 2001 report by Yildirim Yavuz (May 2001)

I. Introduction

Wadi Hanifah is the longest and most important valley near Riyadh. With its occasional lush stretches, it is a unique natural and geographical feature in the dry central highlands of Saudi Arabia. It is also a natural drainage course for surface water for a very large area, fed by a number of tributaries. Wadi Hanifah's entire drainage run-off area covers approximately 4,000 square kilometres. While it runs on a course from the north-west to the south-east, passing through the relatively smaller western portion of Riyadh, it also acts as a natural sluiceway for the Saudi capital. And so today, to the south of Riyadh, the valley has turned into a continuous watercourse due to the daily discharge of 400,000–600,000 cubic metres of ground water, rainwater and treated waste water from the capital, which has a population of approximately four million people. This continuous flow of water and treated sewage has created a unique natural phenomenon in the middle of the dry, arid land where a luxuriant ecological corridor, almost 100 kilometres long, has been created, with small waterfalls, lakes and islands, supporting a rich variety of flora and fauna.

Currently, Wadi Hanifah is being exploited by the increased demands of the rapidly expanding Saudi capital. Parts of it are used as a dumping ground for rubbish; stone quarrying and sand removal for concrete manufacture have scarred parts of the valley; and good agricultural land has been overrun by industrial and urban developments, some of which are actually located in the flood plains, presenting a great danger for both people and property. The recently formed wetlands to the south are a particular favourite for recreational use, with many people coming to the valley for picnics, to fish and even to swim, which is dangerous because the water is insufficiently purified.

In light of Wadi Hanifah's great potential for recreational use and as a green haven, the Arriyadh Development Authority (ADA) formally accepted a Development Strategy Plan in 1994, thus marking the beginning of a long-term programme for the preservation and proper utilization of the whole valley. Today, the programme is still at a preliminary stage and it seems that its implementation and complete realization will take a long time.

II. Contextual Information

a. Historical background

The valley of Wadi Hanifah, which is the most significant natural drainage course around Riyadh, is connected to many adjacent *wadis*, particularly at the northern part. Important ones include al-Oyaynah, al-Ammariyah, Safar, Wabair, al-Mahdiyah, Laban, Namar, Laha and al-Awsat, all of which slope from the west, and the al-Aysan and Batha valleys sloping from the east. The whole extent of the Wadi Hanifah is historically significant, due to the identification of 580 heritage sites, according to a survey made in 1987 (*Wadi Hanifah Development Plan*,

ADA, 1992), along its length. Most important among these are the abandoned village of al-Diraiyah, the home town of the Saud family, and the five-hundred-year-old stone dam near al-Masani. The presence of antique settlements within the valley indicates that this ancient natural scar on the surface of the Najd plateau in central Arabia has supported human existence throughout history, and the presence of water in the valley most probably played a central role in this. In fact, the old stone dam near al-Masani is an indication of earlier settlers' attempts to trap the rare and vital rainwater.

At the turn of the last century, when ar-Riyadh replaced al-Diraiyah as the main settlement in the region, and particularly within the last twenty years when Riyadh has been transformed into a large urban sprawl, the appearance of the valley began to change. During the rapid urbanization of the city, natural features on the side slopes as well as on the valley floor were damaged and destroyed at various points due to the development of stone quarries, sand excavation and rubbish dumps. The sewage network of the city drained into the valley, creating a health hazard.

In view of the continued environmental deterioration of the valley, a protection and development plan was deemed necessary. Preliminary studies were commenced at the beginning of the 1980s. Landmarks, historical sites, roads, traffic and the general condition within a radius of about 120 kilometres of the valley – between Thahrat Sadha, south of the northerly Sudoos, and down to al-Ha'ir lakes in the south – were studied in detail. The Manfouha Sewage Treatment Plant opened in 1982 and, at about the same time, the consultants SCET International, working for Riyadh Master Plan, highlighted the importance of the valley. The consultants proposed that Wadi Hanifah should be designated as green belt to the west of the city of Riyadh, and any land subdivisions in this area, which might encourage urban development, should be prohibited. This, unfortunately, was not realized and the city of Riyadh has sprawled westward, beyond the valley during the past twenty years.

