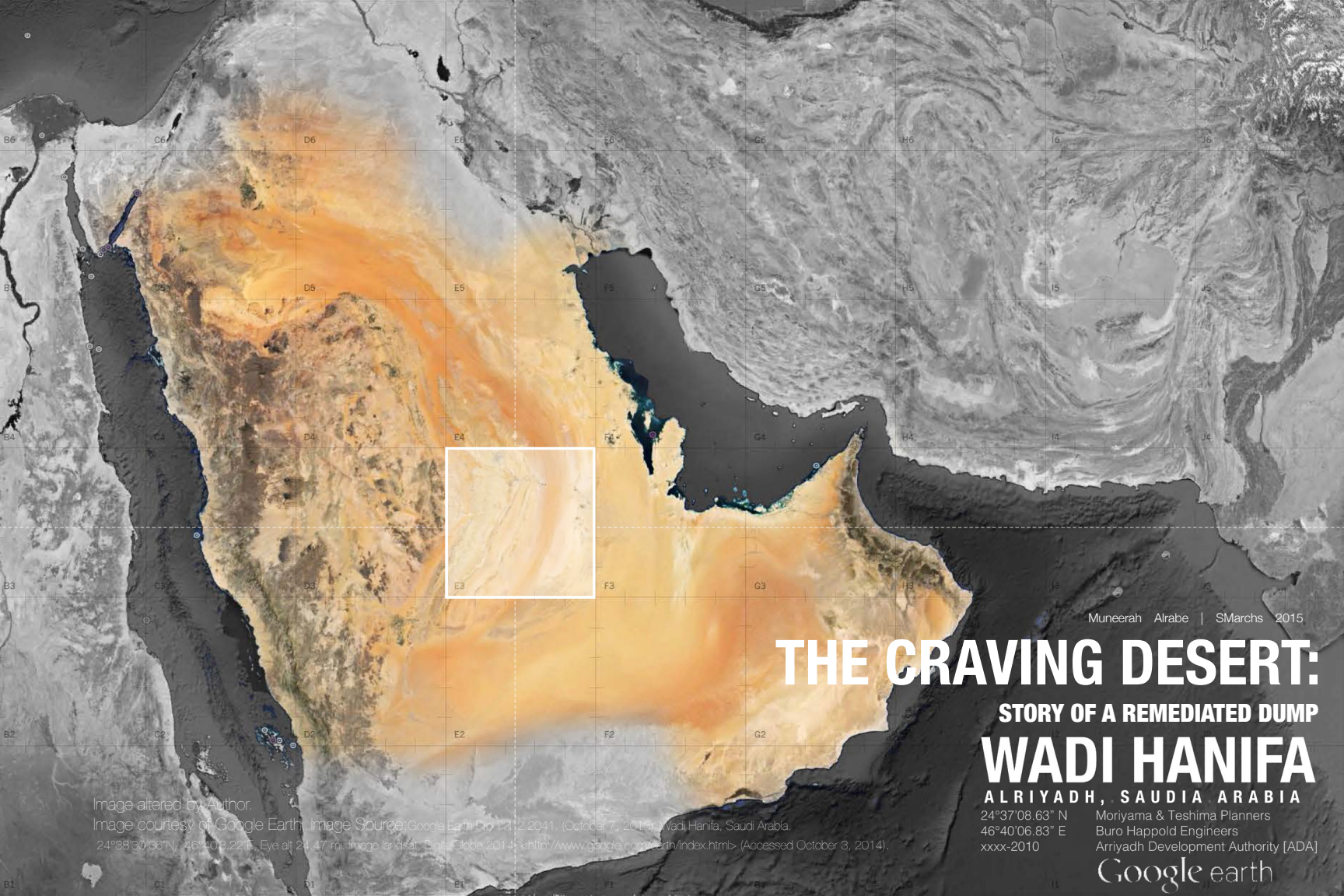


Muneerah Alrabe | SMarchs 2015

THE CRAVING DESERT:

STORY OF A REMEDIATED DUMP

WADI HANIFA

ALRIYADH, SAUDIA ARABIA

24°37'08.63" N
46°40'06.83" E
xxxx-2010

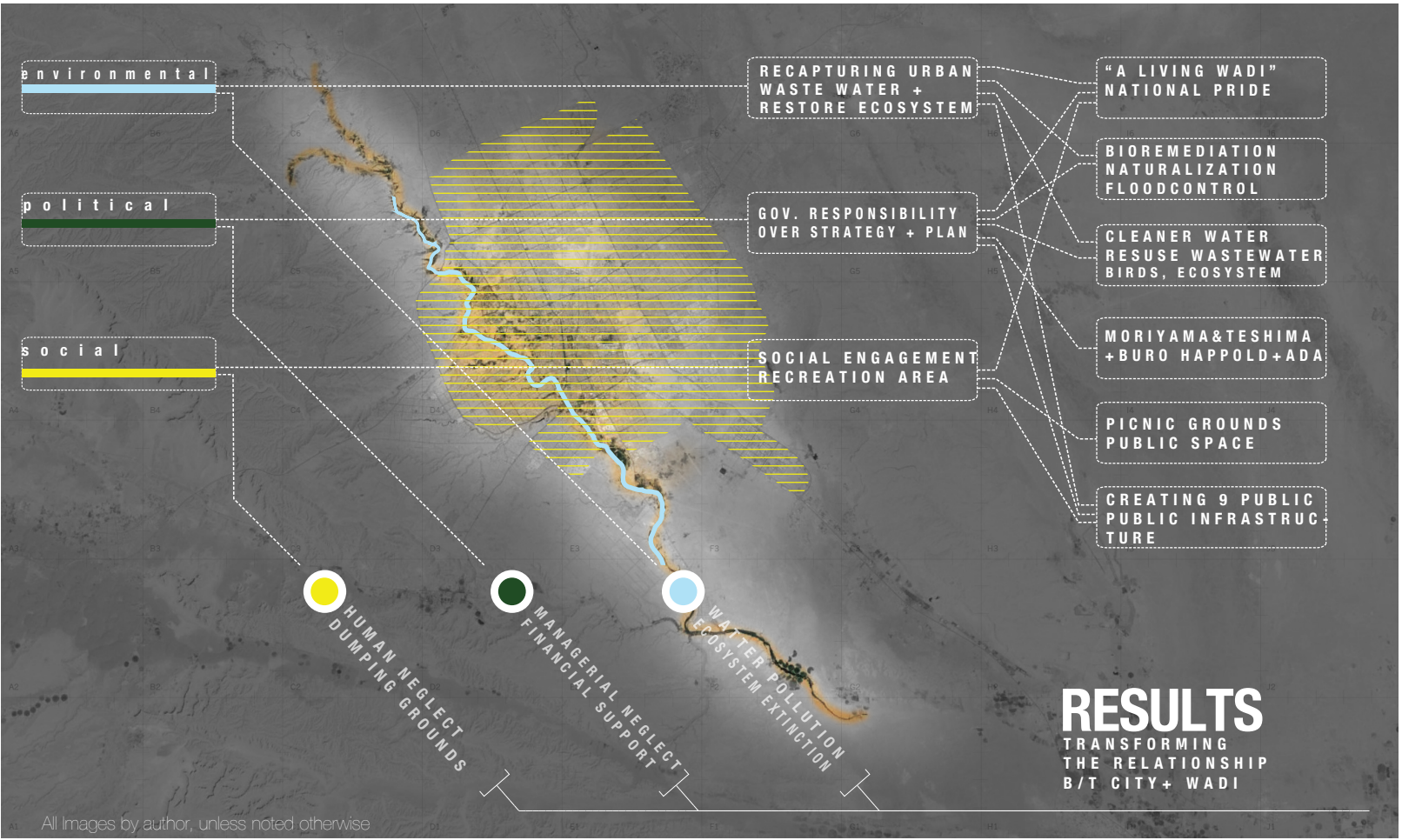
Moriyama & Teshima Planners
Buro Happold Engineers
Arriyadh Development Authority [ADA]

