INVENTION / TRANSFORMA-TION STRATEGIES FOR THE OATTARA / JIMI OASES IN AL AIN

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in charge of conserving and promoting the heritage and culture of Abu Dhabi.

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Al Nahyan. ADACH has a holistic vision of culture, which embraces both tangible and intangible heritage. It is committing all its resources to the preservation of ar-

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Invention/Transformation

Strategies for the Qattara/Jimi Oases in Al Ain

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Al Qattara and Al Jimi Oases in Al Ain: Sponsor's Introduction

Sami El-Masri, Ege Yildirim

Situated at 160km from the capital city Abu Dhabi and at 120km from Dubai, Al Ain is considered the most "authentic city" within the Emirate of Abu Dhabi in the way it had preserved the attributes of its cultural and natural environment. Despite the major changes the United Arab Emirates, in general, and the Emirate of Abu Dhabi in particular have undergone as a result of the discovery of oil in the late 1960's and the subsequent urban development rush associated with the "oil boom", Al Ain still preserves a strong local character and sense of place.

With a cultural legacy that dates back to the 5th millennium BC, Al Ain boasts of a diversity of cultural assets, which continue to mark the character of the city and influence its development into the future. The diversity of the cultural and natural heritage as well as its unique representation of the attributes of a culture with roots in high antiquity, have warranted the submission of a nomination file for the inclusion of the Cultural sites of Al Ain on the World Heritage List of sites of outstanding universal value. This unique Al Ain culture revolves around the natural, cultural and social unit known as the oasis.

The oasis is at the core of Al Ain. Al Ain is in fact constituted of an assemblage of six oases areas: Al Ain Oasis, Mutared, Muwaiji, Hili, Qattara and Jimi oases. Ancient settlements grew at the fringes of the oases, first in the shape of small circular self-contained settlements, and then later, as full-fledged villages expanding on the edges of oases areas. Nowadays, those settlements have grown bigger and merged to form one large city, with the oases at its core, but no longer constituting the main driver for development and growth.

Historically, the oases of Al Ain have always been a driver for change and evolution. An evolving place with an oasis culture originating sometime around the 3rd millennium BC, evidence of the oases and associated settlements is to be found at the archaeological site of Hili, at the so-called remains of Hili 1, 10 and most spectacularly Hili 8. Back then, limited irrigation systems using water extracted from deep wells allowed the inhabitants of heavily fortified circular structures surrounded by moats to farm the desert and grow crops of different types. By the 1st millennium BC, oasis irrigation had developed so much through the introduction of the falaj irrigation system (the equivalent of the Persian qanat system, but much older, it consists of an underground water channel linked to an underground aquifer) and its associated complex water management system therefore enabling large extensions of land to be farmed, sustaining in the process a larger population and enabling the accumulation of surpluses, which were at the basis of the expanding economic and trading role of Al Ain.

The crucial role the oases have played in the history and development of Al Ain up until the mid 20th century is evident. But the winds of change which brought along the discovery of an important natural resource (oil), invariably changed the destiny of Al Ain and of its inhabitants for years to come. The oases no longer play the decisive role in the subsistence mode and growth of Al Ain. Today, many question the potential role of the oases in the future vision for the city and its region.

Throughout the last decades of the 20th century, the wisdom of the late Sheikh Zayed Bin Sultan Al Nahyan (former president of the United Arab Emirates and the person responsible for the unification of the country and its modern development) and his vision for Al Ain have safeguarded the city from the fast pace of change which swept through traditional coastal settlements such as Abu Dhabi and Dubai, converting them into modern metropolises. While cities like Abu Dhabi and Dubai lost much of their authentic character and traditional attributes to large thoroughfares, high rises and expanded residential areas, Al Ain was protected, its oases uncommitted (their protection legally guaranteed by decrees issued in 2004 and 2005) and its overall structure largely kept to the human scale. The traditional green character of the city was reinforced through the creation of parks and gardens, and the low-lying aspect of the city was safeguarded via a very strict law on building heights.

The oases' morphological status quo was further enforced by the decision to encourage palm tree plantation and to subsidize crops through direct government support. The price of the date produce became viable and lucrative business for many of the local landowners of the oases which took pride in their connections to the land, a testimony to their authentic lineage and identity rooted in the ancestral oasis. The new business model, on the basis of which the oases were now sustained, required however serious intervention from the local authorities to ensure that oases not only continued as traditional landforms within Al Ain, but also functioned in a economically viable manner. This necessitated a physical infrastructure to provide easy access and transfer of goods to and from the oases, a functioning irrigation system, very well managed water allocation system, and a workforce to look after and care for the upkeep of the oases.

All of these new parameters meant that the traditional systems of maintaining and managing the oases were no longer viable and that significant change and intervention was necessary in order to safeguard at least the physical "completeness" of the oases. A new road system was introduced, with wider routes allowing for cars and trucks to access the various orchards, new orchard boundary walls were built, more resistant to vehicular impact and not requiring regular maintenance (unlike in the case of the traditional mud walls), a special unit (Al Aflaj Directorate) was established at the core of Al Ain Municipality to manage water supply to the oases and make sure there are no shortages (water is now pumped into the traditional falaj system from an alternative source due to the insufficiency of aquifer sources), the oases are regularly fumigated in order to make sure that pests remain under control and the produces of the date palms forthcoming.

Change brought with it impact on the historical and authentic aspects of the oases; mud brick walls were replaced with prefabricated stone cast walls, and mud roads covered with interlocked cement tiles. The look and feel of the road network within the oases became uniform and less organic, somehow affecting the overall perception and authenticity of the oasis environment. More significantly, the social aspect of the oases was substantially lost, they were no longer the center of life and development in the city: historic buildings within them were abandoned for newer modern dwellings situated in distant residential areas, oases areas were surrounded by development belts which failed to create a connection to the oldest and most organic elements of the city, 'dialogue' with the oases came to a halt.

This significant change and the growing concern for the loss of the physical attributes of the local culture motivated the authorities of Al Ain to seek a comprehensive approach to the preservation, conservation, management and promotion of the cultural heritage of Al Ain, with the oases at the core of it. In 2003, the Al Ain Economic Development and Tourism Promotion Authority (which became in 2005 the Abu Dhabi Tourism Authority) asked for the support of UNESCO, the United Nations Educational, Scientific and Cultural Organization, for the preparation of a plan that would help preserve and promote the cultural heritage of the city and its surrounding area. A strategy was elaborated over a two-year period (The Abu Dhabi Cultural Heritage Management Strategy, November 2005) which promoted an integrated approach to the management of the cultural heritage of Al Ain and Abu Dhabi, thus linking together the physical tangible attributes of the local culture with its intangible intellectual aspects. The role of the oases as drivers for change at the level of the entire city was again in question: what would be the new role of the oasis in the future? How could it contribute to the future growth of the city? What role would it play in reinforcing the character of the city and improving the quality of the living environment in the 21st century? What is the status of design in oases areas and how can cutting edge design which brings with it a new functional aspect to the oases be sympathetic to the authentic character and historic legacy of these organic components of Al Ain? Many questions which are at the core of this publication.

Many issues were highlighted by the UNESCO Strategy, most significantly the framework through which oases areas can be revived and become active catalysts for change in the city; just like they have always been for centuries. A new vision for culture was set-up by the government of Abu Dhabi, an ambitious plan to root culture in the core of the Emirate's future development was laid out and adopted, the Abu Dhabi Authority for Culture and Heritage (ADACH - established in 2005 as a pre-requisite of the implementation of the UNESCO Strategy for Al Ain and Abu Dhabi) was established with the mandate to fulfill the vision of the government in the area of cultural development. Al Ain and its oases were at the core of ADACH's 5-year strategy to conserve, manage and promote the cultural heritage of Abu Dhabi Emirate. In addition, an urban planning framework (Al Ain 2030) elaborated by the planning entity of the government of Abu Dhabi (The Urban Planning Council-UPC) promised special treatment for the oases, ensuring that they remain at the heart of the community for generations to come.

From the outset, it was imperative for ADACH to use the oases as the vehicle for delivering much of its cultural development strategy. Not only because of the evident setting they provided, but mainly because of the need to re-activate the role of the oases as an incubator for a new dynamism that will introduce change into the city; this new dynamism is at the core of the government's strategy for development. Each oasis had its own specificity and that necessitated a tailored approach in each case, but the guiding principles and the design tools and languages could have much in common. A pilot project was launched therefore by ADACH at Al Ain Oasis; over there, the main driver for change is the need to rehabilitate cultural and socio-economic institutions situated at the fringe of the oases (the Al Ain National Museum, the Sheikh Zaved Palace Museum and the Al Ain Souks) and include them within a comprehensive cultural interpretation approach incorporating the cultural legacy of Al Ain Oasis. A new institution was also added to the assemblage in order to increase the cultural portfolio of the most important central area of Al Ain City: a Centre for Music in the World of Islam. The Centre would have research and documentation capabilities, but will also constitute an important performance venue for ethno-musicological traditions in the world of Islam. The oasis will not only act as a connectivity hub for these institutions, it will provide the natural and cultural setting at the core of which the program of these different institutions will be carried into, thus activating the open spaces within the oasis.

The most ambitious oasis revival project however is taking place at Al Qattara. The amplitude of open spaces and the number of historic structures within this oasis, as well as favorable accessibility issues have made it the likely option for the implementation of a substantial portion of ADACH's cultural development program for Al Ain. With a number of cultural and educational institutions to be established there (Arts Community Centre, Traditional Souk for the Arts and Crafts, dedicated Arts Library, etc.), it is important to approach intervention on the oasis in a comprehensive manner, starting with a master plan that not only lays down design and development guidelines for the entire program of the oasis, but also looks at physical as well as socio-economic means of integrating the oasis into its surrounding urban context, acting as an area of influence and generator of activity as opposed to just being a green park area for occasional city promenades. The cultural programming at Al Qattara will also have a distinct identity, focusing more on the local community in its arts themes, as opposed to the tourism-oriented interpretive themes at Al Ain Oasis.

The occasion of launching the oasis revival initiative at Al Qattara created the opportunity to engage the Graduate School of Design at Harvard University for a combined urban design and architecture studio in the Spring 2009 semester, which complimented the above-mentioned approach with its scope to design an Emirates Center for Arts, Crafts and Design at the Oases. This was also a chance for combining the ADACH goals of fostering academic research, developing fruitful partnerships with world-class institutions such as Harvard and sourcing academic expertise in the oasis master planning efforts.

Over the course of the design studio and preparations for the master planning consultancy, it became evident how closely Al Qattara was connected with Al Jimi, another oasis immediately to its south, which led to the inclusion of Al Jimi in the scope of work. Al Qattara and Al Jimi Oases actually form a whole, both through their interesting, somewhat organic interface along the curving road separating them, which the studio used creatively, and through the 'mega-block', bounded by main urban arteries on all sides, that envelops both oases together with their fringes. This provided a well-defined section of urban land on which to develop urban design schemes, as well as to explore possibilities beyond the mega-block, to forge wider connections between the oases and their surrounding urban context. Also in terms of programming, it has been possible to extend the natural spatial association of Al Jimi with Al Qattara into a functional one, whereby Al Jimi Oasis could adopt the arts and culture themes envisioned for Al Qattara.

Learning from the Al Ain Oasis Development Master Plan example referred to above, we maintain that the approach to the revival of Al Qattara and Al Jimi Oases should be one guided by an outward looking methodology as opposed to an inward looking methodology whereby the oasis infiltrates into the city and influences the urban edge, instead of the opposite approach where urban development reaches the edges of the oasis. Establishing transitional areas between the natural oasis environment and the built environment where activities are programmed allows for the physical continuity of the oasis to extend into the city and influence the built physical environment. This outward-looking approach would need to be addressed both for the most immediate fringes of the oases where an organic spatial pattern dominates, and for the wider urban environs beyond the 'mega-block', where access, mobility and functional relationships would be considered.

Many ideas have been under discussion and it has been hoped that by allowing for the Harvard Design Studio to take place at Al Qattara and Al Jimi, a multitude of design approaches would be explored on the macro as well as on the micro level, without drawing too much emphasis on the constraints of the place or on imposed limitations. Several design proposals emerged from this workshop; they definitely pushed the boundaries of our thinking about finding appropriate solutions to the design of Al Qattara and Al Jimi Oases and other oases areas in Al Ain much further. Furthermore, many valuable ideas have emerged concerning the sustainability agenda and its relationship with cultural heritage, and the reinterpretation of vernacular/ traditional forms and principles for the present day. We believe that the unique local setting and circumstances of Al Ain have provided the studio participants with an interesting and stimulating case study for such an academic exercise.

By dwelling on the creative suggestions of the students and professors of this design workshop, many notions will emerge to influence the upcoming design master plan for the revival and development of Al Qattara and Al Jimi Oases. The master planning consultancy brief that ADACH has issued defines an interpretation concept, urban and landscape design master plan to conserve and enhance their historic landscape and urban fabric, creating and connecting cultural points of interest around the Oases. Also cited among the aims is to support the functions of the Oases as a part of the life of the people of Al Ain, as agricultural areas, and as areas of great interest for those wishing to explore the cultural life of the city. All of these targets are clearly in a position to benefit from the wealth of ideas that the Harvard design studio has put forth. The extent of derivative work may go even further, in that the ongoing bid for World Heritage Site status for the Cultural Sites of Al Ain entails the requirement for a comprehensive site management scheme to sustain the outstanding universal value of the sites. Among the various activities to fall within such an overarching scheme are the management plans for Al Ain's oases mandated for delivery under the five-year ADACH strategy; the master plan and urban designs developed for Al Qattara and Al Jimi Oases may also serve as solid foundations over which to build these management plans.

The publication of 'Al Qattara and Al Jimi Oases in Al Ain' is highly significant in terms of its contribution to the growing literature of architectural conservation and urbanism in Abu Dhabi and the region. This also reinforces ADACH's commitment to making Abu Dhabi a center of research and production of knowledge as well as complimenting its vision to establish global best practice in its field. Finally, we at the Abu Dhabi Authority for Culture and Heritage are very happy, excited and thankful for the interest of Harvard, its professors and students in a cultural and geographical context which promises to be equally challenging and stimulating to the mind.

The Al-Qattara Studio at the Harvard Graduate School of Design

Jorge Silvetti

During the Spring semester of 2009, a distinct multidisciplinary pedagogic experiment took place at the GSD when a group of twenty five graduate students and two instructors engaged in an intellectual and experiential adventure whose most palpable outcome at the moment is the present book; its aspirations though, are even more ambitious and far reaching. During the fourteen weeks of the semester they focused energies and talents on imagining the future of an existing unique cultural and physical environment best defined by its extreme attributes of beauty and harshness: the Al Qattara Oasis in the city of Al Ain, on the eastern frontier of Abu Dhabi with Sultanate of Oman, immediately north of the forbidding Rub'al Khali, ("Empty Quarter") in the Arab Peninsula. It was sponsored by the Abu Dhabi Authority for Culture and Heritage (ADACH) whose interest in preserving and responsibly developing the precious group of Oases in the area of Al Ain falls well within their broad charge as the protector, interpreter and promoter of Abu Dhabi's heritage, and by extension of the Emirates at large.

In many ways this pedagogic experiment, a "double Option Studio" with students from all the Departments of the School and team-taught by two faculty members from two different Departments was "a first" on many counts, and served in itself as a test of possible future studios. While there are regularly single studios jointly offered by two departments, and in a few occasions separate studios from two different department have looked at the same site from different perspectives, this time we were attempting a hitherto unexplored pedagogic and academic model where fluidity among the different fields was allowed to act and disciplinary differences purposely overlooked. What was different and new, how it was conceived, why the particular "double studio" format was used and who were those involved in its gestation and operation are the topics of this first part that I, one of the two instructors, authored; ¹ what was the particular pedagogy developed for this course, how the semester evolved, what are the results and how this book was put together are the subject of the text which follows, written by co-instructor Assistant Professor Felipe Correa. ²

What can be advanced at this early point in the book though are a few wide-ranging contextual issues that today loom big in our academic and professional thoughts and actions and which defined our state of mind at the beginnings of this process: the school is operating in an atmosphere in which its academic structure and pedagogic methods are being challenged by a number of fresh intellectual, ethical and technical conditions that are defining this first decade of this century. Among them there are two which are unequivocally central to our mission as a design school: on the one hand, the constellation of issues emerging from what is considered by many the crisis of our times, that is the environmental research agenda related to energy conservation, global warming and sustainable human practices and on the other, the impact of digital technology methods of analysis and problem-solving that have not only proliferated in the professional spheres but have also transformed our intellectual expectations, invigorated our academic offerings and put us in productive contact with a broader than ever community of world protagonists in the fields of design. Yet, by taking in these exciting and irresistible challenges, the forces and opportunities that they unleashed have also taxed our resources and defied the identity of our métiers. How creatively we dealt with such daring propositions in this instance is part of the successful history of the Al Qattara Studios.

Specifically, and not surprisingly, the alluring fascination and severe demands that some of these new opportunities confront us with and impose on us tend to put strains in our pedagogical models, particularly on the exclusivity that the Departments exert on the definition of content and method on their studios. Indeed, the Option Studios ³ have been, and still are defined, promoted and managed strictly from within the three independent departmental academic entities that conform the School: Architecture, Landscape Architecture, Urban Planning and Design. This is a logical and productive operative model that serves well the very broad and specific curricular needs of departments as they must cater to an avid cadre of would-be professionals within a limited time. As a consequence of this neat disciplinary model the studios have tended, inevitably, to focus inwards in order to explore issues that are located within the seemingly clear boundaries that define the diverse areas of knowledge and expertise that inhabit and flourish in our School. Thus, while each advanced studio is open for enrollment to students of all the disciplines and programs that the school possesses, their size, pedagogy and staffing overwhelmingly privileges one over the other.

Assessing the pros and cons of this model is an ongoing process in the School, but it is clear that while it is and will

1 See short bio of Jorge Silvetti on page 336.

2 See short bio of Felipe Correa on page 336.

3 Option Studios are upper level required design studio courses of intense concentration on specific design problems. Among the three Departments of the School, there are about 14 Design Options offerings each semester, each offering a different design problem as defined by the individual design instructor. Each studio is composed of no more than twelve students and one instructor, who may be an in-house regular senior faculty member or a visiting critic from other School or the professional field.

continue to be for very good reasons a preferred and privileged pedagogic choice for professional schools as there will always be the need and obligation to comply with the delivery of the disciplinary core of each area of concentration, such model may require at times a certain degree of thematic, pedagogic and format elasticity in order to make also room for the occasional studio in which not only disciplinary boundaries must be relaxed but also its size amplified and its teaching methods revised. While there is no doubt that the first years Core offerings should maintain disciplinary identity and build up specific knowledge vertically and cumulatively as students move forward in their studies and develop serious knowledge based expertise and critical abilities, advanced work, such as that attempted in the Option Studios must confront the present need to broaden its focus and thus expand laterally as it were, stepping outside, crossing disciplinary boundaries and embracing wider agendas. Indeed there has been a trend on this direction that inexorably begun to trace a new path in studio teaching along this lines over the past decade, but along this trend the Al Qattara Oasis Studio would be the first in which the format, content and pedagogy amalgamate into a synthesis which, however tentative, gives us a promising working model to help us address some of the novel types of problems that are becoming more characteristic of our times.

The Genesis of the Al Qattara Studios

In October of 2008, a discussion begun in Abu Dhabi between Dr. Sami Al-Masri and myself about a possible collaboration between ADACH and Harvard regarding the future of the Al Qattara Qasis, 4 Dr. el-Masri, the Executive Director for Strategic Planning of ADACH,⁵ understood the potential that sponsored graduate studios at the GSD offered to the Authority. They could provide it with a wide range of hypothetical scenarios as to how to envision the future of the Al Oattara Oasis which was at the time one specific site in Al Ain under close scrutiny. Because of its unique features this Oasis was an ideal case to focus in as the generator of strategies that could help fulfill ADACH's ambitious plan to protect and promote the cultural heritage of the city of Al Ain, the cradle of Abu Dhabi's history and identity. As with many complex urban strategies for intervention during gestation, their future condition did not appear obvious or self-evident when observing the rapid current changing environment of growth and development that is transforming what was once a placid desert village into an important center in Abu Dhabi's hinterland. Yet, the formulation of a desirable future of one of Al Ain's most emblematic components was becoming imperative for the city, the authority and the Emirate itself.⁶ Indeed, Dr. el-Masri's request coincided perfectly with the motivations that promoted the idea of sponsored studios and the role that they have played at the GSD since the early 1980s as conceived by former Dean Gerald McCue and which, since then, have become one of our School's trademark pedagogic tools for advanced design experimentation. Briefly, the "sponsored studio" is a particular version of the tradition studio format of intense tutorial teaching that attempts to marry two broad needs, on the one hand the requirement for an academic graduate program such as ours of providing a strict academic experience based on a well defined real problem and on the other the need for a sponsor ⁷ who finds itself in the early stages of structuring and defining a design problem to obtain and compare alternative visions of what possible courses of action may be available and what they may entail. When time is short, problems still vague, and there is a will to experiment and take hypothetical risks with variables, constraints, programs, sites or institutional contexts in order to see an array of possible scenarios that would help to make decisions about how to proceed, then that is the time for an sponsored studio option.

Dr. el-Masri specific proposal was to have ADACH sponsor a Harvard study that would tackle the future of the Al Qattara Oasis, on the northeastern corner of the city and which was being encroached by development by producing a series of possible alternative scenarios. He suggested that the design instrument to be used by the Studio as a tool to help reimagine the future of the Oasis be a vaguely defined Center for Arts and Crafts of the Gulf region, a new institution whose creation and location somewhere in Al Ain was nonetheless being considered very seriously by the Authority. Enter at this point my own experience working at the central Al Ain Oasis, at the heart of the city and to which it gave its name, and my initial contradictory thoughts. On the one hand this experience played a very important role on my enthusiastic **4** As a partner in the Architecture and Urban Design firm of Machado and Silvetti Associates, I have been the leading member of a consulting team to ADACH working on the Master Plan and associates projects of the AI Ain Qasis since 2007.

5 See short Bio Sami Al Masri on page 337

6 See Sami el Masri's article in this publication.

7 A sponsor of a Studio Option may be public agency, a private institution or a private entrepreneur who provides the initial spark in the form of a programmatic need, an unexplored site, a vague institutional make up, etc. as the initial spark for investigation, and the funds for the study that usually involve covering expenses for traveling, research materials and assistance, and publication of results. support for his suggestion, as working with such unusual rich environment had proven to be immensely rewarding at an intellectual and professional levels, but on the other it made me aware of the latent issues and problems that the suggested topic would likely awaken and unleash and its potential likely complication that they would pose for an academic exercise: no matter how carefully crafted and controlled to serve as a pedagogic experience and how appropriate for an architecture design studio the design of an educational facility such as the suggested Arts and Crafts campus might be, any design intervention involving the context of the Al Qattara Oasis could not be kept on check within the strict limits of the architectural design of the buildings involved and their adjacent public spaces for an institution. Indeed, once students and faculty begin to work on it, the process of analysis and understanding of the conditions surrounding this rich and extreme site would multiply and expand the variables, parameters and questions to be addressed. To confront such inevitable, yet still unpredictable wider agenda, we would have to broaden the knowledge base of the studio, not only in terms of the material its instructor would bring in for the students to learn, but in the very composition of the student group in order to assure that the wider coverage of topics that would surely be untapped be served properly. I already knew a few of those uninvited agenda items that would show up and had experienced how they tend to proliferate almost out of control on problems such as this as I was working already on the similar neighboring problem of the Al Ain Central Oasis. Just to mention four of the most ubiquitous contextual issues that would inevitably enter into the menu to alter our academic experience:

1) on Al Qattara Oasis there exists an unusual concentration of historical buildings,⁸ some of them already restored by ADACH yet unassigned and unused: the whole gamut of issues related to historic preservation, heritage interpretation, promotion, and reuse would be at the forefront;

2) there exists in Al Qattara one of the most complete and extensive falaj system of irrigation ⁹ still in use in the area and constitutes the lifeline of the Oasis serving its agricultural base but which currently is operating under tremendous stress due to over-demand for fresh water in the growing city of Al Ain: its vivid presence would undoubtedly bring into focus the issue of water, conservation and sustainability as key factors in the definition of any development strategy for the Oasis;

3) there is a palpable and unstoppable growth of urban infrastructure around the Oasis in the form of an elaborate grid of roads, highways and associated utilities that are circling, isolating and eventually rendering this fundamental cultural resource invisible and inaccessible to the Al Ain's citizens' experience and consciousness: the impact of regional transportation, demographic growth, public services and mobility of a rapidly expanding urban area will become immediately a topic and problem in and of itself;

and finally,

4) there is the elusive yet ineludible subject of national, ethnic and regional identity associated with all Al Ain's Oases as they are the indisputable, conspicuous physical proofs and symbols of a society's origins, the locus of "where it all started": the politics of identity would rightly be brought to the fore with whatever type of proposed intervention and its associated interpretation of the site.

