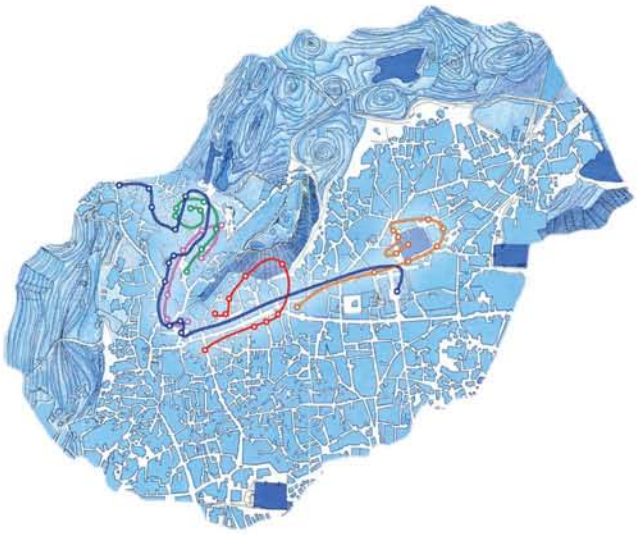
Ricerche di Rilievo e Rappresentazione
dal Progetto di Architettura al Design Industriale

Between History and Memory, the Blue Jodhpur

Experiences of integrated documentation and survey techniques



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MAGGIOLI EDITORE

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Experiences of integrated documentation and survey techniques

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Cover: the 5 urban paths documented by the workshops carried out in Jodhpur since 2013 (image by Minakshi Jain)

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Foreword

His Highness Gaj Singh
Maharaja of Marwar-Jodhpur

It is with great pleasure that I welcome the publication of "Blue Jodhpur" an academic and incisive collection of articles, drawings and experiences of and in the Old Walled City of Jodhpur over five years (20 days a year) of workshops conducted by the Ferrara University, Italy and CEPT University, Ahmadabad with students and teachers of architecture.

The "Bhitri Shahar" - Inner City - as we, who live outside of it now call it, has long been close to my heart. For it is as venerable and wonderful and precious as the Mehrangarh Fort, which looms high above protecting it like a lioness her brood; and was indeed, once visible from each and every home here. Furthermore, the Foundation of both the citadel and the city go back to the same auspicious day in 1459 AD; in the reign of my ancestor Rao Jodha, who gave his own name to his new Capital.

But whereas we have been able to achieve much in the conservation and restoration of the Fort, the Old Walled City has been neglected and decays before our eyes - for many reasons, some - like changing life-styles - beyond any one's control. What was once described as the "thy Venice of the East", is today a shadow of its glorious self....as magnificent Havelis are daily torn down and pristine water bodies allowed to die without a second thought....

Fortunately, the Residents of the Walled City - famous for their civility, culture and hospitality - remain as positive and steadfast as ever; and it is my fervent hope that this extensive documentation will help them & the Administration to face up to the challenges before us. Indeed, I am confident that it will be the first step

towards a complete and holistic Heritage Preservation & Development Plan for the old city, now also famous as “Blue Jodhpur”.

It is an amazing documentary work, perhaps one of a kind, which will add to the historic archives of the city. The drawings not only are a physical testimony, they are representative of the cultural cityscape and a unique lifestyle.

As I feel so connected to Jodhpur, its people & culture, I am happy that this has now so thoroughly been documented and conveys that people living here in our times are contented, cheerful and feel safe here. The neighbourhood, the housing, the water systems and drainage systems have withstood the test of time, despite the neglect and pressure of population. A true example of sustainability. When the work was exhibited at the Mehrangarh, the inhabitants felt proud of it as did I.

I am grateful to all the Contributors to this enlightening book, the Ferrara University, Italy & CEPT University, all the way from Italy to Ahmadabad, and students across India, for their dedicated work in our beloved city. Most of all, of course, to Minakshi Jain, who made it possible from start to finish. She has worked with us shoulder to shoulder on many Restoration & Conservation Projects, and her love for, and commitment to Old Walled City of Jodhpur has been steadfast over decades.

Preface

Stefano Bertocci
University of Florence, Department of Architecture

As stated in the recent "Symposium of representation scientific area for development of multidisciplinary international programs", promoted by UID (Unione Italiana Disegno) and hosted by the University of Florence, the achievement of experiences and research in different geographical areas determines the development of an adequate capacity for critical and interpretative analysis of complex cultural models.

In this direction, the five years' experience of cooperation between the Department of Architecture of the University of Ferrara and CEPT University of Ahmedabad shows the great value in exchanging synergies and research methodologies, examining the role that heritage documentation and representation can play in "building bridges" among different cultures. During the workshops in Jodhpur, survey and documentation have been realized in order to achieve an overall investigation collecting data related to the most relevant features of the "Blue City".

An accurate and overall survey allows improving the awareness of the needs of the historical city in order to plan maintenance process able to preserve heritage to future generation and to understand how the development of the historic city could meet the need of preservation of tradition and heritage.

Thanks to the holistic approach in heritage documentation realized during the on-site experiences and described in the book, young generations of future professionals had the opportunity to understand the significance of preserving the historic cities, made of tangible and intangible heritage.

Documentation and representation, challenging relations between local people awareness and cultural heritage, the education ecosystem as well as the social values of public spaces and the connection among build environment and traditional values are some of the main outcomes described. The different sections in which the book is divided present an overall interdisciplinary approach able to include documentation, analysis, data management, survey, representation, visualization, protection and preservation issues.

Moreover, the organization of documentation and design workshops in Jodhpur and Ferrara for the students of the department of architecture of the two institutions, allow also the involvement of local professionals and local authorities responsible for the preservation and management of two historic centres, creating a "virtuous circle" towards the sharing of experiences.

The experiences and methodologies employed on an international basis by scholars and professors belonging to our scientific association of the Drawing, the collaboration / competition that today takes place on research themes between different institutions and countries is expressed through the exchange of synergies, of methodologies and scholars with a high scientific qualification.

Introduction

Marcello Balzani
Minakshi Jain
Luca Rossato
Editors

This book describes the outputs of 5 years of cooperation between the Department of Architecture of the University of Ferrara, Italy and CEPT University of Ahmedabad, India.

When we started this academic experiment, in 2013 we firstly identified the crucial features of a possible educational approach in dynamic and changing contexts such as those of *Global South Countries.* At that time we were wondering "can the exchange between international educational experiences enhance the development of best practices for cultural heritage documentation and preservation?" In order to address the topic, this book presents the results of the educational projects developed in the Blue City of Jodhpur (India) as an academic cooperation, involving professors, researchers, local authorities, professionals and young students from both the countries.

The book aims at examining the role that heritage documentation and representation can play. Emerging countries such as India can benefit, if they are implemented as joint activities involving different stakeholders. Jodhpur, the so-called "Blue City", is an outstanding example of the extremely relevant role of mixed research and documentation methods applied in a context where tangible and intangible heritage are closely linked in a great risk of failure, due to population pressure, growing tourism and other threats.

The book presents several on-field approaches concerning visions about heritage documentation in terms of research, future directions, methodologies and working tools in the field of education for heritage preservation and enhancement.

As the reader will understand the workshops experience have been organized over a period of five years, consisting in researches and on-field surveys carried out by the group of students supervised by professors coming from both the institutions. During the last year the workshop was open to students with a background of design coming from the University of Ferrara as well as to students of urban management of CEPT University. Along the five years of workshops, different urban areas of the historical city centre have been analyzed and surveyed, setting up a methodology able to meet the main needs of knowledge, understanding, refurbishment and conservation. In this direction, integrated survey processes were tested and applied in order to provide tools for an overall "reading" of the uniqueness of the local heritage and to point out possible conservation strategies. The book is divided into areas of investigation.

The first two sections (representation and documentation) analyze possible techniques to be applied to Indian vernacular architecture. As a result, the documentation is integrated by information related to materials and state of conservation, diagnostic procedures and the documentation of architectural features.

The third part (awareness) deals with the challenging relation between consciousness and cultural heritage, both from the education ecosystem aspect and the inhabitants point of view.

The social values of public spaces and the connection among build environment and traditions values are a core topic of the fourth section (tangible and intangible heritage).

The last section (cultural heritage preservation) presents indeed a holistic approach: the overall interdisciplinary approach aimed to include documentation, analysis and data management in order to combine survey, representation, visualization, protection and preservation issues.

The whole research project was able to highlight the challenges that future professionals have to take into consideration, such as societal contemporary needs, compromises between conservation and development, new skills and better focused trainings in the cultural heritage sector.

The benefits were identified both in Indian and Italian students and included increased awareness of the importance of heritage preservation and representation, to the societal challenged related to cultural heritage and sustainable development. The cooperation and the approaches presented in the project were also useful in fighting cultural stereotypes and increasing awareness of the professional skills and competences required in Global South countries.

The capacity building activities and awareness campaigns described in these pages can greatly benefit from the introduction of new technologies, know-how and effective methodologies. For instance beside traditional representation techniques, the new digital tools should be applied in order to foster the cooperation among professionals of the sector and at the same time could act as a vehicle of added value.

Furthermore the urban analyses techniques can develop the students' conceptu-

al approach to Indian cultural heritage.

The city centre of Jodhpur has been slowly altered over the centuries. In this framework, we hope that this book could show how the integration of diverse stakeholders stimulated a better evaluation of urban documentation techniques to be apply on Indian Cultural Heritage. The city centre requires continuous monitoring and planning of interventions aimed at the preservation of its historical value and this might be accomplished in a more efficient workflow using the advantages offered by the sharing of knowledge, techniques and methodologies.

The activities and experimentations carried out by the international authors of this publication identified functional methods for the analysis, representation and diagnosis of the architectural heritage of the Blue city demonstrating the potential of joint and interdisciplinary activities implemented in fragile and challenging contexts.

REPRESENTATION

Documenting and representing transformation in incompleteness

Marcello Balzani
University of Ferrara, Department of Architecture

Axiom of incompleteness

A city is a whole which must remain indefinitely,
structurally not saturable, open to its transformation,
to the minimal additions which come to alter
or displace the memory of its heritage.
A city must remain open to the fact that
it does not know yet what it will be:
it is necessary to inscribe the respect of this not-knowing
into the architectonic and city-planning science and skill,
as it were a symbol.

Jacques Derrida
Generazioni di una città: memoria, profezia, responsabilità,
in "Adesso l'architettura", Libri Scheiwiller, 2008

Knowing is a dynamic action, it is a process, it does not establish specific boundaries. To some extent, it could be said that it goes beyond the very principle of determining identity.

Eight years ago, when the DIAPReM departmental centre of the University of Ferrara Department of Architecture set about making its first approaches towards the "cradle of the earth", as Guido Gozzano, an Italian poet of the early 20th century, described India, it was likely that nobody had yet realized what was behind so much Bruce Chatwin-like *restlessness*.

The desire to "always keep moving on to another place" requires a *reset.* First of all, to bestow dignity on the "site of thought" (conscious and aware) in order to bring forth the space of knowledge. A language fortified by doubt that helps to promote

the consolidation of healthy "little islands of critical rationality in a dogmatic ocean" (François Laplantine). Thus, human experience, with all its extraordinary, active energy, lies at the centre of the survey and documentation project. *The space of knowledge*, as Herman Hertzberger said, is not the outcome of a few Cartesian coordinates, but rather of *other,* many *other*, extraordinary forces. The realities (Jodhpur, Ferrara) do not resemble one another, but they are mutually attracted by their substantial differences. This is why the need (and the desire) to express (and describe) problems and contradictions has gradually intensified over the years, ultimately becoming this volume, where our common and interconnected experiences are assembled.

Conservation entails a difficult equilibrium. Understanding the historical thresholds that still allow a glimpse of the contexts – the material, chromatic, and technological compatibilities in the unflagging metabolism of transformation – is not easy. Expectations about housing, business, tourism, mobility, and safety take shape with a rapidity that at times makes it difficult to distinguish the outlines of the context. It is not just a problem of Indian historical contexts, by now it pertains to every pre-existing global reality.

Experience tells us that there are irreversible natural processes – which is like saying that the world around us (with ourselves included) is changing (perhaps it ages when it is historical?). It changes day by day without any possibility of ever turning back. It is a reality that the architect knows very well, perhaps from the first day that s/he enters the classroom as a student of Architecture, and comes up against the second-year exams in which s/he is made to use surveys and drawings to try to understand first, what the space is, and then what the forms in space are, and, finally, to realize how *they are*, and how, *translated* into substance, they *live* their season of life. In the experience of the workshops in India and in Ferrara with the CEPT University of Ahmedabad, in direct contact with the historically consolidated fabrics of cities stratified over the centuries, the *degrees of need* (conservation, recovery, renewal, regeneration), are very diverse. Perhaps the reality of things can be made "to age well", as Kevin Lynch suggested in *What Time Is This Place*? through an aware design validating the diagnosis in order to determine the therapy, with, if possible, reversible actions, for a chronic patient who has every right to a dignified life for as long as possible. Or perhaps the hybridization processes, which are objectively stronger, will instil an apparently redeeming *neotenic vision*.

However, we must remember that the *sustainability* issue no longer stands alone but is beginning to cluster together and qualitatively connect with that of the *preservation* of memory. The *two lines of thought*, apparently far apart in terms of the cultural and technological stimuli and triggers they can spark or in turn were themselves sparked, today more than ever find themselves in a complementarity of actions and

Figure 1: (next page) a view of Mehrangarh Fort external wall. Realities do not resemble one another, but they are mutually attracted by their substantial differences (image by the author)

results that is not trivial in effect. The similarities are not few. Both lines of thought (cultural, social, design, technological) refer to a *concrete future* (Marc Augé) that should be offered to those who come after us, with coherent qualities and conditions of responsibility. All this must prove to be so for the available resources, so therefore it requires a careful assessment of the energy and environmental costs of every initiative, whether underway or potential. But it must also prove to be possible for the preservation of memory (material and immaterial) underpinning the continuity of a critical development (the theoretical principles of reversible restoration are an example). Choosing to preserve memory and choosing to meet the needs of our own generations without limiting those of the future generations is what I call social, cultural, and technical behaviour that is very similar if not identical in terms of models and principles. Is preservation of memory a *deeply-rooted need*? Does choosing what and how to preserve constitute an act that is steeped in *sustainable design*? I think that the answer is very interesting and that the Jodphur experience is a point of departure for evaluating some impacts of the transformation underway.

The *sustainability* of the implemented design aims to maintain, in the broadest way possible, the *capital* (environmental, architectural, cultural) that is the focus of the intervention. By expressing the value of *heritage*, we are trying to identify a quality of uniqueness, and therefore perform each of the required tasks with an awareness what came before, so it will be *reversible*; that is, less contaminating, destructive, interpretative, dispersive, allowing whoever comes next to be able to enjoy the same *asset* and to be able to go back and reversibly intervene using even less invasive and more protective design and conservative technologies. It is essentially a d*esign principle in transformation* that is not limited in time to a given procedure but lays down the bases for a consciousness (at work in the local communities, a crucial aspect in India) that acts by degrees, experiments verified in time, that is self-checking, self-correcting, in short it aims for progressive improvement.

Jacque Derrida's *axiom of incompleteness* could come to our aid here. The city, the territory, and the fabric remain *open*, since only a *behaviourist and flexible* interpretation can make them more readily adapt to change. The experience that evolved in the Indian historic centres shows that if descriptive models are used that are little by little, increasingly coherent, structurally integrated, finally assigning a value to quantifiable characteristics, to measurable elements of an object and a space, then we can describe a credible context of scenario simulation and try to keep what has been accomplished under control. This is especially evident in Jodhpur, where the continuity of the workshops over several years has made it possible to evaluate some of the methodological approaches.