Google earth

Image altered by Author.
Image courtesy of Google Earth. Image Source: Google Earth Pro 7.1.2.2041. (October 7, 2013). Wadi Hanifa, Saudi Arabia. 24°38'30.66"N, 46°40'8.22"E, Eye alt 24.47 mi. Image landsat. DigitalGlobe 2014. <http://www.google.com/earth/index.html> (Accessed October 8, 2014).

Abstract

Wadi Hanifa, the most significant natural resource in the Arabian Peninsula, is a wadi stretching 120 km through Riyadh, the capital city of Saudi Arabia. This paper looks into the origins and foundations of the Wadi Hanifa Project. This study traces the transformation of the wadi from a dumping ground into an ecological restoration project developed by Moriyama & Teshima, in partnership with Buro Happold. This case study examines the social and environmental approach that is integrated into the design of the project. The paper investigates the benefits of the Wadi Hanifa project by studying the most influential factors that lead to the successes of the project. This study also looks at what was not successful and anticipates potential disadvantages and future challenges for the Wadi Hanifa project. I pursue the research in two folds. First, I develop an understanding of the project through published reports, analysis, and interviews with users and planners of Wadi Hanifa. Second, I spatialize the project at different scales through an analysis of the different applied systems. Overall, the Wadi Hanifa project proves to be a successful one, as it responds to social and environmental needs. Wadi Hanifa is a restoration project that aims to remediate and clean the water of the river by rehabilitating the once existing eco-system. This is done by implementing a large bioremediation plant that cleans the water of the wadi. Furthermore, the project transforms a neglected area of the city into a thriving social space by providing public amenities along the river. In addition, the design integrates culture-sensitive design elements, such as the semi-enclosed private family compartments that cater to the specific cultural needs of the Saudi Muslim culture. However, the project is criticized as a greenwashing scheme put forth by the government to gain international recognition. The success of the project resulted in an increasing value of surrounding real-estate. This phenomenon would potentially drive local farmers away. All in all, the project demonstrates that it has the potential to facilitate new forms of social collectivity and environmental literacy.



All Images by author, unless noted otherwise

Introduction

Ibn Battuta described the city of Riyadh as "a beautiful, fertile city, with abundant water."[01] The name Riyadh, which means gardens or meadows in Arabic, was given to this fertile city. Wadi Hanifa is one of the most significant natural resources in the Arabian Peninsula. Wadi, is a term used to describe a valley that is mostly dry throughout the year, except during the rainy season.[02] Situated on the Najd plateau in Central Saudi, Wadi Hanifa, stretches 120 km southeast from the Al Hissiya valley, terminating into the "empty quarters" of Riyadh, known as, al Rub' al Khali. [03] With the rapid growth of the city of Riyadh in the 1970s, the wadi was transformed from a main source of life into a dumping ground. After the Wadi reached a critical stage of degradation, the Wadi Hanifah Comprehensive Development Plan (WHCDP) was developed by the Canadian architecture and planning firm Moriyama & Teshima, in partnership with Buro Happold and commissioned by the Arriyadh Development Authority (ADA) on July 28, 2001. The comprehensive design put forth by Moriyama & Teshima and Buro Happold aimed to "transform the relationship of the city with its most significant natural feature," winning the Aga Khan Award for Architecture in 2010.[04] The Wadi Hanifa project is a thriving one that enhances sustainable growth on a city scale. The project sets up a framework for social engagement in an environmentally sensitive manner in order to improve the future health of the city. It is not an end product, but rather, an open-ended process that encom-

01 Matthew Teller, "Seeds of High Asia." Saudi Aramco World 63 (1 January/February 2012), 13.

02 "Wadi." Merriam-Webster. Accessed October 17, 2014. http://www.merriam-webster.com/dictionary/wadi.

03 Teller, "Seeds of High Asia." 13.

04 Drew Wensley and George Stockton, "The Living Wadi." Water Canada (May/June 2001), 38.

passes 120 km of parks, lakes, bioremediation plants and water facilities incorporated within recreational areas. [05]

This case study looks into the origins and foundations of the Wadi Hanifa Project by tracing the transformation of the wadi from a dumping ground into an ecological restoration project developed by Moriyama & Teshima, in partnership with Buro Happold. This paper examines the social and environmental approach that is integrated into the design of the project. This study investigates the benefits of the Wadi Hanifa project by examining the most influential factors that lead to the successes of the project and anticipates potential disadvantages and future challenges of the Wadi Hanifa project. I pursue the research in a two fold study. First, this study will present a detailed investigation on the design interventions through published reports, analysis, and interviews with users and planners of Wadi Hanifa. Second, this work spatializes the project at different scales through an analysis of the different systems applied.

Altogether, the Wadi Hanifa project proves to be a successful project as it responds to social and environmental needs. This success is dependent on its strong top-down planning approach, strong political and financial support, and long-term vision. However, the projects needs to address the behavioral nature of the society using it, in order for it to sustain itself as the city