Consequently, it was obvious that an array of multiple expertise would need to be deployed; that the work would have to be sustained by concurrent intellectual efforts each focusing on Al Qattara's diverse scales and domains, and that insights and ideas would emerge only with constant, active interaction among all the creative minds participating in this studio, all looking at our "object" from different intellectual and methodological angles.

But while this was very much in tune with trends in design practices and speculative academic thinking, it was also clear that the School (and I would dare to say schools in general) lacked a flexible pedagogic model that would overcome the circumstantial rigidity that the exclusive disciplinary definition of the Studio Option format imposes, as commented above. The only apparent alternative available was that of declaring this particular studio as being specifically multidisciplinary and hope that the right combination of twelve students ¹⁰ would select it. This process being too ambiguous and its outcome too uncertain, it was evident that something more effective was necessary.

At this point a look into the School's past did help to clarify options and open a door to a possible viable alternative: we

8 See the built heritage sub-chapter in this publication, pp. 62-63.

9 See Urbanism chapter

10 The GSD normal size of Studio Options.

11 This three studios were: 1) The Ria de Bilhao (1997/8): the work of the two studios was staggered on the school year's schedule, the first in the Fall semester administered by the Urban Design Program (taught by Prof. Rodolfo Machado) addressing large scale urban issues in the Ria de Bilbao in Spain, and the other followed immediately in the Spring by the Architecture Deparment (taught by Prof. Jorge Silvetti), focusing on specific architectural problems proposed by the "master plans" handed down by the previous UD studio. 2) "La Reserva Ecologica de Buenos Aires" 1997: two concurrent studios offered during the Spring Semester, one run by the Department of Architecture (taught by Prof. Jorge Silvetti and Assistant Professor Monica Ponce de Leon) and the other by the Department of Landscape Architecture, (taught by Prof. George Hargraves and Assint. Prof Anita Berrizbeitia) concentrating in large coastal area of Buenos Aires, and 3) The National Archives of Argen tina (2002) two concurrent studios offered during the Spring Semester (one run by the Department of Architecture and taught by Prof. Jorge Silvetti and the other by the Department of Urban Planning and Design taught by prof. Rodolfo Machado). In these last two, while the studios were concurrent the pedagogy of each was kept strictly independent.

had three precedents of multidisciplinary efforts that I could recall which could help us conceive of a new up-dated model more useful to our current needs. In each of these three instances the work was carried by two studios from different departments, but with great degrees of independence from each other.¹¹ in all of them the interaction was constant and positive, but guarded as it were as the thresholds between disciplines were never crossed and the 'integrity' of each preserved. In fact, we can safely say that the subject and pedagogy in those three instances were conceived as separate and distinctive to each one of the two concurrent studios according to strict disciplinary criteria. Thus, at first none of the previous pedagogic model seemed particularly appealing given the interactive way we were considering necessary for the problem in Al Qattara. Yet, one aspect that characterized them resonated well with what I was after: the number of students and faculty involved did represent a condition that offered not only a critical mass of minds adequate to the complexities and richness of the problem at hand, but also the ability to include any of the disciplines of the School in numbers that would have an impact on the outcome.

This idea was attractive enough for me to contact the Department of Urban Design and it was well received. One of its faculty members, Assistant Professor Felipe Correa, a trained architect with broad interests, knowledge and experience in the field of Urbanism and the role of Architecture in the conceptualization and reformatting of larger territories, could be part of this experiment and he joined in immediately in the efforts to understand the problem proposed by ADACH and to imagine the format and pedagogy of this double studio. Soon we had a team with the addition of Morgan Carter, one of our post-Professional students who was appointed teaching assistant for the course, and the three of us traveled to Abu Dhabi in the month of January 2009 for an initial recognizance visit to Al Qattara, the city of Al Ain and the headquarters of ADACH in Abu Dhabi.

From then on, it was intense work to put together a pedagogy for this unique and unprecedented experiment, to define a program of requirements, and to start the process of gathering expert minds and friends that would be eventually called upon to help move the Studio forward towards its goals. Two appendixes are included at the end of this publication, the first reproducing the official course description as it appeared in the students bulletin prior to the beginnings of the semester and their enrollment in courses, and the second the outline program brief describing in more detail the spatial requirements of a Campus for the Center for Arts and Crafts that the students would use as a vehicle with which to explore the Al Qattara problem.¹²

In short when we started we had obtained the commitment of an enlightened sponsor, ADACH, to support the work and results of a pedagogic experiment that would bring together all the intellectual fields operating in the GSD represented by twenty five students and two faculty. The charge to this group would be to look closely at the conditions under which a unique urban event, the Oasis of Al Qattara, had evolved over time from a primeval natural Oasis where the scarce population of desert nomads and caravans had stopped, settled or bivouacked, to became part of a thriving city and symbol of a young prosperous nation, and to hypothesize what its future may have in store for it as it enters a complex and uncertain period of growth and change. In doing it, the Studio would test the strengths and potential not only of a conventional "multidisciplinary" organization but a novel "transdisciplinary" ethos in which boundaries are erased while expertise recognized, disciplinary risks are encouraged while responsible use of knowledge demanded, where a positive "suspension of disbelief" would be initially required to overcome the frightening intricacies and mysteries of an unprecedented urban condition, namely the presence of an Oasis in the midst of a growing urban fabric. Once launched in February the surprising ease and smoothness with which the students took this ride and made it look so simple was a marvel to watch. For ADACH, we believe the results would be of great assistance in their next steps to imagine, assess and produce guidelines and policies regarding the future of the Oases of Al Ain. What ADACH has done for us as a byproduct of its main interest is to act as promoters in the advancement of progressive higher education methods for training future professionals in the environmental fields. The Harvard Graduate School of Design is extremely grateful for their generosity and vision.

Assistant Professor Felipe Correa follows this account to describe in detail the way in which the Al Qattara Studio unfolded, what was achieved and how this book was produced.

12 Unexpectedly, the most stubborn lingering problem to resolve was not the lack of data, nor the approval of the budget or the organization of a long trip for a large group in short notice, but the legal issues that had to be resolved to assure the signing of the agreement between ADACH and Harvard on time for the semester to take off – a delicate intense ping-pong of seeminaly conflicting views of what the studio was about but which fortunately, and with great effort and good will put by all the parties at ADACH and Harvard, was smoothed out to perfection at the last minute for a momentous take off in February 2009

The Al-Qattara Studio at the Harvard Graduate School of Design: Framework and Development

Felipe Correa

Beyond its most romantic connotations as a serendipitous encounter with a speck of vegetation amidst an abundance of arid despair, oases in most cases are an affected environment and therefore can be conceived as a first act of design. From the Foggara-based oases in Fezzan to the lavish railroad posts of Reyner Banham's mechanized America Deserta, the oasis has always performed as a magical thread that can unfold the promise of settlement in a terrain that by definition resists domestication. An advantageous location within the poorly provided resources of the desert, generally because of its proximity to and relatively facile manipulation of water, serves as a point of departure for the construction of an artificial environment - a critical staging ground - with the sole mission of mediating the asperous affiliation between body and sand. The oasis, at first hand perceived as a gift of nature, is actually an infrastructural operation - in some cases austere and in others excessive- that allows for the inscriptions of inhabitation within the shifting sands of the desert.

Using the Qattara / Jimi Oases as an open laboratory, this double trans-disciplinary studio – 2 instructors and 25 students ¹ – specifically revisited the potential role of the oasis to once again serve as a staging ground for alternative urban scenarios that can restructure the city of Al Ain. The introduction of an academic facility, a Campus for the Advancement of the Arts, Crafts and Design Traditions of the Arabian Peninsula, within the grounds of the oasis, was proposed as a precise, yet malleable programmatic device that could short circuit the current dynamics of the oasis grounds and jumpstart a gradual transformation of the derelict grounds adjacent to the forested plots.

The Terrain of the Al-Qattara Studios

Also known as the oasis city of the Emirates, the regional city of Al Ain, located in the most eastern edge of the State of Abu Dhabi (United Arab Emirates) can trace its origins to an initial infrastructural project that involved the careful adaptation of water, in order to transform its desiccated ground into an arable garden. Originally known as Al Buraimi, this loose aggregate of ruled lands was extensively transformed by the pairing of water and gravity through a falaj system,² a man made stream which intercepts the groundwater table through several wells at the footsteps of a mountain. This laborious topographic manipulation precipitated groundwater to drench the sand dunes east of present day Omani mountains, ³ and allowed for the territory to become a significant agricultural outpost in addition to a strategic node where nomadic caravans could be serviced and replenished with water and food.

The falai's performative attributes, far surpassed its utilitarian hydrological purpose. As the falai brought water to the surface through a tunnel with a slope less steep than the natural hydrologic gradient, it also split into several branches, creating an intricate figural imprint that clearly defined the agrarian / urban morphologies of these oases; primarily through the aggregation of orchard plots that circumscribed key edifications for royal or military use. This canalized figure, with its precise geometries derived from the flow of water became an integral organizational device that clearly defined, in a single action, the distribution of water, modes of circulation, parcel structure, and a social and economic framework for the nine loosely affixed original settlements.⁴ Water canals demarcated property ownership and served as a right of way for circulation, while the construction and management costs of the falaj were paid by the collection of water rents in exchange for water shares. If the planimetric extensions of the oases were defined by the logic of the falaj, its sectional qualities emerged from the evolution of a stratified agricultural system that conceptualized the oasis as a thick ground with layered crops and other agrarian activities. Below the canopy of the date palm, the staple crop of these oases, other complimentary vines and shrubs would be planted. In addition, the shade proved to be ideal for animal husbandry and honey harvesting. Tracing the origin of the Al Buraimi settlements back to approximately 600 AD, for more than 2,500 years, the Falai system defined the physical and social framework that coalesced the urban and cultural dimensions of these Oases. The extent and boundaries of Al Ain's Oases were precisely defined by the selfimposing limits of its hydrological infrastructure.

The oases of Al Ain served as a paradigmatic model for an agrarian enterprise in arid grounds. Remote and undisturbed for centuries, its modus operandi was only challenged in the second half of the twentieth century when new 1 This double trans-disciplinary studio involved two instructors Jorge Silvetti, Professor of Architecture and Felipe Correa, Assistant Professor of Urban Design, and 25 students from all three GSD departments: Architecture, Landscape Architecture and Urban Planning and Design.

2 The falaj, also known as qanat, is an idea of Persian Origin and dates back more than 2000 years. Falaj: the word itself in Arabic means the division of ownership into shares among those who have rights.

3 The Falajes of Oman and the United Arab Emirates have provided communities with water for irrigation and domestic purposes for the last 1,500 to 2000 years.

4 The nine original settlements that made up Al Buraimi are Al Buraimi, Sara, Hamasa, Al Muwaiqii, Al Ain, Al Mutaradh, Al Qimi, al Qattarah and Hili, dominated by two dominant tribes Nu Aim and Bani Yas. For additional references please see ARAMCO's Reportson Al Hasa and Oman 1950-1955 mobility infrastructures, primarily the private vehicle, paired with the Emirati oil boom, eroded Al Ain's remoteness. Throughout the postwar years, its critical geographic value was abraded by newer technologies and supplanted by its own historic relevance. These settlements were redefined as a cultural gem with easy vehicular access from the more densely populated littoral settlements to the east. Recast as a modern metropolis, Al Ain was re-imagined to accommodate an unprecedented increase in population, allowing for the location of diversified industries, and providing for new agricultural fields that replaced the gravity-driven falaj with mechanical pumps and desalinated water from the coast as their main source of water for irrigation. Heavily influenced by Derek Walker's Milton Keynes, a post war model city in England that offered a deceiving promise of constant flow, Al Ain town planning officials throughout the seventies and eighties conceptualized the expansion of this town as series of neighborhood unit super-grids linked by round-abouts that circumscribed the original oases, creating a forced juxtaposition that locked these green goblets within the boundaries of modernity.

Today, while still culturally significant, these geometrized date palm forests, sunken and hidden within the urban blocks, no longer play a significant role in the city's economy, and therefore their presence within the urban structure of Al Ain and Abu Dhabi must be redefined in order to guarantee their subsistence throughout time. The date fruit, which for centuries served as the main economic driver for these modest agricultural settlements, today sits on the sideline of the Emirati economy, being thwarted by oil revenue and its byproducts. Therefore, the oases plots, which continue to be passed on from generation to generation, persist as part of a larger cultural contract rather than as the result of economic forces. Given that the Al Ain oases' principal role as an underlying infrastructure for settlement has been replaced by newer technologies and their respective urban geometries, it is essential to redefine their role within the twenty-first century desert city. In doing so, these clasped hinterlands can be recharged with a renewed formal and experiential identity in order to improve their spatial, cultural and ecological performance within Al Ain.

If almost three millennia ago the oases had a primal role in the configuration of these desert settlements, today these grounds could once again be conceived as the epicenter for renewed urban strategies; strategies that explore surrogate cultural, ecological, and spatial logics for the oases and their residual grounds, and in doing so, propose transformative actions that would not only reconfigure the oases themselves but also reformat the urban configuration of the superblocks that surround them.

Al-Qattara / Al-Jimi Oases Studio: Research Platform

Given the current territorial configuration of Abu Dhabi and the United Arab Emirates –dominated by a tri-nodal dynamic between Abu Dhabi and Dubai (the two economic engines along the coast), and Al Ain as a major inland tourism destination – the oases were conceived as a key nerve within a multi-scalar network of physical and cultural infrastructures that partially make up the current Emirati urbanized landscape. Instead of starting the analytical portion of the studios by looking at a circumscribed geography with a finite scale, the research component began with the assignment of eight discrete, yet interrelated investigative tracks that were analyzed across a wide range of scales and through multiple forms of representation.

For the first three weeks of the semester, students from both sections working in groups of three focused on the following eight research lines:

1 Hydrology in Arid Ground: which on the one hand investigated the history of water in the evolution of the oases and on the other explored current water dynamics in the region, in particular sea water desalination and distribution within the interior of the UAE; 2 Agricultural / Botanical Systems: looked at the botanical and agricultural dynamics of the oases, and also investigated new modes of cultivation currently used within Al Ain and the UAE; 3 Infrastructure in Arid Ground: engaged the larger public works system that has facilitated urbanization in the region. This research looked at a broad set of infrastructural geometries ranging from heavy to light (i.e. mobility to shade) that have tailored this terrain for settlement; 4 Programmatic Inventory: focused on the larger uses and rituals that have shaped the oases, the city and the region, focusing on the historic value of this landscape, and how these might frame an attitude towards intervention; 5 Morphology of the Oasis, City and Territory: constructed a clear documentation of the diverse material fragments, natural and artificial that have defined the geometries of the region; 6 Regional Arts and Crafts: surveyed traditional crafts from within the region and their role in the construction of material / cultural identities; 7 Rammed Earth and Other Earthen Construction Technologies: explored both traditional and contemporary building technologies using rammed earth and its affiliated variants; and 8 Project Inventory: surveyed seminal design projects in arid grounds, of varying scope and ambition, that could serve as a reference for future intervention in the region.

The research phase resulted in a thick compendium of drawings and territorial metrics that de-bundled the complexities of this terrain in order to expose the diverse design actions and processes that have shaped it. The objective of the research was twofold. Its main aim was to translate raw facts and observations into clearly synthesized information that could provide a more in-depth understanding of the territory in question and serve as a reference point for future design actions. Its secondary objective was to construct a significant body of work – a regional atlas – that would provide an alternative reading of this complex urbanized landscape to the diverse audiences affiliated with this territory. This research served as the primary source for the first chapters of this publication.

Al-Qattara / Al-Jimi Oases Studio A + Studio B Alternative Models for the Oases and their Specific Design Hypotheses

For the second portion of the studio, and utilizing the research component as a common ground for discussion and debate, students in both studio sections were asked to construct potential spatial models that would re-conceptualize the future role of the oasis grounds. In doing so they came up with a series of design actions that would set forth significant transformative processes. Among the many ideas that surfaced, three were most salient:

A_ Rethinking the interface between the private oasis orchard plots and the larger superblocks that enclose them. This investigation resulted in the discovery of extensive amounts of residual spaces resulting from incongruencies between the lose forms of the oasis and the rectilinear geometries of the post-war urban plan. Such spaces could be appropriated by new programmatic uses – i.e new academic facilities, organized and informal recreational spaces, new typologies of domestic space, etc – and in doing so provide alternative superblock configurations that can better articulate the relationship between oasis and city.

B_Re-conceptualizing the space of the oasis as both a symbolic productive ground and as a unique form of collective space in order to enhance the visibility and cultural performance of these hidden gardens.

C_Exploring future configurations for the oasis in relation to water scarcity, and contemplate possible scenarios that would either reduce the current footprint of the oasis and/or introduce new, more efficient irrigation technologies that could complement or replace the falaj system currently in use. Furthermore, students questioned if the oases themselves could become an experimental ground for emerging water management technologies in arid geographies.

These three major constructs, along with many other ideas, facts, and anecdotes served as the backbone that informed the diverse strategies for the location and configuration of the arts and crafts campus. Furthermore, these three points, served as clear parameters that guided how an academic facility could have a significant impact in redefining this currently vague landscape. The preliminary hypotheses developed during the initial weeks of the studio, were tested and further expanded during a one-week visit to Al-Ain. Throughout the trip, students had a first-hand experience of the oasis, and discussed their ideas with ADACH and multiple city officials. This further enriched the pedagogic experience of the studios.

For the third and longest portion of the semester (approximately six weeks) the two studios branched off, and worked individually until the final review.

Studio A, offered by the Department of Architecture, and taught by Jorge Silvetti, focused specifically on how a public institutional building or collection of buildings could open up the oasis to the city and propose a more accessible

experience of the oasis grounds. Focusing extensively on rammed earth building technologies, studio A proffered a handful of well tempered design projects that effectively re-articulated, through the introduction of a building, key nerves within the two oases. Furthermore, as a larger collective of projects, the studio offered an inventory of more mediated moments of exchange between the private orchard plots, the unacknowledged residual spaces within the oases, and the surrounding urban fabric.

Studio B, offered by the Department of Urban Planning and Design, which I instructed, utilized the arts and crafts campus as a multi-scalar programmatic device that could be used as a ploy to reformat large tracts of land within the oases. This section yielded a diverse portfolio of projects that shifted in scale from tactical fine grain architectural interventions to larger landscape strategies. Alternating between more contested issues such as defining "public space" within Emirati culture or the environmental footprint of desalinated water usage within the oases, to more pragmatic concerns such as the provision of shade, students engaged the academic campus as an operative medium that allowed them to set forth cogent positions regarding the future configurations of the oases in relation to the current physical, socio-economic, and environmental strictures of Al Ain and the region at large.

The two studio sections came together again at the final presentation. During the review,⁵ staged as a full two-day event, students from each section presented their project to an expanded panel of critics from very diverse professional, academic and cultural backgrounds; including architects, landscape architects, urbanists, botanists, and water management experts, among others. ⁶ Rather than presenting a singular set of recommendations for Al Qattara and Al Jimi, the studio as a whole presented a rich set of spatial scenarios, all coming from assorted vantage points, that singled out key design moves for these grounds. The final outcome of the studio was an expansive constellation of 25 projects that provide an exquisite imaginary of possible futures for the two oases in question.

Publication

The work documented within this publication presents an edited version of the work produced by the Qattara / Jimi double studio. The publication was assembled throughout the summer of 2009 by the two instructors with the unassailable collaboration of Dan Handel and Justin Fowler, along with the support of a larger editorial team. 7

The publication is made up of four major chapters, On Geography, On Urbanism and Ecology, On Regional Techniques, and On Strategy. On Geography, documents the broader spatial dynamics of the territory. Conceived as a series of discrete entries, in synthesis, they present an overview of the diverse social, cultural, and economic pressure systems that have shaped this territory. On Urbanism and Ecology, conveys a visual profile of the continuous struggle between geography and geometry within the region, Al Ain and the oases providing an expansive overview of urbanization in this area. On Regional Techniques, provides a survey of regional building technologies used in the area for centuries and how these could be implemented in current design practices. Finally, On Strategy, presents a series of student proposals that rethink the two oases in question. Organized by design procedure and scale, this chapter nests multiple projects into a set of working models which include; Inversion Logic, Spotty Logic, Prosthetic Logic, Fringent Logic, Web Logic, Frontage Logic, and Point Logic. This allows for projects to be read individually and as part of a larger transformative argument. Embedded in-between chapters is a collection of essays from three contributors, Paul Andersen, Chris Reed, and Brent Ryan. These writings present particular positions in regards to urbanization in arid grounds and complement the material developed in the studios.

5 The final review took place on May 7th and 8th, 2009.6 For a full list of final

The work collected in this book presents an unfamiliar view of the Qattara / Jimi Oases, Alin and the interior of Abu Dhabi. In doing so it allows for two objectives to unfold. On the one hand, it provides a synthesized inventory of the oases that allows for a better understanding of their evolution over time as well as their current physical state. On the other, it serves as a projective device that can ignite the imaginary of the reader, singling out the oases as a significant cultural asset and as a primary source for future urban transformation in the area.

7 For a full list of the editorial team, please see the credits on page 336

review critics, please see the

acknowledgements at the

opening of the publication.

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GRAPHY

On Geography

by Justin Fowler

While Dubai and the city of Abu Dhabi represent the global face of the United Arab Emirates, the modest municipality of Al Ain would appear to be something of an outlier, yet upon closer scrutiny, this "oasis city" is situated at the very heart of the struggle to locate, or perhaps retroactively construct, an Emirati cultural identity. The birthplace and domain of the late Sheikh Zayed, Al Ain is the product of a fruitful convergence of tribal heritage, date palm cultivation, Western urban planning, and tourism, underpinned by a substantial immigrant workforce. It is a place symbolically bound to its ancient irrigation system (falai) yet now augmented by its infrastructural ties to the desalination facilities in the coastal region. With a significant portion of Abu Dhabi's agricultural production occurring in the vast farming plots to the west of the Al Ain, the date palm oases which once ordered the city's loose urban fabric now exist to promote the memory of their former glory as vital havens for roving Bedouin tribes. If Dubai offers Emiratis and European tourists the chance to indulge in American fast food and snow skiing in the shadows of iconic palm-shaped commercial towers, then Al Ain is its Janusian double, offering a carefully calibrated vision of authenticity and place within the grand narrative of rapid Emirati modernization. While Al Ain is, in part, actively being construed as an antidote or bastion of resistance to the enveloping tide of globalization, its course is a fundamentally modern one and the municipality is being obliged to cope with the inevitable growing pains that besiege any emerging metropolis, yet Al Ain's unique position within a harsh desert environment demands a careful and considered approach to urban planning and design, as the extreme costs of sustaining life in such a location place a premium on every detail.