"*In the beginning was design. Or, the waste of order-building.*" With this statement, Zygmunt Bauman titles the first chapter of a book written more than ten years ago predicting, very cogently, something that today is a fact of life, something that occupies our thoughts. At the heart of *Wasted Lives* (2004) is the theme of the planetary vulnerability/interdependence of humans, in a situation of an *initial, primitive*

Figure 2: Jodhpur was essentially made by a d*esign principle in transformation* that is self-checking, self-correcting, in short it aims for progressive improvement (image by the author)

nature. Bauman calls it "primordial nature", especially because it is not regulated by policies intending to intervene with the processes of globalization; it is essentially uncontrolled. It is a condition that produces hugely powerful transformations, because it seems clear that the "traditional forces" are no longer sufficient to stem the change underway. New types of "*frontier land*" conditions are continually created; they are shaped and interconnected by as many new "*spaces of flows*". The latent condition of continuous transformation appears even more evident when the context is historical, where *memory* is day by day replaced by *amnesia* (cultural and social), and where what had once been consistently described, understood, and accepted is gradually transformed into a boundary, a *new frontier land*. The conditions of insecurity, the insiders and the outsiders, beyond the frontier separating the "useful

product" from the "waste", are what define these *incessant activities of separation* that erode the spaces of knowledge (historical centres and places of remembrance), making them more and more fragile.

Recycling and recovery become necessary behaviours, through a careful interpretation of the typologies, the places designated to represent social values (a tree, a fountain, or a temple or a meeting point) as much as the connective tissues: each path to interpreting the historical centre of Jodhpur is an idea for an avenue of possible designs. The survey, analysis, diagnosis, and the coherent representation of the data acquired through a visualisation, intercepting innovation and in constant touch with an ongoing training course are the new tools. Each interdisciplinary tool and all the ways they overlap (in terms of purpose and sense) enhances the design. This new core of the problem, this new focal point, interprets differently the *roles* of the materials, the *weight* of the technologies, the criteria of form/space and morphology, and the economic *values* over time and in the continuity of use and the lifecycle of objects, as in architecture, or urban systems. Just as what is happening in the effort to mount a defence against the deleterious effects of *hyperconsumerism* as against the products of a social model that is not shared (which aims to make everything too full, too saturated), likewise, in built spaces the same steps are being taken. And the historical part of the city is the most vulnerable.

Here, then, the concept of *order* – interpreted by Bauman as a system approaching obsolescence (in the traditional logic) that dictates the rules while producing no longer sustainable waste, like a grid that is perhaps too rigid in defining what is "good" versus what is "bad", in a legal structure that makes a product *useful (= legitimate)* – is also poised on a *delicate* and fragile ridge. Does it still work? Every day we realize that the descriptive models imported from the last century and consolidated over a hundred years of developmental processes (more or less in agreement) do not always manage to render the potential of the ideas that enhance the design, especially those involving conservation and repurposing. Is the ordering system too busy sifting through, separating out, and eliminating the *waste* first from the design, then from the construction, which instead should perhaps be understood, accepted, contained, reclaimed, and recycled? Reviewing the many designs produced in the workshops of the historic centre of Jodhpur and recalling the many discussions between students and professions of worlds apparently so far apart, many of these questions seek an answer.

The fact remains that what happens in Europe is not very different from what happens in the rest of the world with the zoning grids used in urban planning, or inside the architectural and building processes that transform construction technologies to meet new needs with different services. Will they be able to propose architecture

Figure 3: (next page) several layers of form/shape overlapping in Jodhpur old city (image by the author)

that can adapt to the change underway using the technical skills and, above all, the heart and mind ready and willing to do it?

Adapting to the change, first of all:

- many architects, right now, are not working in their homeland but are far from their borders, often in complex situations where they are seeking their own route to development (which we hope is aware and sustainable);
- many young students at schools and courses of architecture are trying to interpret the processes of transformation of the urban realities in other countries, sometimes very different from our own, and they are trying to make their own contribution;
- a lot of knowledge is being *hybridised*, and training, which for decades had been at the foundations of the design idea and model, does not meet the needs of the reality that is taking shape; it is not able to stimulate and interest what instead, for example, is being born in and from the *spaces of flows*.

It may not be worthwhile *waiting for the barbarians*, as in Konstantinos Kavafi's famous poem, finding the worst motivations because we are committed to preserving without trying to understand, hiding the fact that the enemy is first of all within ourselves. Instead, as the Jodhpur experience demonstrates, it is possible that the *frontier lands*, created by that unstable temporal border that makes every historic city centre less historic, and the *space of flows*, where communities create the space of knowledge and awareness, become extraordinary stimuli to give meaning to the term design and to the training and role of the architect.

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Figure 4: (next page) young people of Jodhpur can really create the space of knowledge and awareness for an effective protection of the historic city (image by the author)

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The best for both the worlds: documentation of blue Jodhpur and the education of architecture students

Minakshi Jain
CEPT University, Ahmedabad

Extremely photogenic, the fascinating blue city of Jodhpur is captivating. There are many blue cities around the world, *Chef-chaouen* in Morocco, *Juzcar* in Spain and *Santorini* in Greek island are some of them (Figure 1 and Figure 2). Way back in 1989, it was first documented in *Lokkhsetra* report for INTACH, Jodhpur, by Prof. Kulbhushan Jain, myself and the team. The force, and drive behind this vision document were Mapu (Martand Singh) and Bapji. (H.H. Gajsingh of Jodhpur). They believed that the blue city is unique and is worth conserving.

Blue cities of the world: Why blue? Blue is the colour of balance and harmony. One feels peaceful and calm. Blue colour is psychologically most soothing, local resident brahmins consider it to be sacred. Besides it reflects the summer heat and is cheaply available.

Presently historic cities are straddling between ideologies of preservation and continuation, to expose students to this process, the Department of Architecture, University of Ferrara, in Italy and the Department of Architecture, Center for Environment, Planning and Technology (CEPT), Ahmadabad, in India, together planned to develop interdisciplinary competence of analysis of historic city centers through diagnostic methods.

In view of much discussions and debates on the “future of the past”, a short winter workshop was offered in 2013, under aegis of SWS (Summer Winter School) at CEPT University.

The Historic blue city of Jodhpur was selected as a case study, and documented for the next 5 winters. It became a win-win situation for the students and for the city.

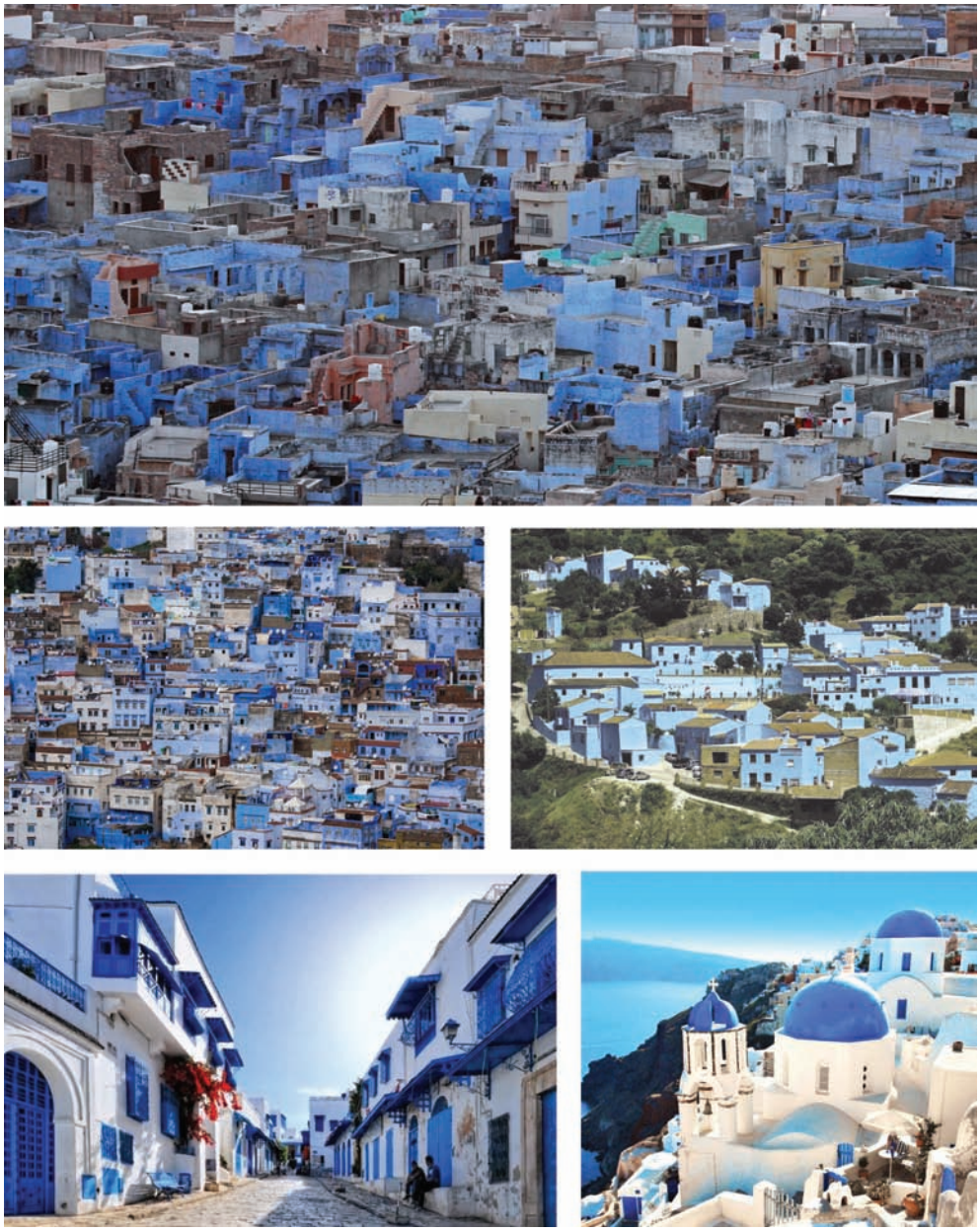

Figure 1: (top) the blue city of Jodhpur; (central row left) Chefchaouen city in Morocco, Arabs built in 1471; (central row right) Júzcar city in Spain: was created for "The Smurf 3d" Movie; (bottom left) Sidi Bou Said, Tunis, is blue and white; (bottom right) Santorini, Cyclades Islands, Greek

The objectives of workshops

1- Student's Exposure and Education by being on site and experiencing.
2- Developing first hand knowledge and attitude for future of historic cities.
3- Documentation, first step for development and planning of historic blue city.
4- Recognizing ambience, character and value of blue Jodhpur.

Issues

The world of conservation of blue cities acknowledge the coexistence of the old with the new, as a potential way of development. Understanding and developing an ability to analyse the physical, social and cultural environment will become a key skill for the future professionals. They are the ones, who will take care of unique and irreplaceable Cultural Heritage. Its continuation is placed in the care of the present generation.

Development, recognizing character

Historic city centres in India are dynamic, and they are urbanizing at a fast pace, so are the aspirations of the people. A place with a rich history and culture, has been an area of our interest, resulting in to several conservation works of monuments. But, there is much that needs attention, particularly in the public realm and infrastructure. To understand the forces of development, one has to literally go down the time machine to perceive and document the changing historic culture. Through these workshops, students developed the point of view of the complexities of such development, while the city got documented, as an extra benefit.

For documentation in Jodhpur, Italian and Indian students, the first time visitors, went berserk in narrow winding streets and blue houses. They were owed by the costumes, jewellery, flowers, bangles, the street food, *mirchi vadas*, and *mava kachori*, fabric and footwear etc. Most important was the warmth of people. For them it was exciting to be on site. At one point, a local girl wrote a poem for students.

Presently the blue city's residential area gives an impression of ignored and neglected. Last few centuries, the attention has been only on development of new city, very little infrastructure has been added here. The Heritage of 300 to 100 years have aged, and needs safeguarding, public places / public health are most affected.

Figure 2: (first on the left) treet steps at Chefchaouen, Morocco; (other pictures) Narrow streets and steps in blue Jodhpur, note the open drain

Figure 3: (top left) rikshws and two wheelers block street; (top right) street is a public living room; (bottom left) vegetable shops are encroachment; (bottom right) electrical substation is a place for garbage dump (images by the author)

The city form consists of small and large houses, schools, water bodies, temples, squares and *chowks* within narrow meandering streets (Figure 3). With a little care and maintenance, the city could attain its full potential. Thorough documentation is required to develop planning strategy, for the old historic blue city.

Documenting the blue city

Students noticed that the streets become narrower and winding as one goes up on the hill slopes. They were not a problem to residents, but no cars can go. Narrow streets have taken a form of open living rooms with plastic chairs! Elements such as *zarookhas*, projected balconies, stone brackets, *Chajjas*, etc. give shade, while *otalas* generate interaction. Entrances and stairs are placed in enticing geometry. Closely hurdled houses defy the notion of minimum standards. Their space per person, facilities per person, street widths per vehicle, leaking water system, open drains etc. are below western standards. Updating and stream lining of municipal services will do

Figure 4: (from left) advertisement boards, buildings too close, food shop as encroachment

half the work. Degenerated houses with common walls and shared courtyards, meagre facilities, still works just well. Such historic places are highly sustainable. In arid area like Rajasthan, water is most important subservience element. Famous historic water bodies, wells, *beras*, and *baories* are preserved and still in use, in spite of piped water. The Combination of pink stone and all hues of blue lime paint are important aspects of city character. The place is still growing, developing and being encroached upon. In absence of regulations, new constructions and additions were observed in historic built (Figure 4), with new materials and different colour paints. Historic blue is reducing. One section of residents want to stay here because they like it and feel safe. Whereas others would like to move out, but are not able to afford shifting.

Efforts of other agencies

Over five years, between 2013 and 2017, 47 sites got documented in different areas, of diverse character by a combination of Indian and Italian student groups, their work has been a tremendous stimuli for local people, officials and local groups. Walled City Regeneration Plan (WCRP) group have been working on developing di-

Figure 5: streets are public realm. Temples, food, flowers and vegetable shops, open on streets, so they are part of the shopping places as well. Other than means of vehicular / pedestrian paths

lapidated / unused sites, for some time now.

Jodhpur is one of the cities of Government's Heritage City Development and Augmentation *Yojana*. (HRIDAY), focuses on infrastructure. So hopefully some planning cleaning and infrastructure will get under way. This documentation will definitely help in deciding the issues of architectural ambience, architectural form and colour coordination, to keep the continuum of culture (Figure 5).

Workshop's program

Every year, for five years (Figure 6), several aspects were added to the study to understand the complexity of each site in historic sector (Figure 7).

In 2013: 13 sites, residential, were selected, just off the *Chand Pol*. People were courteous in spite of lack of modern facilities.

In 2014: 10 sites of bazaars, streets, lake edge, residential areas, school and temples were chosen around the *Gulab Sagar*, its potentials remains unrealized.

In 2015 : 8 sites, were selected in *bhrampuri* area. Documentation, and solutions to issues were discussed. Topography responded to built form and culture.

In 2016: 7 sites were chosen in the narrow streets. The study was focused on reuse. Documenting, interviewing and short film clips gave understanding of changes.

In 2017: 9 junctions or nodes of the streets, were selected. Most nodes are like parking lots. Students filmed relevant issues.

All the scaled drawings are compiled and annexed for reference into this publication (see annexes section at the end of the book).