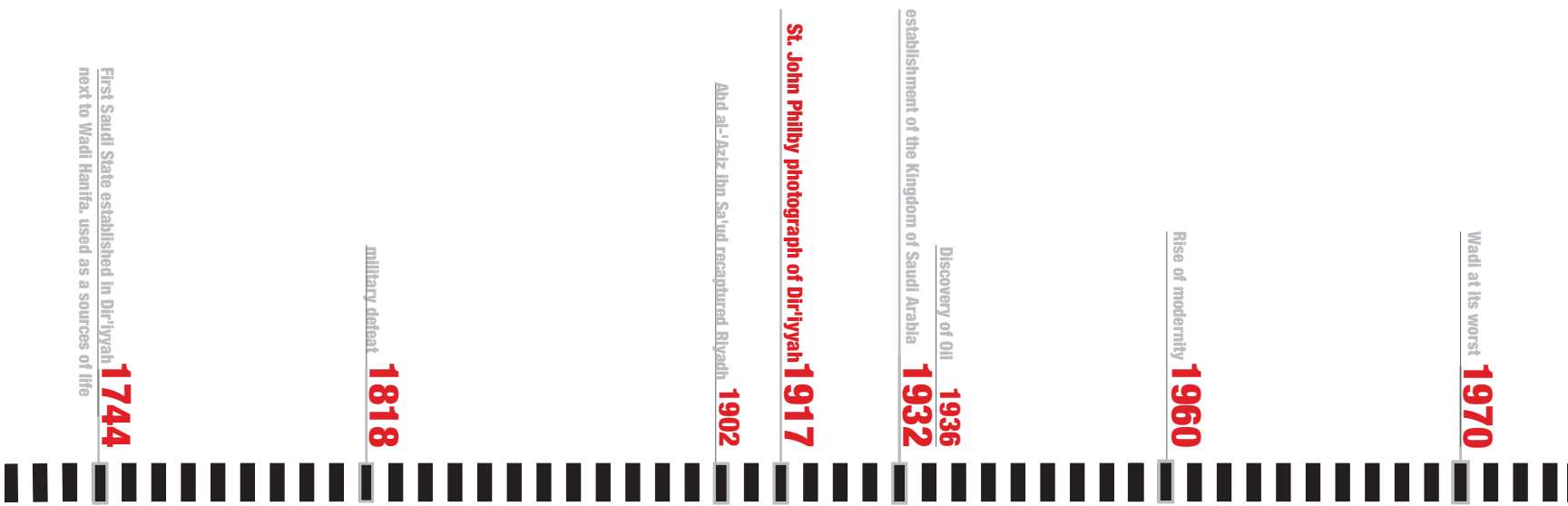
continues to rapidly grow. Overall, the wadi revives the natural environment of the city of Riyadh by restoring the eco-system, providing cleaner water, and constructing public amenities along the wadi beds. The project was possible only because it was backed up by a strong organization and a well-planned long term vision that catered to its social, political, and environmental context.

On the one hand, the project's all-inclusive design process allows for the enhancement of sustainable environmental growth whilst providing for future economic benefits and opportunities. Its success stems from the technological and creative interventions in environmental planning. The project seems to be an example of Anne Spirn's definition of nature as consisting of "the creative and life- sustaining processes that connect everything in the biological world and the physical universe, including humans" where the "chemical, physical, and biological processes interact with social, economic, political, and cultural processes, over time, to produce landscapes".[06] Indeed, the design process of Wadi Hanifa allowed for biological and physical processes to communicate with its social, economic, political and cultural processes. On the other hand, the success of the project does have some consequences that might constrain the future growth of the wadi. Nonetheless, the project proves to have the potential to promote new forms of social collectivity and environmental literacy in the city of Riyadh.

05 Wael Samhouri, 2010 On Site Review Report- Wadi Hanifa Wetlands, (2010), 3.

06 Anne Spirn, "The Nature of Mill Creek: Landscape Literacy and Design for Ecological Democracy." 2014, 1.

Figure 1
Historical Timeline
Historical Timeline depicting the significance of Wadi Hanifa on the history of Riyadh and Saudi Arabia.



 All Images by author, unless noted otherwise

P R O B L E M S

P R O C E S S

R E S U L T S

الهيئة العليا لتطوير مدينة الرياض

لا إله إلا الله محمد رسول الله

bödeker partners

MORIYAMA & TESHIMA

BUROHAPPOLD ENGINEERING

1970 Exploitation of Wadi

1974 Formation of ADA

1983 Construction of city's first wastewater treatment plant at Manfouha
400,000 cubic meters of effluent being discharged into the wadi every day

1984 investigation in wastewater dumping began in wadi hanifa

1990 Formation of river and lake system from treated systems

1993 Excursions and photographic exploration of site

1994 Wadi Hanifa Development Strategy Approved

2000 Boat Explorations by Jens + Ulli

2001 Joint venture Team : Moriyama & teshima + Buro happold project team was chosen

2003 Start of Construction

2004 Zone 1 + Zone 2 + Zone 3

2005 Zone 3 + Zone 4 + Zone 5

2007 Awarded the Aga Khan Award for Architecture

2008 Fecal coliform bacteria by 97%; Total coliform by 87%; Enfonila by 92%, Biological oxygen demand (BOD) by 60%; Phosphorous by 48% Suspended solids by 97%.

2009

2010

2011

2020

Historical Background

Up until modernity, Riyadh's growth has always depended on this living wadi. In the pre-Islamic times, the Bani Hanifa tribe settled along this significant natural resource, called Wadi Hanifa, meaning pure. Early settlements in 1744 used this wadi as a source for life, in fact the first Saudi state was established in Dir'iyah located right next to the wadi. [07] Their mud walled ruins still remain visible today among the other 580 recognized heritage sites that are part of the preservation of the cultural heritage of the wadi. [08] This civilization depended on the wadi as a source for life, therefore, there was a healthy balance between the land, the wadi, and its people. [09]

Following the creation of the Kingdom of Saudi Arabia in 1936, the Al-Saud ruling family established Riyadh as the capital city. With the discovery of oil, a wave of modernity took over the city and lead to the expansion of the city, population, and industry. As Riyadh grew westward to sustain its rapid growth, Wadi Hanifa was not able to cope with the increasing water demands. As a result, desalinated water was pumped from the Eastern Province of Saudi, causing rising groundwater levels and water contamination. Eventually the wadi witnessed increasing neglect by the city, leading to evacuation of local farmers. "There came a point when it was impossible for us to stay any longer. We left the valley," reports Matthew Teller from a local farmer Ibrahim al-Salim. [10] [Figure 1]

07 Teller, "Seeds of High Asia," 13.

08 Yavuz, Yildirim, Wadi Hanifa Wetlands The Aga Khan Award for Architecture Report. The Aga Khan Award for Architecture: 1994, 3.

09 Wael Samhouri, 2010 On Site Review Report- Wadi Hanifa Wetlands, 2010, 4.

10 Teller, "Seeds of High Asia," 13.

Wadi in Context:

The rise of the oil-economies in the Gulf region lead to an exponential growth of each of their cityscapes. The increase of population and economic boom lead the Saudi government to seek help and reach out to foreign expertise to plan future developments. The rapid urban growth has altered the city fabric with various out-of-place architectural interventions and large-scale urban developments. However, the Wadi Hanifa project situates itself as a culture-sensitive approach to the reserved conservative society and the harsh environment of Saudi Arabia.