The ensuing studies for the preparation of a development strategy for Wadi Hanifah have included assessments of the watercourse, soil quality, wildlife, land ownership, land use, farming, historical sites, recreational features, traffic, air and water pollution and water life.

The Arriyadh Development Authority (ADA) prepared the Development Strategy Plan for Wadi Hanifah in 1992. The plan was officially approved in 1994, marking the beginning of a long-term programme for the preservation and appropriate utilization of the valley. This year (2001), the ADA is preparing to invite various consultants to submit their proposals for a development programme for the valley, which would be realized in three phases, with the short- and long-term implementation to take place during the final phase.

b. Climatic conditions

Wadi Hanifah is located on the Najd plateau of Saudi Arabia, which has a dry, arid climate, with extremely hot and dry summers and mild, dry winters. The annual rainfall (October to March) is scarce and sporadic. According to rainfall records dating back to 1964, one significant characteristic is that the rain does not cover the whole area or large parts of it but falls on one or more smaller areas. The rain falls with great intensity for short periods,

creating flash floods, which are a common phenomenon in desert areas. The records indicate different rates of rainfall for different parts of the region, ranging between 60 millimetres and 110 millimetres.

The coldest month around Riyadh is January and the hottest is July. The mean daily air temperature ranges from 6.4°C in the winter to 42.9°C in the summer. The overall annual average is given as 24.6°C. Within the valley, cooler temperatures are provided by the shade of steep escarpments, single trees, palm tree canopies and high bushes growing on the banks of the lakes. Given measurements of these areas indicate a reduction in the temperatures of approximately 5 to 7°C.

c. Site context

The Development Strategy Plan for Wadi Hanifah prepared by the ADA has divided the valley into five different study sections, due to the differences in their ecosystems and the level of their recent exploitation.

The first section, from the al-Waseel tributary to al-Diraiyah, which comprises the large north-western part and its tributaries, is a dry desert and arid steppe area. However, the sub-valleys descending from the high mountains in the north-east present a rare characteristic for a desert region – a dense covering of wild trees and other plants that provide a suitable environment for a rich variety of wildlife. The dry northern part of the valley is picturesque thanks to its variably shaped desert surfaces, its occasional lush green oases and its ancient settlements like al-Diraiyah, built from mudbricks. The natural characteristics of this first section are mostly undisturbed.

The second section, extending from al-Diraiyah to the sub-valley Wadi al-Aysan, close to old Uraijah in the south, is surrounded by residential areas and by subdivided land that has yet to be developed. Agriculture is the main activity in this part of the valley, where the water-table is high and the swamps are abundant.

The third section, from Uraijah to al-Masani in the south, passes through a highly developed part of Riyadh, with an urban infrastructure and many residential districts.

Section four extends from al-Masani in the north to al-Ha'ir in the south. This is the section of the valley where the constant discharge of water begins, treated sewage water and excess underground water being discharged into the valley together. Here the valley is also surrounded by residential plots that have yet to be developed. The main activity is again agriculture.

The fifth section, which broadens and extends from al-Ha'ir to the south, is known as the lake area. This section contains a large number of farms and a wealth of animal and plant life.

The whole extent of the valley was once traversed by old dirt tracks, which are only partially usable today. Currently, various parts of the valley can be reached by secondary dirt roads, which branch out from the paved highway, running parallel to Wadi Hanifah.

d. *Site topography*

The valley in cross-section consists, in general, of four main formations. The first is the valley bed or bottom, which is the lowest part and includes the watercourse framed by sedimentary side terraces, some of which are either arable or are suitable for grazing thanks to their fertile soil and the availability of water. During high floods, the entire valley bed is covered with water, including the sedimentary terraces. The whole valley is made of limestone and sand. The first 15 metres at the top consist of alternating layers of clay, sand and gravel. This is why water remains on the surface. Rising up from the valley bed, on either side, are limestone slopes. Above these, the rocky edges of the valley delineate the upper limits of its width.