The documentation

Firstly students had to hit upon methods to get correct measurements, since the settlement is convoluted, not at right angle! Only after drawing on computer, they could get the correct angles and dimensions. They had to often do it twice around to be sure. Sections had number of layers in horizontal as well as in vertical plane. Each students group prepared two panels, as their submission, which became part of the Jodhpur box. It included location plans, detailed plans, elevations, sections and inte-

Figure 6: (from left) 2013,2014,2015,2016, 2017 workshop booklets of each year contains all details

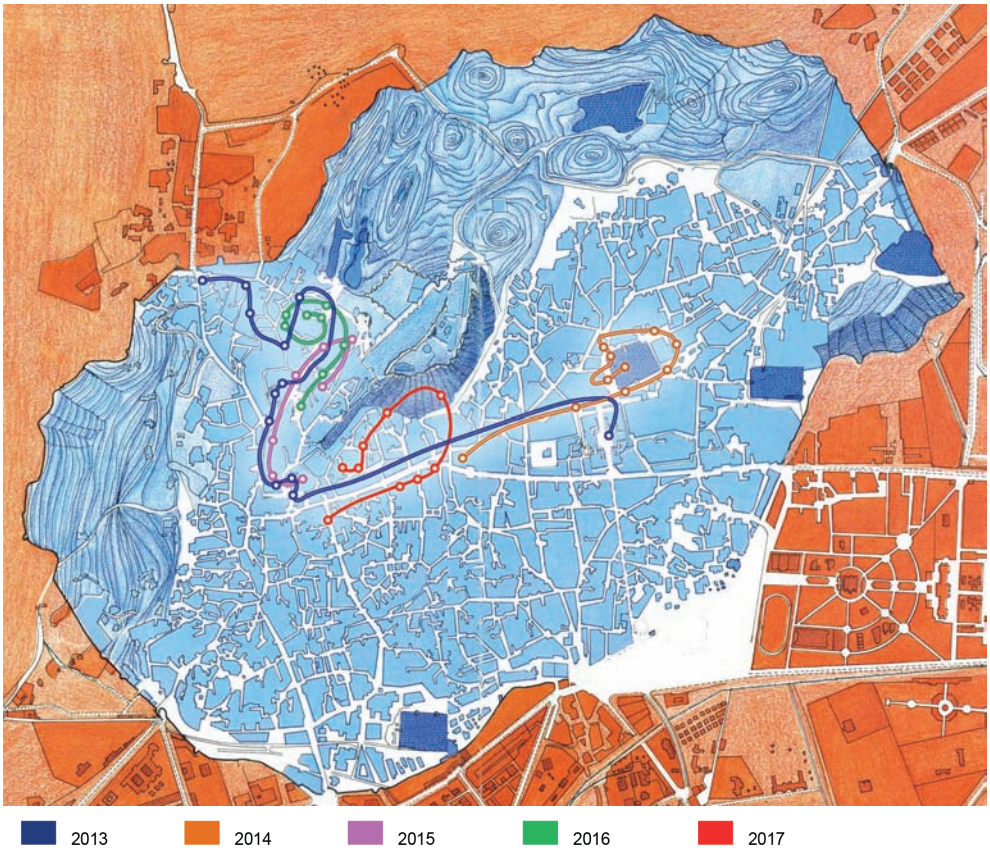

Figure 7: map showing the site locations of five years in different colours (image by Minakshi Jain)

rior to a scale. They learned historic importance and state of deterioration by means of photographs, and sketches and inferred issues involved; students independently focused on issues, they considered important. Later composition of a panel was finalised by discussion.

The day schedule at Jodhpur was very gruelling and tight. Students, worked thorough the day and in the evening, taking a critique from teachers and correct the drawings at night. A pool side area was provided to us by the hotel for evening class.

This open class room, like teaching under a tree, added enthusiasm and freshness in everyone. On the field they interviewed local people and filmed them, so the study was interactive. Experts' lectures were arranged at Jodhpur, for students to know the place.

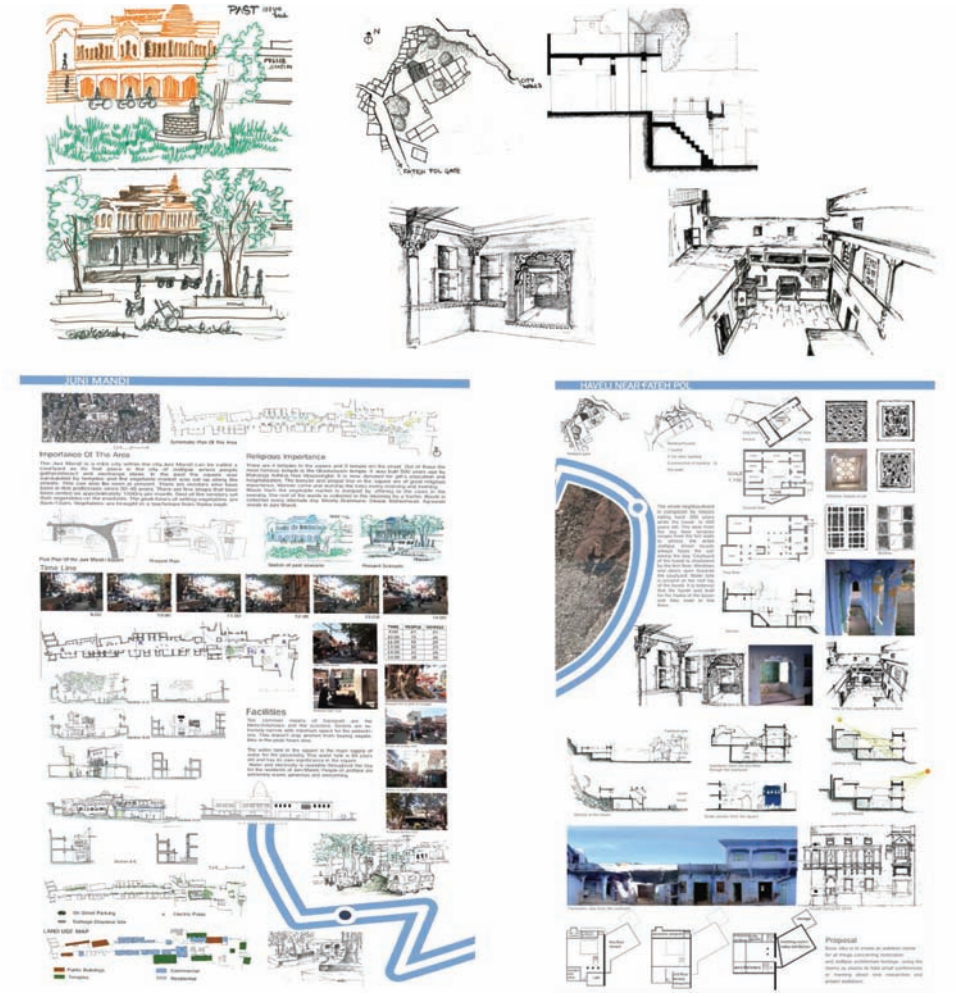

Figure 8: final drawings were completed in the studios of CEPT, Ahmedabad

Awareness & presentation as jodhpur box

A prototype, of the presentation was suggested by Prof. Marcello Balzani in the form of *Jodhpur box*, idea was borrowed from Alberti's historic box. It became unique, sumptuous and attractive presentation. Composed in a 360 x 360 cm x 240 cm height cube by panels of 90 cm wide x 200 cm high, 14 card board panels substituted as walls of the box, and black textile covered as the ceiling, with opening on one side for viewing the film clip. These have become archived material of lifestyle of our time. Panels of previous year were exhibited in *Meherangarh*. Students put up

14 such panels (Figure 8) and a short film every year (Figure 9).

Two way accomplishment

Students' skill development, and cities' documentation was aimed as a result of workshops. Students came from architecture, planning, urban design and urban planning, interior design and industrial design disciplines and developed comradeship. It was an important gainer, although it was a different kind of challenge for teachers. Students went through the process of beginning to presentation, learnt a lot.

This was an effort to inculcate in the students an interdisciplinary competence of analysis, leading to design thinking and making proposals of how to negotiate the

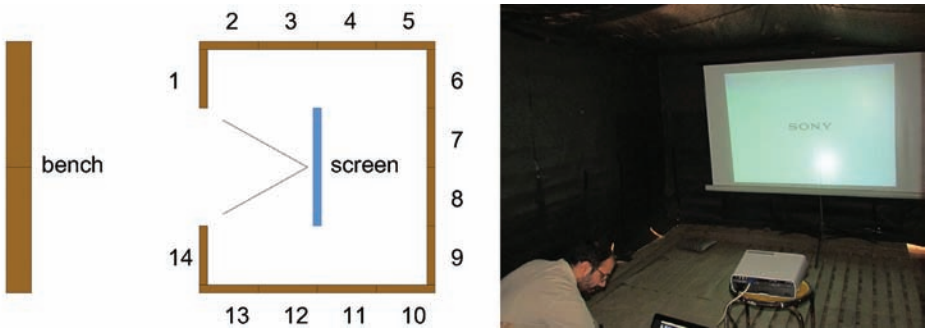

Figure 9: (left) plan of Jodhpur box and (right) set up of the internal movie projection

new within the old, the public and the private realm. The exercise made the students think, how fragile are these environments. It was all worth a slog. The results were astonishing (Figure 10).

Conclusion

On site learning of students was great, it will remain with them for a long time. Through this exercise, students suggested following actions:

1. Establish heritage cell. Conserve all historic monuments, if plastered, paint in blue.
2. Give incentives in tax, improve routing of electric wires, have drain covers.
3. Upgrade work of Municipality, for cleaning, managing animals, parking etc.
5. Permission will be required for adaptive reuse / addition / demolition horizontal and vertical encroachments to be stopped.
6. Parking / grouping of stray animals in rented open not built / unused / plots.
7. Area to be free wifi zone, it will be a progressive action.
8. Heritage walk/ rest points may be identified / public realm on lake edges.

Figure 10: Jodhpur box at Maherangarh (top) and at CEPT University (bottom)

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Documenting Vernacular Heritage to preserve diversity and sustainability

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During the last decades around the world many things have changed and sometimes lost in many historic centres. Residents want to update their own houses with the most modern features and, in many cases, there is the need to improve living standards. In Jodhpur, within the vibrant environment of its historic centre, inhabitants are trying to find more contemporary spaces for themselves by adapting the existing ones. While their love for these old settlements has not diminished, some of the residents have moved towards the new areas of the city in search of a modern lifestyle and more urban facilities such as schools, public transportation, etc. While the Jodhpur municipality wants to protect the vernacular heritage of the city, it is also clear that preservation policies must take into account that changes in the physical structure of old settlements are inevitable (and indeed have been continuing from ancient times). This, quite recently, has stressed the need to maintain control over these changes, driven not only by social inputs but also by economic activities. It's always a matter of knowledge: on one hand preserving our vernacular heritage aims to conserve our cultural and social variety and transmit it to future generations, on the other hand we still have to fully understand the lessons that could be learnt from the study of these buildings and that can then be applied to contemporary settlements. It doesn't have to be development versus conservation: the two issues should work together. It's an uneasy path, full of economic and cultural obstacles, but still viable if we really want to preserve this important cultural heritage.

Within this framework we shouldn't forget that sustainabili-

ty and heritage conservation can no longer be considered as two separate issues. As stressed also by the New Urban Agenda (NUA), cultural heritage (both tangible and intangible) is an important factor for urban sustainable development (United Nations, 2016). The future must deal with the available resources, careful energy balance and the human environmental impact, but it should also interact with the preservation of heritage (both tangible and intangible) that is the foundation of the continuity of a critical development for humankind. Preserving our cultural heritage and meeting the needs of present generations, without limiting those of future generations, defines social behaviours culturally and technologically similar in terms of models and principles. Furthermore, it is important to highlight that cultural heritage is vulnerable to climate change: for instance, natural sites are affected by climate modification and related factors such as sea level rise, beach erosion, loss of vegetation, etc. (Markham et al. 2016). As the world of conservation expands to acknowledge the coexistence of the old with the new as a potential way of developing the historic city centres, the new professionals will need to be appropriately equipped to understand the complexities of such development (Jain and Majmundar, 1989).

The vernacular heritage in Jodhpur old city

Vernacular architecture is known world-wide as extremely vulnerable heritage. This is due to economic, social and political reasons and why it's related to urban decay and physical degradation, exposing to risk an essential historical, cultural, but also social and economic, resource. Moreover, due to its vast geographical range and the population numbers involved it's rarely recorded or listed, and important information has already been lost. The term vernacular is derived from Latin vernaculus, meaning "domestic, native, indigenous", so we can define vernacular architecture as a local need, and construction materials-based architecture which reflects local traditions (Figure 1). The vernacular architecture in Jodhpur is facing a quiet process of transformation/adaptation by individual households. Slowly, every year, an old window is replaced by a new one, some kind of space is added, or a new steel railing is placed to protect an ancient balcony. These modifications are visible also in the so-called "traditional" architecture that includes buildings which bear elements of more refined design, for instance temples. These buildings are characterised by stylistic elements of design by a professional architect for aesthetic purposes which go beyond functional requirements. Even if they are in better condition than the vernacular buildings, they are highly hybridised as well.

Preserving the diversity

The vernacular architectural legacy demonstrates an interesting evolution of the concept of cultural heritage in the development of new methods of protection, preservation and enhancement. The conservation method, according to the theo-

Figure 1: (next page) internal staircase of an old house in Jodhpur old city (picture by the author)

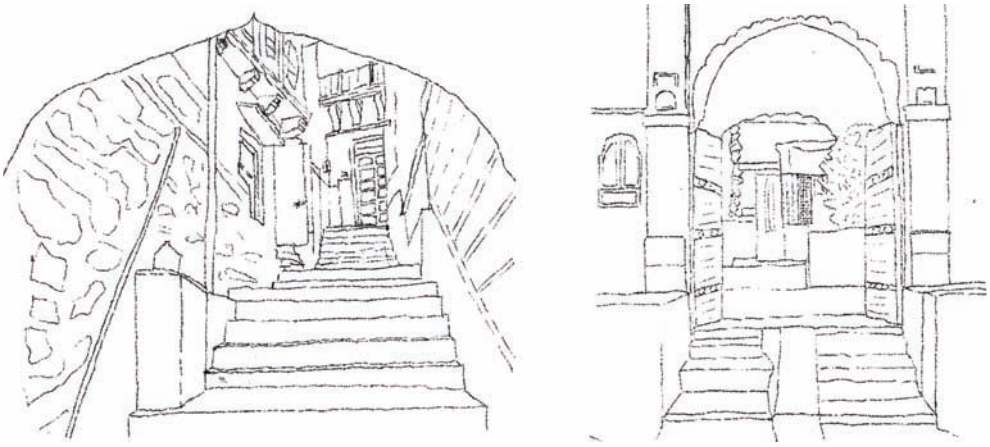

Figure 2: preliminary sketches of the vernacular heritage in Jodhpur (hand drawings by the author)

retical and methodological approach of preventive restoration (rather than deep intervention) should be developed using the knowledge of its historic characteristics. In order to have effective programmes of maintenance conceived through conservation plans, interdisciplinary and organised documentation activities are needed (Figure 2). These sources of information, able to target specific built architecture in all its aspects (historical, formal, figurative, symbolic, constructive, functional, etc.) can specifically inform the planning processes of the historic centre by continuously checking buildings' transformation over time.

As identified by the European Commission, one of the current goals in the area of Cultural Heritage is to raise greater awareness of its multiple benefits and present policy recommendations which aim to foster heritage's full potential as carried out by the "Cultural Heritage Counts for Europe" project. (For more information, see: http://blogs.encatc.org/culturalheritagecountsforeurope).

Following the UN indications, in order to achieve a sustainable development we should firstly consider the impacts on the cultural, socio-economic and environmental fields (Figure 3). An interesting overlapping approach can easily demonstrate that working on sense of place, educational knowledge skills and regional attractiveness (for example through the enhancement of historic city centres) could significantly improve the three subdomains mentioned above.

It is a matter of sustainability but, at the same time, of diversity and equality. As already understood by Claude Levi Strauss during the 1970s, "No doubt we take comfort in the dream that equality and fraternity will one day reign among men, without compromising their diversity." (Claude Lévi-Strauss, 1971). What is really in danger is not only the tangible part of cultural heritage but also our cultural diversity as human beings (i.e. traditions, style of life, cultural behaviours, etc.).