Wadi Hanifa is located in a dry and arid climate with extremely hot and dry summers averaging over 120°F degrees in July and winters averaging under 40°F degrees in January. The Wadi Hanifa watershed's basin descends from the Tuwaiq escarpments in the Northwestern region of Riyadh along with 40 tributaries that drain into the wadi. Riyadh is known to receive an average of 100 millimeters of rain per year, which all occur during the heavy rainfall seasons between March and April, [11] causing water from these tributaries to flow through the wadi resulting in instant flash floods traveling at 60 km per hour through Wadi Hanifa. [12]

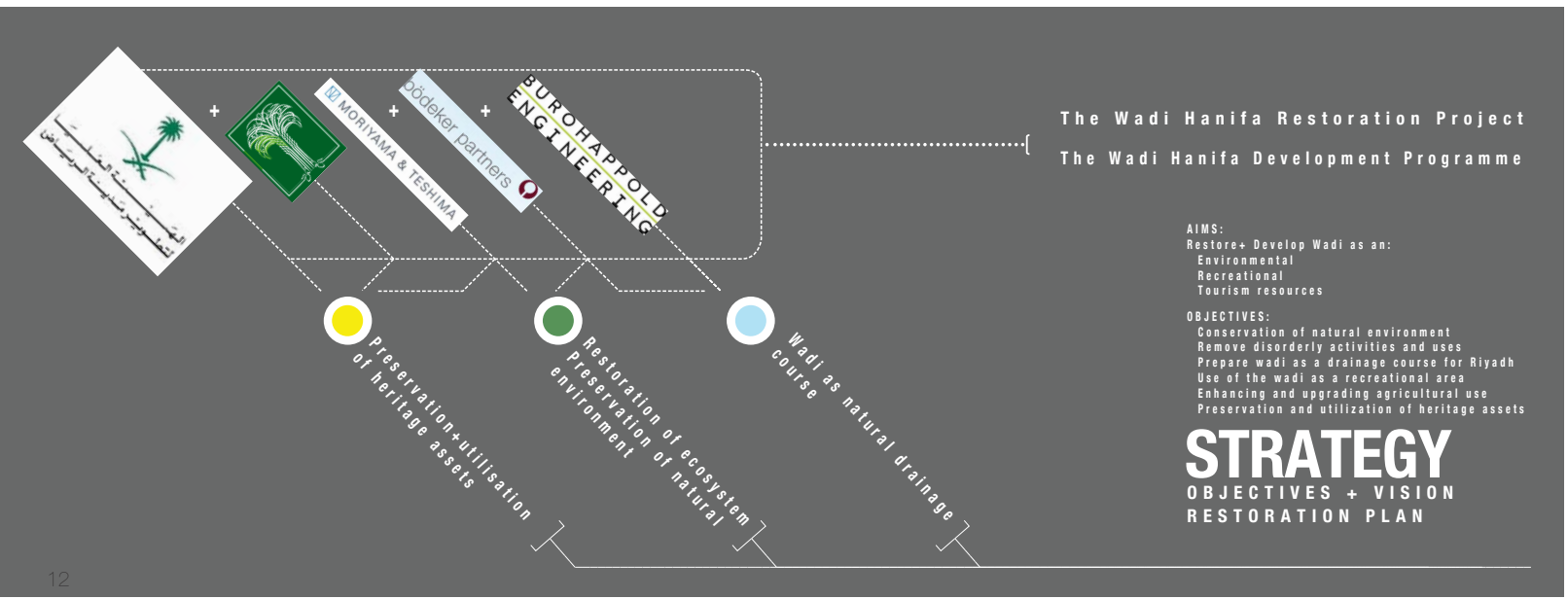
Wadi Hanifa extends 120 km from the periphery of the city of Riyadh ranging from 100 meters in width in certain areas and extending up to 1000 meters in its most extreme areas. The wadi's

11 Yildirim Yavuz and Mohammad Al-Asad, On Site Reviews Reports, Wadi Hanifa Development Plan, 2001-2004, 2.

12 Vall Ross, "A River Back from the Dead," The Global and Mail, 2007.

Strategy

A collaborative project facilitating many players: the ADA, Al Turath, Moriyama & Teshima and Buro Happold, and Bodeker partners



depth ranges from 10 meters to an utmost of 100 meters at its deepest. [13] The valley of the wadi is known to have 40°F cooler temperatures due to numerous vegetative plant species shading the wadi. [14]

Initiation and Development

One of the main players for the initiation of the project would be Jens Bodeker, of Bodeker Partners. His early photographic excursions of the wadi in 1984 exposed the dense vegetative and extreme degradation of the wadi. Simultaneously, the wadi was recognized as a health hazard by the SCET International consultants, who were working on Riyadh's Master Plan, and proposed for the wadi to act as a green belt for the city. However these plans were neglected and not realized. In addition, there were numerous reports from local architects, engineers, and academics by local members of the ADA since the beginning of the 1980s. [15] These reports include technical studies, water resource and flood studies, along with historical and archaeological reports conducted by the ADA within the area.[16]

According to reports from Richard Bodeker, Jen Bodeker's father, "Jens suggested to the president of the ADA and the heads of the departments in charge to explore the wetlands by boat

13 Yildirim Yavuz and Mohammad Al-Asad, On Site Reviews Reports, Wadi Hanifa Development Plan, 2.

14 Yavuz, Yildirim, Wadi Hanifa Wetlands The Aga Khan Award for Architecture Report, 2.

15 Ibid, 8.

16 Wael Samhouri, 2010 On Site Review Report- Wadi Hanifa Wetlands, 5.

because the dense riverside vegetation made it nearly impossible to reach the open water." Thus, he was given the opportunity by Abdullatif al Sheikh, the president of the ADA, to train himself and his partner Uli Riederer for a boat excursion. This resulted in a three month boat expedition that allowed them to explore the wadi in 1993. [17] These excursions produced published reports, photographic archives, and design proposals for the development of the future of Wadi Hanifa wetlands. [18]

As a response, the Arriyadh Development Authority took charge of this project and Saleh Al Fayzi was the newly appointed director. In 1994, A Development Strategy Plan for Wadi Hanifa was approved and enforced by the High Commission for the Development in Riyadh, yet a failure in the overall planning process pushed for a more comprehensive development, design and implementation plan. As a result, the Wadi Hanifah Comprehensive 10-year Development Plan was contracted to the Canadian architecture and planning firm Moriyama & Teshima in partnership with Buro Happold by the ADA in 2001 from a limited competition between invited consultants.[19] However, some sources claim that the architects were chosen during a discussion in which foreign firms were invited to discuss major challenges of Riyadh, "Mr.Stockton outlined the benefits of cleaning up the

17 The Aga Khan Award Committee, Wadi Hanifa Wetlands The Aga Khan Award for Architecture Report. The Aga Khan Award for Architecture: 1994, 5.