These arid conditions not only drive formal and morphological development patterns, but also dictate a very distinct mode of social life that is largely contained within the air-conditioned bubbles of the walled family compound and the sport-utility vehicle. To the extent that it exists, public space is manifest less as a consciously delimited type, but rather emerges at dusk as people begin to fill the shaded interstices of the city, populating the grassy medians and the palm-filled linear parks that flank AI Ain's over-scaled roadways These vegetated margins and byproducts of infrastructurallyenabled sprawl have seemingly replaced the original oases as the centers of public activity. Such ad-hoc dispersion and its operation within the nested scalar systems of the city is indicative of the larger set of issues associated with the ambivalent legacy of modernist planning in AI Ain and can also be viewed as a metaphor for the parallel existence of consciously-separated constituencies in the region as a whole.

Indeed, there is a fine line that remains to be drawn between the existing condition of ambivalence and that of achieving a more measured sense of balance amongst a range of competing interests within the region. Piecemeal overtures toward the formation of civic life, such as the commissioning of iconic public artwork, the preservation of historical sites and tribal practices, along with the creation of new urban plazas within the city center have begun to ameliorate the atomization effects of sprawl, yet an overarching strategic overhaul has yet to garner serious traction, in part, one suspects, because of the unspoken benefits of ambivalence in a situation where a large segment of the population is transient, being comprised of vacationing Emiratis from the coastal cities, expats, tourists, and temporary workers from Southeast Asia and other segments of the Arab world. To reconceive of the oases of Al Ain as civic places rather than the antiquated domain of the privileged few would appear to be a vital first step in any strategy that seeks to restructure the city so as to accommodate change within a framework anchored by local heritage.

Apart from their obvious symbolic value, the oases are the primary hinge for strategic intervention in Al Ain because they too have been lost within the normative vehicular grid of multi-lane streets and can thus provide a model for the development of a secondary scale of infrastructures with the ability to respond to a greater range of lifestyles and choices of inhabitation, while also minimizing the necessity for vehicular transport and excessive energy consumption. By removing the notion of architectural or urban performance from its rarified place within the technical discourse of the sustainable it can be applied in a more systemic manner to a wider scope of issues from ecology to human geography so as to foster the materialization of new modes of community from which more sustainable lifestyles and political structures can emerge. The possibility of such communities hints, not at a return to some romantic notion of Bedouin self-sufficiency and clientelist political linkages, but rather toward the extraction of the operative logics behind such small-scale tribal systems in order to adapt their advantages to address the demands of a rapidly modernizing society. Al Ain, with its problematic, yet fortuitous position as the locus of Emirati heritage and cultural consciousness, has the potential to become a seminal laboratory for the deployment of this systemic form of adaptive preservation within the Arab world.



Territorial Ambitions

Agency within Fortuitous Circumstance

Nestled at the base of the mountainous terrain extending from Oman, Al Ain has developed as the vital intersection of historical strategic interests. Tribal politics, trade, and water rights have solidified these oasis-dotted lowlands as perpetually contested grounds.



Al Buraimi Political and Physical Boundaries

Though Al Buraimi was a disputed region of tribal territorial claims for hundreds of years and a key staging ground for invasions of Oman via the lowlands of the Al Batinah coast, the issue of establishing clearly delimited political borders emerged only in the 1950s largely due to competing oil interests between American-backed Saudis (ARAMCO) and the British-backed Trucial States of Oman. British troops secured the region for Abu Dhabi and unilaterally established its border, claiming that the oases of Buraimi were historically connected to the coastal city of Abu Dhabi through tribal linkages, economic ties, and seasonal migration patterns.







Top Aerial image of Buraimi Oases (1968)

Prior to the establishment of a fixed border between Oman and the UAE, the larger Buraimi Oases flourished, as competing tribal authorities necessitated the negotiation of water distribution for the entirety of Buraimi.

Bottom

Aerial image of Buraimi Oases (2008)

The divergent forms of management and urbanization between the two countries has allowed the oases on the Oman side to fall into disrepair while Al Jimi and Qattara have grown with the addition of agricultural plots.

The Social and Physical Structures of the Falaj System

The falai system is an infrastructure for oasis irrigation that collects rainwater from the surrounding higher ground of the Hajar Mountains, channeling it to the privately-owned vegetative plots of Al Ain. The logic of this network of canals has a distinct hierarchy, yet the demands of equal water distribution among the plots necessitated the development of a finely calibrated system of water management, where the managers themselves became an integral part of the system's structure. Historically, falaj irrigation was informed by a measurement system based on duration, rather than volume. Plot size, seasonal variation, and time of day were all conditions that had to be taken into account to insure that no plot was left without water. A network of laborers physically manipulated the water flow through damming techniques that were both crude and effective in their simplicity. Due to the tribal prestige of plot ownership, water distribution was a fundamentally political activity, as distribution canals cut across plot boundaries. Regionally, water politics remains an issue since Abu Dhabi must continually negotiate with Oman for water rights.







Top Falaj operational structure

Bottom

Water flow from the mountains of Oman is directed into holding basins and distributed throughout the oases via canals. A sizable workforce is required to manage the canals and maintain the aquifer access shafts in the high ground.

Opposite

Regional map showing the source of the falaj irrigation system





Laborers who maintain the falaj control the irrigation periods for specific plots via simple damming techniques with improvised materials such as rocks or bricks draped with old textiles. Traditional Irrigation Schedules



Oasis plot irrigation is measured in terms of duration with water flow periods corresponding to the quantity of trees within each plot. Prior to electronic timing mechanisms, water distribution within the oasis was determined through solar and lunar cues.

Durational Distribution



 $\begin{array}{c} \bullet \bullet \bullet \bullet \\ \bullet \bullet \bullet \bullet \end{array}$

Bottom Vertical access shafts for falaj maintenance

Al Qattara and Al Jimi Oases contain a variety of plot sizes resulting from the division of larger family plots among heirs. Over time, falaj managers worked to calibrate the distribution system to establish distinct durational periods for water flow that could accommodate this fragmentation.

HIII F

4 Although



<-2.5°C <-5°C <-10°C

5:00 PM

Noon

5. Ruba'a (7.5 Minutes)

Average Number of Trees: 5-10

5:00 AM

Regional Water Production

Abu Dhabi has the highest per capita water consumption rate in the world, yet the arid conditions of the region are hostile to the production of fresh water. In Al Ain alone, the falaj system accounts for less than 40% of the irrigation needs due to low amounts of annual rainfall. The maintenance of large stretches of landscaped spaces and roadways requires a multi-faceted approach to augmenting the water supply, which includes a massive network of wells, desalination facilities, and pipelines.











Opposite

Top The c

The decline of the natural freshwater table has heightened the necessity of wells to supplement traditional water supplies. A significant quantity of wells has been established to maintain the large agricultural plots clustered to the west of Al Ain.

Bottom

Abu Dhabi desalinated water production in millions of gallons per day.







Тор

Pipeline Networks. Pipelines from desalination plants extend across the desert to inland cities, paralleling the road and power routes.

Bottom

Locations of Wells. The majority of wells have been positioned in areas of low salination to aid in the irrigation of agricultural plots on the outskirts of the oases.

Opposite

Тор

Well Capacity. With a relatively small population in the south of Abu Dhabi, water produced in that area is largely diverted to other parts of the country.

Bottom

Soil Salinity. Salt levels are generally the lowest in the areas to the west of the inland oases of AI Ain and Liwa, near the southern border with Saudi Arabia.



Patterns of Mobility and the Erosion of Remoteness

Modes of transport on the Arabian peninsula developed along the seasonal migration patterns of Bedouin tribes. These routes were intimately linked both to trade and to the locations of water sources throughout the desert. Within this context, oases became crucial nodes anchoring the barren landscape with the promise of food (dates), water, and shade. The historical development of modern transportation infrastructures followed the logic of these Bedouin networks and also took advantage of the dry riverbeds (wadis) which provided driveable surfaces for early vehicular exploration and oil-seeking expeditions. Within Abu Dhabi itself, greater tribal migration to the coast for purposes of pearling, shipping, and later, offshore oil discovery, necessitated the maintenance of infrastructure connecting the coastal settlements back to Al Ain. These highway projects, which sliced through the desert, further required the development of landscaped barriers protecting the roadways from sand drifts.







Opposite

Throughout the Arabian Peninsula, Bedouin migration patterns have solidified into formal infrastructural systems. Coastal and inland settlements along these routes developed into major cities because of their proximity to water sources.



Top to Bottom donkey routes, camel routes, Rover routes, highway routes Opposite

> **Top** Global Traffic

Bottom

Travel routes within Abu Dhabi established links among coastal cities and reinforced ties between the coast and the inland settlements around Al Ain in the east and Liwa to the south.





Political Spheres

Personalities, Networks, and Constituencies

With a political system steeped in patronage and interpersonal reciprocity, the UAE is gradually institutionalizing its governmental processes and forging a distinct national identity to cope with the demands of a heterogenous population and a sprawling economy.



Political History of the UAE

Economic History of the UAE

1800	1820	"Pirate Coast" sheikhdoms sign Treaty of Maritime Peace in Perpetuity with UK. The region becomes known as the "Trucial Coast" Rulers of Trucial Oman sign exclusive treaty of protection with UK		
1920 ⊶	1919	Five original sheikhdoms joined by Ras Al Khaimah in the north	1920s	Dubai surpasses Sharjah as the dominant commercial power in the region
1930	1934	British-Saudi diplomatic controversy begins over eastern boundary of Saudi Arabia with the Sheikhdom of Abu Dhabi		
1940 [°] 1950	1951 1952 1955	Trucial Oman Scouts established by the British as a local peacekeeping force Previously ruled by Sharjah, Fujairah becomes Trucial Oman's seventh sheikhdom Al Buraimi oasis dispute reaches its peak with the British sending the Trucial Oman Secure to even a Securit patient of Acting on beside of Abu Dhobi, the UK	1939	Oil concession granted by Abu Dhabi to the Iraq Petroleum Company forming the Abu Dhabi Petroleum Company subsidiary
1960 °···		Scouts to expel a Saudi police contingent. Acting on behalf of Abu Dhabi, the UK unilaterally defines Abu Dhabi's boundary with Saudi Arabia.		Discovery of oil in Abu Dhabi Abu Dhabi begins to produce and export oil Discovery of offshore oil in Dubai
۰ 1070 م	1968	UK announces intention to terminate treaty obligations with the Persian Gulf sheikhdoms by the end of 1971	1967	Abu Dhabi becomes a member of OPEC
1970 °	1971 1971 1972	Six sheikhdoms form the United Arab Emirates and proclaim independence Sheikh Zayed bin Sultan Al Nahyan is elected President of the UAE Ras Al Khaimah joins the UAE	1970	Dubai begins oil production
0	1974	Abu Dhabi settles boundary dispute with Saudi Arabia		Discovery of offshore oil in Sharjah
1980	1981	Gulf Cooperation Council (GCC) founded with the UAE as a charter member		Discovery of gas-condensate in Ras Al Khaimah
Ū	1987	Abu Dhabi supports attempted coup in Sharjah by ruler's brother, ending in a tenuous compromise		
1990	1990 1990-91 1992	In defiance of Iraq, the UAE invites U.S. forces to participate in joint air exercises UAE joins coalition forces to repel Iraq from Kuwait during the Gulf War Dispute renews with Iran over the 1971 agreement on joint administration for the island of Abu Musa		
2000	1996 1998	UAE adopts a constitution and names Abu Dhabi the federal capital UAE restores diplomatic relations with Iraq		
2000	2004	UAE President Sheikh Zayed bin Sultan Al Nahyan dies and is succeeded by his son, Sheikh Khalifa		
	2005	Sheikh Khalifa proposes limited elections for the consultative Federal National Council		
0	2006 2006	Sheikh Maktoum bin Rashid al-Maktoum, the UAE Prime Minister First national elections. A limited body of hand-picked voters choose half		Economic proposals are announced including laws to reduce dependence on foreign workers and permitting the creation of trade unions
2010 °		of the Federal National Council	2007	Dubai and Qatar become the two largest shareholders in the London Stock Exchange



Al Ain, 1960

UAE Constituencies

Much has been written regarding the precarious balance the UAE must continually maintain between its subsidized minority native population and its large imported labor force. Narratives of such bifurcation, however, often fail to capture the sheer richness and variety of the constituencies, both acknowledged and latent, existing on seemingly isolated layers that nevertheless must occasionally cross, causing an ongoing series of disjunctions within daily life that become more norm than exception. Unpacking the mechanisms of this normalization poses a number of issues pertaining directly to political scale and the strains that population growth places on the traditional workings of Middle Eastern politics and its historical privileging of dominant personalities and intimate relational spheres between tribal leaders and their subjects. The rapid population increase has largely determined the way in which UAE society has been driven to limit its subsidized citizenry and create modern institutions to address the infrastructural and bureaucratic management of the population as a whole. In this way, the seemingly hidden majority exerts a very definite structural imprint upon the country's political system through no real concentrated initiative of its own.

Language Preferences of UAE Students



47% English





The indicators of conflicted identity within the UAE are both overt and structural. Traditional garments and modes of living persist, though Western norms, practices, and consumer symbols exert their presence on the urban fabric and in the classroom.

Sheikh Zayed: The Personality that United the Emirates

Al Ain's native son, the late Sheikh Zaved bin Sultan Al Nahyan has achieved an almost mythical status as the ruler who modernized Abu Dhabi and turned a loose federation of Emirates into a cohesive national body. The ruler of Al Ain during the Buraimi disputes, Zayed refused a significant Saudi offer for the territory despite being in desperate need of funds for the city. He began a campaign to revitalize Al Ain that included falaj renovations, oil exploration, and the facilitation of cultural projects such as archaeological digs. Admired for his loyalty, generosity, and leadership capability, Zayed was respected by Bedouin tribesmen and prominent leaders alike as someone able to balance the conflicting demands of modernization and regional identity. In 1966, Zayed assumed power in Abu Dhabi from his elder brother Shakhbut in a peaceful coup supported by those frustrated by the elder's lack of economic ambition for the region. Under Zayed's reign, the UAE became a safe haven for international commerce and tourism within the Middle East as well as a place of measured reforms, reflected in initiatives such as the founding of the Abu Dhabi Women's Society in 1972 by Zayed's wife, Fatima. Zayed's death in 2004 was a period of mourning for the nation as a whole and the transition of power to his son Sheikh Khalifa bin Zayed Al Nahyan was a peaceful and uncontested one.















This page

Images of the late Sheikh Zayed throughout Abu Dhabi. The memory of his benevolent rule is a powerful call for Emiratis to embrace a unified national identity.

Institutionalizing the Patron-Client Network

"I must say that this type of direct communication, though new in format, is not new in principle. It is part of a continuing practice wherein I meet daily with many of my brothers and sisters, citizens of our country, on my visits to government departments and during my field trips across the United Arab Emirates. I view such two-way communications and contacts as extremely valuable."



Excerpt from first e-session:

Your Highness: We have started to notice that young men and women wear Western costumes and speak foreign languages. I don't feel they represent the real Emirati citizen. Is our culture and identity at risk? Or are they exceptions that do not reflect the real majority?

Our young men and women are good, and they are loyal and well-connected to the country; they are proud of their national identity. The segment you are talking about is just a minority, limited in number and temporary in its behavior.

Your Highness: I've noticed that you keep an eye on every single detail here and there. You also keep an eye on the international and Arab media reports, and you are aware of all dimensions of the international financial crisis and its impact. How do you manage to follow-up on all this and keep yourself updated?

First of all, I do communicate with people and live among them. People see me on the streets, in restaurants, and in public and social occasions. It is said that "knowledge is power" and we live in the "information age." I always encourage government officials to keep themselves abreast with the latest developments. They have to stay alert or they will lose.

In 20 to 30 years time, will there be ownership of land by UAE nationals in Dubai? What's Dubai's plan in this regard?

Yes there will be ownership of land for UAE nationals in Dubai. More than 75% of our land is empty space ready for construction.



individuals/clans

individuals/clans

individuals/clans



Publicity photo of UAE Vice President and Ruler of Dubai, Sheikh Mohammed bin Rashid Al Maktoum promoting his first "e-session" with the public, signifying the effective digitization of the majlis as a practice.

As a formal reception room for visitors, the majlis is a both a place for discussion and interpersonal negotiation.

The majlis has historically existed to permit direct interaction between tribal citizens and their rulers. This mechanism continues to be used for the resolution of conflicts between parties and for the symbolic airing of grievances.

Cultural Aspirations

Cultural Production as an Economic Mode through Five Operations

Al Ain has positioned itself as the bastion of authenticity and culture in Abu Dhabi, offsetting the excesses of modernization displayed elsewhere in the Emirates. The maintenance of this role is, however, a distinctly modern enterprise.



Falconry: The Intangible Cultural Heritage

16% of the Emirati population participates in the 4000-year old tradition of falconry, a sport practiced in over 60 countries. The UAE is currently preparing a heritage village for falconry tourism along with a UNESCO proposal for the preservation of the sport as an "intangible" aspect of the Emirati culture. The desert expanse on the outskirts of the UAE's major cities is considered prime territory for the training of falcons for purposes of long-distance hunting of prey, which differs from training elsewhere that occurs in dense parkland areas. The falcons are considered to be prized possessions and are now often kept in air-conditioned spaces and tracked via GPS.







Тор

The Abu Dhabi Falcon Hospital treats 4400 patients per year, with 168 percent increase in tourist visits in 2008.

Tourist Packages

Normal Package: (2 hours) "Visiting the museum and the hospital, picture taking with the majestic falcons sitting on your arm and witnessing the unique falcon flight show in winter or free flying falcons in summer."

Comprehensive Package: (3 hours) "Normal package plus lunch/dinner in the traditional Arabic tent (Khaima) and a 5-star intercontinental buffet prepared by Abu Dhabi National Hotels staff."

Camel Racing

Camel racing remains one of the most popular spectator activities in the Emirates and the recent revival of the sport is viewed as a way to preserve the legacy of the vanishing Bedouin pastoralist economy, though race winners are paradoxically often rewarded with luxury vehicles. There are over 14,000 racing camels currently maintained in Abu Dhabi. The late Sheikh Zayed himself possessed several thousand camels and a labor force of over nine thousand to tend to their upkeep, reflecting the larger economic and job creation benefits of this cultural enterprise. Camel breeders and trainers are provided with government subsidies. Races generally take place in the winter months and occur on tracks that range from 4-10 kilometers in length. The larger tracks are equipped with a variety of accomodations for both spectators and camels alike and often have an inner track for camera vehicles which attain speeds up to 65 km/hr to keep up with the frontrunners. After years of using child jockeys, the UAE has shifted to the use of lightweight robots controlled by the camel handlers from the sidelines.









Opposite

Top lightweight robot jockeys are the latest advance in a sport most closely associated with Abu Dhabi's Bedouin history.

Built Heritage

The preservation of mud-brick tribal forts and palaces within Al Ain has become one of the key strategies of identity maintenance in the region. Likewise, the construction of "heritage villages" that celebrate tribal life with displays of traditional crafts and practices has also become a popular enterprise within the preservation movement.

1. Hili Archeological Park 2. Hili North Tombs 3. Rumailah Towers 4. Bin Rayah al Darmaki Tower 5. Hemaid bin Kadhelbah Al Dhahiri Fort and House 6. Sultan al Khumaisani al Dhahiri Mosque 7. Muraijeb Fort and Towers 8. Abdullah Bin Salem Al Darmaki Fort and Mosque 9. Heritage Village 10. Abdullah Bin Salem Al Darmaki Fort and Mosque **11.** Al Qattara Fort and Souk **12.** Daramkah Tower 13. Sheikh Mohammed bin Ahmad al Dhahiri Mosque and House 14. Bin Jaber Al Suwaidi House **15.** Sheikh Ahmad bin Hilal al Dhahiri Fort and House 16. Sheikh Ahmad bin Hilal al Dhahiri Tower (Jimi Oasis Watchtower) 17. Bin Suroor House 18. Al Sureer Eastern House 19. Al Sureer Southern Mosque and Houses **20.** Jahili Fort 21. Sheikh Zayed (Al Ain) Palace Museum (new form) 22. Murabaa Fort 23. Al Ain National Museum 24. Al Naqfa Fort **25.** Al Mawalji Fort









Performative Iconography



In the 1970s and early 1980s, municipal officials in AI Ain reached the diagnosis that the city's strict building height limits coupled with its large-scale Milton Keynes-influenced roadway system produced an anonymous horizontal landscape that necessitated the commissioning of a series of public art projects to adorn the city's traffic circle islands. The exuberant sculptural projects that emerged now serve as crucial wayfinding markers that reinforce AI Ain's image as the cultural and historic heart of Abu Dhabi and also provide lush public spaces for informal gatherings.



Date Harvesting

The date palm is perhaps the most symbolic and historicallyproductive native of the Emirates and the Arab world as a whole. Mentioned in the Koran more than any other plant, its legacy as a provider of both food and shelter serves as an ongoing expression of Emirati wealth and patronage. While its silhouette is continuously appropriated in Abu Dhabi and Dubai as island and tower forms, the date palm's more performative qualities are exploited in Al Ain, where, in an initiative spearheaded by the late Sheikh Zayed to aid in the diversification of the UAE economy, large agricultural plots on the outskirts of the city produce vast quantities of dates. At the same time, however, the preservation of the oasis date plantations in the city center recaptures the symbolic value and traditional tribal prestige of date palm ownership and is heavily subsidized by the government.







The date palm is both a culturallyingrained symbol for all Emiratis and a way of life for oasis laborers, though its economic impact remains minimal in comparison to that provided by energy resources.

Once a product for subsistence, the date is now largely a crop for export. Locals still produce dates for personal consumption and take a great deal of pride in the quality of the dates they are able to grow.

BRENT R'


Some Thoughts on Desert Urbanism

Brent D. Ryan

"If this is a desert, what are all these people doing here?"

Reyner Banham, Scenes in America Deserta, p.158 (1982)1

The desert, as is well known, is a harsh and unforgiving environment. Without careful preparation those who travel there do so at their peril. Threats to human well-being are numerous, ranging

from blazing heat and lack of water to vicious sandstorms and, at least historically, the risk

of attack by brigands. Some areas of the desert are so harsh that a person without water will be dead within hours.

The desert, infertile as it is for life, has always been fertile ground for city-building. The "Cradle of Civilization" in Mesopotamia is mostly a desert area, albeit with abundant water in places, and cities such as Damascus are among the oldest cities in the world. The rich civilization of Pharaonic Egypt, huddled on a knife's edge between river and desert, and Egypt's greatest monuments are desert monuments. At least one of the largest cities in the world (Cairo) and many of its holiest cities are desert cities. Whether this is by will or happenstance is perhaps best left to the imagination.

The past is made evident in the desert city in a way that it is not, and cannot be, elsewhere. Even as the desert destroys life, it preserves almost everything in death. Some of the most intact ruins of ancient civilizations are found in the harsh deserts of Africa and Peru. The desiccated climate preserves documents, bodies, and even entire cities, such as the Roman camp of Timgad in Algeria. Where a forest will consume a city within decades, desert cities, for all intents and purposes, last forever, even if they be buried in sand.

Why are there so many desert cities? Brute economics is certainly one explanation. In many cases, the apparent infertility of the desert masks a plethora of resources. This is particularly the case with oil, which lies beneath some of the most unforgiving terrain in Asia and whose revenue has generated a flurry of city-building on the sands above. Almost all of the recent urban activity in the Persian Gulf is in some way attributable to oil.