To the north-west lie the high Tuwaiq mountains from which a series of sub-valleys descend towards the east, to join the Wadi Hanifah. The northern part of the valley, from al-Waseel to al-Diraiyah, consists of hard geological formations, and their steepness is characteristic of the side slopes of the main valley as well as the sub-valleys. Here, vast areas of bare land are punctuated by some agricultural and industrial activity.

The valley becomes flatter and more fertile between al-Uraija and al-Masani, but here the urban development of the city of Riyadh has extended as far as the very edge of the valley.

The land south of al-Masani to al-Ha'ir and beyond consists of weak geological formations and the valley becomes so wide at this point that it is impossible to see the side escarpments from the valley bed.

III. Programme

As has been indicated above, The Wadi Hanifah Development Strategy Plan was prepared by the ADA as a result of the rapid deterioration of the natural environment in the valley, due to the swift growth and urbanization of Riyadh, which is located almost halfway down the valley. Physical changes had occurred in the valley from quarrying, dumping and sand excavation. In addition, inadequately purified waste water from the city, together with excess underground water, meant that about 600,000 cubic metres of water were discharged daily into the valley. This caused the underground water levels to rise, creating swamps and polluting the water and adjacent land, which is used by visitors for picnics, to fish and – unadvisedly and prohibited – even to swim. Further dramatic changes in land use occurred as good agricultural land was swallowed up for residential and industrial purposes.

A long-term programme for the preservation and correct utilization of the valley was launched in 1994 when the Wadi Hanifah Development Strategy was officially approved. Since then, environmental awareness has accelerated apace. The sustainability of resources has become a major goal in all planning and development activities in Riyadh. It was also recognized that the assets of the valley should significantly improve the quality of life of the people in the growing metropolis and its environs. As a result, based on the 1994 strategy and subsequent studies, new objectives and criteria were established for a comprehensive planning

and development project for Wadi Hanifah, to be advanced by a limited competition between invited consultants to be held this year (2001).

The first phase of the development project for the valley is expected to summarize the results of research due to be conducted, to indicate a short- and long-term vision for the valley, and to prepare alternative development proposals according to these ideas. The second phase is likely to be the preparation of a general plan, which should include land use, environmental zoning, water-management plans, guidelines for urban design and principles for environmental planning. The final and most important part of the programme will be the implementation phase of creating and designating roads, open spaces and recreational areas, together with the restoration of the water system and the historical sites. The implementation is expected to require a long timescale.

IV. Description

The Wadi Hanifah catchment area is approximately 4,407 square kilometres. This includes approximately 70 per cent of the city of Riyadh, with 80 per cent of its population. The valley is about 150 kilometres long and an average of 30 kilometres wide. The urban section of the valley from Sad Ilb to al-Masani, where the city of Riyadh is located, is the area in which the proposed new drainage channel is to be undertaken. This area has been irreversibly damaged by uncontrolled urban growth, resulting in considerable deterioration of the natural and historical features of the valley.

The upper section of the valley, from Sad Ilb to the north, still retains its relatively pristine condition and contains a considerable number of sites and villages of historical importance. Therefore, the planning for this area will focus on maximum protection, so that possible future exploitation can be controlled.

The southern section, extending from al-Masani to the lower extremity, includes the new al-Ha'ir dam (regulator) and contains unique, untouched natural settings. This section of the valley, affected over recent years by the constant discharge of water from Riyadh, terminates with a large area of interconnected lakes and islands. This area, in particular, will be earmarked for recreational use.