18 Jens Bodeker and Ulrich Reiderer, "Wadi Hanifa Wetlands, Design Proposal", 1983.

19 Yavuz, Yildirim, Wadi Hanifa Wetlands The Aga Khan Award for Architecture Report, 5.

river, and was given the green light. No competition, no fuss". [20] This decision was a result of the trust earned by Moriyama & Teshima's previous award winning work in Saudi Arabia's National Museum.[21] Moriyama & Teshima in partnership with Buro Happold, completed the plan in 2003 and construction works started in 2004. [22]

Project Description

With such a large task at hand, the ADA agreed to fund the $580 million project, known as the biggest water reclamation project in Saudi Arabia, in order to remediate their most prominent natural resource. The development, design and implementation plan was developed by the design team as the Wadi Hanifa Comprehensive Development Plan (WHCDP). The WHCDP was strategically developed into five components as a 10-year program of works aimed to rehabilitate Wadi Hanifa as per the ADA's long term vision to transform the wadi into an environmental, recreational, and touristic resource. [23] The five components developed were established to: identify ecological characteristics, tackle problems of water management, develop land use plans, rehabilitate the valley, and to develop a system of checks and balances to control and monitor the wadi. [24]

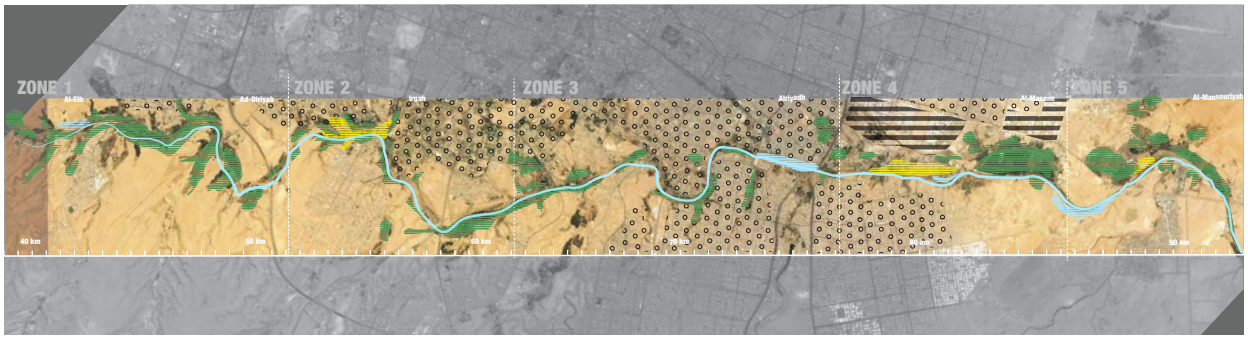
20 Vall Ross, "A River Back from the Dead," The Global and Mail, 2007.

21 Vall Ross, "A River Back from the Dead," The Global and Mail, 2007.

22 Buro Happold and Moriyama & Teshima, and Arriyadh Development Authority. 2010. Wadi Hanifah Restoration Project, 11.

23 "Wadi Hanifa, The Riyadh Waterfront, a Potential for Investment." Archaeology Magazine (2010), accessed November 16, 2014. http://www.archaeologic.net/cmds.php?action=newsopen&id=2316

24 Samhouri, 2010 On Site Review Report, 4-5.



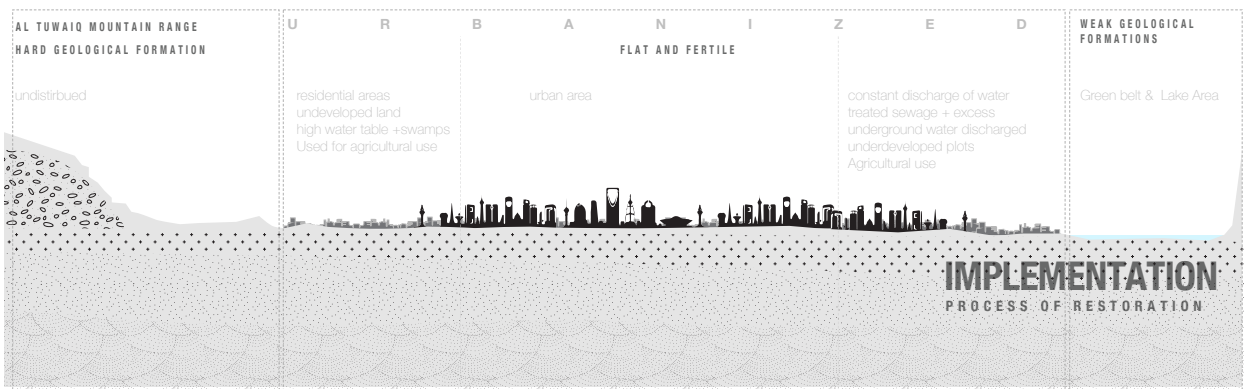


Figure 2
Implementation:
Environmental Classification of the five zones that make up the Wadi Hanifa Project

All Images by author, unless noted otherwise

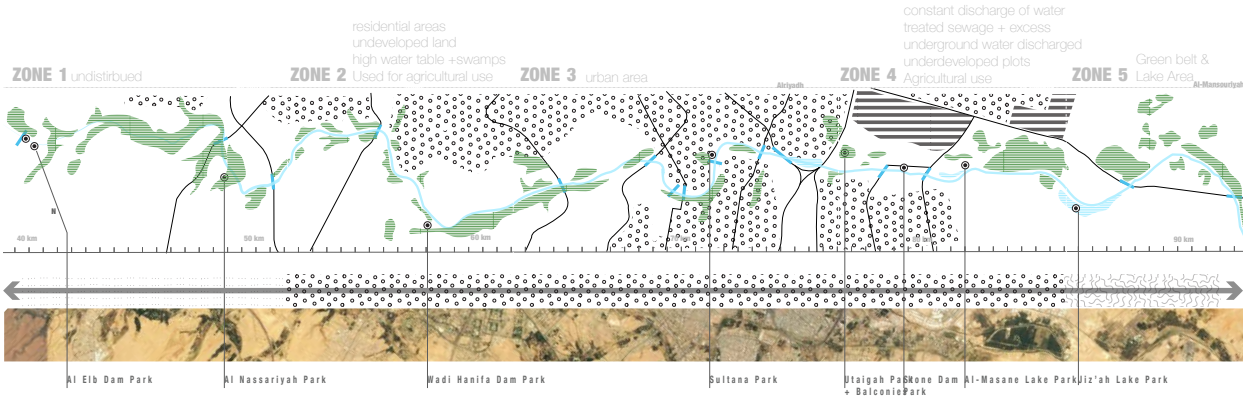
The 120 km (75 miles) project consists of: an area of 10 million square meters of cleaned wadi beds, 9 parks, 5 lakes with a total surface area of 25 hectares, 43 kilometers of reengineered and resurfaced road structures, 7.4 kilometers of pedestrian promenades, 47 kilometers of recreational trails, and a substantial 500,000 cubic meters of removed trash and rubble. [25]

The valley was divided into 5 ecological zones and developed according to their ecological characteristics. A framework that guarantees ecological sustainability was established to provide solutions that respond to each of these zones. The first and second zones are undisturbed and are made up of strong rock geological formations inhabited by farmland of wealthy owners. The third and fourth zones consists of flat and fertile lands that run through the city of Riyadh. Due to its close proximity to the city, this zone suffers mostly from heavy effluent discharge from the industrial sector. [26] Finally, the last zone consists of soft rock geological formations allowing for the wadi to widen into a green belt and lake area. This section of the wadi is known to have constant flows of filtered wadi from nearby water treatment plants. [27][Figure 2].