Technology is certainly another reason for the growth of desert cities. There is absolutely no way that the American cities of Phoenix, Las Vegas, Tucson, and the like, could have attained their current size (Phoenix being the fifth largest city in the United States) without the technology that permitted vast quantities of water to be transferred to these locations. This technological capacity thus far appears inexhaustible, although the environment's ability to sustain it is another question.

There is a third, more worrying possibility. Deserts are not static; they grow and shrink according to climate change and environmental abuse, particularly overgrazing and overcultivation. The reality of desertification is slow and bleak, a grinding aridity that leads first to loss of fertility and then to gradual abandonment as settlements and fields shift to more sympathetic climes. The baked salt pans of Mesopotamia were once fields of grain, and the abandoned Anasazi Pueblos of the American Southwest once overlooked cornfields. There is little doubt that human resource (over)extraction can both inhabit and manufacture deserts. The overriding need to adapt to the harshness of the desert or perish historically made climactic responsiveness the dominating theme of desert urbanism. Irrespective of their location on the globe, desert cities displayed geographical and typological similarities. Proximity to water, of course, was nonnegotiable, and the sound and sight of water consequently became an important formal component of many desert cities, particularly Islamic ones. Other similarities were architectonic: in the face of hot sun and hard winds, desert cities by necessity were huddled masses of thick-walled buildings and narrow streets. The streets were for shade, and only the occasional plaza or the house interior were for sun.

The formal result of the historical desert city's necessary adaptation to climate is often dramatic and exciting. There is a beautiful logic, for example, in the villages located around oases. The dense clusters of homes located just at the edge of the cultivated greenery makes it easy to imagine the pleasure of cool desert nights spent on the roofs of these buildings, with the moon rising over the date palms, and perhaps the sound of water nearby. During the day the shade and water of the oasis moderated the heat of the sun, and made settlement there tolerable. This juxtaposition of water and heat in Damascus led Arab poets to declare the city the most beautiful place in the world, the embodiment of paradise on Earth.

Water or no, there is something irrational about building in the desert. On a psychological level the desert city can be seen as a collective act of courage, a bold statement that human enterprise can withstand and even reverse the harshest climactic conditions. For there is no more fundamental assertion one can make against nature than to build a desert city. There is a basic perversity, an illogicality, in constructing a dense settlement in a place that seems to barely support life.

The very improbability of building a city in the desert has always made a fantasy an essential component of desert urbanism. Doubtless, the visceral pleasure of finding civilization (and water!) after a long desert trek led many travelers to associate desert cities not only with excitement, but with other pleasures as well. The Western stereotype of desert decadence may be in part due to what Edward Said called "Orientalism," but the desert itself must surely be partly to blame as well. For who, seeing a city shimmering at the edge of the waste, would not project a variety of pleasures there well beyond that of the first draught of water? Certainly the persistent psychic lure of the desert city cannot be accounted for by the attractions of its heat and scenery alone.

Modernization has destroyed many of the distinctive historical qualities of desert cities. With the sudden availability and affordability of open, glassy, and air-conditioned buildings, the densely packed mud dwellings of the old city (or the pueblo) are now perceived as both antique and stigmatized. Who but the poor would choose to continue living in such hovels? And water, once a preciously scarce resource, has been made magically (if ephemerally) abundant by new technologies that draw it from deep beneath the earth, from faraway rivers, or from the sea itself. The desert lake is no longer a mirage but a reality that answers the persistent desire for "amenity" in new luxury developments. A third major change has come from motorization. Reyner Banham, in his 1982 "Scenes in America Deserta", observed with pleasure the superiority of automobile transit through the desert over that of the railroad and the ease of accessing once inaccessible areas by car. One can certainly understand the eagerness of those who have recently transitioned from laborious camel or caravan treks to the Land Rover or Lamborghini. Even the Sahara, once perceived as an insuperable barrier requiring months of caravan travel, has become the site of an annual auto rally that takes less than two weeks to travel from the Strait of Gibraltar to the Malian border by car, truck, or motorcycle.

Although all of these forces have made it much easier and more pleasant to live in the desert, they have exerted a scattering effect on desert cities. Even as the desert city has become greener, cooler, and easier to access than ever before, its typological coherence has been lost. Buildings are now sited far from obvious sources of water, often along major arterials, and they are widely spaced, each surrounded (if the owner can afford it) with a patch of green. The desert city is no longer dependent on proximity, shade, or the oasis for survival. One could easily conclude from all of this that the historical determinants of desert city form are comprehensively obsolete.

Technological change presents a compelling dilemma for the designer or planner who remains interested not only in historical desert city form but also in the environmental dyad of settlement and water that once characterized these places. One dilemma is typological. Should the form of new desert settlements mimic any of the qualities of historical places? Are there legitimate reasons for doing so beyond simply achieving a scenographic imitation of the past? Another is economic. Is there a continued reason for being for those historical desert settlements that survive, apart from being a place to move out of as soon as one has the means to do so? Is the inevitable fate of the historical desert city that of a preserved, uninhabited monument? Both dilemmas ask the same question of the designer: How valid is the past in shaping the future of desert habitation?

Responding optimistically to this challenge, one can hypothesize a few principles that might lead future urban form and settlement in the desert to retain some of the spatial logic that characterized such settlement in the past. Each offers a promising direction for future urbanistic efforts, and each is exemplified by a current project now in progress.

The most significant is a reconsideration of the value of climactic responsiveness, particularly sensitivity to heat and sunlight. This has obvious environmental benefits at the city scale, where more closely grouped structures make walking between buildings easier, more pleasant, and more visually rewarding, reducing the omnipresent dependence on the automobile that currently typifies all but the poorest areas of desert cities, and regenerating some of the formal complexity and unpredictability that made the historical city both comfortable and mysterious.

An ambitious attempt to recast the form of the desert city from top to bottom is currently under construction in the desert outside Abu Dhabi, where the new city of Masdar is being planned under the aegis of Norman Foster and the Emirate. Conceived in the grand tradition of top-to-bottom master plans, Masdar is envisioned as a comprehensively zero-emission, car-free city that reincorporates vernacular construction methods and urbanistic configurations (densely packed buildings and narrow, shaded streets) into a large-scale design for an envisioned total of 40,000 people. Water will be supplied by a solar-powered desalination plant. In one fell swoop, Foster + Partners is attempting to reverse the entirety of the trends that have led to the decentralization of the desert city. The scheme is almost Utopian, and one can imagine a variety of ways in which the exigencies of politics, society, or economics could adversely impact the vision. Yet as with all Utopias, Masdar offers promise not in the likelihood of its total realization but in the variety of alternatives it offers to an urbanization model that clearly needs reconceptualization.

Reconsidering the sourcing and conservation of water is perhaps the most urgent issue for desert cities. Hydrological sensitivity was always a dominant consideration in the desert, and its gross violation in recent decades is perhaps the most disturbing aspect of recent urbanization. In the absence of alternative means of sourcing distant water without incurring significant environmental costs (particularly consumption of fossil fuel and/or the deprivation of distant areas of their water), water conservation seems the most productive measure. This can be imposed at the sourcing end through legislation, but is perhaps more productively employed at the usage end through reduced water waste on greenery and increased water efficiency in structures.

Such increasing strictures have been imposed recently in the United States by the city of Las Vegas, Nevada, which grew in population more than 300 percent during the past two decades, mostly through low-density sprawl into the desert. Las Vegas has effectively tapped out its principal source of water, the Colorado River, and Lake Mead, the city's reservoir, has dropped to 50 percent capacity and is likely to continue dropping. Unable to effectively restrict the development of land or migration to the region, the regional water authority has imposed rules governing not only the type of vegetation that may be planted around new buildings but has also required "water efficiency plans" for all new developments. These plans must demonstrate that the new development will use only 50 percent of the water used in "typical" projects elsewhere in the country where water is less scarce. Las Vegas's conservation approach is far more pragmatic and arguably less ambitious than the Masdar scheme, but it holds the additional promise of being able to incrementally influence the behavior and environmental performance, if not the urban form, of the existing settlement of more than 700,000 people, and of potentially having a greater environmental benefit as a result.

Many historical desert settlements, designed by necessity according to the very same principles that are at the leading edge of today's planning efforts, face a bleak future. No longer desirable as living areas for the very simple reason that their inhabitants aspire to the better life seen everywhere around them, they either fall into abandonment and destruction, or are physically restored but emptied of their inhabitants, preserved forever as museums of the past.

Is there an alternative future? The same question might well be asked of historical vernacular settlements around the world faced with the same choice of abandonment, commodification, or remaining impoverished. Although to pretend that an ideal solution to this dilemma exists is perhaps unrealistic, the Siwa Sustainable Development Initiative in Egypt, funded by the United Nations Development Programme and the International Finance Corporation (IFC) of the World Bank, is tackling the challenge on multiple fronts.

Recognizing that the economic activity of the oasis settlement is the key to

the settlement's continued utility and therefore survival, the IFC is financing a microcredit scheme to permit both the restoration of historical structures and a "cottage industry aimed at revitalizing Siwa's traditional handicrafts and promoting a culture of artisanship among (oasis) women." These initiatives are occurring in conjunction with a parallel effort to promote organic agriculture schemes in the cultivated oasis landscape, keeping these landscapes alive in parallel with the historical settlement.

Considered together, these three projects present a range of innovative ideas, each of which in its own way is far ahead of conventional design and planning practice. Yet together they also present a somewhat ironic contrast with each other: desert design and planning is attempting to recapture traditional urbanistic and spatial principles precisely as the few remaining historical settlements are experiencing pressure from globalization. Are efforts to recover environmental responsiveness and preserve historical settlement patterns marginal attempts to go against an inevitable tide of modernization, or might they possibly represent the leading edge of urban trends that will shape the desert city of the future just as the air conditioner and the automobile shaped the desert city of today?

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MODEL CITIES DAN HANDEL

Model Cities

Dan Handel



Apparition

Flying over or driving through the city of Al Ain, one is reminded constantly of another city located within radically different geographical circumstances, which, by the end of the 1960s, came to be one of the salient models for town planning and the prototype for Al Ain—Derek Walker's Milton Keynes, England. Milton Keynes and Al Ain are connected not only through the similar physical characteristics of their transportation systems and the expertise of the British designers who played a role in shaping them, but also through the global economic circumstances that redefined the power structures by which they came into being. A closer inspection of Al Ain, though, casts doubt on the ease of cultural export and the primacy of western models, and reveals innovations for urbanity within the realm of a newly formed national identity on the Arabian Peninsula.

New Towns in England were described often as end-products of a process of rationalization and optimization in city-making. Milton Keynes, an exemplar of the late period of these towns, embodied in its structure and form aspirations for a contemporary, mobile society¹. Milton Keynes's neighborhood units and its multifaceted hierarchy of road networks were crafted meticulously to support the ideology of "ultimate mobility": a world in which programs, goods, and, even, people are in constant flux. No less groundbreaking than their innovations in transportation and social planning was the framework the Milton Keynes planners used to construct nature and incorporate it into the organizational logics of the urban environment. Using careful inclusion, framing, and manipulation of natural features and landscape elements, the Milton Keynes planners introduced into their project a bold experimental model of integration: one that is particularly relevant today, as planners and designers face the contemporary ideologies of conservation ethics, nonanthropomorphic habitation, and environmental thinking.

This model, though, had its shortcomings: the most crucial of which is the way in which it conceived of nature. A very specific, very English idea of the environment underlies the articulation of the nonbuilt components of the city, narrowing the range of "natural" interventions to cultivated, linear parks and well-trimmed grass compounds. The potential of a city "greener than the surrounding countryside"² was never fully exploited. At least not in Milton Keynes.

As the same concepts were exported and actualized throughout the world, specifically in projects in which British professionals were involved, the influence of the concepts turned out to be substantial, reaching far beyond the boundaries of the United Kingdom. The resulting offspring cities, however, were never precise replicas of the originals that inspired them. These cities were, in selected instances, incarnations of certain ideas and methodologies that were limited or not possible before. The protocols that were used in the process of adaptation generated variances and fragments that, in turn, introduced novel methods for conceptualizing the city that were unanticipated or unintended by the original models. Outlining the history of ideas and their importation, along with the unique history of the Gulf Region and its rise to cultural and economic prominence in the global arena, supply an array of techniques used in embedding nature most talented of our designers, working within the discipline of the cleverest plan for a major new development since the war, would be given the time and resources to come up with a sparkling demonstration of what we could do in the mid-twentieth century in British urban planning and design." Michael Brett. 1994. "In the Frozen North," Architectural Design, v.64, n.9-10, p.[14]-24

1 "We all felt that here the

2 "When I presented a concept for a city greener than the surrounding countryside to the board, 'forest city' became our image..." Derek Walker. 1994. "introduction", Architectural Design, 1994, v.64, n.9-10, p.6-7 within the operation of cities, galvanizing, in turn, new forms of urbanity.

Milton Keynes

In the summer of 1973, the Milton Keynes team, comprised of designers, engineers, economists and bureaucrats, was featured on the cover of Architectural Design magazine. They were photographed outdoors.

Eluding the familiar compositional expectation of such a photograph, an unusual, gothic and eerie image was provided. A symbol of the finesse and grandeur of nature, the old Elm tree that dominates the picture is crowded all the way to its top with crow-like figures of black-clad team members. The image, supplemented by the flat, gray tones of a cloudy English day, is as enigmatic as it is disturbing. For a team that, at the time, was the spearhead for urban planning, and promoted a rational structuring of transportation networks to meet contemporary challenges, the choice of representation is curious. Beyond mere anecdote, it exposes absentmindedly, an underlying view of nature that threads through the Milton Keynes project. Rather than something untamed or sublime, and essentially exterior to human habitation, nature is perceived as a densely populated field of action, subordinated and domesticated for the needs of man. The initial condition of the site upon which the city was constructed played a role in establishing such a view. Instead of the tabula rasa one might imagine as the base of a New Town, Milton Keynes was comprised of a patchwork of small settlements and agricultural traditions that shaped and reworked the landscape for centuries, disassociating it from any traces of an uncultivated past.

Under these conceptual constraints, Nature, with a capital "N"³, which appears in great detail in the numerous schemes generated in the process of planning the city, should be regarded as a fabrication, weaved through the settlement in diverse ways, but always kept in the straitjacket of culture. This tension is especially important as the originators of Milton Keynes and its narrators exerted considerable effort to demonstrate the emergence of a new approach to nature and its relationship to modern human habitation. The road network, which became the main agent of physical and social mobility in the city, was rhetorically constructed around geographical identifiers: Loughton Brook on the west, and the Grand Union Canal and River Ouzel on the east. The drainage basins of these waterways formed the two valleys that flank Milton Keynes, and were used to inform the transportation and parkland systems. The lack of hierarchy between the two

Left: An early scheme of Milton Keynes. Right: a 1970's plan of the city of Al-Ain.



systems is the most radical aspect of the plan. By avoiding prioritization of the infrastructure systems, full integration is offered, unifying vehicular mobility and the spatial flow of natural elements into a single metasystem of organization. This aspect of the design is described as a significant departure from both the Garden City and New Town traditions: a great step forward from those models' "artificial naturalness." Steen Eiler Rasmussen writes that it was a relief to see a "civilized" plan again⁴. His choice of words is by no means incidental. Within its context of operation, Milton Keynes would never escape observing nature through the lens of civilization; as a tree to climb on.

Hinge

The year in which the photograph was taken turned out to be a key moment in the history of the New Town. During this year, the team's intentions to build an ideal, modern society were hindered by the 1973 oil crisis, which sent shockwaves through the British financial system, damaging the public–private partnerships that were at the base of the Milton Keynes project, and leading to an erosion in governmental support for such endeavors⁵. At this time in Britain the New Town model ceased to exist as a viable model of urbanism.

As the events of 1973 abruptly ended the optimism that characterized the early years of the Milton Keynes project, they also precipitated questions about the ways in which urban models could be exported and implemented overseas. While the crisis was halting the economies of the west, it was bolstering the economies of the Middle East. The oil crisis gave OPEC members the opportunity, for the first time, to exert their economic strength. The oil embargo and the raising of world oil prices established OPEC as an international political power. For the UAE, this meant a new trajectory. Unified and reorganized under the leadership of Sheikh Zayed bin Sultan Al Nahyan, the UAE was now equipped to shed foreign influences and shape its own identity. For that, no practice proved more substantial than that of city-making.

placed above each other it is the green of Nature which transcends all else through the layers of tracing paper. Nature is the frame for Milton Keynes, just as it was, once upon a time, the frame for New Haven in Connecticut and is still in parts of Paris. One day, when the trees have grown really big and round, it will be upon Nature this city will finally depend for its humanity and order". Stephan Gardiner. 1973. "The City As a Rug," Architectural Design, June. pp. 353-354

3 "When all overlays are

4 Steen Eiler Rasmussen. 1978. "Reflections on Milton Keynes" (reprint: 1994. Architectural Design, 9–10).

Left: The rural site of the future city of Milton Keynes. Right: The design team of Milton Keynes in a group photograph on site.

Al Ain

Rub' al Khali, or the Empty Quarter, as the desert in which Al Ain is situated is referred to, is a vastly different biome than that of Buckinghamshire County. As its name suggests, the Empty Quarter was throughout the ages mainly a barren, hostile, arid territory, crisscrossed thinly by caravan routes and spotted with habitation in the rare locations in which geologic and hydrologic circumstances came together to allow minimal radiuses of foliage and shade.

The decision of modern Al Ain's in-house planner⁶ to follow the Milton Keynes model was not improbable, given the circumstances. At the time, Milton Keynes was not only a well-known and elaborate example of contemporary urban planning, but the site conditions of each city bore certain resemblances. Like Milton Keynes, the new city of Al Ain was conceived as a mechanism by which to unify several preexisting settlements. In addition, Al Ain was designed to develop its own identity, to become differentiated from Abu Dhabi, its competitive, rapidly growing counterpart. The new design scheme, therefore, was simple. A series of traffic circles and highways would be lain over the region's oases and settlements, creating a seamless network of vehicular mobility, facilitating a contemporary lifestyle.

The plan seemed to work—at least to a certain extent. In a 1975 guidebook, written by a former British diplomat⁷, Al Ain is described as a sequence of roundabouts that act as anchoring points of orientation from which excursions can be made into the city's sandy ocean of sites and features. The book's description of the square fort next to the fifth roundabout, or the one "near which stands the Hilton," offer an image of a drive-through city, easily digested through the window of a Range Rover by the western traveler. In Al Ain ultimate mobility came to the forefront again, far away from its geography of naissance. Here though, the actualities of implementation and the measures that were taken in the process challenged such a concept of mobility. The deviations, though slight, intrinsically altered the original model , leading to an autonomous version of it.

The city of Al Ain diverges from Milton Keynes in two substantial ways: the flatness of its scheme, and the natural context in which it is situated. The plan for Al Ain disregarded grade separations and other means of segregation between different transportation modalities that were central to the ideology and rhetoric of Milton Keynes. The result in Al Ain is a limited organization that encourages a simultaneous, uncoordinated use of various modes of transportation. Vehicles, animals, and pedestrians cross each other's routes, resulting in modes of exchange and communication not conceived of in the original model. The flatness of the scheme thus becomes, an infrastructure for public space. The harsh natural conditions surrounding Al Ain dictate an economy of means and habitation drafted for centuries as mechanisms for survival. Under such circumstances, nature cannot be regarded as an artifice: neither is it tamed nor subordinated for human requirements. Such a conception of nature dictates, in turn, certain relationships that can be constructed between the built and natural environments. In Al Ain, the well-defined, well-controlled, and carefully cultivated park system of Milton

5 "The bubble of optimism was difficult to sustain....The success of the New Towns movement was based on comprehensive political support. Erosion in this principle started with Peter Shore's infamous Inner Cities versus New Towns debate....Bank rupt and opportunist political doctrines are not sensible foundations for building anvone's future..." Derek Walker. 1994. "introduction", Architectural Design, 1994, v.64, n.9-10, p.6-7

6 The plan, referred to as "in house" by succeeding planning documents, was most likely prepared John Elliott, who was the town planner for Abu Dhabi at the end of the 1960s. Later, the plan was taken on by the London firm Shankland, Cox and Associates.

7 Michael Tomkinson. The United Arab Emirates–An Insight and a Guide. 1975, London, 192 p. Keynes is replaced by a diffused configuration of urban fragments that frame nature in a new way: not as an exterior element, but as an ever-present entity that is shaped and is being shaped by the city.

Supplemented with the loose definition of public spaces, a new model for urbanity is unraveled: one that is the palimpsest of local operations and regional forces, registering influences but never fixed to a final form. Its organization, plain and intricate at the same time, allows for synchronic, interlaced, or compounded operations to be deployed. These allow for the road network to be considered beyond its merely utilitarian aspects. Rather than a functional overlay, it turns into a set of programmatic containers, accommodating flattened, provisional areas of exchange between large, natural pieces and corresponding urban fragments. An infrastructure of intermodal stations, mediating urban, rural, and natural conditions, is then outlined, locating differentiating identifiers on various parts of the urban environment, previously homogenized by the masterplan⁸. Within this setting, the dichotomy between man and nature is constantly being challenged: no longer would the survival of one mean the exploitation and eradication of the other. In the global sphere of deep ecology, resource management, and environmental conviction, Al Ain can become a model for other urban environments, much as Milton Keynes was four decades ago.

> 8 One consequence of this homogenized environment, and the manner in which it was acknowledged and dealt with, is a series of commissioned public art projects that were installed in AI Ain's traffic circles. Discussed on the Geography chapter.

Opposite: The city of Al-Ain in a satellite image.



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ANISM DISK

On Urbanism

Marc Puig Mengual

Next morning we approached Muwaigih, one of eight small villages in the Buirami oasis. It was here that Zavid lived. As we came out of the red dunes on to a gravel plain I could see his fort, a large square enclosure, of fort, behind a crumbling wall half buried in drifts of sand. was a garden of dusty, ragged palm-trees, and beyond the palms the isolated hog's back of Jabal Hafit about ten miles away and five thousand feet high. Faintly in the distance over the fort I could see the pale-blue outlines of the Oman Mountains.¹

Until 1970, Al Ain was a loose aggregate of ruled lands, a collection of small villages. Al Buraimi is the old name for this collection of communities adjacent to oases that were located along the edge between the Empty Quarter and Oman. The size of these settlements was related to the amount of irrigating water provided by the Omani Mountains. Al Ain is the royal city of the Emirates, the ancestral home of the Abu Dhabi ruling family. Al Ain, the old city of the UAE, is known as the garden city for its unique network of oases that mitigates the harsh temperatures of the desert, and provides pleasant breathing spaces. The old agriculture of date palms has been nourished by the ancient falai irrigation system for more than 3000 years. The cultivation of the date palm was the primary economic driver of AI Ain until the city became a beneficiary of oil revenues. The oases have endured for centuries as the most vital economic center of the city, but have been neglected as the nomadic trade routes have almost disappeared. Although today the oases have little visual presence within the city, the origins of Al Ain remain linked to its oases and its falaj system.

The largest inner settlement of the UAE is a diffuse amalgamation of vegetation and infrastructure. Reading the relationship between patterns of urbanization and the unique geography of desert and oases across history gives us a procedure to comprehend the shape and morphology of the city. As a result of the oil boom in the UAE, the city has experienced an exponential urban growth. To accommodate its expansion, the city followed a suburban model based on a scheme of mega blocks surrounded by a road network that defines a boundary for each sector. In contrast to the neighborhood units that characterize the mega blocks of Islamabad, Milton Keynes or Chandigarh-all developed in the Mid-20th century-the residential units of Al Ain are strictly mono-functional and cannot be considered self sufficient.