To retain the fine qualities of Wadi Hanifah, protection of the native wildlife is of the utmost importance. The greatest ecological potential in the valley can be seen in the northern and southern sections, away from the urbanized areas. The main plants that grow in the dry land of the northern section of the valley, aside from the short-lived desert weeds, are *Calotropis procera* (*ausher*), an evergreen shrub with poisonous sap that grows up to 3 metres; acacia (*salam*), a dry-climate variety with thistles that grows to 6 or 7 metres; and tamarix (*ethel*), a blooming native desert tree that can reach a height of 10 metres and survives in all parts of the valley, dry or wet. In the wetlands to the south, the watercourse is framed on either side by a dense belt of wild vegetation. The most common plants in this area are tall water reeds, *Phragmites australis* (*ghab*) or the marsh herb typha (*dees*), a leafy, spreading bush; convolvulus (*oleik*); and tamarix. This part of the valley is also known for its growing population of various species of bird, most of which are migratory, coming from Eastern

Europe and Siberia on their way to their winter grounds in Africa. They land in the valley to rest or even to stay for the winter. In addition to the migratory birds, about thirty different species have been identified, including various types of heron and egret.

Various forms of water molluscs (such as tiny water snails), and fish such as carp, tilapia and molinesia live in the watercourse, while tiny leopard frogs and insects such as dragonflies abound, together with various butterflies and a few species of spiders that live in the thickets of the waterside plants. While domestic animals like sheep, goats and cows are brought down to the water's edge for grazing, stray dogs and other animals from the city, such as rats, also roam the southern part of the valley.

Alongside its drainage function, Wadi Hanifah has great potential to provide recreational space for the four million citizens of Riyadh, a population that increases by 8 per cent each year. Particularly at the northern and southern extremities, environmental protection and recreational possibilities are closely linked. At present, the wetlands in the south are completely littered with rubbish left by picnicking visitors, while in the north, careless barbecue fires sometimes destroy whole palm groves.

For the time being, the whole valley is devoid of any social or recreational services, such as parking areas, designated picnic grounds, restaurants, toilets, supplies of fresh water and so on. These will have to be tackled in the comprehensive development plan for Wadi Hanifah, which is going to be put out to tender this year. This three-tier plan requires alternative development proposals to be submitted to fulfil its first part, after a period of analytical studies have been undertaken in the valley. The general plan is expected to be consolidated in the second part, when land use, water-resource management and environmental zoning will be decided. Part three consists of a ten-year implementation programme, when particular plans will be put into action.

The official client of the Wadi Hanifah Development Plan is the Arriyadh Development Authority. Since the beginning of the 1980s, more than twenty reports have been prepared relating to the development of the valley, put together by architects, engineers, academics, planners and consultants who have worked under the direction of the ADA. While there have been several foreign experts among these professionals, many were local members of the ADA.

V. Technical Assessment

The Wadi Hanifah Wetlands is not a designed or implemented project but a natural phenomenon which has been formed by the presence of a continuous and abundant flow of waste water, discharged from an urban conglomeration containing about four million people. The result is an amazing green corridor in a desert environment that opens into a wide stretch of interconnected lakes, teeming with wildlife. Such a positive result, achieved by waste water in a dry valley-bed in the desert, is hugely encouraging for the future of mankind, which continuously abuses its natural environment.

The valley in its natural condition today provides immensely valuable recreational possibilities for the citizens of Riyadh, with its fascinating landscape formations, the lower temperatures thanks to the shade of trees and tall bushes, and the soothing effects of its running and still waters. Currently, it is exploited by visitors, who damage the environment with rubbish and discarded belongings. Nevertheless, in the future, when the valley has been properly planned and developed, its usable recreational value will increase noticeably, and its exploitation might be controlled.

Since time immemorial, Wadi Hanifah must have drained flood waters from its catchment area, a process that has helped it attain its present form and depth. Considering its great width at certain points, some of these floods in the past must have been large, forceful and devastating. The impermeable soil of the valley bed, with its alternating layers of sand and clay, forces the water to run on the surface rather than quickly disappearing underground. In the new development programme, research on water resources and their management will be an important issue. This study will include surface and groundwater resources, the frequency and extent of floods, evaporation, pollution, and the use of water for different purposes. According to the results of the study, a restoration scheme for the water system is expected to be devised, including channels, lakes and ponds. The priority given to the restoration of the water system in the valley is a sound decision since it is the main element that has revitalized the once-dry valley.