25 Teller, "Seeds of High Asia," 12.

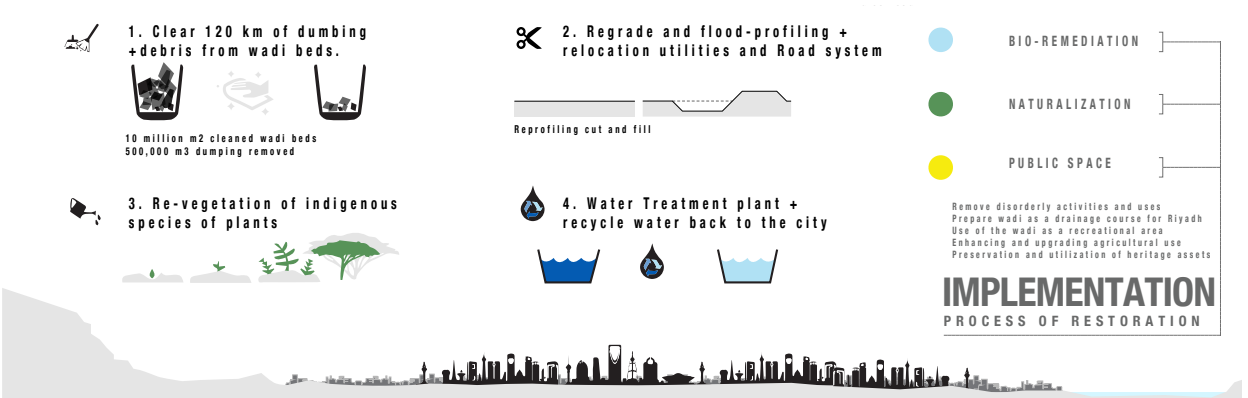
26 Samhouri, 2010 On Site Review Report, 4.

27 Ibid, 3.



Implementation

Steps taken by the ADA and Moriyama & Teshima and Buro Happold during the process of restoration.



All Images by author, unless noted otherwise

Figure 3
Bioremediation
Designed to treat existing problem that existed prior to the WHCDP.

All Images by author, unless noted otherwise

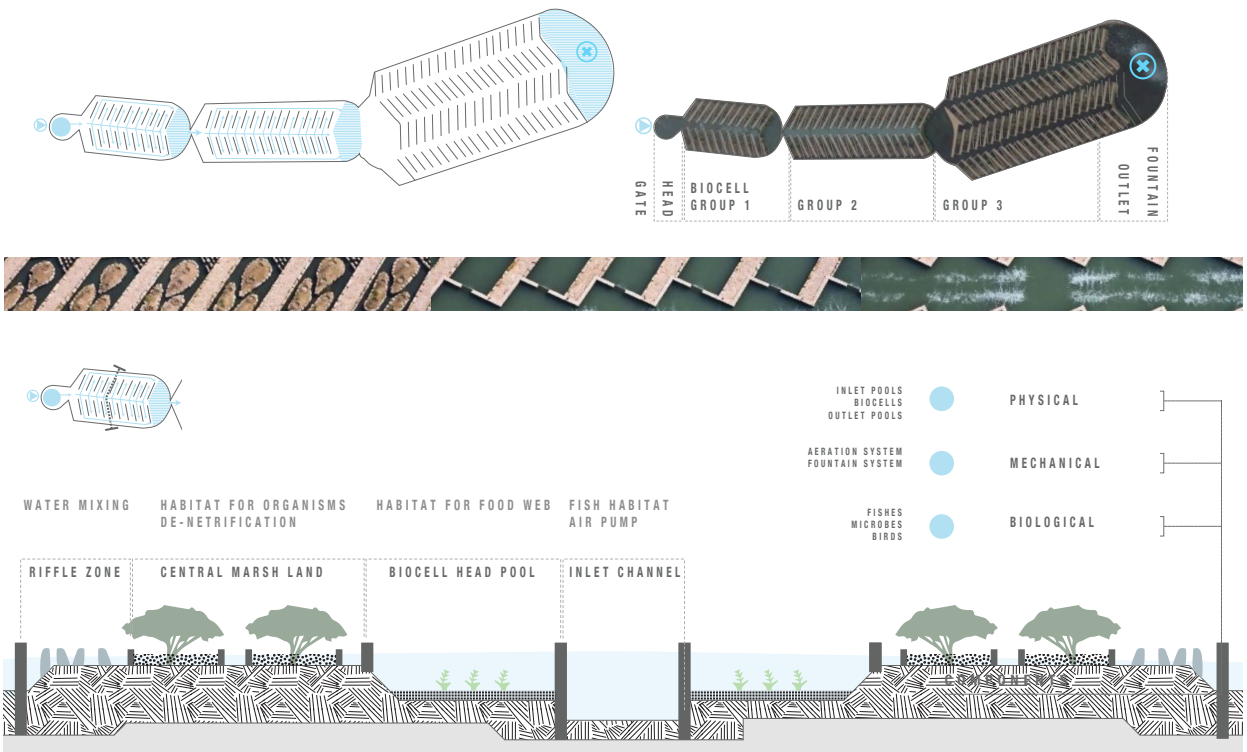


Figure 4 Bioremediation Components

A pioneering system, consists of a series of inlet and outlet pools, biocells, fountain and aeration system. This bioremediation plant uses a hybrid of natural systems, without the use of any industrial system.

All Images by author, unless noted otherwise

Water Management:

The term Wadi is defined both as the Arabic term for valley and as the channel of watercourse that is usually dry except during periods of rainfall, [28] this describes part of Wadi Hanifa. Wadi Hanifa experiences seasonal flows in the first three zones from the northern region, but starting from the north division channel, the water is fed by the city's treated waste water which continuously flows throughout the year. [29] Moriyama & Teshima in partnership with Buro Happold sought to resolve the seasonal flash floods by widening the wadi beds, reducing the slope of its bank bodies, and building catchment areas on both sides. A series of weirs and riffles were also integrated throughout the project to help oxygenate the water in order to eliminate bacteria and pollutants. Still, local blogs recently reported on several missing bodies due to flash floods. In one case, the body of a six year old was reported to have disappeared in the wadi. [30]

Due to the general degradation of water quality, large amounts of bacteria in the water became a health hazard to the city. As a response, one of the largest human-built interventions of the Wadi Hanifa plan was a "state of the art" bioremediation plant [Figure 3]. The large-scale bioremediation plant is located at the crossing of two main highways of Riyadh's entry point. This plant naturally re-

28 "Wadi." Dictionary.com. Accessed November 18, 2014. http://dictionary.reference.com/browse/wadi?s=t.

29 Vall Ross, "A River Back from the Dead," The Global and Mail, 2007.

30 Al Hamadi, "Search for the Missing Body of the Young Girl in Wadi Hanifa," Al-Isda' Blog. 2014, accessed November 16, 2014. http://www.a9d2.com/13209.html.