Al Ain exists in between desert and oases. The mountain Jebel Hafit, the red sand dunes, the dry river beds (wadis). and the Omani border, now define the outline of the city. The elasticity of the boundaries that define the morphology of Al which the mud walls were ten feet high. To the right of the Ain are directly related to economic forces. In today's context, Al Ain is not constrained by the amount of regional water, or physical and political boundaries, but rather is situated within a global network of economic processes. Arab oil cities are now largely defined by limitations of cost-effectiveness. The escalating growth of Al Ain in the last decades has fueled a constant negotiation between sand dunes and the city as the desert is reclaimed to create new areas for development. Although the condition of Al Ain as a major city inside the UAE differs from the flamboyance of Abu Dhabi or Dubai, the common denominator amongst Dubai, Las Vegas, Astana, and Al Ain is its unrestrained urban expansion. Local water resources, physical features, and political borders are losing their importance in the definition of globalized cities.

> Boundaries imposed by the specificity of the landscape have been blurred by the power of an oil economy, and this erosion of natural limitations prompts certain environmental concerns. For instance, while across the Oman border the Al Buraimi oasis is drying up, the Al Qattara and Al Jimi oases are flourishing because of effective management techniques and funding from oil revenues which allow desalinated water from Abu Dhabi to be pumped from the coast to these inland plots of vegetation.

> Throughout time, AI Ain has discovered new limitations. The amount of available water constrained the growth of the oases in the original settlements and different physical features have defined the city's boundaries during the last four decades. Today, Al Ain is driven by an economy where mountains, wadis or deserts are not confining its growth. Al Ain, then, must again consider the value of limits and seek to establish a framework that can begin to define a more responsible longterm relationship between oases, city, desert, and economic and political horizons.

1. (Thesiger 1959, 268) 2. (El Diasty 2008, 40) 2.(Lotto 2008. 93) processes refers to the flows of capital, labor, goods, raw materials and traveler rade defined by Saskia Sassen 5. (Elshestawy 2004, 172)



Oases Inventory

A traditional source of water and shelter within desert environments, the oasis is a phenomenon common to most arid regions of the world. The following section explores three of the modes in which settlements relate with their respective oases: the overlapped, where the oases merge with the city; the patterned, geometric or altered oases; and the contained, where the oases define the clear border of a settlement.





Palm Springs, USA 2. Blythe, USA
Warm Springs, USA 4. Mohave Valley, USA 5. Coolidge, USA
Huacachina, Peru 7. San Pedro de Atacama, Chile 8. Elche, Spain
Timimoun, Algeria 10. Ouargla, Algeria 11. M'zab Valley, Algeria
Tozeur, Tunisia 13. Kufra, Lybia
Siwa, Egypt 15. Bahariya Oasis, Egypt 16. Nile, Egypt 17. Feiran, Egypt
18. Ein Gedi, Israel 19. Al Qatif, Saudi Arabia 20. Al-Hasa, Saudi Arabia
Al Qattara, UAE 22. Tabas, Iran
Yarkand, China 24. Turfan, China
Palm Valley, Australia

Overlapped Configurations





M'zab Valley, Algeria
Tabas, Iran
Yarkand, China
Ein Gedi, Israel
San Pedro de Alacama, Chile
Elche, Spain

Patterned Configurations





Mohave Valley, USA
Coolidge, USA
Blythe, USA
Palm Springs, USA
Al Kufra, Libya
Warm Springs, USA

Contained Configurations



Ouargla, Algeria
Tozeur, Tunisia
Timimoun, Algeria
Turfan, China
Siwa, Egypt
Bahariya Oasis, Egypt

Topological Index

The precise abstraction of the physical and geographical features of the city of Al Ain as an index of contours, permits a synthetic analysis of the natural geo-logics that have informed the city's urban growth patterns.



Topography

Geographic location is a major deter-minant in the origin of cities. Al Ain lies 300 meters above sea level and is bound to the south by Jebel Hafit (1240 meters) and to the west by the mountains beyond the Oman border (500 meters). The city's relative lowland position within this mountainous terrain reaps the benefits of natural water flows. The synthetic drawing on the right collapses all of the analytical layers surveyed in this section. Water table, primary road networks, agriculture land, temperatures, wadis, and the major topographical features overlap in order to understand how these different systems structure the city.



Water Table



In the context of Al Ain, water is a definitive force. The analysis of the water table in the region allows for a better understanding of the formation of the aquifers that feed the falaj system, which, in turn, structures the city. The size and form of the water table depends upon topographic and soil conditions. The water that comes from the mountains accumulates first in the aquifers and is then channeled by the falaj system and directed towards the oases.



Al Ain's increasing population has placed significant demands on the water system that can now only be satisfied through the importation of large quantities of desalinated water from the coastal regions of Abu Dhabi. Groundwater is a vital resource for the region and the estimation of recharge is one of the most difficult aspects in defining sustainable rates of groundwater extraction.



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Wadis





In arid regions, dry riverbeds (wadis) assume an importance beyond their function as water funnels from nearby watersheds. The ground of many wadis consists of packed gravel-textured sediment and can provide adequate surfaces for cross-country movement. Near-surface water can often be found in wadi channels, generating small pockets of vegetation. The wadis are multivalent armatures: paths, vegetation, water flows, and nomadic settlements occur in these valleys. Al Ain has several wadis that emerge from different directions; all of them are important components in the shaping of the city.

Dune Formations







The expansion of the city is constrained by the red sand dunes to the north whose formation is intimately tied to the prevailing wind direction. Barchan dunes are migratory phenomena that can multiply and evolve along a specific wind path. Within a system of unimodal winds, dunes form a steep slip face opposite the wind direction.





Jul. 2005 Dec. 2005 Jul. 2006 Dec. 2006 Jul. 2007 Dec. 2007 Jul. 2008 Dec. 2008



Jan. Feb. Mar. Apr. May Jun. Jul. Aug. Sep. Oct. Nov. Dec.

Jan 27/10°C Jul 44/20 °C Jan 24/12°C Jul 42/29 °C Jan 18/4 °C Jul 35/20 °C Jan 22/10°C Jul 35/24 °C

Al Ain is located at the nexus of three spectacular macro-landscape forms: the alluvial gravel plain, the flowing dunes and the mountain, Jebel Hafit. Each of these forms possesses distinct climatic conditions pertaining to temperature, wind, and humidity.

The oasis canopy establishes a microclimate condition that enjoys lower temperatures relative to the city.



Agriculture



While the oases represent a significant portion of the vegetative area in Al Ain, a number of existing production-oriented agricultural plots in the city help define smaller gradations of space within the maxi-block grid. City Growth



Al Ain's pattern of development can be traced back to the tribal settlements around the town's oases. Initial developments linked these points into a coherent urban fabric, while subsequent development has been characterized by sprawling expansion toward the north and west.

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Circulation Networks

The maxi-block road structure orders and supports the expansive development of the city; however, the massive vehicular scale of the planning scheme necessitated the development of smaller-scale circulation arrangements, which are often manifested in networks of secondary and tertiary roads within these blocks.

Following

View of AI Ain from Jebel Hafit. The mountain limits the southward expansion of the city, forcing its subsequent development to further encroach upon the desert.

View of main thoroughfare in Al Ain city center.





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Block Morphology

The block is a seminal element of modern Al Ain and is comprised of neighborhood units delimited by an infrastructural road scheme extending through different sectors of the city. This study begins at the smallest scale of settlement, the Fareej, and follows the morphological evolution to the maxi-block so as to comprehend the negotiations that have occurred amongst the pre-existing urban units around the oases, the agriculture plots, the wadis, and the infrastructural roadway scheme imposed on the city in the 1970s.





Wadi Block

The growth of the city is constrained both by natural features and Abu Dhabi's political border with Oman. The origins of Al Ain are tied to the oases of Buraimi and the city's urban growth has historically been anchored by these vegetative zones. The direction of subsequent expansion occurred westward from the Omani border along the highway extending toward the city of Abu Dhabi. The Wadis of Al Ain play an important role in defining the shape of the city. The wadi block is the symbiosis of preexisting traces of natural features with the imposition of a maxi-grid.

Mosques

Wadi

Building Grain

Parcels



Main Road

Secondary Road

Tertiary Road



Normative Block

Central Open Space

Mosques

Building Grain

Parcels

Tertiary Road

Secondary Road



Main Road

The conceptual definition of the normative urban block is guided by a set of pre-established hierarchies involving primary, secondary and tertiary roads, and the relation of open space and religious structures to the housing units.

Following

View towards the city from Al Qattara Oasis canopy

View across Al Jimi Oasis canopy







Figural Imprint

This section focuses on the oasis as it exists within the city of AI Ain and the edge condition that emerges out of the relationship between the diffused roads of the 1960's and the normative Modernist infrastructural schemes in AI Qattara and AI Jimi oases.





Aerial view of Al Ain
Layers of the Oasis



Al Qattara and Al Jimi Oases layers: historical buildings, building grain, urban plots, oasis plots, agricultural plots, secondary roads, primary roads, falaj, and topography.









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Al Qattara and Al Jimi Oases contain a diffuse assortment of building types and neglected open spaces. Though bounded on all sides by a street grid, the maxi-block interior has an ill-defined hierarchy of villas, worker housing compounds, historical forts, and pedestrian paths.



















In addition to benefitting workers living and working in the oases, agricultural practices also provide fodder crops for farm animals kept within the family compounds.

Al Qattara and Al Jimi Biome

Nested Ecologies

The oases contain a series of networked dependencies amongst natural and artificial systems and organisms. The maintenance of these nested ecologies often comes at an extreme cost. In this environment, shifts on scale become a key issue of concern, as the date palm canopy provides a sectional stratification of climatic variance, permitting the survival of secondary layers of vegetation and their respective fauna.



Planting Densities

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A variety of sectional conditions proliferate across the site both within and at the edges of the oases. The interstices that emerge in a sectional analysis suggest areas for potential intervention. The fluctuating density of the date palm canopy through the site permits a variable range of microecological conditions based upon shade and soil salinity.



Historical buildings within the oases act as wayfinding devices. Open spaces along the edges of vegetative plots fall victim to ad-hoc usage and waste disposal.

Agricultural Ecologies





A wide variety of agricultural species are accommodated within the ground of the oases and exist in a symbiotic relationship with the palm canopy.

Garden Ecologies





Garden permutations surrounding the oases also take advantage of palm canopies to provide shade for recreation and the development of secondary vegetation. Palm canopies and exposed grassy surfaces can be used to augment built structures, permitting spaces for rest during the day and the evening, when shade is no longer a necessity.



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Underpinnings for an Arid Urbanism

Chris Reed with contributions by Eva Nemcova and Scott Bishop and drawings by Stoss

World economies are in crisis, and consumptive lifestyles are partly to blame, depleting natural resources at an alarming rate, and with even more consumptive solutions being proposed to alleviate the stress.

The case is no different in the Emirates, where an intelligently engineered and crafted solution to small-scale settlement in what grew to be falaj-based desert oases has been scaled up beyond its capacity, exhausting groundwater resources, changing groundwater flows, and thereby increasing the salinity of the water to a point at which it is useless for drinking or agriculture.

To address the crisis, fuel-powered desalination plants have been established along the Emirates' coast, with desalinated water pumped inland to provide drinking water to Al Ain and a number of other eastern settlements that have outgrown and overdrawn local groundwater supplies. In parallel, on the urbanized coast, outof-control development has decimated protective mangrove populations, as well as crustacean, fish, and bird habitats, reducing the cooling and cleansing capacities of localized ecological communities. The result is a de-naturing of the Emirates landscape in favor of purely artificial life-support systems for consumptive lifestyles: systems powered by natural resources that are quickly being depleted.

Yet the disappearing mangrove may be part of the solution in rebalancing inland ecosystems and urban settlements that initially thrived on groundwater-fed falaj systems. There may be an opportunity to take advantage of the mangrove's tendencies to clean and polish water and to thrive in brackish conditions—not unlike those being produced in falaj systems now fed by salty groundwater—to reconstitute working mangrove settlements far inland from the mangrove's native coastal habitat. In parallel, there may be an opportunity to take advantage of the region's most plentiful and renewable natural resource, the Sun (in place of oil), to power a more multidimensional set of urban–infrastructural–ecological dynamics and systems that can better sustain life long term in the harsh and fragile desert.

The research depicted in the following pages addresses very broadly the current problems and potential opportunities associated with urban life in the desert. It documents the specific nature of the current crisis of rapidly diminishing resources in the face of rapidly increasing demand for resources. The work also attempts to broaden the set of issues that could be brought into play—beyond petroleum-dependent engineering technologies and calculations alone—in considering alternative futures for Al Ain and for settlements in arid regions throughout the world. In addition, the research outlines a preliminary and (admittedly) provisional regional management agenda that might better address the full set of economic, ecological, technological, and social–cultural issues at stake.





Disappearing Mangroves

Scott Bishop

"The race for 'socioeconomic development' among the Arabian Gulf countries has primarily focused on vast development of coastal infrastructure projects. This is especially true on the west coast nations like Bahrain, Oatar, Saudi Arabia and United Arab Emirates. This has resulted in far reaching adverse consequences to the coastal ecosystem in the region and makes the west coast of the Arabian Gulf vulnerable to both environmental and unforeseen geological disasters." – M. Khan and A. Kumar, from "Impact of Urban Development on Mangrove Forests Along the West Coast of the Arabian Gulf," Earth Science India, Vol.2 (III), July, 2009, pp. 159–173.

Situated in a unique position in the Arabian (Persian) Gulf, the grey mangroves (Avicennia marina) of the Emirati coast are the cradle of life for both marine and estuarine environments. Among the mangrove's adaptations is its ability to tolerate high-salt concentrations, capture sediments, and absorb heavy metals on a large scale. Consequently, the grey mangrove plays a distinct and varied role in the ecology of the desert coastline.

Particles from the backwaters, including those that are blown in or rain down from above during dust storms, are deposited near or at clumps of established mangroves, as the mangroves' rootlet structures slow down the velocity of the water, allowing for siltation and, eventually, land formation. As sandbars form around the ankles of established trees, the trees jettison viviparous propagules, or germinated living seed. While many mangrove species have the ability to sail or float their seeds far distances, the grey mangrove has, through adaptation, developed a more specialized seeding process.

Although A. marina is one of the most salt tolerant plants and can survive in pure seawater, its propagules have a finely tuned set of propagation requirements relative to water salinity. When the propagules are dropped from the parent tree into pure seawater they float. When they are dropped into freshwater they float. It is only when the seeds find a suitable brackish mix that they sink to root themselves, typically within 10 meters of the parent tree, in a newly developed sandbar. This finely tuned process, however, does not preclude a secondary, more tenuous means of propagation: one in which the propagules float in the sea until they happen upon the right conditions. In this case, though, it is more likely that the propagules will become food for marine life, as most of the propagules will not find the appropriate conditions in which to root.

What is more, if the conditions in brackish water shift to become too fresh, rooted propagules will disengage and float again, at which point they will be carried toward the sea, where if they encounter another suitably brackish environment they will reroot. This self-set zonal limit is an effective strategy for survival, because in a freshwater environment, the mangrove is almost always outcompeted by its taller, more robust, and less salt tolerant cousins and neighbors.

The mangrove also responds to environmental dynamics that can potentially threaten its existence. For example, if a mangrove colony thrives, advances into the sea, and closes off its own lagoon habitat, seawater will no longer be able to enter the lagoon, and sabka, or salt flats, will develop. The salt flats will be most robust at the back of the colony, farthest from the sea. The increased salinity will weaken or kill some of the mangrove trees in the rear of the colony, creating a breach that The Emirate of Abu Dhabi "... has one of the highest per capita water consumptions in the world, despite having an arid/hyper arid climate with less than 100mm/yr rainfall, a low groundwater recharge rate (c.10% of total annual water used) and no reliable, perennial surface water resources."

http://www.zawya.com



"Nitrate and Chromium occur naturally in the groundwater at levels that exceed drinking water standards. Nitrate from inorganic fertilizers is also the main pollutant of fresh groundwater. Nitrate levels exceed drinking water guidelines for a bulk of the groundwater. Exposure to high levels of nitrate represent a health risk. In 2005, 228 samples were collected from farm production wells in Abu Dhabi Emirate. 80 per cent of the samples exceeded the Abu Dhabi Emirate's guidelines on nitrate levels in drinking water which is 10 mg per litre."



"The UAE's water consumption is growing annually by 8 to 10 percent."

"Agricultural activities consume about 80% of the available groundwater in the UAE." Comprehensive Assessment of Water Resources in the United Arab Emirates (UAE)

"Lack of adequate rainfall and the inequality between recharge and groundwater withdrawal rates is a crucial problem facing the UAE. The water availability of natural resources in UAE is less than 200 m3/capita" (Kansoh et al. 2003) Comprehensive Assessment of Water Resources in the United Arab Emirates (UAE), page 1450 will enable virgin seawater to enter the lagoon once again, desalinate the sabka, and reestablish brackish conditions for mangrove propagation and growth. Likewise, to compensate for erosion caused by the sea, mangrove colonies perpetually regenerate themselves and enable sabkas to accrete on their inland flanks. Thus, the natural forces that exist on the coast allow the mangroves to express their resilience and be formative in creating different types of coastal environments.

Over time the adaptive migration of the mangroves has been reduced due to changes in the composition of coastal waters. If the creeks in the Arabian Gulf region were like rivers, the mangroves would have a reserve: they would migrate inland, chasing the ideal environment upstream and allowing the coast to erode. The creeks in the region, however, are more like shallow bays, and as the hydrostatic gradient decreases, so does the presence of the creeks themselves, causing brackish water to enter the groundwater table as sea- or saltwater moves inland. A similar effect can be caused by changes in the groundwater table, the upwelling of which provides much of the freshwater required for coastal mangroves to flourish. As the salt content of the groundwater rises, the freshwater source (groundwater) becomes saline. In both of these scenarios, because of the incursion of saltwater, the mangroves have no place to which they can migrate. The ecological concern is not that mangroves cannot survive in a saltwater environment but that they need brackish water (fed by a freshwater source) to reproduce.

Typically A. marina is a land generator, and can both construct and bolster its own ecological niche, but stressed environmental circumstances contribute to its rapid decline. With more limited supplies of freshwater, the depletion of creeks, and shifts in depositional patterns, mangrove populations are unable to colonize new lands accreted at the shoreline. The less stable shoreline, in turn, contributes to the ongoing deterioration of the mangrove and other coastal habitats, rendering much of the shoreline ecologically devoid of life, and even in need of artificial stabilization.

Given that these trees are the buffers between salt- and brackish water, the overall migration of the colony is affected by the salinity of the water. Yet the fact that they exist where they do would, in an ideal situation, allow them to establish and then migrate the colony outward to the sea. But as sandbars grow and elevations change, seawater is kept from intruding into the backwater of the creeks, stalling any migration.

What is more, in other locations, coastal real estate development in areas typically colonized by mangroves (the Dubai Creek, for instance) simply overruns this rich, coastal forest community. Mangrove colonies are not only nurseries for the species itself but by some estimates account for 75 percent the fisheries and biological productivity in the Gulf. The disappearance of this resource has a broad impact on the viability of the native ecosystem, on water quality, and on the quality of life for the people in the area. Clarke PJ, Myerscough PJ (1991) "Buoyancy of Avicennia marina Propagules in South-Eastern Australia," Australian Journal of Botany 39, 77–83.

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Sauren, Das. (2001) Seedling Morphology of three Mangrove Species and Its Taxonomic Implication. Journal of Plant Biology 44(2), 92-96 "Another related problem is the growing salinity of the groundwater in the emirate. This has resulted in the increased salinity of agricultural land that in some cases can no longer be used for growing crops." Towards the Establishment of Water Management in Abu Dhabi Emirate, page 212

"...estimated annual recharge for groundwater in the UAE is 20 million cubic meters...

...the rate of groundwater extraction has been around 880 million cubic meters a year...

...groundwater levels have dropped at a rate of one meter every year for the past 30 years."

http://ipsnews.net/interna.asp?idnews=22968



"The gap between availability and demand [of required drinking water] is bridged by expensive desalinated water, costing US\$ 0.84 per cubic meter (Helal et al. 2004)." Towards the Establishment of Water Management in Abu Dhabi Emirate, pages 207, 212



"Previously, all of Al Ain City's domestic water requirements were met from wellfields: however, massive increases in domestic demands, from an annual population growth rate of 8%. has meant that wellfields have been placed under increasing stress, resulting in declining water levels. increase in groundwater salinity with a resultant decrease in total production. The widening gap between groundwater supply and domestic demand has been met from an expansionist policy of desalination using all types of production process under an ever increasing responsibility of the private sector...

"In 2003, total domestic wellfield production had reduced to only 26 Mm³/yr, meeting only 17% of the total domestic requirements in the Eastern Region. Since 1998, production from the domestic wellfields has decreased by over 60%." WATER RESOURCES OF ABU DHABI EMIRATE, page 58,59



WATER CONSUMPTION UAE black water 24% grey water 57% blow drawn 20%



WATER SYSTEMS ELABORATION

PIPE NETWO total 483 MGI





A Provisional Agenda for an Ecologically Based Management Framework

Given the current state of the global environmental and economic crises, and their manifestations in the UAE and Al Ain, specifically, we propose an alternative agenda for a more robust and more grounded arid urbanism: one that fully embraces the altered environmental conditions outlined above, leverages more plentiful natural resources in new ways, and adapts the inherent ecological mechanics of local and regional natural systems to re-tooled, multidimensional ends.

Provisional though it may be, we strongly advocate a projective agenda that deals honestly with conditions as they are now, not as they once were, and sets out principles and strategies for less environmentally disruptive, more ecologically stout urban infrastructures. Thus, this framework for a re-tooled urbanism, specially adapted to the foundational conditions of the desert, is as much about pragmatics as it is about big ideas.

In many ways, the principles and even some of the system components we imagine are like a contemporary and regional version of the falaj, a highly inventive urban infrastructure built using and intimately connected to locally available natural resources. Yet our current agenda is the falaj writ large—an Emirates-wide planning and management framework that puts broader sets of renewable environmental resources into play with the networks and structures that sustain human life:

constructed ecologies + integrated infrastructures = dynamic arid urbanism

This agenda for change is based on four broad principles:

1. Recycle outputs to lower demand for inputs, especially for inputs from stressed and limited resources.

2. Re-tool power systems to take advantage of renewable (and plentiful) natural sources (the Sun).

3. Graft and reconstitute productive ecosystems that may better adapt to the altered conditions at hand.

4. Seed new, productive economies based on these introduced and reconstituted technological ecologies (inland aquaculture based on new greywater mangrove habitat, for instance, in place of, or alongside, more traditional and consumptive agricultural economies).

Specifically for regional AI Ain, and the Abu Dhabi Emirate, these principles might take the form of

—imported mangrove colonies, which can thrive in increased salinity levels, to clean greywater from urban settlements and to introduce a new inland fisheries industry.

—a greatly expanded solar-power-generating initiative, using high-efficiency solar arrays in lines along the coastal and mountain fronts, which can displace fuel-dependent systems.

—a supplemental hydropower-generating system, powered by the release of cleansed greywater, for peak periods of electricity demand.

—the establishment of new hydrologic cycles that manage both inputs and outputs, assess comprehensive water exchanges, and include a full range of regional waters: greywater, saline groundwater, desalinated ocean water, recycled water for reinjection and infiltrations, and the like.

These initiatives are aimed at establishing a new starting point, and a new set of expectations, for how future generations might adapt to more highly concentrated urban settlements in harsh environmental conditions. To this end, a re-tooled Al Ain—as structured by the small- and large-scale initiatives depicted herein—might set new standards for regionally adapted, ecologically informed infrastructure strategies for urban settlements the world over.