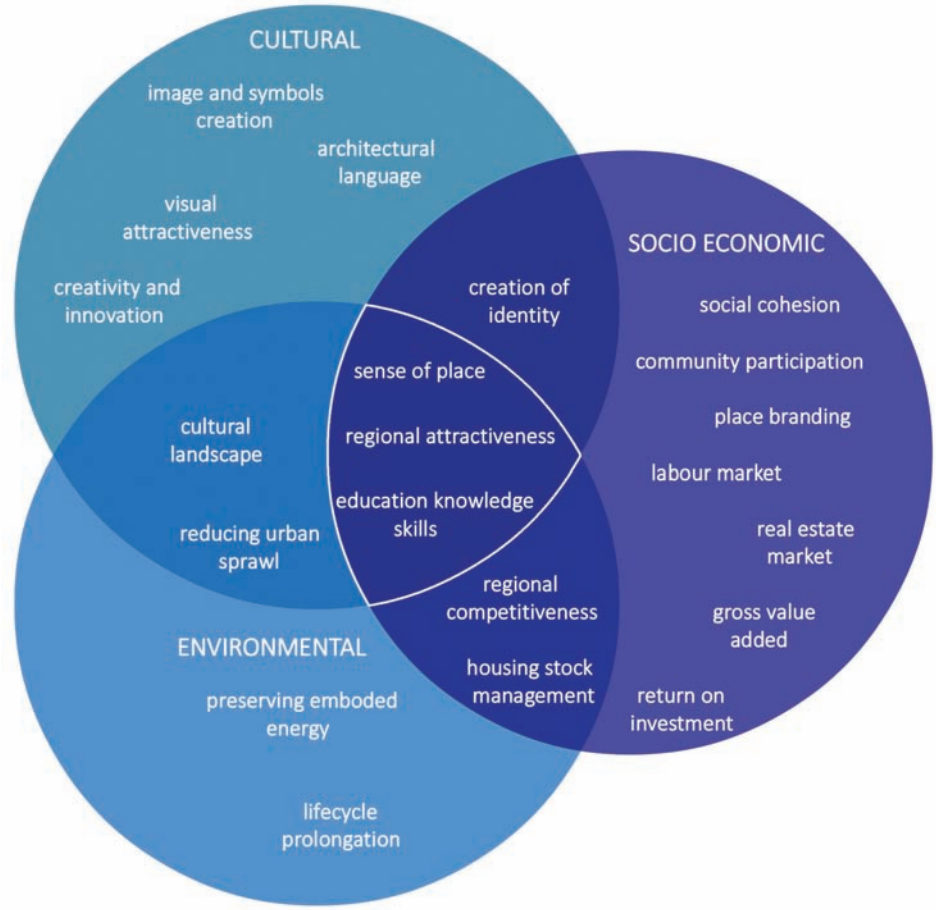

Figure 3: The different impacts on sustainable development as defined in the Cultural Heritage Counts for Europe project, a two-year project funded by the EU Culture Programme that aimed to raise greater awareness of cultural heritage (graphic elaboration by the author).

The research described by this publication has been carried out over five years, spent between Ferrara and Jodhpur, and was aimed at providing an innovative contribution in defining the organisation and procedural arrangements of integrated and interdisciplinary documentation activity for the survey, protection and enhancement of vernacular heritage. The field of investigation is slowly but persistently attracting students, teachers and professionals in India, and is increasing awareness of the value of this architecture. Even if only few students of architecture are keen to broaden their knowledge of historic architecture in India, wider cooperation and collaboration established through these activities will encourage the young generation

of architects to examine this topic.

As identified by J.T. Dallen and N. Gyan (Dallen and Gyan, 2009) one of the most frequent threats to cultural heritage sites (in Global South Countries) is the lack of management. In this framework participatory processes and audits, with the involvement of students and researchers, can improve the knowledge of problems related to lack of planning and maintenance.

This effect can be better explained by the concept identified by Simon Thurley, (Thurley, 2005), which defines a phenomenon called "The Heritage Cycle", an approach that gives us an idea how we can make the past part of our future and how awareness and capacity building activities can play a key role in fostering the value of vernacular heritage (Figure 4).

In principle, Thurley's concept argues that through the understanding of cultural

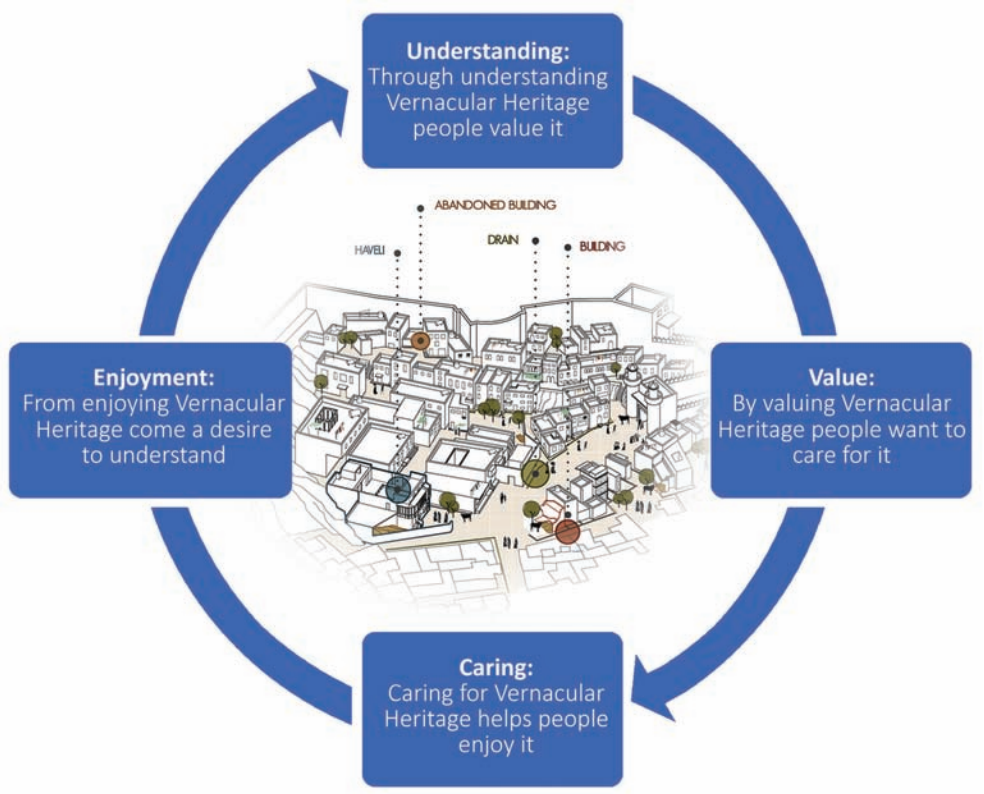

Figure 4: the "Heritage Cycle" as defined by Simon Thurley adapted by the author to the Vernacular Heritage

heritage people come to value it, and by valuing it people want to take care of it. Consequently, caring about cultural heritage helps people enjoy it and ultimately the enjoyment encourages the desire for a deeper understanding of cultural heritage, and so on again. This on-going process could be helped by taking advantage of new technologies (as can be seen at the "Jodhpur box", a mixed physical and digital exhibition arranged at the end of each workshop experience in Jodhpur). Digital media can be utilised for much more than re-creation or re-presentation of physical entities. It has the capacity to become a tool to capture both the tangible and intangible essence of cultural heritage and the society that created or used the sites (Kelay et al., 2008).

Learning from the old sustainability

As well as the preservation of this cultural heritage, we should also stress the importance of the increasing knowledge related to historic centres such as Jodhpur old city. Recently, several contemporary architectural projects built in many regions of the world have highlighted an important fact: most of the designers proposed solutions closely linked to the respective local situations. These local initiatives, defined as vernacular solutions (inspired by vernacular inputs), are inevitably and perma-

Figure 5: human activities (left) and nature (right): between traditions and sustainability (pictures by the Author)

nently tied to the geographic, topographic and environmental features of their land of origin; nonetheless, they have the capacity to showcase new approaches for a more efficient energy management, especially in terms of natural light and overheating protection (Vegas et al. 2014). This trend shows us that our vernacular heritage can help us to be more sustainable. New architectonic regionalism (also in India) is driven by solutions developed in dissimilar areas and mediated by the designers, whose creative capacity, design skills and knowledge originated from vernacular traditions. This is a promising start in developing an ecological approach to the study of vernacular buildings.

The layout, construction and use of human dwellings are based on a wide range of factors related to lifestyles and values concerning the social organisation of households and communities. In principle the buildings of the historic centre of Jodhpur are part of both a tangible and intangible cultural heritage that needs to be protected and enhanced by keeping it in use. A human ecology perspective stresses that adaptive processes for sustaining settlements are based on both ecological principles and cultural practices (Figure 5). No site of an existing or future construction should therefore be interpreted in isolation from all these characteristics; some cultural aspects such as studies and survey activities, protection and enhancement of the vernacular historic centre can demonstrate relevant best practices.

Currently, also within the blue historic centre of Jodhpur, as the indigenous knowledge of traditional building methods declined, the impact on the construction of the built environment, together with the consumption of materials and energy, increased significantly. Nowadays there are choices between traditional materials and methods, synthetic materials and new technologies; the former usually enable the use and reuse of renewable resources whereas the latter require more energy and more specialised expertise. Most modern materials and methods may produce more unintended ecological costs that the human populations will have to absorb in the future. Inadequate responses to current ecological, economic and social problems are due to several reasons, including misconceptions about people/environment relations, inappropriate practices, and the lack of a collective project for the common good of current and future generations.

Conclusion

The city centre of Jodhpur has been slowly altered over the centuries but at the same time, several capacity building programmes were implemented in order to also increase the skills of professionals and experts in the conservation of the city. Within this framework, the research carried out by CEPT and the Architecture Department at Ferrara University shows how the integration of diverse stakeholders stimulated a better evaluation of urban survey techniques to be applied to Indian Cultural Heritage (Balzani et al. 2015). The workshops and experimentations identified functional methods for the analysis representation and diagnosis (Figure 6) of the architectural heritage of the Blue City, demonstrating the potential of educational activities imple-

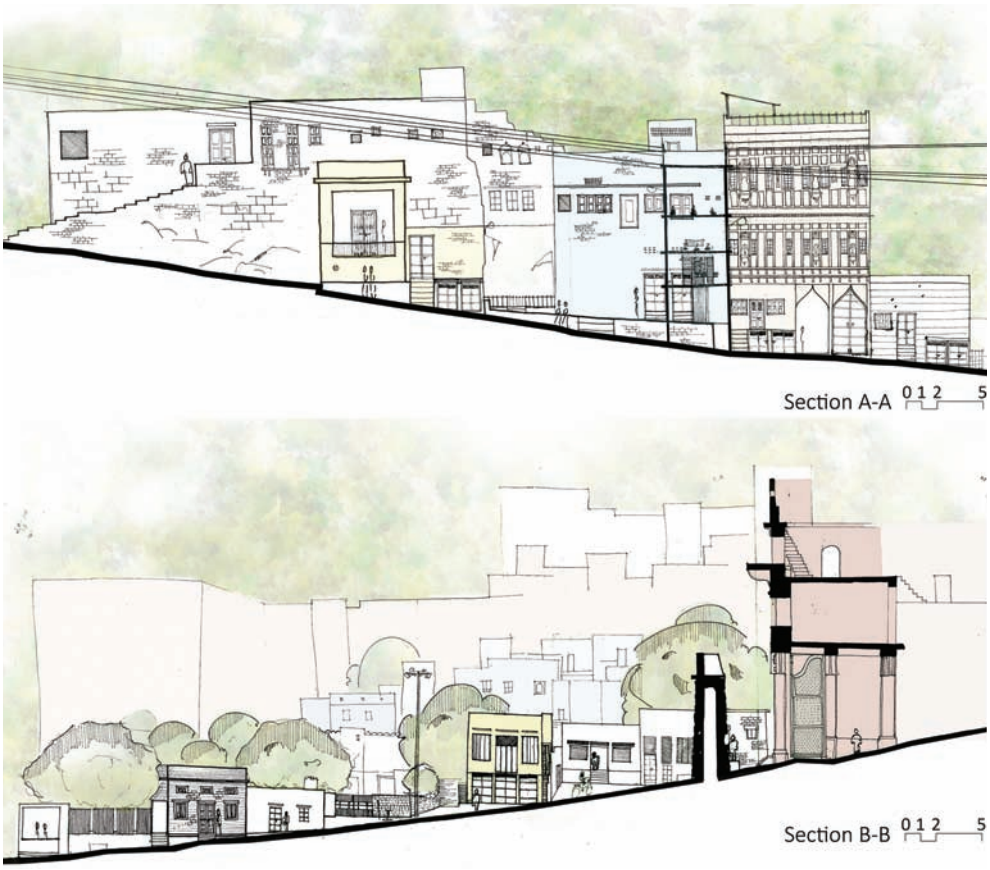

Figure 6: drawing and understanding vernacular heritage in Jodhpur. (Drawings by students of the workshop "Historic City Centres", 2017).

mented from an ecosystem perspective.

Individual and community awareness, education and consciousness are the prerequisite for a public commitment to the redefinition of goals and values that ensure a more balanced use and a more equitable distribution of all kinds of resources.

It is important to teach young students about the mechanisms that sustain human beings, which depend on their capacity to adapt to changing local conditions, such as climate and the availability of resources - lessons that can be learnt from historic centres.

Students and researchers must understand and be very aware that any given human habitat is also a small part of a much larger region that has interrelated sets of indigenous, ecological, biological and cultural characteristics (Figure 7).

Figure 7: Arna Jharna (about 15 kilometres from Jodhpur), the Thar Desert Museum conceived by Komal Kothari, renowned folklorist and ethnomusicologist. It is an example of preservation of vernacular inputs and oral traditions to be passed on to future generations (picture by the author)

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DOCUMENTATION

Negotiating conservation and development: historic core of Jodhpur

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1459 AD, founding of a new city by the ruler of Marwar Rao Jodha, marks an important phase in the evolution of urbanity in western India. This city of Jodhpur, named after its founder, is preceded by Jaisalmer, a trading town further west in the middle of the desert. Jaisalmer was initiated in 1156 AD. Both these settlements demonstrate a very high level of construction methods addressing harsh contextual constraints–particularly the hot dry climate and use of locally availability sandstone for building. Yellow stone used in building Jaisalmer is found in two varieties–sandstone and limestone, both are dense and can handle weathering very well. On the other hand the red sandstone found in the vicinity of Jodhpur is more porous and disintegrates much faster. It cracks, flakes and crumbles leading to greater complexity in conserving buildings inJodhpur.

When Rao Jodha decided to shift his capital from Mandore to the new location, it was the Fort Mehran which was first conceived and set on top of the huge rocky outcrop. And till today, despite its huge size and location on top of the hill, the fort remains geographically central to the city of Jodhpur. Paradoxically, despite its core position, it was an exclusive place–central, domineering and distant.

However, the fort with its palaces has been transformed into a fabulous place in public realm without compromising the key objectives and fundamental principles of conservation andadaptive reuse. This has succeeded in creating a new order of public domain and functional links with the city (Figure 1).