Because a new, high-quality road network will ease access to the valley after the implementation of the development programme, pedestrian and vehicular numbers will undoubtedly increase. However, for the time being, there seems to be no great problem with traffic circulation within the valley since no development project has yet been designed or realized.

VI. Users

At present, Wadi Hanifah is being used by various kinds of people from Riyadh, for various reasons. Most of those who come to fish are adults and children from low-income families. Among these, workers from the Philippines, Thailand and Sri Lanka, who are particularly fond of tilapia, make up a high percentage. Mid- or low-income Saudi families usually come for picnics. Contractors still occasionally illegally dump demolition debris in the valley, but those involved in quarrying and sand excavation have been effectively banned from the area. The public reaction to the future development of the valley as a protected recreational space has definitely been positive, with support from administrators and professionals.

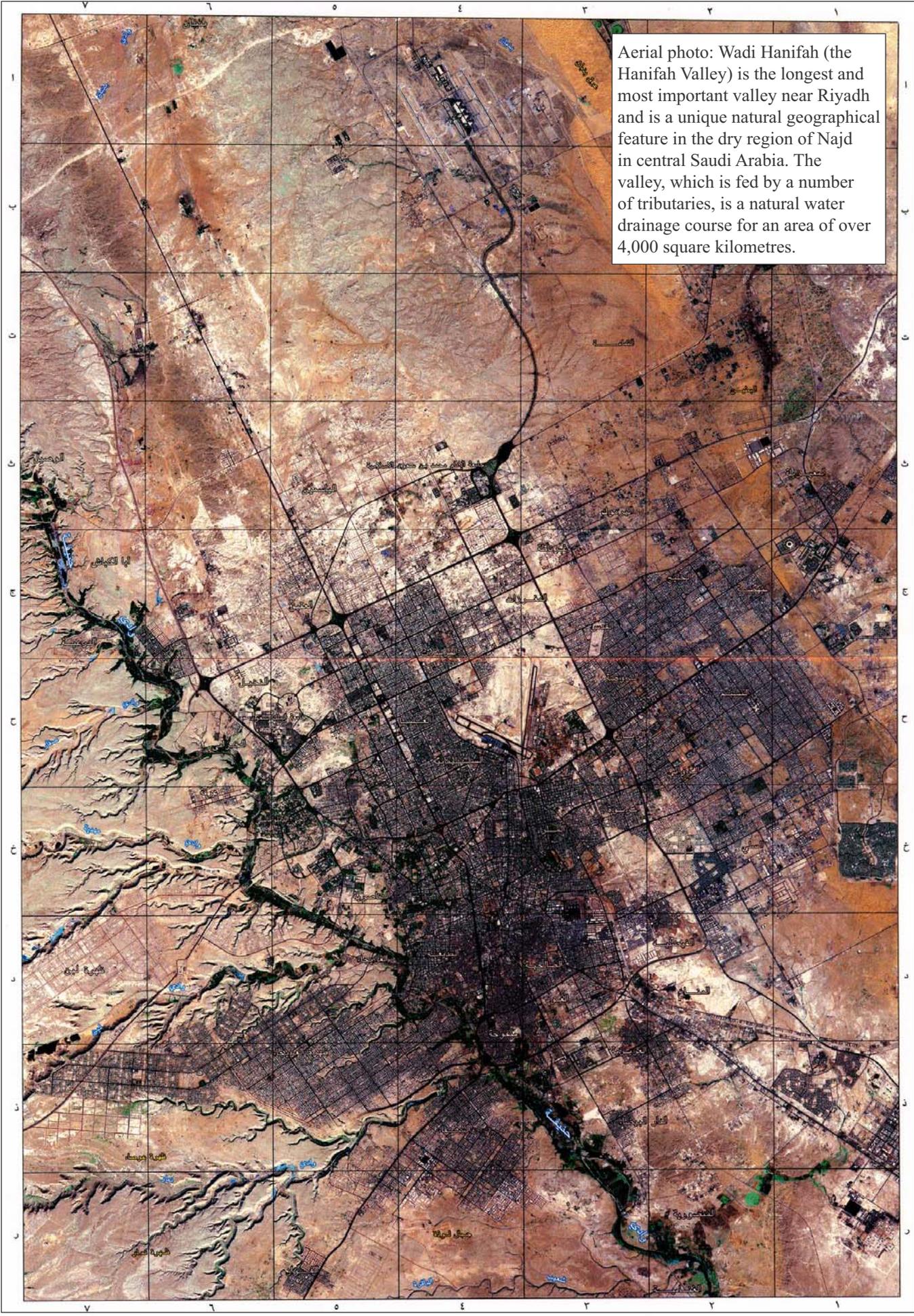
VII. Persons Involved

During the past twenty years, around thirty people have been involved in writing reports about various aspects of Wadi Hanifah, preparing it for future development. It is the ADA personnel, however, who have particularly worked towards this goal. Among them, Abdullatif al-Shaikh, the president of the ADA, and his vice-president Ibrahim al-Sultan are the main directors of the programme. Dr Zahir A Othman, the secretary general of Al-Turath – Prince Sultan bin Salman Award for Urban Heritage, was the vice-president of the ADA until last

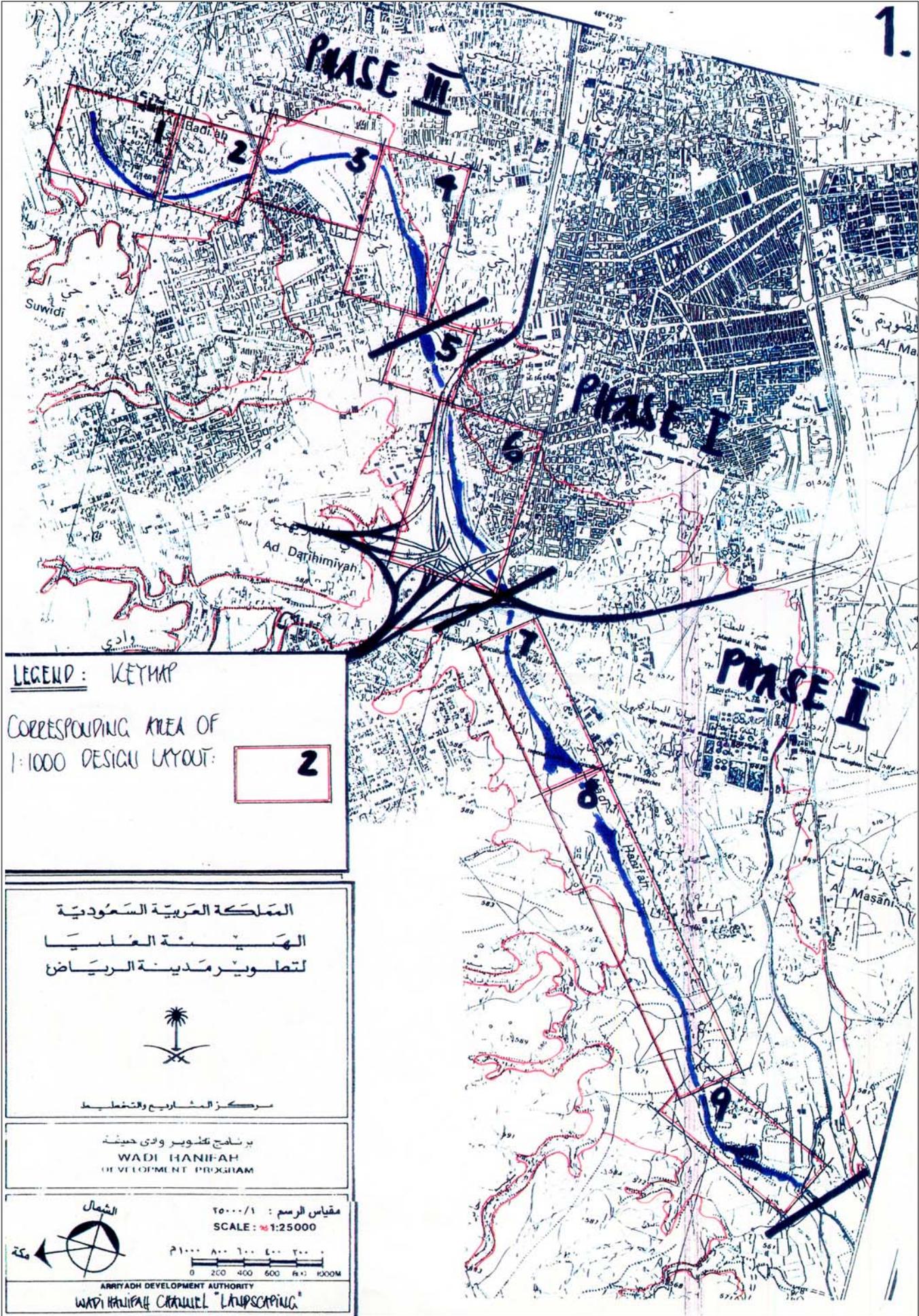
year and has also been involved with the Wadi Hanifah project. Abdulrahman M Al-Sari, director of Urban and Cultural Development in the High Commission for the Development of Arriyadh, is another person who is responsible for the progress of the programme.