MANGROVE LINED CREEKS . MANGROVE MIGRATION





REGIONAL TECHNIQUES MORGAN CARTER

Regional Techniques

Morgan Carter

The perpetual battle against the arid climate of Al Ain produced a distinctly defensive building archetype in which massive adobe walls were the primary organizing elements, enclosing humble dwellings and modest gardens. Minimal resources led to an architecture of pure forms, simple earthen walls, and scant adornment that reflected the inherent modesty of the cultural context. Thermal mass, small apertures, and the enclosure of wells and small gardens revealed a cultural ecology that responded to the harsh and relentless conditions.

Although the advent of air conditioning, the availability of imported materials, and the proliferation of desalinated water appear to have mitigated the effects of climate on survival, it is more likely that these technological advances have merely shifted the preexisting ecological threat across geographical and temporal lines. Such threats require techniques that place as much emphasis on the rigorous integration of empirically proven technologies as they do on an intuitive and thorough reading of the site and the dynamic and evolving identities of its inhabitants.

The approach to technique described in this section begins to reflect the sort of "ecological functionalism"1 advanced by Juhani Pallasmaa that is firmly rooted in regional context and is characterized by an "experimentation with new techniques (alternative energies, for instance) and new concepts of living," in which the "priority of representation will be replaced by the priority of performance."2 Thus, the investigation of technique within a wider social and environmental framework represents a point of departure for reimagining an oasis under siege as it struggles for cultural and ecological survival.

1. Pallasmaa, Juhani. "From Metaphorical to Ecological Functionalism," The Architectural Review, June 1993, pp. 74–79.

2. lbid., p.79.



Rammed Earth and Compressed Earth Block



The first step in the process of building a rammed earth wall involves the construction of a suitable water resistant footing (concrete, stone, fired brick, etc.) This is followed by the building of a robust formwork, capable of withstanding compaction. An appropriate mixture of dampened earth is then poured into the formwork as a single uniform layer.



The second step is the ramming process, in which the moistened earth mixture is compacted. This process can be done either manually, with a heavy tamper, or by machine with a hydraulic ramming device. The act of compaction is what renders the wall structurally sound, as the moist clay begins to bind the mixture together into a single, unified form. A typical rammed earth mixture is comprised of approximately 50% sand, 20% clay, 15% silt, and 15% loam.





s is the d subsei the wall to e to water. earth, s such as de range of nmed earth n a ring red earth ist in the ids.





The final step in the process is the removal of the formwork and subsequent detailing of the top of the wall to ensure adequate resistance to water. Variations in the mixture of earth, which may include pigments such as iron oxide, can result in a wide range of textures and striations. Rammed earth walls are often finished with a ring beam of concrete or stabilized earth to ensure durability and assist in the distribution of structural loads.

In a similar sequence to rammed earth construction, compressed earth block requires a water resistant footing or plinth, and a damp-proof coursing, before the blocks can be lain. Walls can be designed with or without buttressing, and blocks can be designed with or without steel reinforcement.

Opposite

The basic ingredients of effective rammed earth mixtures are sand, loam, silt, and clay. These must be blended according to prescribed ratios, and moistened with the addition of water prior to compaction.

This sequence illustrates the basic layers of construction in a rammed earth wall. As rammed earth is highly sensitive to water, it must be elevated from the ground on an extended footing or plinth, damp-proofed, and covered by overhangs or eaves once completed. As this material functions exclusively in compression, it is usually necessary to use alternative materials for lintels and ring beams, depending upon the types of openings and structural loads.



These steps are subsequently repeated, with each layer of earth mixture being compacted before the next is added. It is during this process that conduits may be inserted for services, and additional forms may be used for openings. While it is possible to avoid the use of additional materials by designing smaller and differently shaped openings, most conventional rammed earth walls use either concrete, wood, steel, or stabilized reinforced earth when designing openings for windows.



Active and Passive **Cooling Systems**



it out the other. capable of taking advantage of varying wind direction.





Stack assisted exhaust Cool air distribution Air cooled by falaj

Air intake at high point of falaj



Thermal mass	
Ceiling mounted cooling panels	
In-floor cooling pipework	
Heat pump and condenser	
In-wall cooling pipework	
Heat pump shafts to aquifer	
	and the second sec
	and the second

Тор

One particularly efficient system, uses networks of falaj water to cool interior spaces. Air can also be passively cooled by movement through underground ducts, where temperatures are consistently lower than surface temperatures. Possibilities for such a system to be further augmented exist at the Southeast edge of the oasis, where underground falaj canals offer a context for evaporative cooling to take place. By tapping into these existing agueducts, intake air can be cooled by a combination of lower underground temperature and evapotranspiration, and then vented through the building before it is exhausted through roof vents.

Middle

A more basic version of this process can occur in other parts of the oasis, by taking advantage of cooler temperatures on the oasis floor, and even augmenting them with strategically placed reflecting pools and fountains. The existence of the falaj irrigation infrastructure throughout the oasis provides a usable source of water, which is always kept cool by the date palm canopy above. Where prevailing winds are not consistently strong enough to drive ventilation, the introduction of solar chimneys can generate adequate movement for exhausted air.

Bottom

In less arid contexts, active systems are usually limited to external ceiling fixtures as they require condensation pans to collect moisture; but the extremely low humidity in Al Ain allows them to be placed within walls, floors, and ceilings, which take advantage of thermal mass and larger surface areas to transfer energy. These systems can also take advantage of consistently cooler underground temperatures to reduce the level of energy consumption.

Passive systems are those which use the design and orientation of building mass and envelope to exploit the cooling and/or heating potential of sun, wind, water and other systems. They are passive in that they do not rely upon energy-intensive mechanization to move air or water through the building.

Active systems are those which rely on mechanical means to cool or heat buildings, though they require more energy to operate than passive systems, they can still be highly efficient in their use of energy, depending upon the nature of the system.

Тор

The movement of wind through towers can also be manipulated by understanding the principles of stack effect, solar chimneys, and local wind regimes.

Bottom

Traditional wind tower technology was used extensively by Dubai's merchant class prior to the introduction of air conditioning.

Planting and Surfaces













Planting techniques, when carefully employed, provide opportunities for buffering wind, enhancing natural ventilation, and cooling ground surfaces.

Bottom

A sample taxonomy of surface conditions across one section of the oasis reveals a considerably high proportion of radiant surfaces, contributing to unnecessary heat gains. The differences in ambient temperature from surface composition alone can result in variants of as much as 35 degrees Celcius.

Opposite

Тор

The oasis of Al Qattara is rich in biodiversity. Traditionally used as a means of sustenance—date palms, fruit trees, and varieties of ground nuts and vegetables represent effective tools in the control of micro-climates and local wind patterns.

Bottom

A cataloguing of surfaces suggests numerous planting and ground strategies which could reduce unwanted surface radiation, and help control stormwater runoff during the rainy season.













Wastewater Management and Biogas

With more than 100,000 date palms requiring annual pruning, the AI Qattarra and AI Jimi oases have the potential to supply an immense and consistent supply of biomass for conversion into biogas. This production of this clean energy mimics ecological processes in that it uses the embodied energy from organic waste to fuel other activities, such as the operation of much needed urban transit systems or the supplying of power to residential areas on the oasis periphery.

Тор

An effective biogas system depends upon a constant supply of organic materials, which are fed to a primary digester. Through a process of fermentation, the digester converts the waste into gas, which in turn can be used as a clean fuel in the operation of vehicles, generators, and the like. The residue from the digester can be returned to the oasis in the form of fertilizer, which in turn contributes to the viability of future date cultivation. Such a shift would also represent a significant reduction in carbon emissions as the current practice of burning pruned branches contributes significantly to Al Qattara's carbon footprint.

The issue of wastewater treatment in Al Qattara represents a significantly under-utilized resource given the low levels of available groundwater in the area. While there is limited ongoing usage of gray water for the irrigation of trees in Al Ain's boulevards, there is a need for a broader and more intensive consideration of wastewater recycling in the region.

Opposite

Techniques for accomplishing this can be understood at the scale of the oasis (bottom), the scale of the building (top), or the scale of constructed wetlands (middle). After the wastewater is collected, it goes through a primary phase of settling and percolation in specifically designed tanks, before being filtered through a series of beds planted with reeds and other local plant species. Treated water may be returned for use in non-potable applications, and/or distributed for the purposes of irrigation using the existing falaj network. Excess water is eventually filtered through the soil, and returned to the water table in a process of aquifer recharge and regeneration.













AL AIN'S COEVOLUTION-**ARY CONTRACT** PAUL ANDERSEN

Al Ain's Coevolutionary Contract

Paul Anderson

Pure nature is typically nature without human impact—we often consider ourselves to be external observers rather than integral participants. And when we do intervene, to create farms or gardens, we do so with a sense of sovereign choice about what to plant, how much, and where. We like to think that we're in charge, but desire for different forms of pleasure—sweetness, lushness, color, control prompts us to cultivate and arrange certain kinds of plants and not others. While the benefits of agriculture for people are clear, the corresponding advantages for the plant are often ignored. From its point of view, an ability to satiate human desires guarantees the expansion of its territory, the development of new and diverse varieties, and the long term prosperity of the species. For those plants that entice us to breed them (they use us just as we use them), humans can be a powerful evolutionary ally.¹

Just south of the Fertile Crescent, where humans first systematically cultivated plants, a modern example of coevolution is unfolding. In Al Ain, the mutual dependence of the city and its oases is a complex spinoff of the more basic human-plant affiliations found in farming. The oases, a conglomeration of privately owned plantations and irrigation channels, functioned exclusively as a patchwork of agricultural fields until recently. But emphasis on their cultural significance and city wide urban greening suggest that they can perform multiple roles, that they can simultaneously satisfy Al Ain's desires for sweetness, lushness, leisure, and heritage. The oases are no longer mere cropland, and as their appeal becomes more elaborate, so do their coevolutionary arrangements with the city.

The icon of this sudden complexity is the date palm, whose historic place in local agriculture (dates have always been a key part of the diet) is only part of its importance. The tree's cool shade and sweet fruit represent the unlikely pleasures of this desert land. The UAE is not merely a country of basic provisions, but a place of luxury. While the date palm have been nutritionally and symbolically prominent throughout Al Ain's 4,000 year history, in recent decades it has profited from Sheikh Zayed bin Sultan's drive to turn the country's deserts into a green and productive landscape. Its side of the coevolutionary bargain includes a population explosion from fewer than 2 million trees in 1977 to more than 42 million today and an increase to over 120 varieties from just a handful a generation ago.²

Husbanding the date palm to such prosperity has confirmed its value as a fundamental food source and, at the same time, elevated its appeal as an urban component. Along with grass, the date palm is among Al Ain's most cultivated plants, populating public territory from boulevard medians to city parks. Its newfound and multifaceted significance suggests that the entire oasis could make a parallel leap from obscure agricultural preserve to a more integrated urban infrastructure. At 1 For an in-depth description of coevolution of plants and people, see Michael Pollan, The Botany of Desire (New York: Random House), 2002.

2 Habeeb Salloum, "Abu Dhabi Has Been Converted from Desert Land to a Land of Gardens" Washington Report on Middle East Affairs (December 1995) 54, http://www.wrmea.com/ backissues/1295/9512052. html present, visual access is partial—the oases tantalizingly emerge here and there into the city fabric—and physical access is restricted to workers and tourists. The mutually beneficial relationships that have developed between people, the palms and other oasis plants, and the city's water system, have produced a rich and changing landscape with an uncertain future. But it is clear that the oases' design—in what ways they shrink, expand, proliferate, or remain unchanged—will determine the larger urban and ecological qualities of Al Ain.

Because new water sources are materializing, it is possible to imagine a number of very different directions that the oases might go. Several thousand years ago, they were an untouched geologic anomaly—an impossibly lush patch of vegetation in a desert that regularly recorded the highest temperatures in the region. Then the falaj system, a technological marvel of open and closed channels connected to nearby aquifers, was constructed to expand the oases into their bone-dry surroundings. Rapid urbanization in the past four decades and an ambitious program to green the city's boulevards and parks have dramatically increased the demand for water. As aquifers have been depleted, treated water (reprocessed wastewater and desalinated water) has become more necessary and available. As before, this technological transition will heavily influence the composition and extent of the oases. And like their predecessors, the oases are artificial landscapes born of reciprocal support between people and plants. With many possible futures and many desires in play, what form should they take?

Option 1: Reduction

Strategy: Maintain a symbolic oasis. Distinctions between the historical oases and more recent greening projects are increasingly difficult to make, so isolate each oasis on a single, complete, and bounded plot. This would involve shrinking the currently sprawling oases to create compact and intense versions. An advantage would be recuperating the iconic image of the oasis. The diminished water demand and footprint of the oases would create a surplus of each for the city, anticipating future urban growth. And as the oasis recedes, more developable land would become available.

Technical solution: Cut off reprocessed wastewater, desalinated water, and falaj channels into the oasis and divert them to the city fabric. The oases will be fed by their on-site springs alone. The falaj, in particular, will have to be adapted to function as a municipal water system rather than as an agricultural irrigation system.

Example: Salt River Project (SRP), south-central Arizona. SRP was established in 1903 to irrigate farms on about 250,000 acres. Although SRP continues to deliver

water to the same area, today only about 10 percent of the land is used for agriculture.³ The remainder has been urbanized, and the water system has been changed in response to the widespread shift away from farming.

Option 2: Preservation

Strategy: Maintain the oasis as is. Popular appreciation of the oasis and its historical significance to the UAE is at an all time high, so the current size, form, and vegetation should be preserved.

Technical solution: Tap a new source of water. Surrounding aquifers are being depleted as the rate of extraction is outpacing the rate at which rainwater can recharge them. The water table has dropped considerably, and overly aggressive pumping will begin to pull seawater. Other currently used sources are equally undependable. Desalinated water pumped from the Arabian Gulf to the periphery of the oases is slowly changing the soil's chemical composition and beginning to thin the date palms' crop yield. (Desalinated water is not totally salt free, and over time increases soil salinity.) One possibility is to supply freshwater through a new trans-Iranian pipeline from the Caspian Sea. Another, more practical solution would be to dilute the desalinated water with treated wastewater to combat salt accumulation over time, or make a complete conversion to treated wastewater.

Example: Israeli water conservation. Much of the water used for agriculture in Israel comes from treated wastewater rather than surface or ground water. The Israeli government anticipates that by 2020 the country's output of treated wastewater will double. In addition, new low-volume irrigation technologies, such as drip systems, microsprinklers, and automated control, have increased efficiency to an average of 90 percent, as opposed to 64 percent for furrow irrigation.⁴ Add in artificial recharge and cloud seeding, and Israel's agricultural demands for water can be easily met.

Option 3: Technological Change

Strategy: Allow current technology to determine the form, plant life, and size of the oasis. More than half of worldwide desalinated water use is in the Arabian Gulf region, and desalinated water is the area's most rapidly growing supply of freshwater. Desalinated water will deplete populations of some plants, bushes, and trees, and encourage the proliferation of others. The current oasis is a precedent for this approach: the falaj system substantially increased the oasis' size and the diversity of its vegetation.

Technical solution: Continue to pump desalinated water from the Arabian Gulf. Salt-tolerant vegetation, such as olive trees and oleander, will begin to accompany the date palms. The palms will continue to grow, but as the salinity of the oases' soil increases, they will become less productive. Desire for maintaining a link to Cherrington, Yvonne Reinink, "Salt River Project: Experience in Conversion from Agriculture to Urban Water Use" Irrigation Drainage Systems No. 21 (2007):145–157.

3 Robert S. Gooch, Paul A.

4 Israel Ministry of Foreign Affairs, "Israel's Chronic Water Problem", Israel Ministry of Foreign Affairs, http://www.mfa.gov.il/ mfa/facts%20about%20 israel/land/israel-s%20 chronic%20water%20 problem the tree's heritage will be satisfied, even if the availability of sweet dates declines.

Example: Mandalay Bay Hotel and Casino, Las Vegas, Nevada. A mix of advanced drip irrigation, greywater recycling, and precise plant selection enables the vegetation of a lush, 11-acre pool area to thrive in the heat of the southern Nevada desert. An abundance of tropical plants populates the grounds, giving them the unmistakable feel of a Southeast Asian jungle. Yet the plants are not native to the Pacific Rim, but rather the most lush greenery contemporary technology can sustain in the arid Southwest.

Option 4: Expansion

Strategy: Enlarge the oases. They are valuable cultural and civic resources, so encourage their sprawl. This option is very close to the ongoing greening of Al Ain, but with several key differences. While the current program adds vegetation discretely grass here, a palm grove there—an expanded oasis would be characterized by the wild, impure, and diverse mix of plant life that it comprises already. The relative unpredictability of the oasis' most mottled parts could be extended to Al Ain's boulevards, distinguishing them from boulevards in Abu Dhabi, for example. In addition, expansion could have significant influence on how the oases are viewed and used by the general population. Enlarging them would create opportunities to enhance access and promote public use, two limitations of the current situation.

Technical solution: Increase the water supply and eliminate physical boundaries to expansion (walls, roads, and the like), allowing the oasis to infiltrate the maximum footprint of continuous undeveloped land.

Example: The Al-Abjan lakes. A notable project in the UAE's desert reclamation program, Sheikh Zayed personally financed the creation of five artificial lakes. Large ducts were built to carry seawater from the coast to the lakes, which are located deep inside the desert at Al-Abjan. The first of their kind in the Arabian Gulf region, the lakes are surrounded by a massive green belt, contain a healthy fish population, and have become a regular stop for thousands of migratory birds. Unlike the grass-lined medians of Al Ain, the lakes' artificial landscape has spawned its own ecology.⁵

Option 5: Proliferation

Strategy: Replicate the oasis in numerous, small versions through the city. Reproducing public space in miniature as private space is not without precedent. Much as the lawn was once viewed as a small, private park (for example, very few public parks were established in Los Angeles because they were long believed to be unnecessary for those with yards), the oasis could be disseminated and personalized. Al Ain's reputation as the Emirates' "Garden City" would be played out at multiple scales and through various ownership models—large, privately owned oases; large, publicly owned parks and medians; medium, semi-public plazas; and small, pri-

5 Salloum, 54.

vate gardens. A variety of social structures could be cultivated in tandem, such as shared gardens for several households, a block, a neighborhood, or a region of the city.

Technical solution: Increase water flow to each house. One approach would be to reconfigure the falaj network to direct less to the city's larger oases and more to the neighborhoods. Portions of the existing oases would be subdivided and transplanted to locations throughout the city in correspondence with adjustments to the falaj. Water will be used sparingly and efficiently to sustain local oases.

Example: The Islamic garden. An unlikely affinity for the outdoors in the predominantly arid climate of the Middle East has led to a prevalence of gardens in individual homes. Known for having enclosed walls, water features, lush trees and flowers, and use of arabesque geometry, the gardens are both a practical response to the climate and a manifestation of Islamic teachings. Their aesthetic serenity, urban integration, individual customization, efficient and effective use of water, and diversity of uses make them a model for how to disseminate the oases throughout the city.

The collective variety of desires that can potentially shape Al Ain's next coevolutionary contract with its oases doesn't favor any particular approach. Some development strategies privilege agricultural production (desire for control), some glorify cultural heritage (desire for continuity), some maximize the accessibility of dates (desire for sweetness), and some promote the spread of lush landscapes (desire for sensory pleasure). For those who design it, the future Al Ain human-oasis ecology can take many forms. One thing is for sure—the date palm will do just fine. By diversifying its appeal, it has done its part to secure its own coevolutionary success.

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ON STRA

Inversion Logic / 192 / Spotty Logic / 206 / Prosthetic Logic / 218 / Fringent Logic / 232 / Spine Logic / 244 / Filter Logic / 260 / Corner Logic / 274 / Web Logic / 284 / Frontage Logic / 298 / Point Logic / 310 /

The following pages document a broad array of design proposals developed by students from both studios. The projects, ranging in scale from larger territorial strategies to specific buildings provide a trans-scalar constellation of design possibilities for the arts and crafts campus, the Qattara / Jimi Oases, and the city. The projects are organized as a series of nested scales defined by a broader strategy. The ultimate objective of this taxonomy is to provide to the reader a series of multi-faceted spatial strategies that go beyond the specific agenda of each individual project and create a broader set of design scenarios for the two oases in question.

On Strategy

Almin Pršić

From its origin, the term "strategy" has an inherent militaristic connotation, suggesting simultaneously a play of force, order, and hierarchy in time: a dynamic paradox par excellence. To act strategically is to utilize one's projective abilities fully: to navigate a future in which to be successful necessitates the ability to conceptualize and construct a larger framework, a playing field of sorts, and to keenly adapt the uncertainties created through the interdependency and counteraction of opposing forces. Strategies are generatives their default protocol is to exploit opportunities that emerge from complex interactions. Unlike tactical operations, which are concerned with reaction and fast-paced instinctual responses, strategic operations force the indeterminacy of outcome. They involve a prolonged staging of time in which "there is more room allowed for our own apprehensions and those of others" to become a part of the process of conjecture in which the ability to abstract spatial and temporal conditions assumes absolute primacy.¹

The city of Al Ain finds itself continually in tension with the environment. The city and its oases exist within climatic, topographical, and typological extremes characterized by limited regional biodiversity, the unstable ground condition of the sand dunes, and a rare kind of urbanism rooted in the chasm between the traditions of the indigenous nomadic Bedouin tribes and new explosive urban settlements. Al Ain finds itself somewhere between falaj-dependent, small-scale agricultural production and the utter exhaustion of natural resources, a context in which matters solved through hard-line delineations or taxonomies of existing constituencies would inevitably continue to offset the delicate balance of elements in place. In response, one begins to devise strategies.

Such strategies may not aim toward generating new, fixed types of urbanism, but rather might speculate on open-ended ways to build, environ, and atmosphere through abstracted organizational principles, testing the generative potential of a different vocabulary, operating somewhere between architecture and urbanism, cultural discourse and policy, and, even, tradition and progress. The aim is to formulate concepts that are reducible to a given set of variables, somewhat akin to a recipe—an abstract set of instructions. However simple, contained in this abstraction lies the potential for projects to unfold new narratives through the engagement of site-specific conditions. Nevertheless, transparency and simplicity do not guarantee the success of an operation, as they require agility, expertise, and adjustment to local conditions. Considered in such a manner, strategy unfolds its potential, and approaches alternative, sometimes unprecedented, realities. For example, the operations within Prosthetic Logic, though they can be distilled into straightforward actions such as the addition and removal of vegetation, are nevertheless able to exert a more pervasive impact, revealing further opportunities at scales larger than those of the initial intervention. Within this context, ecology–originally meaning the study of ecosystems and now denoting the formation of relationships between any system and its environment–becomes a spatial agent, colonizing and organizing the territory of the oasis, within which existing pathway networks may act as infrastructure, allowing residual spaces to become programmable surfaces fueling new development.

In general, strategies similar to the staging diagrams shown in this chapter may appear as if they conspicuously lack shape. Yet, exemplified through operations that culminate in base geometries, they possess the agency to generate form. Strategies become foundational infrastructures, setting the ground for future maneuvers. Unlike supra- or superstructures, which immediately suggest a hierarchical ordering device, strategies often work from within. Such operational logics, manifest in the deliberate insertion of parcelized, stitched or striated forms, allow for varying degrees of independency, progression, and phasing. Flexible and anticipatory, the artefacts are able to act subversively through methodology, form, or politics, further asserting the position of the designer by means of a well-defined conceptual stance.



¹ Carl von Clausewitz. On War (New York: Barnes & Noble, 2004), 175.