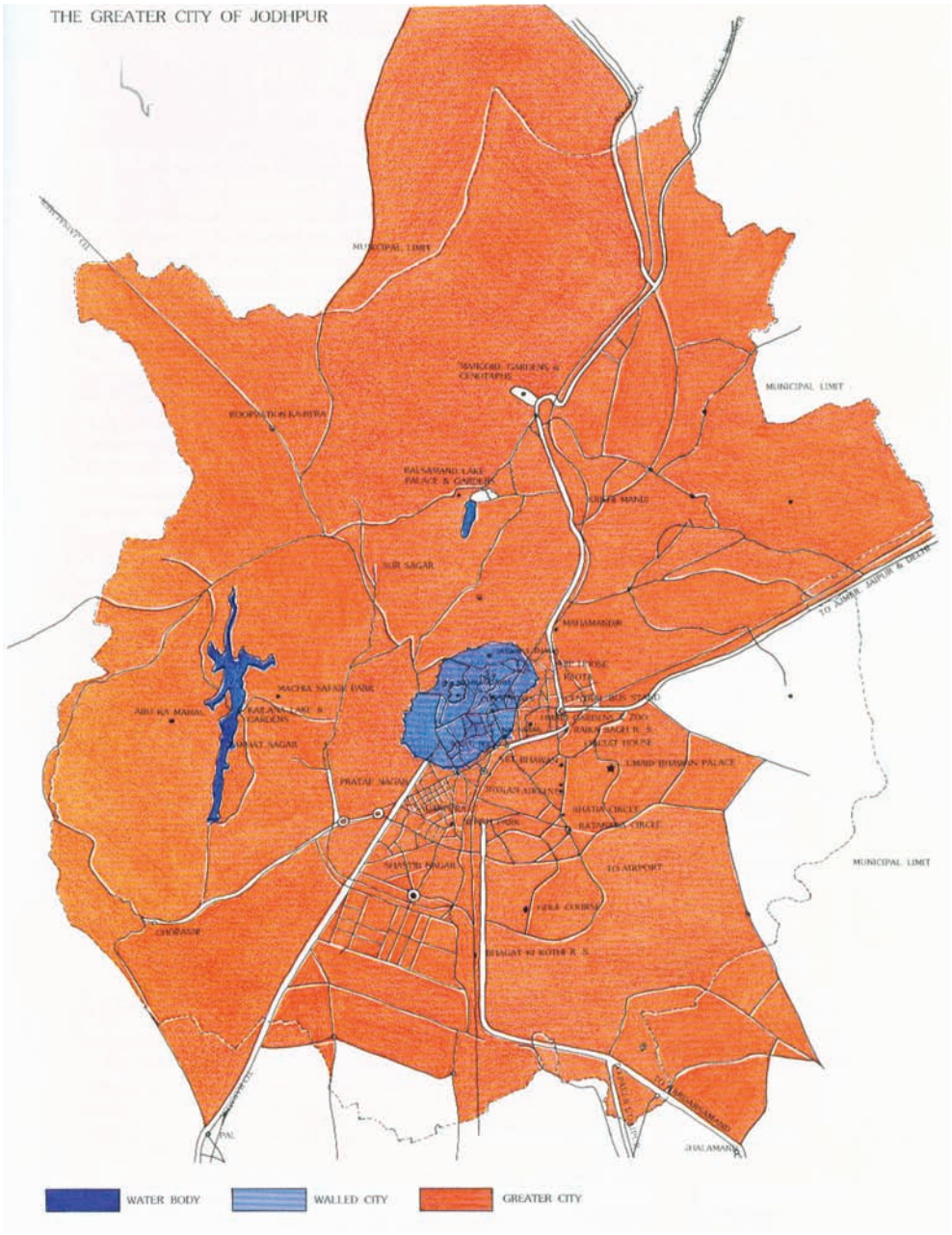

Figure 1: historic city of Jodhpur in its setting

Figure 2: on the left: view of Mehrangarh showing massive form on top of the hill. The fort can be seen from a long distance. On the right: the palaces on the upper level of the fort are reached by a meandering ramp. Recently an elevator has been installed to facilitate visitor movement

Conserving Mehrangarh

"In 1972, Maharaja Gaj Sigh II, then twenty four, set out to organize his royal inheritance in Jodhpur, including the Mehrangarh. Remarkable foresight encouraged him to create a trust the *Mehrangarh Museum Trust* to manage and safeguard the fort and other assets within it (Figure 2). The initial efforts of the trust were focused on preventive measures to arrest further damages and to organize some display of its objects (Figure 3). Sagat Singh was put incharge of this project and slowly, but surely, the fort was opened to public. However, the true potential of the fort lay dormant." (Jain, 2017). Respecting the basic values of form and spatiality of the fort, adaptive reuse as a Museum has transformed the place from a financially constrained asset to an enormous economic resource.

As a matter of fact it now reaches out to support other socially desirable objectives in the region (Figure 4). Although the conservation efforts were initiated in the

Figure 3: some of the conservation work done in the Mehrangarh

Figure 4: Mehrangarh with its fortification, palaces, gardens and water bodies. Construction of masonry dams over the valley area in the northwest resulted in two lakes, the Ranisar and the Padmasar. While the water of the Ranisar has been used by the fort, the Padmsar serves the people in the area around it

late 1980, major conservation of the fort started in 1993 when a comprehensive master plan for conservation and adaptive reuse was prepared.

The basic principles included minimum intervention in the original order, museum to respect architecture, spaces to be restored for their original quality, new public realm to be negotiated for the advantage of the both the royal inheritance and the people. This has successfully been achieved. Mehrangarh is the most valuable asset of Jodhpur, both for the quality of its architecture as well as the economic

Figure 5: views of the interior spaces of the palaces displaying objects for the museum

activity it creates. It receives more than a million national and international tourists every year generating funds for ongoing conservation work and provide direct and indirect employment to thousands. It has successfully demonstrated high quality of conservation work, very apt adaptive reuse, a museum of its inheritance, and a large number of national and international visitors (Figure 5). The fort is a studio for architects to learn about manifestation of climate responsive architecture, a laboratory for conservationists, a workshop for skill development of craftsmen and above all on economic model of self-sustaining heritage conservation project. This effort is an outstanding example of perfect balance between conservation and development. Several national and international organations support heritage conservation. Funding has also been extended to several projects in India. The issue is not so much about funding as it is about post conservation sustainability. This aspect needs to be incorporated in the initial plan proposals.

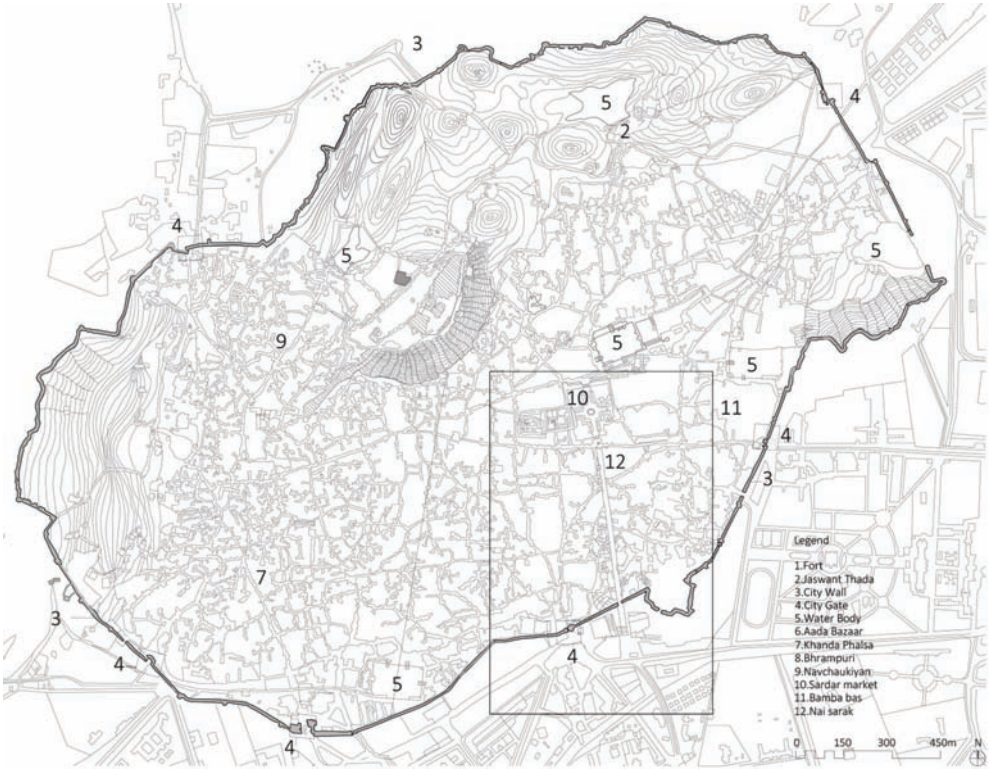

Figure 6: the historic city of Jodhpur with the character of its fabric. Entire northwest is full of contours and remains unbuildable. The rectangular box shows location of a new road (Nai Sadak) which was cut through the fabric in the late 1970s

Spatial organization

Although the city was planned at the same time as the fort, its spatial structuring was not based on a gridiron pattern (Figure 6). Instead its organization adopted organic principles respecting topography both for its slopes as well as the natural drainage of the storm water. With the fort at the centre and two main bazaars at the foot of the hill, the streets negotiate the rain water channels, the terrain and the radial connectivity of the city gates with the centre of the city. Streets are narrow, meandering and respond well to the climatic conditions. The city, however, with its mixed population comprising of several social, cultural and economic strata grew incrementally over a long period of time. The spatial disposition of the communities was governed more by social parameters rather than the economic status. This created a mix of various economic categories with a more homogeneous social fabric. While market places became common meeting places, bazaars and edges of the water bodies created opportunities for shared community spaces. As the city grows the malls and other physical infrastructure is gaining popularity in the outer city, the

Figure 7: dense building pattern of the city (on the left) and a photograph from the fort showing its south western corner with a temple and part of the city further down (on the right)

inner city continues to sustain its character and activity pattern. But the threat of tourism-centric development looms large on the historical character of the place. The major challenge for the inner city lies in its ability to negotiate conservation of its cultural and architectural assets with development. This is the primary issue. Streets and small sqaures created along the movement pattern charectrise the urban form of the inner city (Figure 7). Since the dispersion of communities is based more on caste system rather than economic class, the grouping shows small and large houses in close proximities. Trasformation of these areas is still on the basis of individual properties as compared some larger cities where developers combine few properties to create larger schemes and in the process destroy more. This remains one of the biggest chellenges, even for Jodhpur.

Conservation versus development

Conservation and development of the inner city is seen as a potential area for tourism with all the attachments of fiscal attributes and impact on the cultural fabric of the living communities. While tourism does bring in economic advantage, it does cut through the lives of the people who live there. At the same time tourism plays an important role in valorizing the historical value of the physical fabric of the area.

Figure 8: the site plan shows typical streets from Brahmpuri, note the small and large houses in close proximity

On the other hand new constructions replacing old buildings can sustain community life as long as the landuse and the density pattern is maintained in conformity with the existing one (Figure 8). This, however, does not necessarily retain the homogeneous nature of the community structure. In a micro-neighborhood, in other words a cluster of houses, people share a lot more when they belong to the same caste or community group. Their celebrations, festivals, religious activities and social rituals bring them together more than their economic status– the class group.

Owners of heritage properties, original or the new ones resort to commercial exploitation by converting than into tourist facilities, such as heritage hotels, souvenir

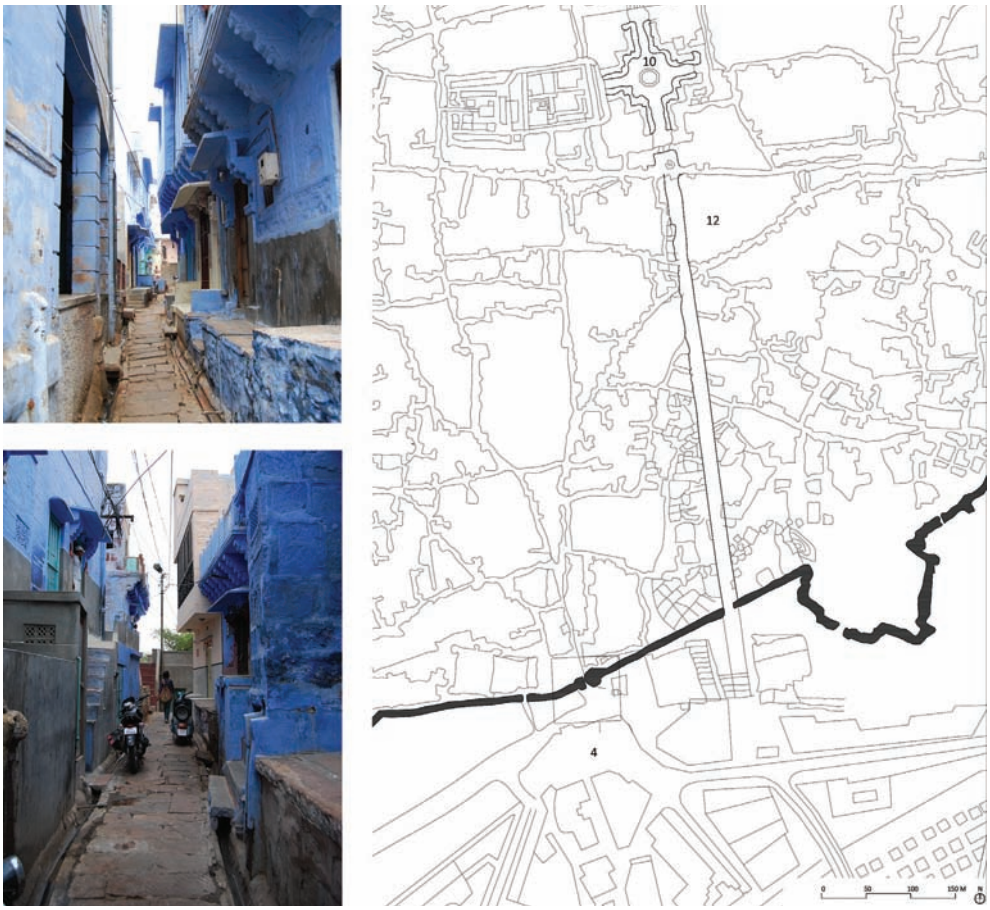

Figure 9: view of typical streets of Brahmpuri (on the left) and (on the right) a plan that clearly shows a super imposition of an idea which is alien to the context and how it divides the east part and the west part.(for location refer to Figure 6)

shops and other attractions for tourists. This generates good economic activity but at the cost of original fabric and activity pattern. A major intervention within the fabric of the historic city took place in the late 1970s when Nai Sadak, new road, was cut across to connect new developments outside the old city with a new commercial centre at the core of the city. The new square with shopping around and a clock tower in the centre is known as Sardar Market (Figure 9).

The city plan shows the location of the Nai Sadak and how it cuts across the fragile fabric. It draws from a classical sense of axiality with scant respect for the existing organic pattern and how the new road connects to the other streets. Fortunately this idea was not tried any further and most of the city fabric is intact.

Managing transformation

There are no two views about the fact that inevitable pressure of development will bring about urban transformation to the historic city of Jodhpur. In order to safeguard this valuable heritage total control on new constructions or its functional up gradation is not possible. However, an urban heritage management strategy followed by a plan and control mechanism can save a lot in the city. The following principles can guide preparation of such plan:

1. Setting out a specific heritage conservation philosophy for Jodhpur, which should aim at safeguarding the urbanity of the city rather than each and every building.
2. Urbanity here includes over all urban character generated by streets, squares, bazaars and buildings. These elements of urban form should be the primary focus areas for the address.
3. Buildings with historical facades and significant architectural features should be preserved and restored, specially the facades. Internal changes and improvement of the infrastructure inside the buildings should be permitted.
4. In case a building has to be replaced, its height and volumetric control should address the context.
5. New buildings should also show concern for traditional materials and cli matic expectations. Such expressions need not be imitative of traditional building language.

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Survey and representation of historical surfaces: the colours of Jodhpur

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Documentation, survey and representation processes aimed at heritage preservation are a complex task, requiring an integrated and "cross-disciplinary" approach, able to assess and include different features at different scales. The so-called "critical survey" means how to approach heritage through documentation, visual investigations and critical analyses, addressing central issues in order to frame interpretations and priorities.

In this framework, the methodological approach to be implemented in facing the issue of documentation and conservation (or integration, restoration and, sometimes, replacement) of the chromatic finishes is the main point of all the operations that it is possible to accomplish in understanding the identity of the historical surfaces (Balzani, 2011).