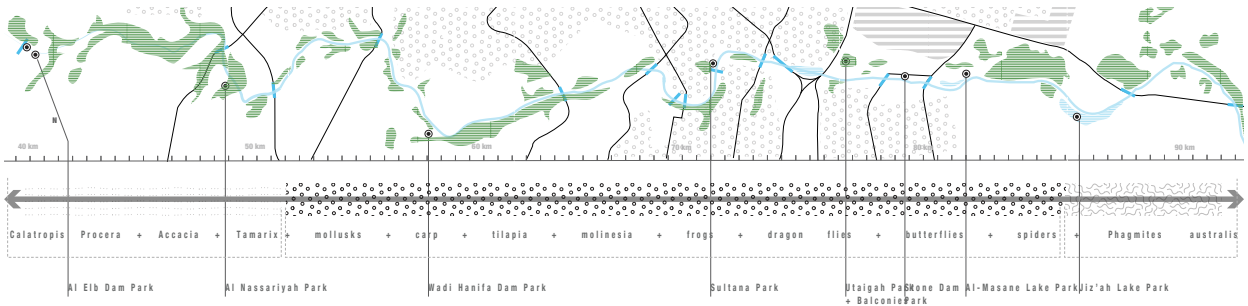


Figure 5
Naturalization
A process to reestablish the natural vegetation of indigenous species of plants and wild animals of Wadi Hanifa. This process was implemented in hopes to attract some of the lost animal species such as desert foxes, and herons back to the area.

All Images by author, unless noted otherwise

mediates water by incorporating a hybrid of ecological principles. It functions within three large pools that include multiple denitrification and aeration systems that kill bacteria and allow for an ecological food system to emerge.[31] [Figure 4]

This aspect of the project is highly praised for pioneering its simple and natural system. As Matthew Teller indicates in his recent BBC report, "Indeed, now that bioremediation has been proved to work in Riyadh, scientists are studying how to transfer the technology to other cities". [32] However, I question this ecological infrastructure system as it is located right under the main highway into the city. This approach seems to tackle water pollution, yet, I wonder how it responds to resolve concerns of air pollution due to the heavy vehicular flow of traffic coming from above. The air pollutants from the highway deposit directly into the surface of the water, referred to as "atmospheric deposition", can cause serious harm to the living organisms within the water. [33]

Naturalization:

One of the wonderful features of this project is its attempt at re-establishing natural vegetation of the indigenous species of plants. The first step of the naturalization process was to conduct a wildlife inventory of existing animal and plant species, these studies were done in collaboration with

31 Buro Happold and Moriyama & Teshima, and Arriyadh Development Authority. 2010. Wadi Hanifah Restoration Project, 20-25.

32 Matthew Teller, "An Oasis Where Saudi Citizens Can Really Relax." BBC News. May 26, 2012, accessed October 1, 2014. http://www.bbc.com/news/magazine-18181361.

33 "Air Pollution and Water Quality." EPA United States Environmental Protection Authority. September 11, 2013. Accessed November 17, 2014. http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/airdeposition_index.cfm.

the ADA. After this process of identification, a greenhouse complex was initiated to house samples of the identified plant species. These samples were collected from across the undamaged parts of the wadi and were regrown and housed in the greenhouse in order to establish new families of these species. More than 35,500 shading trees, 6,000 date palms trees, 2,000 Acacias trees, and a total of 50,000 shrubs were planted, covering more than 70 km of the wadi beds.[34] [Figure 5] The naturalization process was implemented in hopes of attracting some of the lost animal species such as desert foxes, and herons back to the area. [35]

Land use plan and policy planning:

In order to maintain the the health of the wadi, new land use policies that regulated pollution were developed and implemented by the WHCDP. In a 2010 report, Wael Samhouri states that, "the consultants were also asked to develop guidelines for the use as a planning policy document. The ADA recognized that the lack of such planning controls would seriously undermine the restoration project."[36] These guidelines were implemented to regulate real estate development in agricultural, recreational, and touristic uses in order to protect the wadi's environment. [37]

34 Buro Happold and Moriyama & Teshima, and Arriyadh Development Authority. Wadi Hanifah Restoration Project, 13-15.

35 Vall Ross, "A River Back from the Dead," The Global and Mail, 2007.

36 Samhouri, 2010 On Site Review Report, 6.

37 "Wadi Hanifa, The Riyadh Waterfront, a Potential for Investment." Archaeology Magazine

Social rehabilitation:

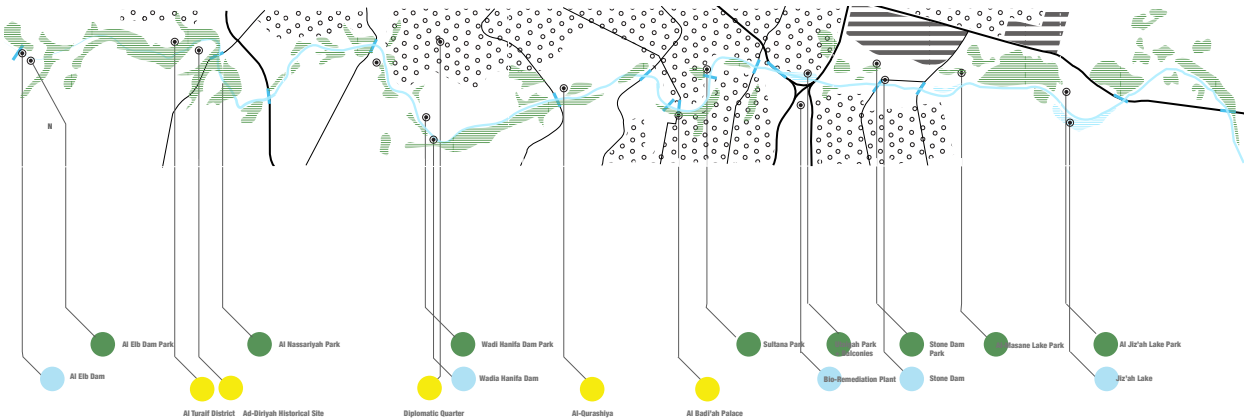
Traditionally, Riyadh lacks areas of public entertainment spaces due to the religious and cultural restrictions on public life. Riyadh is mostly known for its strict conservative culture, where women are not allowed to drive or walk freely without a male companion. Most forms of entertainments are banned, there are no cinemas, no theaters, nor areas for music. Typically the only places that families and friends meet on weekends are large commercial shopping malls. Sometimes, weather permitting, families might even go picnicking in outdoor parks.[38] Therefore, by providing a family-oriented environment, the Wadi Hanifa project proved to cure the craving for public space by the people of Riyadh. As Hussein Al-Doseri expressed, "It makes me happy, to relax and spend time with my family by the water. It feels like the opposite of Riyadh. Nowadays, if I want to meet friends, I tell them: 'To the lake!"[39] Another report states that, "One can find diplomats and high-ranking government officials in the same place, at the same time as workers from the Indian subcontinent and the Philippines." [40] The Wadi seems to encourage and attract people from different backgrounds to engage in activities ranging from picnicking to barbecuing to fishing along the river.