^{*}It may sound strange, but for all who know War in this respect it is a fact beyond doubt, that much more strength of will is required to make an important decision in Strategy than in tactics. In the latter we are hurried on with th moment; a Commander feels himself borne along in a strong current, against which he durst not contend withou the most destructive consequences, he suppresses the rising fears, and boldy ventures further. In Strategy, where all goes on at a slower rate, there is more room allowed for our own apprehensions and those of others, for objections and remonstrances, consequently also for unseasonable regrets; and as we do not see things in Strategy as we do at least half of them in tactics, with the living eye, but everything must be conjectured and assumed, the convictions produced are less powerful."

Inversion Logic

Shift, Negotiate, and Exchange

Inversion logic establishes a new large-scale infrastructural framework for the phased development of the oasis block, enabling productive tensions to emerge between densified swaths of urban fabric, preexisting agricultural plots, and vacant land.







Johannes Kohnle: Thickened Boundaries





This project undertakes a direct reversal of the traditional urban condition between periphery and edge. By redirecting the primary road network of the site and deploying a range of housing and block typologies along with programmatic attractors in a phased series of developments, the oasis maxi-block becomes a dense urban center with a logic that can be exported to condense other blocks of similar scale. Taking advantage of the oases in the center of the block, this strategy reverses the conventional relationship between city and countryside by placing dense urban housing along the periphery, and agricultural fields in the center of the block.

Patterns of development in arid zones

Opposite

Site plan

Following

Site model





Тор

urban edge

desert edge
Opposite

dated edge

Bottom

Close-up of site model showing

Close-up of site model showing

Axonometric drawing showing typological variation within new consoli-

- Tog Residential Bar I 'Plug 'n' Lift' Residential Cluster VIII Office Building I Residential Mat I 'Cumulus Profiles' 'Sloped Courtyard' 'Interlock' Residential Cluster IX Residential Mat II Residential Bar II Residential Cluster III 'Layer Cake' 'Protruding Parapet' 'Introversion' 'Storefront' Residential Cluster X Cultural Building I Residential Mat III Residential Bar III 'Fortified Living' 'Desert Forest' 'Shifting Volumes' 'Checkerboard' Residential Cluster XI Residential Cluster IV Residential Mat IV Residential Bar IV 'Layered 1' 'The Underbelly' 'Public Courtyard' 'Shadow Legs' , so Residential Cluster V Residential Cluster I Residential Bar V Residential Cluster XII 'Sunken Home' 'Shaft Block' 'Towers' 'Layered 2' $\langle \diamond \rangle$ Residential Cluster XII Residential Cluster VI Residential Bar IX Residential Bar VI 'Undulating Cubes' 'Traditional' 'Cutting a Swath' 'Terracing' Residential Single I Retail/Culture Box II Residential Cluster II Residential Bar VII 'Wall Peeking' 'Oasis Watching' 'Villa Type' 'Colonnade'

Retail Box I

'Vaulted Souk'

Residential Cluster VII 'Overhang'

Residential Single II

'Agro-Villa'

SX

Residential Bar VIII 'Ski-Run'



Iman Ansari: Cultivating the Paths





The project re-organizes the oasis by utilizing existing paths and infusing them with new programs. The campus is then formed around the intersection of these new trails, taking advantage of both their urban and architectural qualities. The project creates a new environment within the oasis with buildings, public spaces, and courtyards that come to life around these arteries. The campus also elaborates on existing historic buildings on site by re-creating an exclusive circulation system that connects all buildings in the oasis. The different elevation of the paths, the oasis, and the historic mosque on site allow for a new sectional relationship, linking interior public spaces and courtyards with the oasis.

Marc Storch: Selective Densities

This project addresses two urban problems. The first is that the Al Qattara/Al Jimi maxi-block suffers from a monotony of sparsely developed spaces. Whereas we typically prefer dense development that opens into free space, this block's neighborhoods are plagued by sameness: low, walled houses set far back from the street, creating large, but undefined dead end open spaces that. The second problem is that without physical or visual connection to the perimeter of the block, the oases are isolated: invisible and unused. Where the neighborhoods end, vast junk-spaces create an unwelcome buffer around the oases. The intervention starts here, inside the block, proposing a future network of lines to promote itineraries through and activity within the oases and the belt of abandoned spaces that surround them. The campus buildings and the landscape connecting them constitute the root segment of this network, defining more clearly and then negotiating the boundaries between neighborhood, buffer, and oases. This first move requires a second: the reassertion of the grid according to which the neighborhoods seem to be laid out, extending streets from the block perimeter to the interior, allowing views of and access to the new interior network from the block perimeter, simultaneously channeling and directing the ambiguous spaces that characterize the neighborhood.




Spotty Logic

Survey, Measure, and Selectively Intervene

Spotty logic emphasizes the strategic deployment of operational nodes within the oasis that serve both to anchor key infrastructural elements within the landscape and provide an infrastructural constellation for the creation of a diffuse campus organization.







₹_5



 Existing plan of the oasis
 Establishment of operational anchors and path network based on the durational constraints of thermal comfort 3. Introduction of primary pedestrian circuit along preestablished network lines 4. Primary vehicular circuit is established
 Calibration of operational anchors according to new programmatic adjacencies and their spheres of influence
 Potential growth of new urban fabric in relationship to cultural and commercial program elements of souks, and mosques

Opposite

Full projected growth of urban fabric with introduction of secondary urban circulation

Justin Fowler, Andrew Lantz, and Geneva Wirth: Programmatic Circuits



Top to bottom/left to right

Centers and Paths Introduction of primary , pedestrian circuit Introduction of primary vehicular circuit Calibration of operational anchors Programmatic adjacencies and spheres of influence Souks and mosques Potential urban fabric envelope Secondary urban circulation

Opposite

Site plan





Morgan Carter: Activating the Central Road









I believe it was Kenneth Frampton who said that the vernacular, for all intents and purposes, no longer exists. If indeed this is true, then perhaps nowhere is it more evident than in the Al Qattara oasis, which hosts dozens of adobe forts, towers, and souks-all of which are immaculate and empty with no purpose other than to exist in the collective psyche of Emiratis as a distant memory of what was. These stoic artifacts nonetheless contain clues about the cultural and ecological values of a people. Pure forms, simple earthen walls, and minimal adornment speak to the inherent modesty of their cultural context, while thermal mass, small apertures, and enclosed gardens describe a cultural ecology which responds to conditions of a harsh and relentless climate. If the oasis is to be more than a museum it has to develop a new dialogue between building and the landscape; between culture and environment. In envisioning a new cultural infrastructure along the transect between the AI Qattara and Al Jimi oases, this project proposes a small campus made of compressed earth block, enclosing two private gardens, and taking advantage of the falaj system as a means of passively cooling the buildings.

Kelly Mangold: The Courtyard Type Revisited













courtyard into a more contemporary form that will engage and interface with the surrounding oasis rather than act as a fortification. Inspiration was taken from existing historical typologies and interpreted with the campus and program in mind. This scheme situates the campus at the central node, adjacent to the historical Al Qattara fort. A secondary axis is created along the road on which the campus program is located and the courtyard opens to the oasis, allowing the oasis to form the fourth wall. Rammed earth is utilized on the exterior wall, protecting the southern side of the building from climatic conditions as the interior of the courtyard allows for shade and indirect light through a system of screens. The rammed earth exterior skin creates a thermal mass and is contemporary while respectful of the historical nature of the site, while the interior of the courtyard is more porous and modern with glazing allowing light into the building. Pedestrian circulation is encouraged through the historic souks and the courtyard building. The automobiles and parking are sheltered behind a buffer of palms.

The project reinterprets the historical

Birgit Wurster: Variable Thresholds









across several sites within the oasis required the creation of a building and hybrid program that would function as a "hub." This was done through locating a private library, a public lecture hall, and exhibition space along the road that bisects the AI Qattara and Al Jimi oases. The two programs are located within separate lobes of the building, divided by a courtyard. The support programs (offices, meeting spaces, social collecting areas) create a path of circulation that ties the public and private areas of the building together. The library and lecture hall are located along an oasis wall, but function as a point of entry (both visual and physical) into a public testing plot and the existing system of elevated paths through Al Jimi oasis. The building itself performs as a knot, tying together the public cultural facilities at the southern edge of Al Qattara with the more private and less visible Fellows' Campus in the heart of Al Jimi. Simultaneously functioning as a wall, a gate, and a programmatic knot, the library offers public frontage for a distributed campus to allow for a greater understanding and experience of the diverse conditions existing at the oases.

The decision to distribute the campus

Prosthetic Logic

Climatic Camps

Prosthetic logic posits the operational performance (shade, ventilation, secondary vegetative layers) of the oasis canopy itself as a system to be appropriated or replicated through artificial means to support camouflaged programmatic insertions throughout the oasis.









is presented

Full projected growth of site

Ryan Shubin: Ground Climate





This project deploys a series of artificial canopy units within the interstices of the oasis to extend its performative logic across a greater space, augmenting the oasis canopy and forming a sheltered framework for inhabitation, circulation, and secondary layers of vegetation.

Top Vegetative oasis edge

Bottom Palm tree canopy

Opposite

Exploded axonometric view of programmatic components

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Library/auditorium Student dormitory Souk Classrooms

Proposed path networks

Paths Proposed vehicle way Main campus walkways Existing oasis walkway Access to roundabout Residential roadway Proposed vegetation

 Turf area

 Vegetation
 Palm forest (planted 5.00 m on center)

 Public oasis (planted 10.00 m on center)

Proposed irrigation network

Hydrology In-ground pipe system Proposed falaj Below street/path water supply Piped main line connection

Proposed grade

 Topography
 Existing oasis – 2.50 m below grade Campus core – 4.00 m below grade Bookstore entry – 7.00 m below grade Campus inner edge – 2.00 m below grade

Adjacent conditions

Existing oasis – palm plantation Cultural center Restored historical building Main road to Dubai

Northeastern Al Qattara Oasis

1% Existing grade toward oasis Existing falaj water network Existing paths Existing stadium parking

Site





Social/gender

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History/tradition

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Individual courts

-Community court

Housing units

Male space

Female space

Shared space

.....

Public/private



Morphology



Тор

Diagram showing the ecological effects of forest-to-clearing condition

Middle

Diagram showing program distribution based on historical and gender typologies

Bottom

Diagram showing distribution of morphologies modeled after the forms of the oasis







Тор

Bird's eye perspective of architectural intervention

Bottom Perspective view of public center of the educational campus

Opposite page

Top Floor plans

Middle Site plan

> Bottom Longitudinal section



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Adrienne Heflich: Extracting Potentials

The diminishing water budget of Al Qattara should be leveraged opportunistically to reframe the relevance of oasis to the city Al Ain and the shared heritage of the Emirates. Access to groundwater through the falaj enabled ancient inhabitation of this desert; today, despite great advances in desalinization and other technologies, Abu Dhabi's water and electricity supplier estimates that water capacity could fall short of demand as early as 2012. Given such a grim projection, the campus I propose, immediately to the south of Al Qattara and Al Jimi, redistributes wastewater into a series of catchments and subsurface wetland treatment zones. The revised infrastructure-its form and siting guided by emerging decentralized technologiesanticipates more varied ecological and social functions with less water inputs. Greywater spillovers run adjacent to the road network and support desert-adapted vegetation, which in turn shades social spaces, improves wayfinding, and contributes to the expression of neighborhood identity. Most importantly, the varying presence of landscape elements makes legible the contrasts inherent to inhabiting a desert and registers the relative scarcity of water resources to passers-by. Cumulatively, the proposal reduces and refines the scale at which visitors and locals experience the Al Qattara maxi-block.











Ilya Chistiatov: Floating Ground





This project takes the position that in order to survive and exist in the arid climatic context, architecture needs to create a naturally-conditioned inhabitable microclimate. The space should offer an abundance of shade and cool air that would provide an escape from the burning rays of sun outdoors. This project consists of a large punctured mat building with translucent glass volumes nested within it, housing the workshop programs. The building is strategically placed on site in order to reinforce the procedural sequence of entering the oasis, while responding to the geometry of the fort on its southern edge.









Fringent Logic

Negotiating the Edge through Surface Occupation

Fringent logic seeks to exploit the friction at the perimeter, yet instead of operating on the edge, aims to change the constitution of the fabric by reworking adjacent surfaces and their relationship to the wider area of intervention.









road infrastructure **3.** Delineated areas of intervention 4. Clearing of existing vegetative fabric 5. New programmatic elements (hotel, sports, housing, parking, exhibition halls, and visitors' center) are inserted into the defined areas of intervention, linking the actual border of the oases to the main infrastructure, which make a claim for new uses and a stronger relationship with the city 6. Located along the perimeter and inhabiting the space between the oases and existing infrastructure, the new programmatic surfaces begin to act as extensions of the oasis, thus going beyond the private condition of its agricultural plot and making it a part of the larger urban fabric. Using elements inherently belonging to the oasis: the falaj, the path network, and the agricultural plot, further subversive

Opposite

Full projected growth of site is presented showing directions of possible expansion

Marc Puig: Programmed Surfaces





This project seeks to exploit the friction between the perimeter of the block and selective moments of the oasis. This is achieved through a series of programmatic insertions that dovetail the edge and the interior.

Analysis of the different conditions of the leftover space between the oasis and the infrastructure

Opposite

Site plan

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Opposite

Top to bottom Site plan (school) Site plan (visitor center) Site plan (hotel) Site plan (sports center)

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Top to bottom Perspective view showing passage to the AI Qattara oasis Transverse sections

Opposite page

Тор Floor plan at +1.00 meters

Bottom Floor plan at +4.00 meters



Jianhang Gao: Concealed Incisions



Historical Fabric







After a careful analysis of the site new programs were added to existing historical buildings, which were found to be in poor condition and mostly vacant, in order to activate them and introduce activity circuits as a means of developing a cluster site strategy. These clusters recycle the excavated earth produced during construction and transforms this material into rammed-earth walls that define the public and private spaces, while also introducing several gateways to the oasis. Institutional buildings are placed behind these walls so as to minimize their visual impact. At the architectural scale, the project utilizes local materials such as the date palm and employs local construction techniques to achieve the idea of minimal intervention and maximum impact.

Spine Logic

Capitalizing on Dominant Infrastructure

Spine logic utilizes the fluid continuity of the sectional profile of the oasis to establish an infrastructural armature along its edge, permitting the development of a coherent gradient of vegetation and building that merges into the oasis canopy.







6



Opposite

Three areas of intervention with full projected growth

secondary roadway system



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Geneva Wirth: Malleable Edge



This project establishes a soft armature along the western edge of the oasis that facilitates the lateral development of ecological systems between city and agricultural parcel. The proposal frames a clear delimitation of the edge through building. The continuity of the edge gradually filters into the oasis through the deployment of a gradient of open spaces and vegetative surfaces.

Top Occupation of oasis (site A) in 1968 and 2008

Middle

Occupation of oasis (site B) in 1968 and 2008

Bottom

Occupation of oasis (site C) in 1968 and 2008

Opposite page

Site plan of Microcatchment strategy







Top Perspective view of microcatchment areas (dry)

Bottom Perspective view of microcatchment areas (rainy)











Diagrams showing gradual progression of Settlement/Stabilization strategy

Opposite

Series of perspective views showing environmental transformation following the implementation of new strategy





Diagrams showing gradual progression of Edge/Urbanization strategy

Opposite

Site plan of Edge/Urbanization strategy





Perspective view of dining hall at oasis edge

Perspective view of constructed oasis

Opposite

Exploded axonometric drawing showing infrastructural and programmatic elements



Suzanne Ernst: Private Gardens











agriculture, roads, and their various patterns and edge conditions, unique and often intimate areas were discovered throughout the site. Connections created between existing pathways, unique landscape features and historic buildings scattered throughout the site, a series of strings or porous bands, connect and draw elements together. Limited access is provided into contained spaces at the oasis level through the lower floors of the proposed campus buildings. These spaces provide a necessary sense of intimacy and privacy that is important to individuals whose cultural disposition may have limited their ability to use public open space. The project is divided into four dimensions: the urban, the local, the campus, and the individual, with each dimension offering a different experience within the site. This arrangement of the site leads people from a more dynamic and vibrant public space, the cultural heart of the oasis, to the more quaint and discrete areas of the campus, and finally winds like a tail to the dormitories located within the private residential areas.

By isolating and carefully analyzing individual site elements, trees, shrubs,

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Filter Logic

Laminating Parcels as Block Building

Filter logic manipulates and augments the existing urban fabric surrounding the oasis to establish a series of access corridors and negative spaces that constitutes a more porous built border with the oasis.







5



Existing plan of the oasis 2. Delineated area of intervention 3. Clearing of existing fabric 4. Generic block typology is inserted 5. As opposed to continuing with the traditional typology of the interior courtyard, the space of the courtyard is conceived as a potential means of providing common public spaces, which are to be shared between different block constituencies
 Visual and circulation axes between the oasis and the city are defined.

Opposite

Full projected growth is presented with further deformation of the generic block typology now presented as a series of fragments acting as a visual filter between the city and the oasis or as a means to weave together the residential fabric with the oasis and the rest of the city.





Opposite



Bird's eye perspectives showing the restructuring progression of block typology

Opposite

Perspective view of public plaza



Justin Brown: Bridging the Gap





Developed in parallel with the work of Johannes Kohnle, this proposal seeks to transform the Al Jimi and Al Qattara oases into a connective tissue between the city to the west and the desert to the east. The campus, located at the intersection of the two oases, serves as a gateway from the city to the semi-public oases and the proposed public arid park. The campus forms a new ground that sectionally negotiates between the ground of the desert and the oasis, the artificial ground of the city, and the oasis canopy. The private program and circulation of the campus occurs on the desert ground plane while the public program and circulation, which links both existing oases path systems, occurs at the city level. Through the use of a parametric canopy deployed at all three levels, light is controlled for different programs below, while different surface conditions for occupation are created above.

Kimberly Shafer: Negotiating the Slipstream

This project builds on the logic of the oasis and its siting capitalizes on its position in an area where contrasting elements slip against one another; where the lush oasis meets the dry landscape in an abrupt elevation change. Locating the campus in this zone creates a critical mass of activity and program to draw people to the internal oasis edge and filter them into the existing path network. The campus serves to negotiate between the physical slip zones of sun/shade, heat/cool, high/low and serves as a way to move between landscapes and elevations while bringing together new tourists, residents and students. The logic of the campus permits flows from the public threshold of the historic souks into the new cultural center and library offering enclosure and shade punctuated by openings, views, and access to the oasis. Workshops and studios for the practice and demonstration of traditional arts and crafts define a semi-public zone.The creation of a new date palm plantation, using the greywater from the campus buildings, serves as an extension of the existing private oasis and allows for public and student access.







John J. Son: Public Avenues

The main focus of this proposal is to create an interface between the city of Al Ain and the Al Qattara oasis by: **a**) utilizing existing oasis pathways and proposing new ones, **b**) proposing new privately owned oasis plots and a public oasis for the city of Al Ain, and **c)** strategically distributing programmatic elements in the interstitial spaces that surround the oasis. The proposed project will incorporate the Sports Stadium and the Cultural Institution of Al Ain in the northeast corner of the oasis block by connecting the urban infrastructural paths, which are already embedded in the urban fabric, and the system of pathways in the AI Qattara oasis. In doing so, the interstitial space surrounding the oasis will become an active zone in which the general public can interact. The project consists of three public "avenues" in which programs are distributed. These public avenues are interconnected by a secondary mode of circulation that runs across the site grain and through the newly proposed public oasis. Sectionally, this publicly-accessible oasis is on ground level, along with the proposed built form, and distinguishes itself from the privately owned oases which are two meters below ground level.







Corner Logic

Politics as Usual

Corner logic prioritizes the selection of a key parcel of the oasis block within which to intervene so as to forge a direct and visually legible connection between the city center and the oasis edge.









encies are introduced

Opposite
Justin Fowler: A Civic Framework for Al Ain



9



Gardens

Souks



Male Garden

This civic infrastructure project addresses the southwest corner of the oasis in an attempt both to re-scale the oasis maxi-block and establish a cornerstone project linking the city to the oasis. By proposing a parcelized field anchored by a figure calibrated to leverage the strategic advantage of the site, the project aims both at specificity and for the production of a model for intervention with the capacity to be deployed across a range of sites and scales.

Тор

Diagram showing random programmatic distribution

Middle

Diagram showing distribution according to programmatic enclaves

Bottom

Diagram showing programmatic distribution according to egalitarian principles



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Bird's eye perspective showing progressive territorialization of site

Opposite

Ground floor plan

Longitudinal section



Top to bottom Perspective view of male garden Perspective view of the tourist pavillion

and souks Perspective of the family garden Perspective view from the hotel

Bird's eye perspective of fully developed corner plot

View from the oasis to the library

Opposite

Top to bottom

مرحبا بكم في مدينة العين بدولة الأمارات

المتحدة







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Web Logic

Building on Tradition

Web logic simultaneously engages the scale of the existing oasis plots and their corresponding network of circulation routes to establish a campus linked to the physical structure of the oasis and in so doing, endorses a strategy in which oasis plots become future sites of scaled programmatic insertion.







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architectural typologies

in-between the oases

Opposite

1. Existing plan of the oasis 2. Main road infrastructure

3. Area of intervention













Bird's eye perspective of educational campus

Opposite

Sequence of transversal sections along the campus









Longitudinal sections through the campus and auditorium

Opposite

Top Perspective view of auditorium space

Bottom Perspective view of interior courtyard

Lorena Bello: Artificial Oasis

One of the main characteristics of the city's morphology is the way in which agricultural plots, including the oases, are bound within urban block interiors. For this reason, the project focuses on the artificial wrapping and augmentation of the vegetative areas within the site. A proposed extension of the oasis to the border with Oman seeks to restore the natural connection amongst the historical Buraimi oases on both sides of the border that are fed by a shared falaj system. The intent behind the creation of such a productive vegetative political border is to engender a shared sense of political responsibility for the maintenance of the falaj system and the level of the water table. The proposed Center for the Study of the Environment will use the oases as an ecological laboratory to develop methods for the efficient use of water in relation to agricultural production. The campus will incorporate the use of artificial "trees" to unify the Al Oattara and Al Jimi oases and provide a canopy to filter light producing an understory climatic condition that mimics the one produced by the date palm canopy. In addition, these artificial structures will collect water to aid existing irrigation systems.



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Andrew Lantz: The Performative In-Between

Instead of arguing for a particular logic of captured form and identity possessed within a given act of architecture, this project seeks to redefine this intention with a system of logics captured in a constellation of opportunity, skewed across the site. Defining the building in the guise of the interiority found within the daily shadows, the grey water extension and influence of a building, and the rules defined by comfortable walking, this project extends the logic found in the ecology of the oasis and the system of measure and exchange illustrated by the falai as a forgotten system, and redefines space-making and form construction around the performative logics of new contemporary definitions of these given site systems. Programmatically, the project focuses on the desire for research on the site by scattering responsive and performance-based units that amplify the temporal qualities of moments along a larger circuit, experienced primarily by pedestrians and visitors, and satisfies the desire for a unit type that can exemplify change as a constant through the display of research as an opportunity to materialize the alteration and difference within each particular research unit. Offering opportunities for earthen technology, date palm, textile, spoken word, and hydrological forms of research, each unit has the capability both to function and perform in a temporal manner, providing moments of respite for passers-by within the larger context of the oasis experience.











SECTION 01



Frontage Logic

Constructing Porosities

Frontage logic pursues a strategy that amplifies the urban corridor along the edge of the oasis block so as to establish a staging ground for the mutual development of city and oasis.









split urban fabric

Opposite











Site plan

Opposite

Transverse section A-A Transverse section B-B Transverse section C-C

Following

Educational campus plan









Opposite

Top Perspective view toward educational campus

Bottom Perspective view toward the oasis

Point Logic

The Built Artifact as Agent and Seed

Point logic relies on the insertion of the campus as a series of crucial architectural pieces throughout the oasis to achieve a concentrated effect that serves as an attractor for the city as a whole.