Historic research, preliminary investigations, materials and building techniques knowledge, documentation and integrated surveys are becoming more and more relevant for architectural surfaces and materials preservation. Survey and instrumental investigations can play a substantial role within the conservation project, the project development and the restoration works assessment and testing (Santopuoli, 2015).

The features of the historical city centres are the result of layered changes that, over the centuries, led to the addition of architectural elements, the replacement of deteriorated parts, the variation of materials and colours. Thus contributing to a consolidated stratification, as a testimony of the historical and constructive events of the individual buildings and of the urban fabric to which they belong.

Figure 1: View of the historic city centre of Jodhpur. Photo credit: Sanket Mhatre

Very often, historical city centres have undergone in the past - and still suffer today - slow transformations caused by continuous interventions, which, if not carefully assessed, are likely to lead to the loss of the historical features of the urban landscape. The surface of the architecture with its colourings is the place where the time is layered (Figure 1). Historical surfaces are a document, a historical testimony and, at the same time, becomes representative of the aesthetic significances of the building, whether it is a monumental architecture, or a simple building, however an integral part of our memory (Santopuoli et. al., 2012).

Methodological approach for documenting colour of historical centres

A holistic methodologic approach for documenting the historical heritage and, in particular, the surface features, foresees an integrated and interdisciplinary procedure based on the "critical" survey. That means knowing, understanding and managing formal, dimensional, metric and geometric, chromatic, perceptive, historical and conservative values and significances. Thus, the survey becomes a tool for pre-di-

agnosis, a basic means for analysis of the historical phases and construction techniques, the state of conservation and the deterioration processes and the state of degradation of the building. It is a process of direct and continuous contact and interaction with the building, aimed at a technical and historical-critical evaluation and an essential instrument for the purposes of conservation. Graphic representation should be managed accordingly, in order to collect all the information and documentation on the work according to the purpose of the survey itself.

Before assessing the possible need for instrumental surveys and diagnostic investigations, the steps for understanding the monument involve a procedure from the macroscopic to the microscopic issues, in order to reach and overall assessment:

- Location/site, context, orientation/positioning, urban scale features (sketches, schemes, context analysis, landmarks, road sections, etc.);
- Geometry and compositional features;
- Analysis of materials (differentiating the support from the finishes);
- Analysis of construction techniques;
- Colours of the facades;
- Analysis of the main degradations and state of conservation;
- Identification of the possible main categories of conservation/restoration intervention;
- Overall values assessment / main significances.

For the analysis of the surface characteristics and for the survey and documentation of the colour, in addition to the direct photographic survey by means of chromatic reference samples or visual comparison by means of the Munsell Book of Color, multispectral instrumental investigations can be applied. This kind of tools allow investigating surface specifications and characteristics by studying emitted radiations, such as spectrophotometry or the analysis of the reflectance data (intensity values) obtained by 3D laser scanner survey as an additional aid for surfaces' characterization.

While spectrophotometric survey is specific for colour analysis as a non-destructive technique able to collect qualitative and quantitative data, the intensity values surveyed by laser scanner are functional to the 3D models visualization and management. These data, however, can be used to visualize and analyse materials and surface specifications since in the point cloud resulting from the 3D survey a specific reflectance value is linked to different materials. Therefore, in addition to metric-morphological data, 3D digital model allows showing surface specification (roughness, cracks, surface patterns, crusts, deposits, biological patina, etc.) and different materials (stone, brick, mortar, plaster, wood as well as wall paints or other decorative elements). Of course, these results cannot be taken uncritically but need to be compered to visual analysis, diagnostic survey, maps of the state of conservation, degradation issues, outcomes from a general inspection of the overall building,

macroscopic analysis of deteriorations on the basis of the nomenclature of the UNI Normal 1/88 recommendation.

Regarding processes for colour acquisition (Figure 2), tools and instruments available nowadays offer different solutions, also for management and rendering of digitized historical building and sites (Gaiani et. al., 2014).

This integrated procedure allows:

- checking measures and morphological data and creating 3D digital models of architectures and sites for different evaluation and assessment (e.g. dimensional, structural, colorimetric);
- implementing procedures of digital acquisition of surface specifications, including chromatic descriptions;
- providing 3D virtual models (Marotta, 2015) collecting different data and features as a support for project development.

Actually, the study of the state of conservation, such as descriptive and qualitative analysis, had over time an increasingly emphasized scientific characterization. Nevertheless, if the need to preserve historical artefacts requests to investigate materials in order to improve preventive actions and that this goal can only be achieved by means of survey and analysis, scientific investigations do not have to move the focus of survey and assessment from the historical-architectural field to the chemical-physical one.

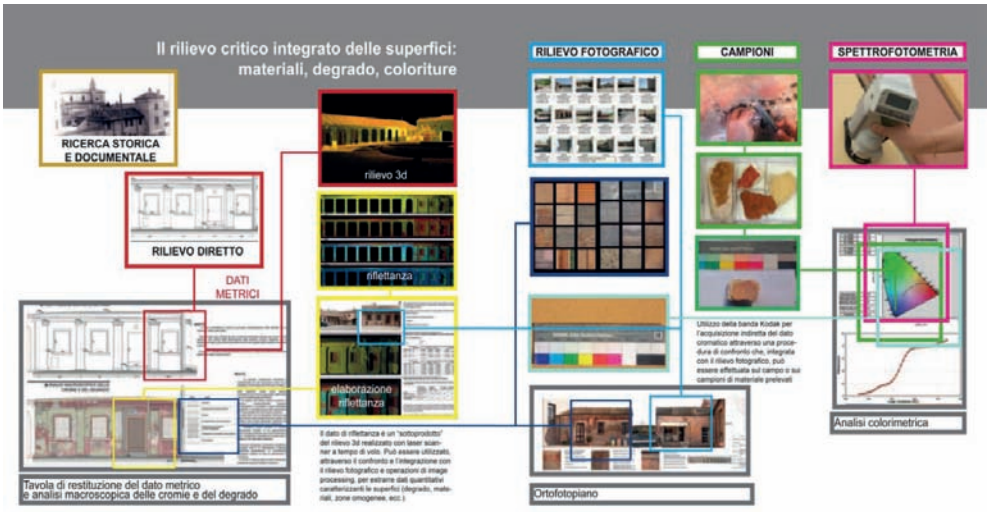

Figure 2: Schematic representation of the methodology of integrated critical survey of architectural surfaces: materials, state of conservation, colours

The historical researches, surveys and in-depth scientific investigations aimed at the preservation of the architectural heritage should be integrated and coexist in a balance in which investigations have to meet historical-critical needs and requirements.

This approach has been applied during survey/design workshops developed by the Department of Architecture of the University of Ferrara together with the CEPT University of Ahmedabad in the historic centre of Jodhpur focusing on heritage documentation. During these experiences, students had the opportunity to set up a methodology of integrated survey and documentation in order to meet the main needs of knowledge, understanding, refurbishment and conservation of the historical city. One of the most significant features is the characteristic blue colour still widespread on different surfaces and historical architectures. Therefore, the analysis of the surface characteristics, including the geometric, architectural, decorative, material, conservative and chromatic aspects has been and essential step of documentation for understanding and preserving historical heritage.

On the one hand, historical chromatic surfaces undergo differentiated transformations and require implementing a sensitivity at architectural or decorative detail scale, on the other hand, the urban or landscape scale arises the problem to understand and interpret the perceptive relationship with the structure of the fabric within a constantly changing chromatic and material climate.

Different approaches can be applied, respectively critical-conservative and critical-operational, formulated starting from the belief that on the complex, variegated and changing reality of the historical fabric cannot be applied a univocal rigid regulatory grid or draft a colour plan.

The preservation of colour of the external surfaces assumes a crucial role in the recovery or in the statement of identity of places and architectures (Maietti, 2011).

An accurate and overall on-site survey allows improving the awareness of the needs of the historical city in order to plan maintenance processes able to preserve heritage to future generation and to understand how the development of the historic city could meet the need of preservation of traditions and cultural assets.

On-site survey of Jodhpur colours: applied methodology

One of the most significant features of the historic city centre is its characteristic blue colour still widespread on different surfaces and historical architectures. Therefore, one of the on-site survey activities during educational workshops in Jodhpur was focused on the analysis of the surface characteristics, including the geometric, architectural, decorative, material, conservative and chromatic aspects.

An accurate and overall on-site survey allows improving the awareness of the needs of the historical city in order to plan maintenance processes able to preserve heritage to future generation and to understand how the development of the historic city could meet the need of preservation of traditions and cultural assets (Maietti, 2014).

Diagnostics survey and representation should guide to the use of visual, diagnostic and documentation methods in order to deal critically the study of heritage.

During the workshop experiences, integrated survey processes were tested and applied in order to provide tools for an overall "reading" of the uniqueness of the local heritage and to point out possible conservation strategies (Figure 3). Survey and representation processes aimed at heritage preservation have been managed and taught as an integrated and "cross-disciplinary" approach, able to assess and include different elements of the survey at the urban scale. Therefore, during the activity of survey and documentation, the first step was usually the explanation of the aims of the so-called "critical survey": how to approach heritage through visual investigations and critical analysis, addressing central issues in order to frame interpretations and priorities.

Drawing and graphic representation is a basic tool in any process of documentation of morphological, material and chromatic features, focusing on the comprehension and analysis required to collect data and information (Chiavoni, 2017).

Figure 3: some phases of on-site colour survey: direct and spectrophotometric methodologies

Figure 4: architectural features and colours of of Jodhpur. Photo credit: Sanket Mhatre

Photographic survey and on-site sketches were the basis of these preliminary investigations.

Photographic survey is aimed at knowledge, documentation and assessment of the overall conditions and state of conservation, is a support for representations and drawings; moreover, it allows setting up digital archives for management of conservation works. As well as the graphic survey, the photographic survey has to be considered a stage in the "reading" of the monument and it starts form a critical pre-understanding of the object to be studied. Photographic survey is also relevant in order to approach a methodology of systematic documentation, from the context and the environmental conditions to architecture general views up to details (Figure 4).

Diagnostics issues survey and representation were a following step, by using graphic standards to point out, describe and graphically represent deterioration morphologies. The aim of this procedure is guiding to the use of visual, diagnostic and documentation methods in order to deal critically the study of heritage and particularly of historical architecture (Figure 5). Survey is a basic step of technical and historical-critical evaluation and it is an essential instrument for the conservation project.

At a later stage than the analysis of location, context, social attitudes, architectonic

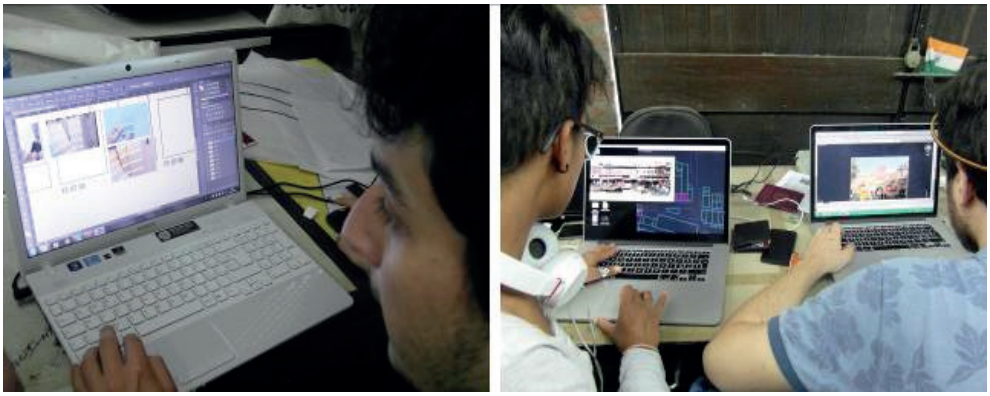

Figure 5: off-site post-processing of documentation related to surfaces' features and colour survey

features, analysis of materials, constructive techniques and state of conservation, a visual-perceptive chromatic survey is usually performed, by using a reference sample encoded in colorimetry. This methodology seeks to identify the chromatic hierarchy of each urban facade and the relationship between spot hues and permanent tones of the backgrounds compared to those of the decorative elements (Borin et al., 2018).

During the researches carried out in Jodhpur, starting from the visual analysis, the survey of facades' colours has been implemented by using this thematic survey as an essential tool for pre-diagnosis. Outcomes from on-site investigations and surveys should be compared with historical researches. In addition to the overall methodology of approaching heritage knowledge through urban scale surveying, some thematic surveys have been carried out in order to demonstrate the procedure for surveying surfaces and colour characteristics.

Within this process, the crucial step is to understand which samples have to be considered for the survey procedure, teaching what to observe and analyse, and how to interpret what the monuments still today "are telling" us. For instance, after some survey campaigns, some considerations have been pointed out regarding the chromatic influence in urban paths and spaces, according to the shape of urban areas (streets, squares, open public spaces, etc.). The chromatic multiplicity and differentiation of background colours and decorative elements is an additional features detected, in addition to the hierarchy, saturation and colour' tones (Figure 6).

These results are probably generated by a spontaneous practice or tradition of using spot colours (hue) mixed together without pre-sampled colours in the creation of tones and undertones. Replacement in chromatic metamorphism can be found mainly in an attempt to simulate the colours of the main permanent natural stone used in construction. On the contrary, the chromatic metamorphism of the decorative elements appears strongly compromised. Moreover, the background colours

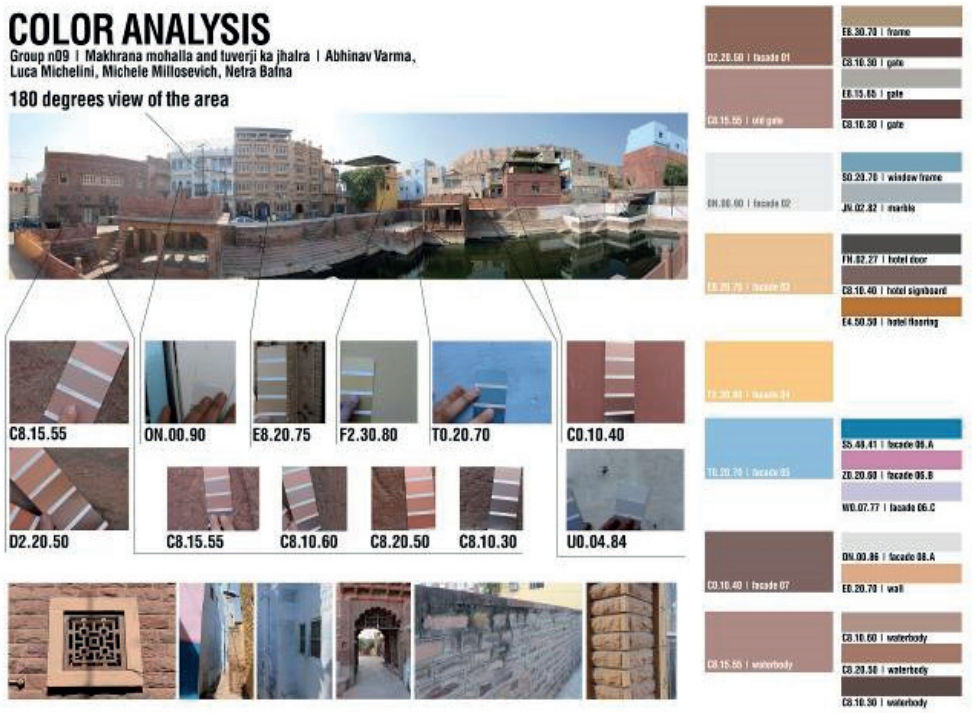

Figure 6: Analysis and representation of colour surfaces surveyed by the students

of some tones that characterize the cityscape and the urban context (as the blue colour) is used from the top to the ground level, involving each decorative feature of the façades.