Among the foreign consultants who have written reports on the valley, the German landscaping company BWP (Bödecker-Wagenfeld and Partners) has been instrumental. From this firm, Richard Bödecker, Klaus Klein, Joachim Müller, Christian Meisert, Richard Grothus and Martin Strassen have been involved with the production of several reports since 1985. Richard Bödecker's son, Jens Bödecker, and his friend, Uli Riederer, have written about the results of a boating expedition in the valley in 1993.

Yıldırım Yavuz
May 2001



Aerial photo: Wadi Hanifah (the Hanifah Valley) is the longest and most important valley near Riyadh and is a unique natural geographical feature in the dry region of Najd in central Saudi Arabia. The valley, which is fed by a number of tributaries, is a natural water drainage course for an area of over 4,000 square kilometres.



LEGEND: KEYMAP

CORRESPONDING AREA OF 1:1000 DESIGN LAYOUT:



المملكة العربية السعودية
 الهيئة العليا
 لتطوير مدينة الرياض



مركز المشاريع والتخطيط

برنامج تطوير وادي حنيفة
 WADI HANIFAH
 DEVELOPMENT PROGRAM



مقياس الرسم : 1/25000
 SCALE: 1:25000



RIYADH DEVELOPMENT AUTHORITY
 WADI HANIFAH CHANNEL "LANDSCAPING"



The southern section of the wadi extends from al-Masani, and includes the new al-Ha'ir dam. This area contains unique, untouched natural settings and is planned for recreational use.