The Wadi Hanifa project aimed to strengthen cultural identity by reintegrating these culturally sensitive private-family-compartments made up of semi-enclosed areas allowing for privacy

38 "Living in Riyadh." Expatriate Community for Expats Worldwide. Accessed November 15, 2014. http://www.internations.org/riyadh-expats/guide/living-in-riyadh-15796.

39 Matthew Teller, "Seeds of High Asia.".

40 Samhouri, 2010 On Site Review Report, 11.



SOCIAL: Infrastructure

9 Major parks
5 Lakes
7.4 Pedestrian Promenades
4.68 Recreational Trails
30 Toiletblocks
2,000 parking spaces
730 wayfinding and signage
2,500 lights stand
600 light features

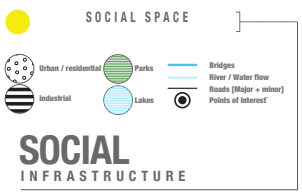


Figure 6
Social Infrastructure
Road infrastructure and public amenitites implented by the WHCDP.

All Images by author, unless noted otherwise

from other neighboring compartments. Each one of these compartments is located on a stepped platform enclosed with limestone walls, so that women and families are protected and screened from passers-by. This allows for a semi-private area within a public park, it responds to the conservative Saudi culture. Saudi Arabia is known to have a car-oriented culture, the plan sought to rebuild the existing road network to allow for more efficient traffic flows, and to eliminate air pollution. In fact, the entire infrastructure services were reworked and consolidated into a 4-meter channel running under the Wadi beds, resulting in the creation of 2000 parking spaces throughout the project. [41] Although, reports today confirm that these parking spots are insufficient: "Thus cars tread and encroach on places that have been heavily landscaped (both hard and soft landscaping) destroying plants and edgings."[42]

As a result, this celebrated public space attracts large amounts of families all over the 9 major parks dispersed around 5 constructed lakes [Figure 6]. However, due to the increasing number of visitors, we must be cautious to the repercussions, since the people of Riyadh have a reputation for throwing trash everywhere. Layla, one of the parks visitors, voiced her concern about trash in the area in one of the online blogs, "people literally picnic next to piles of trash".[43] In addition, other

41 Buro Happold and Moriyama & Teshima, and Arriyadh Development Authority. Wadi Hanifah Restoration Project.

42 Samhouri, 2010 On Site Review Report, 12.

comments in other local blogs raise concerns about the pungent odor that emanates from different parts of the wadi. This proves that there is still much more work to be done in terms of educating the public on maintaining the site's environmental goals.

43 Matthew Teller, "A Wadi Runs Through It." Quite Alone. May 24, 2012. Accessed November 10, 2014. http://quitealone.com/2012/05/24/a-wadi-runs-through-it/.

44 Matthew Teller, "An Oasis Where Saudi Citizens Can Really Relax." BBC News.

Challenges and criticisms:

Overall, the Wadi Hanifa is a successful project that truly integrates social activity and economic development with physical and biological processes of its natural landscape, however, this project has some pitfalls. Some criticize the project as a greenwashing attempt by the government to gain international recognition. These criticisms are legitmaized by the too often ignored presence of extreme poverty in Saudi Arabia, a place where almost a third of the households are still unconnected to mainline sewage.[44] That along with the project's high cost, raises human and water rights issues of the dispersed local citizens of Saudi, yet, these problems are ongoing and seem to continuously be neglected by the government. In addition, it appears that the ADA has "bought out" this plan by hiring world-renowned conservation architects & planners and completely trusting in their designs. Nonetheless, in the specific case of Riyadh, this might be one of the major reasons for the

success of this project.

In addition, the project is a shining example of policy planning and land use development overall. However, there are major consequences as the value of real estate around the wadi has risen up tenfold.[45] One of the ADA representatives, Engineer Sultan, has voiced his thoughts on land use policy conditions, stating that their main concern was to maintain the area as an environment preservation area, which "does not become another real estate development area that damages the environment of the wadi."[46] However, the consequences of the success of the wadi might lead to gentrification within the area, driving local farmers and residents out of the wadi. Yet, a counter argument to that, would be that this gentrification process could benefit the "aesthetic" value of the wadi and encourage local farmers to maintain and regulate the areas around their farms.

Finally, one of the biggest issues is the high cost equating to a $580 billion allocated to an exclusively governmental project brings up questions of sustainable future management. How sustainable is it for the government to maintain this project financially? With such large initial costs and future maintenance costs, my assumption is that the government will need to seek out other sources for investments. Involving the private sector could be a beneficial window of opportunity, not

45 Vall Ross, "A River Back from the Dead," The Global and Mail, 2007.

46 "Wadi Hanifa, The Riyadh Waterfront, a Potential for Investment." Archaeology Magazine

only to encourage the private sector to invest in maintenance but to provide the wadi with amenities such as street vendors and other public features that might start to take responsibility or adopt certain parts of the project. Having said that, the top-down governmental approach proves to be an indicator of a successful strategy for initiation. The Wadi Hanifa project was allowed to become a living wadi, only with the support from a strong governmental backup both financially and politically.

One of the greatest potentials of the Wadi Hanifa project is its undeveloped educational capability to raise awareness and encourage the future generation to take more responsibility of their natural resources. There are ongoing developments to build an educational center to raise the environmental consciousness of the residents of Riyadh. In my opinion, this is one of the most important aspects of the project that needs to be urgently addressed. In order to preserve the environmental benefits of the wadi, users need to be actively involved in the conservation plans to feel a sense of ownership to the project. As the wise words of Baba Dioum state, "In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we are taught." [47]

47 Dioum, Baba. Speech, General Assembly from International Union for Conservation of Nature, New Delhi, 1968.

Conclusion:

The Wadi Hanifa Project is a successful project that defined new realms of technological and creative interventions in environmental planning. This project proves to be truly a successful project in remediating the urban ecosystem that once existed in the wadi beds of Wadi Hanifa. These successes include the restoration of the wadi's ecological habitats through the process of naturalization. The project's groundbreaking simple approach to water purification through the various water interventions within the waterscape and the wastewater treatment facilities. Finally, the culturally and environmentally conscious design decisions were key elements to transform the wadi into an entertainment public space for the city. These elements are all replicable in other areas of the world, however, I truly believe that the key component to the initial success of this project is its top-down governmental approach. This project would not have been implemented without the ADA's financial and authoritative support.

Nevertheless, the success of the project does have some repercussions that might hinder the progress of the wadi. One of the main worries for the development of this project, is its financial burden of long-term maintenance costs on the ADA and the Saudi government, which might hopefully lead to involving local private investors to ease the financial burden. In addition, the increase in real estate value around the project could lead to displacing local farmers, this would cause a culture

conundrum as these farmers have resided in this area for centuries. Finally, the project's main concern should aim to resolve and moderate the human activity waste along the wadi. There is an urgent need for an educational program to be strictly implemented. However, the project does prove to have the potential to facilitate new forms of social collectivity and environmental literacy.

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