Conclusions

The documentation of colours of Jodhpur historic surfaces has been an interesting educational experience thanks to the intensity of the perceptions that the vibrant built environment is able to "communicate".

The Blue City actually unveils, together with the main hue that characterize the historical city centre, a great richness of colours and textures of traditional materials.

Educational experiences in Jodhpur gave younger generations of future professionals the opportunity to understand the significance of preserving the historic city, including tangible and intangible assets.

Working together, Italian and Indian students have shared different cultures and approaches in understanding the complexities of textures that the centuries have layered to create such an amazing cityscape.

The overall interdisciplinary approach aimed to include documentation, analysis and data management in order to combine survey, representation, visualization, protection and preservation issues. As a result, the architectural documentation was integrated by information related to materials and state of conservation, diagnostic procedures and the documentation of intangible values.

Researches and on-filed thematic surveys focused on the facades' colours analysis achieved in Jodhpur, allowed pointing out some relevant considerations regarding the chromatic influence in urban paths and spaces, according to the shape of urban areas (streets, squares, open public spaces, etc.).

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Historical cities centre processes of transformation documentation and analysis

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The protection and valorisation of cultural and environmental heritage in the development of urban areas mainly refers to the processes of both knowledge and individual and collective memory. Historic cities, buildings and sites have a central role in order to create and reflect national and individual identities, constituting a physical continuity with the past. In order to support awareness of the state of art of preservation, the knowledge through memory processes are fundamental to make preservation and valorisation of tangible and intangible cultural heritage, as well as technology transfer activities, effective.

Furthermore, it is increasingly recognized that this scenario affects the reuse and recycling of urban area as well. However, there are main issues to take into account with reference to the transformation of historical buildings in a different way from in the past. Today, 55% of the world's population lives in urban areas, a proportion that is expected to increase to 68% by 2050. Consequently, the preservation and renovation processes are expected to increase in next few years up to 90% of the whole construction activities. In this scenario, the drawing assumes the importance of a document and protocol for representation of tangible and intangible cultural heritage. Documenting the historical cities centre transformation has the aim to enhance the physical and cultural stratification in relationship with the contemporary use of the buildings, cities and landscape. From a preservation point of view, the fact-finding, drawing and representation phases support the analysis of compatibility between historical value and new use.

During the 2016 International Workshop "Jodhpur the blue city"

Figure 1: (top) city landscape (Photo credit: Olaf Kruger) and (bottom) detailed views of the relationship between public and private spaces

a group of both Italian and Indian students developed a series of architectural surveys for the documentation of the historical city centre of one of the most important ultural heritage site located in the state of Rajasthan. Meanwhile, students took the opportunity to conduct interviews in order to verify inhabitants' awareness in regard to cultural heritage.

Documenting historical cities centre transformation as a protocol for the project

The survey, representation and analysis of historical cities processes of transformation are complex tasks, which required a holistic approach in order to understand

and include geometrical and spatial attributes, technologies of construction and architectural values from both an historical point of view and critical perspective.

Moreover, international teaching activities in the field of Survey and Representation for preservation, renovation and valorisation projects put in evidence the importance of the debate between Italian and foreign students. The first ones because of the attitude to represent the layering processes, which characterized the historical buildings and sites, the second ones in quality of witnesses of genius loci in order to analyse, distinguish and understand cultural values of existing buildings through architectural survey (Giandebiaggi, 2014). In fact, the drawing and representation phases deal with the analytical phase of the existing buildings, regardless of they are conducted, aimed at the understanding of the geometrical, spatial, constructive and linguistic attributes from an historical-critical point of view, even before the evaluation of the conservative state of the artefacts.

The teaching activity of many years deals with, in reference to the several workshop editions, the development of a methodological path of specific knowledge in order to represent both material and immaterial characteristics of the "Blue City" architecture and historical city centre processes of transformation. The project areas were identified with the aim to represent the geometric, spatial, stylistic attributes and use of the building as well as the sustainable tourist development of historical city centre (Figure 1). In this scenario, didactics actions by means of low cost survey techniques, digital tools for representation, exhibition design and urban analysis could be very effective in order to enhance and preserve Indian cultural heritage (Balzani et. al., 2018).

Methodological approach for documenting historical cities centre processes of transformation

Despite the availability of digital surveying tools, a traditional survey, conducted through traditional tools and techniques, could be fundamental to take the survey effective for a specific purpose in a complex urban scenario such as the Jodhpur one. Moreover, a fast "critical survey" should lead to perform preliminary assessment for building diagnosis.

Definitely, before managing more complex analytics campaign, students were asked to understand measure and collect data about buildings characteristics in order to train the following areas of competences, knowledge and skills:

- Architectural surveying of historical buildings settlement;
- Understanding urban structure (the public and private spaces, the archi tecture of the "connective tissue") (Balzani, et. al., 1989);
- Identifying, measuring and representation of the elements of the "connecti ve tissue" such as pavements, courtyards, covered walkways, ;
- Reading, measuring, representation of the urban facades in relationship with public and private spaces;
- Surveying and representation of the historic facades composition;

- Analysing, measuring and represent the proportion among structural and non-structural elements in order to identify building modifications;
- Analysing, measuring and represent the facades proportion in order to un derstand original use and new one;
- Identifying and represent the different construction materials and techni ques (from the historical ones to new interventions) in order to verify the presence of both materials and techniques which are not consistent with the historical context;
- Identifying and represent state of conservation of the historical buildings (detailed architectural elements specification sheets);
- Survey and representation of historical surfaces;
- Photographic survey;
- Understanding the field of architectural urban survey;
- Managing the representation of the collected data for both experts and ge neric public;
- Describing inhabitants habits and needs.

Nowadays, the availability of new and low-cost integrated technologies (3D laser scanner, infrared camera, drones, etc.) allow both students and professionals to optimize and to speed up surveying activities in order to carry out, if well performed, more accurate analysis. Moreover, the results of similar technologies could be integrated in a single 3D model, such as BIM model, which allow all the actors involved of new opportunity to dynamically update the model.

Despite Italy still occupies a marginal role in this field of application of BIM tools

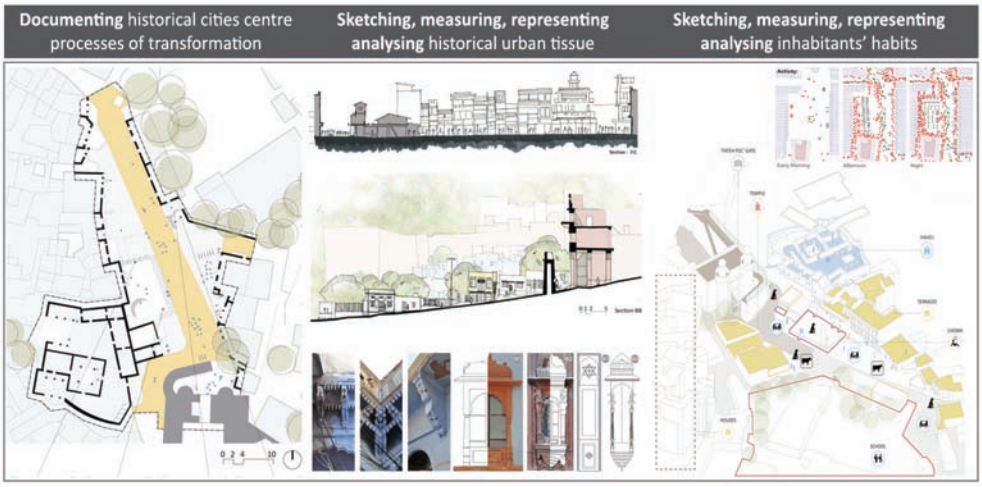

Figure 2: methodological approach for documenting historical cities centre processes of transformation

and methods, Italian historical cultural heritage is emerging as a unique context to verify the impact of BIM process for the existing buildings project management. Therefore, both national and international teaching activities are changing as a result. However, to ensure that new opportunities for the management and enhancement of cultural heritage meet a sustainable approach and development it is not sufficient to rely on digital tools. It is of main importance to design and manage, from a holistic point of view, a critical survey which as to be verified systematically in relationship to the project scope (Figure 2).

Moreover, traditional and advanced survey and diagnostics integrated technologies could lead to more effective documentation process of the urban spaces modification. Consequently, it is possible to understand better the grammar of the historical city and to identify the "not enclosed" space, which is much more fragile than the enclosed space, because it is lived and used without attention and without referential processes (Balzani & Maietti, 2019).

During the workshop, students had the opportunity to experiment this approach to the preservation and enhancement of cultural heritage. Furthermore, training activities were an occasion to discuss about the importance of surveying for preventive and predictive maintenance. Preventive conservation is generally considered to periodically adopt measures to minimize degradation of cultural heritage, thus avoiding major interventions. Nowadays, thanks to the availability of key enabling

Figure 3: Jodhpur "connective tissue". Photo credit: Fasiol, Shresta, Qureshi

technologies such as sensors, there is the opportunity to perform predictive maintenance based on real-time monitoring. Consequently, it is possible to collect data about the degradation of a single material, elements or technological system instead of a standard behaviour of the same components. From a technology transfer point of view, a fast critical survey should be the basis for more complex in-depth analysis, which lead to better decision-making processes.

The didactic activities: data acquisition and data processing

Historical layering of the city of Jodhpur testifies the stately framework of the historical city (Figure 3) and it represents both the values and the social identity of the place. Moreover, thanks to the reading of the stratifications it is possible to recognize the relationship between public and private spaces (Balzani & Bini, 1988) and to draw and represent the interpretive map of both the needs and the behaviour of the inhabitants.

With reference to this scenario, in order to reach didactical objectives, skills and competences, the learning activity followed three main phases:

- Data acquisition, traditional survey and photographic survey were perfomed by group of both Italian and Indian students in order to document historical cities centre processes of transformation and degradation;
- Data analysis and modelling, metric-morphological data analysis and representation through 2D CAD modelling and digital orthophoto model;
- Data communication with reference to a variety of target groups, from owner and client to generic public, were put in place during the temporary exhibition at the Johdpur Mehrangarh Fort.

The first activity was performed on-site through traditional survey equipment such as professional tape measure, levelling rod and photographic survey in order to realize from the perspective views of the city to digital orthophotos of the facades and detailed views.

Meanwhile, each group of students interviewed the local inhabitants in order to collect data with reference to map and to interpret the social behavior. So as the representation of the data becomes territory design itself and the representations find in drawing (Figure 4), also in its more innovative and advanced forms, a useful laboratory that interrogates itself on up to date ways on urban reality, also in perennial becoming (Novello & Marotta, 2015). Subsequently, data processing were performed at CEPT University of Ahmedabad by groups of both Indian and Italian students in collaboration with Italian and Indian teachers.

Conclusion

Historic centres such as Jodhpur are rich of vernacular architectures, which represent a worldwide extremely vulnerable heritage. Moreover, vernacular architectures are rarely recorded or listed and important parts have already been lost. (Balzani et al., 2018). The integration of both traditional and digital documentation of his-

torical cities centre processes of transformation represents an opportunity to implement the knowledge of cultural heritage and to define more effective preservation strategies. This type of approach refers to a more complex data acquisition and data processing management. Definitely, it rely on both technical ability needed to perform reliable metric-morphological survey and competencies to understand and represent the memory of the place. Consequently, significant updating of skills is

Figure 4: workshop results

needed as well as ways of sharing professionals' knowledge among all the players in the construction sector (Balzani et al., 2017). Furthermore, the urban survey defines more complex scenarios in order to acquire and understand data, which are related not only to a building, whether vernacular or monumental, but to a part of the city as well. So as, the documentation process takes into account the relationship among buildings, facades as well as historical streets form and current use of spaces, without considering a single part of the urban space as representative of the entire city history and historical value (Vernizzi, 2009). From this point of view, the teaching activity in Jodhpur represents an opportunity to put into practice a holistic approach to preservation of cultural heritage. Moreover, to ensure that new opportunities for the preservation and enhancement of cultural heritage fit the habits of the operators involved, with reference to a specific background, it is not sufficient to rely on the

availability of low-cost technologies.

Since the effectiveness of systems, protocols and models identified is related to the capabilities, needs and expectations of the internal and external users involved. As a result, the learning activities took into account the process of data acquisition and data processing as well as the survey of the needs and expectations of both the inhabitants and a local stakeholder group, who are involved in the preservation and valorisation of Jodhpur cultural heritage.

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Charting the course: the water structures of Jodhpur

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The historicity of Indian culture is made difficult by "virtually no historical records worth the name … In India there is only vague popular tradition, with very little documentation above the level of myth and legend" (Kosambi, 1965, p.9). Documenting the remnant physical environment provides clues for interpretation to fill the lacuna. As Mainstone has said, "Much of the experience and knowledge, many of the insights, and even some of the wisdom of the past are accessible to us also through the written word and through surviving buildings and other artifacts. Thus embodied, traditions that have now, as living traditions, been changed out of all recognition are still, in part, accessible to us" (Mainstone, 1999, p. 75).

The physical documentation will allow interpretation, in varying degrees, of knowledge pertaining to technology, materials of construction, relationship to the environment, management of resources, social processes and such other.

Indian architecture received scholarly attention primarily for the iconography and historiography of its temples and monuments (Kramisch, Dhaky, Tadgell, Brown, etc.) and documentation of the house form (Jain and Jain, Desai). Architects, anthropologists, archaeologists and historians seek either the monumental and or the vernacular, but the public architecture of daily living is overlooked. The wells, tanks and lakes that dot the landscape of civilisation are relegated to a mundane presence. Traditionally called by a plethora of names in the vernacular like *sar, samand, vav, bavdi, kuan, kuin, bera, beri, sagar, talav, jhalara, johad, kund* they have an immediacy to society; the daily requirements and

Figure 1: Gulab Sagar tank The Gulab Sagar sits in the midst of the historic city and is one of the largest tanks

the essential nature of water enhance this relationship. As Anzuni observes "Of the four elements of the ancient Mediterranean cosmology, water is probably the one to whose control man has dedicated the most time, the one that more than the others has left its mark on human creation" (Anzuni, 2002, p.35). Mapping and documenting the architecture for water in Jodhpur fills, to some extent, the theoretical vacuum in architecture, as a medium of transmitting knowledge, except to corroborate 'facts' of history. It contributes towards a deeper understanding of the relationship of society and environment that the craftspeople of the time expressed in the architecture.

About Jodhpur

Jodhpur, located at the edge of the Thar, in the Aravalli range, sits in a transition region between the desert and the greener plains in western India. It constitutes flat dry land with shrubs and outcrops that are fragmented. A fort was constructed on Chidyanath's Toonk near Pachetia Hill in 1459 to shift the capital of the Rathores

Figure 2: Ranisar This reservoir, created by an embankment below the Fort provided water to the palaces

from Mandore. The historic city is a dense fabric of closely built houses with shared walls punctuated with chowks and courtyards. In the absence of river systems to sustain it, the town developed reservoirs, lakes, tanks, ponds
and wells that were diverse, unique and extraordinary in their architectural and spatial expressions. It contributed in converting this harsh desert terrain into a thriving trading settlement.