 Existing plan of the oasis 2. Main road infrastructure 3. Area of intervention with existing built fabric
Insertion of specific programmatic clusters (educational, cultural, and recreational) along main infrastructural spine through which to regenerate the growth of existing fabric while building on its relationship to the agricultural plot path and falaj network and foundational infrastructures 5. Projected growth around programmatic clusters 1
Projected growth around programmatic clusters 2

Opposite

Full projected growth with area around programmatic clusters 3

Okhyun Kim: Porous Perimeters



This project negotiates the space between the two oases using built form and the creation of a variable series of courtyards, alleys, and vegetated public hardscapes that dissolve the mass of the intervention without disturbing its place-establishing figuration.

Bird's eye perspective showing design concept and programmatic variation of campus plan



Top Ground floor plan

Middle Longitudinal section A-A 0.0.0

Bottom Longitudinal section B-B







Opposite (top to bottom)

Perspective view of public plaza Perspective view of interior passages Perspective view of souq interior Perspective view of interior colonnade

Woonghee Cho: Blurring the Brim



The project focuses on the residual spaces along the southern edge of the Al Jimi oasis. In general, oasis territory is clearly defined by its vertical height, as well as its horizontal geography. Inspired by the sectional differences that influence one's experience of the oasis-such as the vegetation at the lower levels and man-made elements such as paths, roads, and buildings on the ground level-this project functions as a threshold to the oasis. The architectural intervention strengthens this conception of layered experience by introducing visitors to various sectional movements and continuous vignettes. Through these series of actions, the oasis is expanded into the man-made territory and vice versa, which results in a blurring of the oasis edge and promotes the harmonious coexistence of nature and human intervention.





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Juta Cinco: Re-Combing the Wall







0m 5m



This project proposes the notion of a wall that expands and contracts, while housing various programs: gate, courtyard, and campus. It offers the following: a direct connection to the oasis (visually, physically, and experientially) by allowing the oasis to permeate into one of the expansions, creating a public oasis, or leisure space; visual and physical connection to the oasis by allowing the campus to highlight, rather than limit, the presence of it.





Epilogue Anita Berrizbeitia

This volume is a record of the research and design investigations that students and faculty at the Harvard University Graduate School of Design conducted on the re-conceptualization of the Al Qattara oasis in Al Ain, an oasis city located 160 km east of Abu Dhabi and the Persian Gulf, at base of the foothills of the Al Hajar (Omani) mountains. Founded more than 3,000 years ago as a stopping point along a trade route to the south and west, the city was formed from an agglomeration of villages that grew slowly around and between a cluster of seven oases.

Although remote and surrounded by expansive deserts, however, Al Ain has not been immune to economic, social, and political forces that shape more centrally located cities. The emergence of the UAE as a world producer of oil has had significant impacts on the oases enabling, most notably, the construction of an extensive infrastructure that distributes fresh (desalinated) water throughout the emirate. The availability of fresh water, the single most decisive factor in determining the size of city that an oasis can support, is no longer a constraint. Today, Al Ain is the second city in Abu Dhabi, with a population of about 650,000 inhabitants. The reclamation of desert lands around the oases is by now extensive, amounting to 100 square kilometers. As such, Al Ain constitutes an interesting case study of urban settlements that, on one hand, have major environmental constraints presented by desert conditions and, on the other, are presumably "free" of any and all constraints because of the availability of vast financial resources.

A central task of the work presented here is, thus, to expose the various forces or pressures that bear upon Al Ain and its oases, and the relationships between them. These are, to name a few, the dwindling supply of ground water, still a concern in spite of the increasing availability of desalinated water, population growth, the effects of the expansion of the infrastructure into the desert, new forms and techniques of agriculture that demand additional water and energy resources, and the preservation of cultural practices in the face of increasing westernization of leisure and modes of consumption. As this volume reveals, with plentiful water new problems arise. After all, base ecological conditions, such extreme high temperatures, minimal rainfall, and limited biodiversity, remain operative in spite of the availability of water. For example, traces of salt that remain in desalinated water reduce the productivity of the date palm and affect the local economy. As the city expands, those traces that gave logic to the city's gradual growth disappear under the imposed grids of modern infrastructure. The identity of Al Ain also comes into question, as it has been increasingly exposed to western cultural practices through the development of a service economy that has brought with it an international airport, shopping centers, and three world-class hotels.

Thus the first part of the volume is devoted to an examination of the processes that have formed Al Ain as we know it today and their relevance on the future of the oasis-city. Desert conditions drive very specific formal and morphological patterns in architecture, urbanism, and landscape that respond to the need for shelter from sun and heat, and to the most efficient preservation and use of available water. This base research is complemented by an essay that explores the synergies between mangrove and desert ecologies, especially as they relate to the production of fresh water. Through this very specific lens it is possible to further understand the regional ecology of the plain that extends between the gulf and the Al Hajar Mountains, and the various loci for future interventions. Equally important is the relationship between Al Ain and Emirati cultural identity, as the city is widely understood to be the repository of an authentic cultural heritage that is to be protected from the advances of globalization.

The second part of the volume documents the students' design projects. Here, environmental challenges (heat, dryness, lack of ventilation, sunlight, etc.), and existing spatial conditions (unarticulated edges, existing pathways, infrastructure), are re-framed as strategic points of departure for the invention of new alternatives for the oasis city. The ecology of the desert is referenced throughout the projects in literal and metaphorical ways, in both architecture and landscape, to support a design process that ultimately capitalizes on existing conditions to generate a poetics of desert urbanism. More nuanced material gradients between the lush oases and the city, an increased performance in the existing infrastructure, and new layers of public realm all reformulate the role of the primal oasis in the contemporary city.

Appendix A: Studio Brief

FRAMEWORK:

The oasis, as the primordial origin for water, has for centuries acted as a pervading facilitator in the relationship between people and arid ground. Pictured for centuries as a precise moment of happiness surrounded by despair, Oases have been key players in the cultural imaginary of arid geographies. From those of urgent need to those of excessive affluence, these globules of green within a boundless field of sand have had a time-honored tradition as instigators of diverse forms of settlement.

The City of Al Ain, formerly known as Tawam and Buraimi and originally composed of a series of loosely associated tribal groups, serves as a paradigmatic example of an urbanism that capitalized on a singular water supply to define a new way to occupy and transform a barren environment. The intrinsic value historically attributed to Al Ain, located 160 kilometers inland from the Persian Gulf, has been primarily geographic. The city emerged as a key point in the cross roads of the south-west route used by traders for centuries. Envisioned as a fertile oasis, it rapidly became a reliable point of rest, where caravans could be replenished with fresh water and food. This specific condition proffered inventive ways to manipulate water for agricultural production, resulting in an intrinsic public works system that allowed for the emergence of an expanding green enclave within a predominantly arid biome. The Falaj, an irrigation system composed of an agile network of conduits that directed water to date groves located in the lower geographies of the city, served as the backbone for the development of Al Ain's urban morphology. This logic of the Falaj, paired with newer irrigation systems, primarily desalinated water mechanisms, have allowed for a continuous presence of this extended green productive quilt. Today, the Oases continue to have a significant presence in the cultural imaginary of the city, both as a productive geography and also as a set of symbolic spaces for collective gathering.

This trans-disciplinary studio (24 students and two instructors) offered concurrently by the Departments of Architecture and Urban Planning and Design, will use the Al Qattara Oasis as an open laboratory in order to explore the potential transformation of traditionally productive grounds into an integrated network of active open spaces within the city. The pedagogic and research aims of the studio will focus on investigating the broader role of the Oasis as an initiator of urbanism and its ubiquitous presence in the urban evolution of Al Ain and the desert city at large. Furthermore, the studio will aim towards clear configurative strategies that explore the embedded potential of the Oasis to perform as a dual operative device that can on the one hand, continue to be part of the region's larger productive ecology and also act as a host for a variety of collective programs and qualitative infrastructures. Primarily the introduction of an institutional campus devoted to the study, production and advancement of the Arts, Crafts and Design traditions of the United Arab Emirates and the region at large.

STUDIO STRUCTURE:

Given this broad topical diversity of areas of expertise that need to converge in the investigation of this complex environmental phenomenon, and considering that the current plans and projects that exists for this particular area are not advanced to a point where they had established a clear vision and convincing strategy for the recovery and integration of the Al Qattara Oasis, the process of analysis and design for this joint studio will not pursue the linear steps of the traditional master plan methodology which do not seem to apply easily to the vague and ambiguous conditions and quality of the information at hand. Instead, the studio will proceed in the first part of the semester with parallel independent investigations of discrete and thematically distinct lines of research identified within the complex set of conditions that define the eco-urban system of the oasis. This research will then inform the development of precise design interventions that can effectively reframe the role of the oasis within the current urban framework of the city and envision ways in which it can accommodate multiple complimentary programs.

Throughout the research phase of the semester (the first four weeks), the studio will operate as a joint "super studio" in which students from both sections will work in inter-disciplinary groups. Once the research phase is completed, the two sections will work individually with joint reviews and sharing consultants and resources.

RESEARCH PLATFORM:

Departing from an exploratory standpoint, the studio will rely heavily on research and projective drawing in order to establish a clear body of analytical work that can serve as a primary source for future design interventions. For the first portion of the semester, students will tackle the larger physiographic processes of the Arabian Peninsula through a series of research topics that cut across multiple scales and material processes, in order to visualize the modus operandi of the eco-urban systems that the oases have proffered. These investigative tracks, which range in scale from the constructive detail to the region's eco-geographic dynamics will provide a clear visual profile of the multiple pressure systems that affect the terrain in question. This visual profile will then become a collective document for the studio and provide a significant reading of the city and its adjacent open territories. Students will then use the research as a collective body of work that ignites the architectural imaginary for new formal and experiential identities that can begin to reformat the Al Qattara Oasis and its adjacent grounds.

For the research component of the project, students from both studios will be teamed up in small groups and will explore a number of discrete yet interrelated investigative lines.

The research lines are the following:

1_Rammed Earth and other earthen construction technologies: will explore a wide host of constructive technologies using rammed earth and its associated variants covering a wide arch span that includes the traditional, nearly lost methods (which it will intend to recover and codify) and as importantly, explores new more inventive uses of these technologies within arid grounds as well as survey the state of this technology worldwide.

2_Ecology of the Oasis A: will focus on the dynamics of hydrology in this regional desert and the role of the Oasis as a natural, cultural and productive entity within arid grounds. Furthermore, this line of research will also explore the specific botanical qualities of the Oasis and speculate on the embedded potentials within this ecological infrastructure for future forms of settlement.

3_Ecology of the Oasis B: this tract will specifically concentrate on the role of the agricultural dynamics of the Oasis, and investigate the role of these sites as productive entities for the region. Special attention will be placed on the larger agricultural geometries and how these can be adapted / transformed to new post-agricultural uses.

4_Infrastructure in Arid Grounds: will engage the larger public works system that has facilitated urbanization in this geography. This line will focus on the specific infrastructural geometries, ranging from heavy to light (from mobility to shade), that have tailored this terrain for settlement.

5_Programatic Inventory: this research line will focus on the larger uses and rituals that have shaped the Oasis, the city, and the region, focusing on the historic values of the city as a set of parameters that must be acknowledged and capitalized upon in any future intervention. (patterns of commerce, religious rituals, public spaces, urban life, etc.)

6_Urban and Landscape Morphological Evolution: will tackle the diverse urban grains that have shaped the city in the region. This line will explore a broad range of scales from typological studies of domestic space to the organization of larger building aggregates in the city. (this may be a double line, with two different groups.

7_Regional Arts and Crafts: a serious survey of all local traditional crafts that would serve to program the cultural and productive activities of the Arts and Crafts campus as well as to inspire the design activities of the students. It is suggested that the scope of this effort would include crafts from the broader region of the Gulf area (i.e. the Emirates, Oman, etc.) rather than only focus on local traditions of Al Ain.

8_Relevant Precedents and Referents. This particular track will survey a well selected list of precedent projects, drawing samples of diverse scales and geographies, that in one or more capacities can inform the development of the design component of the studio.

DESIGN STRATEGIES: Project Constellation

As the semester advances and this parallel efforts achieve a degree of substantial development the studios will exploit the merged lines of research as an informative plane that allows for the development of clearly conceptualized yet open ended design strategies. The objective of both studios is to cultivate a dynamic set of design alternatives and scenarios, resulting in a multiplicity of interventions that engage a variety of scales and problematics within the Al Qattara Oasis and its associated urban quarters. In doing so, we aim at unfolding a broader constellation of projects, that in summation provide manifold alternative visions for the site.

An institutional campus devoted to the study, production and advancement of the Arts, Crafts and Design traditions of the Emirates in this exceptional location, will serve as a staple program that opens up the discussion about the transformative nature of the Oasis' grounds. The occasion for these studies and its resulting possible interventions is enabled by Abu Dhabi authorities' interest in establishing an important cultural, educational and research institution.

It is envisioned that such facility would take the form of a campus that would harmoniously accommodate in different structures and locations the following broad programmatic components:

a) An institute for the research and promotion of earthen architecture and building technology (including both the recovery of traditional methods and the experimentation and promotion of advanced contemporary earthen technology).

b) An associated library devoted to traditional crafts and design technologies native to the region.

- c) A Community Arts Center devoted to the teaching of traditional crafts.
- d) A souk where traditional crafts would be exhibited and sold.
- e) Provision of a small number of housing units for resident or visiting artisans.
- f) Related support functions as needed (cafeteria, auditorium, exhibition areas, etc.).

Further programmatic details of this campus as well as other complimentary programs will emerge from the research phase of the project. Some additional programs that promote the optimum public, commercial and agricultural operations in the city will be considered as part of the larger operation.

The studio is sponsored by the Abu Dhabi Authority for Culture and Heritage (ADACH).

Appendix B: Campus program description

CAMPUS FOR THE ADVANCEMENT OF THE ARTS, CRAFTS AND DESIGN TRADITIONS OF THE ARA-BIAN PENINSULA

In this second part of the studio students will exploit the merged lines of research as an informative plane that allows for the development of clearly conceptualized yet open ended design strategies for the Al Qattara Oasis. The objective is to cultivate a dynamic set of design alternatives and scenarios, resulting in a multiplicity of interventions that engage a variety of scales and problematics within the Al Qattara Oasis and its associated urban guarters. In doing so, we aim at unfolding a broader constellation of projects, that in summation provide manifold alternative visions for the site

An institutional campus devoted to the study, production and advancement of the Arts, Crafts and Design traditions of the Emirates and the Gulf Region in this exceptional location, will serve as a stable program that opens up the discussion about the transformative nature of the Oasis' grounds. The occasion for these studies and its resulting possible interventions is enabled by Abu Dhabi authorities' interest in establishing an important cultural, educational and research institution.

Part 1 Constellation of Strategies:

For the next two weeks, you will begin to conceptualize in teams of two students the campus from the perspective of a larger design strategy that on the one hand will begin to layout a framework for the introduction of all the Campus' diverse components, and on the other will explore a larger set of ideas that deal with the introduction of broader collective spaces into the grounds of the oasis.

As you begin to conceive the development of a larger spatial framework driven by the introduction of the campus and its associated programs, you should temporarily suspend your general preconceptions regarding the campus and its most immediate spatial implications. In fact the very notion of the conventional campus as a series of buildings harmoniously organized around a singular spatial, formal and stylistic idea must be questioned. Rather you should begin to speculate on new morphologies and organizational systems that can provide a fresh spatial format for the introduction of academic activities within the context of the Oasis, Al Ain, and the Arabian Peninsula.

In thinking the campus you should consider / speculate upon the following issues:

A. How do you begin to conceive, single out a site or a system of sites for the campus. Should it be conceived as a single building (i.e. like a large Madrassa?), or can it be conceived as a larger ensemble of linked actions that tackle a larger area within the oasis and accommodate more expanded programmatic brief?. Can this institutional complex incorporate some of the historical structures already existing? How do you begin to define, a precise geography of interventions within the broader area of the oasis.

B. Is there a larger organizational ambition to the campus that goes beyond the specific requirements of the program? Address the amorphous edge conditions? Create landscape narratives? Can a more comprehensive design operation begin to integrate / laminate much needed infrastructures (such as transit components, parking infrastructure) that serve the campus, the oasis, and the city?

C. Is there a larger infrastructural framework associated to the logic of the Oasis / and or the city that serve as a backbone for the organization of the campus?

D. How do you conceptualize the idea of integration within the campus? What is the role of the campus to the oasis, the city at large, and the broader logic of the desert? How do you define what borders must be manipulated / transformed and which ones should be respected? What is the relationship between the broader private, public and communal spaces and the specific architectural project(s) to be proposed?

E. How can you conceptualize a framework that defines a broader spatial organization without defining the specific architectures that make up the larger strategy?

F. What is the value of the existing landscape itself, and how does this participate within the conception of the project?

G. What parts and pieces from the group research can serve as pointers for the reorganization of the campus and for the reformatting of the Oasis grounds?

Part 2: Test Sites

It is envisioned that such facility would take the form of a campus that would harmoniously accommodate in different structures and locations the following broad programmatic components:

A. An institute for the research and promotion of earthen architecture and building technology (including both the recovery of traditional methods and the experimentation and promotion of advanced contemporary earthen technologies).

. Administrative offices.

- Director's Office i
- Assistants Office (2 people) General Staff Offices (5 people) iii
- . Researchers offices 6 Individual offices i.
- 1 Studio ii
- iii Lounge
- Conference rooms
- Large Conference room (30 people) i
- Two small conference rooms (10 people each. ii
- Test Laboratory
- Laboratory i

full scale mock-ups' vard. (Includes; workshops for mixtures, brick press preparation, wood and metal form ii making, materials storage, etc.)

An associated comprehensive small library devoted to traditional crafts and design technologies. B

This Library could be conceived more as a comprehensive information resource facility, which should be as much a conventional "library" as it is also a "materials" library (crafts materials), an exhibition hall, and digital laboratory.

C. A Community Arts Center devoted to education in the traditional crafts.

- . two large Classrooms (about 25 people)
- . four small Classromms (about 12 people)
- . 4 Crafts workshops where hands-on learning of crafts could take place.
- A Wood shop. i
- ii A Metal Shop
- A Pottery shop (includes a pottery firing kiln) iii Textiles shop with two looms
- . 2 Design Studios:
- large Drawing and painting studio. i
- ii. Apparel design

A souk where local design and crafts would be exhibited and sold. D . 40 stalls minimum

E A small number of housing units for resident or visiting artisans.

Student's dormitories should be considered as a possible additional component to this campus. F.

Related support functions as needed such as food services, auditorium, exhibition areas, etc.. G.

. These are left unspecified, for consideration by the designers. They may establish different associations and play diverse roles depending on the overall concept of the campus. Thus, an auditorium could be conceived as associated with the Community Center or with the Research Institute, or be an independent structure shared by all. And the same could be said for the food services, etc. etc.

H. Parking.

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Contributor Biographies

Jorge Silvetti was born in Buenos Aires, Argentina, where he received his diploma in architecture from the University of Buenos Aires. He continued studies at the University of California, Berkeley, receiving his Master of Architecture degree and pursuing post graduate work in the area of architectural theory and criticism. Mr. Silvetti's architectural practice, Machado and Silvetti Associates, was formed with Rodolfo Machado in 1974. In addition to his architectural practice, Mr. Silvetti has served as a juror for the Pritzker Architectural Prize since 1996, and in 2000 he became a juror for the Mies van der Rohe Prize for Latin American Architecture.

Since 1975, Mr. Silvetti has taught architecture at the Harvard University Graduate School of Design where he became tenured Professor of Architecture in Design and Design Theory in 1983, was Director of the Master of Architecture program from 1985 to 1989, and was named Nelson Robinson, Jr. Professor of Architecture in 1990. From 1995-2002, he chaired the Department of Architecture at Harvard, where he continues to teach. Mr. Silvetti's writings have appeared in numerous architectural and urban design magazines, including Oppositions, Controspazio, Daidalos, Metamorfosi, Harvard Architectural Review, and Assemblage.

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His work, research, and writings have been published in journals, including, Architectural Design, Architectural Record, and Topos. Correa received his Bachelor of Architecture

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Morgan Carter is a Master in Architecture II candidate at the Harvard Graduate School of Design, and completed his Master of Architecture at Dalhousie University in Halifax, Nova Scotia. His interests include ecological urbanism, indigenous knowledge systems, and the interstice between cultural and environmental sustainability.

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Anita Berrizbeitia is Professor of Landscape Architecture. Her research focuses on design theories of modern and contemporary landscape architecture, the productive aspects of landscapes, and Latin American cities and landscapes. She was awarded the 2005/2006 Prince Charitable Trusts Rome Prize Fellowship in Landscape Architecture. A native of Caracas. Venezuela, she studied architecture at the Universidad Simon Bolivar before receiving a BA from Wellesley College and an MLA from Harvard. Berrizbeitia has taught design theory and studio, most recently at the University of Pennsylvania School of Design, where she was Associate Chair of the Department of Landscape Architecture. Her studios investigate innovative approaches to the conceptualization of public space, especially on sites where urbanism, globalization, and local cultural conditions intersect. She also leads seminars that focus on significant transformations in landscape discourse over the last three decades. From 1987 to 1993, she practiced with Child Associates, Inc., in Boston, where she collaborated on many award-winning projects.

Dr. Sami el-Masri is a cultural resource management and development specialist with a long experience and involvement in the planning and execution of cultural development projects. He participated as well as directed projects commissioned by the World Bank, the United States Agency for International Development (USAID), UNESCO as well as the World Monuments Fund and the Getty Conservation Institute, in countries such as Lebanon, Egypt, Syrian, Sudan, and the United Arab Emirates. His involvement with such projects is cross disciplinary involving knowledge, research and planning in history, archaeology, heritage, and the arts, across several Arab countries from North Africa to the Levant as well as in the Gulf Area. He currently occupies the position of the Deputy Director General for Arts, Culture and Heritage, as well as Director of Strategic Planning and is directing a number of projects such as: developing the cultural core of Abu Dhabi, a culture-led development project involving museums, exhibition spaces, national library and evocative interpretive landscape design. Other projects

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Chris Reed is Principal of Stoss Landscape Urbanism and Design Critic in Landscape Architecture at the Harvard University Graduate School of Design. His work focuses on issues of infrastructure, ecology, and urbanism, and his writings have been published internationally. Reed's firm Stoss is working across North America and in the Middle East, and its work on public infrastructure and public landscapes has been realized most recently in Wisconsin, Massachusetts, and Quebec.

Brent Ryan is an Assistant Professor in Urban Design and Public Policy at the MIT School of Architecture and Planning. Before joining MIT, he taught at the Harvard Graduate School of Design and The University of Illinois. He holds a Ph.D. from MIT, and is a certified urban planner who has worked at the New York City Department of City Planning and in the Boston metropolitan area.

Ege Yildirim is a city planner specializing in heritage conservation. She graduated from the Middle East Technical University, Ankara, Turkey (1998) and received an MA in the Conservation of Historic Buildings from the University of York, England (1999). Working with architect Cengiz Kabaoglu, at KA.BA Conservation and Architecture Ltd, in Ankara (2000-06) she was involved in conservation planning, urban design, project development and project coordination for sites in historic urban and rural settings in Turkey. She has also done various voluntary works for professional organizations, most notably as secretary for the Turkish Conservation and Restoration Specialists Association (2003-05). Ege is currently PhD candidate at the Institute of Social Sciences, Ankara University, writing her dissertation on 'Governance in Urban Conservation Projects'. As part of her studies, she was a Fulbright visiting researcher at Pratt Institute, New York (2006-07). Since April 2008, she has been working as Conservation Coordinator at the Abu Dhabi Authority for Cultural Heritage.

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