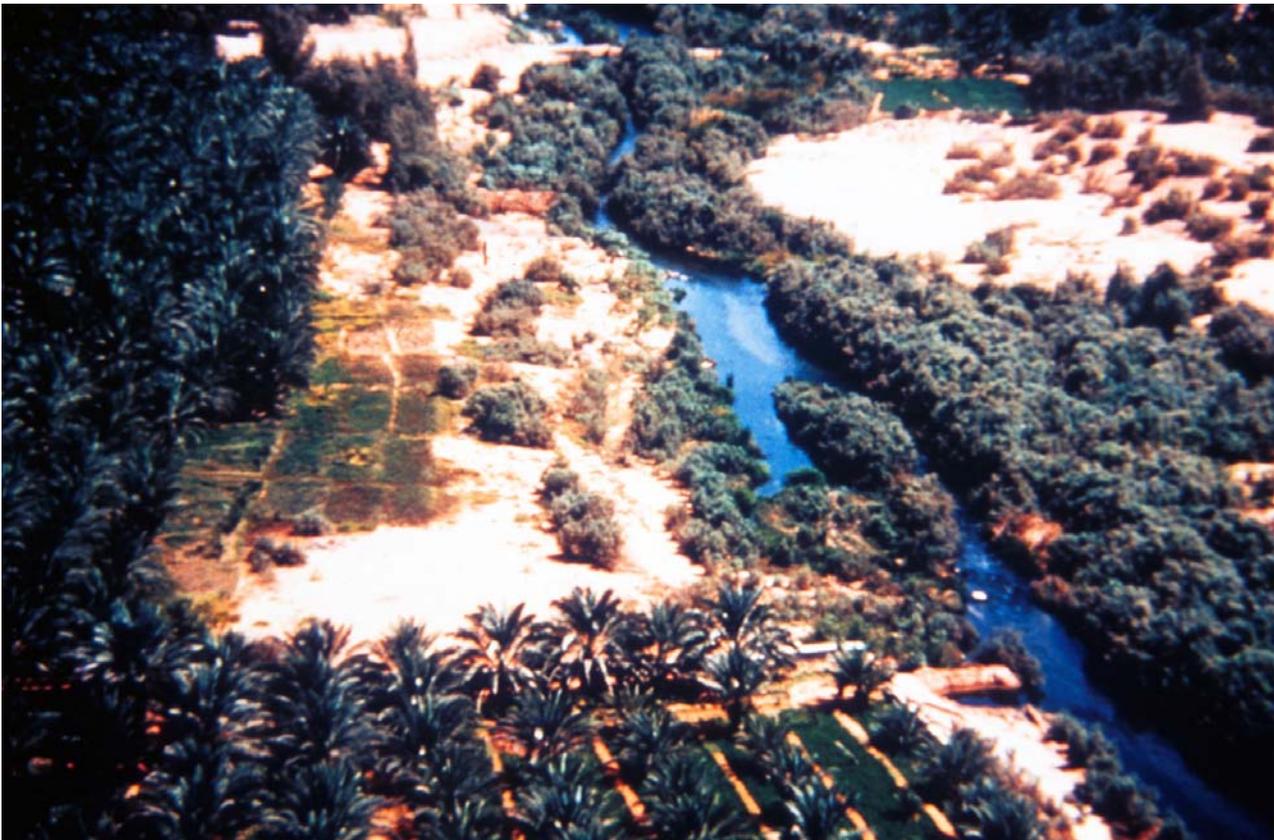
Arriyadh Development Authority has carried out studies of Wadi Hanifah since the 1980s. A development strategy plan was officially accepted in 1994. In 2001, a comprehensive development plan was commissioned, and implementation was initiated in early 2004. The basic components are expected to be completed by 2007.





A continuous flow of water and treated sewage has created a unique natural phenomenon in the middle of the dry, arid land. The development strategy plans five zones, and the two northernmost zones are the least developed parts of the valley and include a number of traditional settlements and farmlands.

A luxuriant ecological corridor, almost 100 kilometres long, has been created, with small waterfalls, lakes and islands, supporting a rich variety of flora and fauna.





To the north-west lie the high Tuwaiq mountains from which a series of sub-valleys descend towards the east, to join the Wadi Hanifah.

The northern part of the valley, from al-Waseel to al-Diraiyah, consists of hard geological formations, and their steepness is characteristic of the side slopes of the main valley as well as the sub-valleys.





The land south of al-Masani to al-Ha'ir dam and beyond consists of weak geological formations and the valley becomes so wide at this point that it is impossible to see the side escarpments from the valley bed.

From al-Masani in the north to al-Ha'ir in the south, the constant discharge of water begins. Both treated sewage water and excess underground water are discharged into the valley.





Wadi Hanifah is used by residents from Riyadh for picnics and fishing. Tilapia fish are plentiful in the tributaries.

The future development of the valley as a protected area will provide more recreational spaces for the residents of Riyadh.





Garbage and waste from Riyadh blow into the valley of the wetland.

Attempts to protect the wildlife of the wetlands have already begun.