Patterns in the landscape

A listing of the water structures was first prepared by Y. D. Singh through meticulous reading of historic texts and physical survey, culminating in a pioneering research published in three books. According to Singh, there are 5 large lakes located on the outskirts of the city, 69 talabs, 21 nadis, 8 jhalaras, 30 tankaas, 249 open wells and 84 baoris totaling 466 water structures of which 133 are surface water structures and 333 are ground water structures. S. M. Mohnot and L. S. Rajpurohit carried

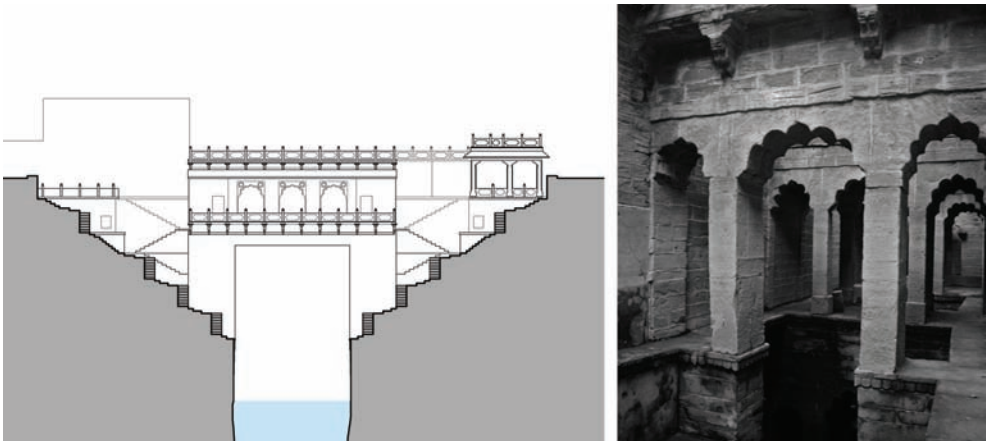

Figure 3: (on the left) Tunvarji ka jhalara, the cross section showing the criss-crossing flights of steps for access to the water; (on the right) Satyanarayan Bavdi a small compact step well in the heart of the dense urban fabric

out another listing that identified 5 large lakes located on the outskirts of the city, 40 talabs, 8 inside the city and 32 outside, 25 nadis, 5 inside and 20 outside, 5 tanks, 8 jhalaras- 2 inside and 6 outside, 125 open wells; SDS traced 98- 41 inside and 57 outside and 45 baoris, 16 inside the city and 29 outside. They located 229 different water bodies; of these, 75 were surface and 154 groundwater bodies (Figure 1 and Figure 2).

The absence of legible maps and drawings in both the listings limit the potential analysis of the spatial order of these water structures. As part of the research to extract the knowledge embedded in these water structures, the listings were collated, and eventually Singh's listing was used as the primary source of data since it was more elaborate on the locations of the water bodies as well as their year of construction and the patron. This became the basis of a survey conducted to locate the water structures on a map of the historic city creating a primary document enabling analysis of patterns of siting, type and relationships to context. All the reservoirs within the walled city were located, including those filled up in recent times. This is the first such instance of a comprehensive survey. Jhalaras and bavdis and several wells were also plotted (Figure 3).

The reservoirs outside the walled city were mapped on a Google Earth image. The mapping corresponds to Y. D. Singh's listing creating a data that includes the map, the chronology as well as the political history. It showed that the locations of the water structures correlated with the undulating topography in the northwestern part of the city where the general elevation ranges from 325 to 460 m above MSL. The southern plains are mostly at a height between 300 to 150 m above MSL. The mapping shows

that water from the hills and the higher slopes flows into the reservoirs and then into the city enabled by the natural gradient.

The city thus developed "downstream" poised to receive the water supporting Mohnot's observation that "Jodhpur is perhaps the only city in India where serious efforts had been made to conserve every drop of rain water ever since the city was founded" (Mohnot, 1986, p. 44). The mapping established the direct co-relation between the features of the landscape, the siting of the city and the flow of water revealing the personal and tacit knowledge of the craftspeople with respect to hydrology, hydrogeology and topography.

Learning from the type

Singh's initial listing classified the water bodies into lakes (jheel and talaab), wells (kuan, beri and bera), stepwells (bavdi) and tanks (jhalara). The next reading of the map added a layer of analysis that foregrounded the relation between the classification and location. Documentation in the form of architectural drawings and photographs that record the structure of the water bodies brought out inconsistencies in that classification.

Subsequent to the measure drawing of some including *Mahilabaug Jhalara* and *Tunvarji ka Jhalara, Ojhon ka Talaab, Ravti ka Talaab, Guron ka Talaab* and *Bhavani Sagar*, a basis of classification that included form, source of water and function was derived to build a typology of water structures. It adds to the database of Indian history available for future reference and analysis. Lakes, reservoirs (created by dams), tanks, stepwells and wells were the types identified through the survey.

The type emerged as an analytical tool to extract the knowledge embedded in architecture. By identifying the types, according to their formal, as well as relational structure, it was possible to interpret the logic of the location as well as the architecture associated with it. The sophistication of the infrastructure network was evident from the choice and development of the type. Its presence contributed to a larger understanding of the culture as it represents a continuum in the face of change, variation and adaption due to context of time, environment and culture. It is an amalgamation of interrelated principles that acquire the status of traditional knowledge, being the result of the cumulative wisdom of various people at different time periods.

As Charles Moore writes "Our associations with water today have been shaped by our ancestors, so that the lapse of centuries adds to the symbolism, and the collected wisdom survives the tides of millennium" (Moore, 1994, p.15). Made in stone, with permanence etched in it, these structures, apart from providing water to sustain society, also provided the sense of continuity, belief and security to the people for whom water was the most precious of all elements. It assured vitality of relations on which architecture was founded.

Conclusion

Mapping the water structures created a spatial delineation across the landscape

of the city. It was possible to ascertain where they were located with respect to the urban fabric, significant monuments and the surrounding terrain. Viewing them together allowed broad geographical relations to be inferred establishing references and decoding the processes of the establishment of the town. Spatial links between the various types of water structures and their relation to the topography could be established. A compelling revision of the perception of the structures as independent and individual entities in the landscape occurs.

The sophistication and complexity of the architecture for water in terms of its construction and repertoire of types apart from the formal organization could be studied with greater depth for inferring the patterns processes through the documentation. This showed sub-types and variations due to conditions of context or function and aids in appreciating the deep connection to society, culture and context that is embedded within the architecture for water. This documentation will aid future research projects that could aim to strengthen the historiography of the water structures of the desert.

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AWARENESS

Changing paradigms in cultural heritage education: an ecosystem perspective

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Over the last decades, changes have been encouraged in different educational sectors, especially those that are directly related to social, environmental and economic changes or that are undergoing major crises and facing important challenges as globalisation, fast and often unsustainable development, or the disruptive impact of digital technologies. Educational systems around the globe have been facing intense pressure to create more holistic and dynamic educational programmes and promoting a shift towards educational models that could meet the emerging and future needs of learners (GEF, 2017). Indeed, in the contemporary changing scenario, traditional educational models are often perceived as distant from learners' needs and if action is not taken by educational and training institutions, as well as governments and international authorities, this divide will further increase in the forthcoming years. It is therefore essential to evolve and develop different approaches to education that take into account the existence of educational and learning ecosystems (GEF, 2017). The concept of educational ecosystems seems indeed one of the potential solutions to dealing with the complexities of the future.

This issue is particularly debated with reference to the cultural heritage sector, especially after the policy documents issued by important international institutions (UNESCO, 1972)[1], identifying education in cultural heritage as a priority and including it as one of the components of the pillars for sustainable development (CHCfE, 2015). The concept of ecosystems has consequently entered the field of education in cultural heritage preservation following its adoption from other sectors, in particular entrepre-

neurship education (Toutain and Mueller, 2015), cultural ecosystem governance and management models (Holden, 2004 and 2015; Borin and Donato, 2015; Borin, 2017) and start-up development (Isenberg, 2010 and 2011).

The components of this educational ecosystems are surely to be adapted to the peculiarities of cultural heritage preservation and enhancement, including the cultural exchanges that often characterise this sector at an international level. This is the case, for instance, of the sites included in the UNESCO World Heritage Site list or those which are the subject of study and research by international teams. In these examples, educational programmes should not only reflect the local cultural heritage ecosystem but could also benefit from additional elements contributed through the knowledge and skills of external actors. However, it is not clear in which ways these international, endogenous components are bringing benefits to the educational ecosystem of local cultural heritage programmes. What is the impact of the exogenous/international actors?

In order to address this issue, the author decided to focus on the case study of the international cultural heritage programme developed in the city of Jodhpur (India) called "Historic City Centres", the workshop organised as a joint activity of the University of Ferrara (Italy) Department of Architecture and the CEPT University of Ahmedabad (India). The empirical analysis of this case study analysed in a longitudinal perspective the development of the educational ecosystem of the programme but focused in particular on the final year of the programme.

This paper presents the results of this investigation, leading to some concluding remarks on how the international dimension could contribute to the changing paradigms in educational ecosystems in the cultural heritage sector. The chapter is divided into four sections: after this short introduction, the first section provides an overview of the literature on the emergence of the concept of ecosystem and its application to the educational and then cultural heritage sector, with special focus on the concepts of sustainability. The next section explains the research design and methodology. Section three presents the case study, then a critical analysis of the results of the empirical research. Finally, section four gives some concluding remarks and puts forward future research developments.

Literature review: ecosystems in education and cultural heritage programs

As mentioned in the previous section, this paper aims to address the peculiarities of educational ecosystem programmes in the cultural heritage preservation and enhancement sector and in particular those developed in the framework of ecosystems including international exogenous elements.

Before presenting the analysis of the case study, it is important to clarify some key concepts related to the changing paradigms in education, the emergence of the concept of ecosystem in the educational field and the potential peculiarities of educational ecosystems in the cultural heritage sector.

Over the last decades, researchers have enriched the debate on education by

underlining its different dimensions and trying to grasp a better understanding of the implications of inserting more transversal, trans-sectoral and holistic approaches to learning programmes. Hannele Niemi (2003, and Niemi and Jakku-Sihvonen, 2009) argued that analysing learning in its two main dimensions (vertical and horizontal) could help us better visualise its holistic nature. Along with the vertical dimension (life-long education at all ages), Niemi identifies a horizontal dimension that implies that learning simultaneously occurs on different levels and in different but related sectors and situations. She argues that learning is everywhere since it is a vital component of our lives, therefore education should respect its pervasive nature; learning institutions should overcome traditional schemes and propose programmes and initiatives that include different fields and also promote opportunities for external learning. These considerations pave the way for a more outward-looking understanding of education that reflects on the need to broaden learning spaces and introduce the concept of educational ecosystems.

In biology, an ecosystem focuses on the exchanges between living organisms and their environment and could be described as a systemic community of organisms which exchange and interact with non-living elements in a specific milieu. Both living and non-living organisms are linked to each other through the flow of energy and the cycle of nutrients. Though potentially of any dimension, ecosystems are usually referring to defined and specific spaces (Chapin et al., 2000). The idea of ecosystems was first introduced by botanist Arthur Roy Clapham (Willis, 1994) later becoming widely known through the work of Arthur Tansley published in 1935 (Tansley, 1935; Trudgill, 2007). Though invented by botanists, the notion was soon introduced in other fields, related for example to management of resources for sustainable ecosystems (Chapin et al., 2000), to the services domain (Daily et al., 2009), and was further investigated focusing on the complex interactions between living and non-living components of ecosystems (Morin and Hulot, 2007). Furthermore, the biological word "ecosystem" was increasingly used metaphorically, introduced for example in entrepreneurship and start-up management (Aldrich et al., 2008; Isenberg, 2010 and 2011) and recently entered the cultural domain. The concept of cultural ecology (Holden, 2004 and 2015) or cultural ecosystems (Borin and Donato, 2015; Borin, 2017) and cultural entrepreneurial ecosystems (Borin, 2018) recently entered cultural sector discussions.

Amongst this wide typology of domains, ecosystem also became a frequent word in teaching and learning. In these domains, ecosystems are described as the whole range of actors (i.e., living species) and all non-living components used in education through teaching and learning. These elements include for example the population inside universities and schools (mainly professors, deans, other students, staff, etc.) as well as the people outside school (entrepreneurs, associations, institutions, parents, families, friends and private persons, etc.). They also include non-living components such as material means (IT resources, classrooms and buildings, facilities, tools, etc.) and also comprise policies and socio-economic conditions that to some

extent influence the nature of interactions within the educational ecosystem. All these elements are defined as belonging to an educational ecosystem because they share an educational milieu: the ecosystem's diverse elements are related to each other through complex networks.

To summarise, educational ecosystems are educational environments comprising several subsystems that include not only the universities or schools involved and their staff, but also local communities, policy makers, local firms and entrepreneurs as well as various stakeholders active in the territory. These subsystems could be grouped in a macro-level ecosystem comprised by different fields and institutions working simultaneously, not only in the educational field but also in the social practices and economic sector involved in the educational programmes. But we can also identify micro-ecosystems (Säljö, 2010, 2012; Vygotsky, 1978), where individuals are learning independently, exchanging and producing knowledge on the basis of their personal characteristics, such as their motivations and skills, their personality and attitudes, their previous knowledge and experiences and their cultural background. The competences derived from blending these two simultaneous ecosystem's dimensions, promoting both self-regulated and cooperative learning processes, could be key in moments of change and transformation as those we are currently facing (OJEU, 2006; OECD, 2013a, 2013b). The progress of students in an educational ecosystem depends indeed both on their micro-dimension and in the macro-dimension of learning environments that work together (OECD, 2010a). Contrasts among different micro-ecosystems as well as dysfunctional interactions among the components of macro ecosystems could indeed sabotage learning processes.

As a concluding remark, it is relevant to point out that educational ecosystems, both at a macro and a micro level, are peculiar and strongly influenced by the nature of the different educational initiatives and most of all by the sector and specific educational purposes of a learning programme. Therefore, when designing a learning initiative in an outward-looking-ecosystem perspective we need to take into consideration the peculiarities of the specific discipline and field.

For the purpose of this research we have decided to focus on educational ecosystems for the cultural heritage preservation sector. There is abundance of literature on education for cultural heritage, that spans from an analysis of learning initiatives in cultural heritage institutions (Xanthoudaki, Tickle, and Sekules, 2012; Stocklmayer, Rennie and Gilbert, 2010) to including the most recent debate on the use of IT and new technologies (Ott and Pozzi, 2011) or serious gaming (Mortara et al., 2014) also including education as one of the components of culture and cultural heritage as fourth pillar of development. However, there is still scarce literature on the educational ecosystem framework on the cultural heritage sector (Borin et al., 2018) and even less research on the idea of applying the ecosystem framework analysis in specific cultural heritage sites and projects. However, the importance of having international/endogenous elements interacting with local cultural heritage educational ecosystems is still rather unexplored.

This paper aims to fill this research gap by the analysis of the case study of the workshop "Historic City Centres" in Jodhpur and Ahmedabad (India).

Methodology of the research

As highlighted in the previous section, this chapter aims to investigate educational ecosystems for cultural heritage that are including international components, considered as exogenous compared to the endogenous elements of the local ecosystem. What is the impact of these international components in the endogenous educational ecosystem? What is the impact of external/international components in the different aspects of the learning process?

In order to investigate these research questions, the case study of the "Historic City Centres" workshop, that will be presented in full detail in the next chapter, seemed particularly interesting since it presented several characteristics that are relevant to this investigation. First of all, the workshop implied the collaboration and interaction between different subjects, such as universities, local heritage authorities, students coming from different programmes (urban managers, designers, architects, urban planners) and also citizens and communities with whom the students interacted during the practical activities; we can therefore describe it as an example of a complete educational ecosystem for cultural heritage preservation. Furthermore, the programme was carried out together with the staff and students of the University of Ferrara, which constituted the international/exogenous component that is the specific subject of our investigation. Moreover, the workshop was organised regularly for over five years, giving the organisers enough time to amend the programme in order to maximise the benefits of the international cooperation and allowing the author to investigate a programme in full maturity.

The research was carried out through a qualitative research method, considered more suitable for investigation of a phenomenon in-depth (Yin, 2014) and using a case study methodology. The research was based on the triangulation of different sources of information (Figure 1). More specifically, document analysis (the programme of the workshops and related documents), direct observation (the researcher participated at all the activities during the whole workshop in 2017), output analysis (more specifically, the posters realised during the workshop and exhibited at CEPT University and in the Mehrangarh Fort, resulting from previous workshops), and in-depth semi-structured interviews with the Indian students involved in this pedagogical activity.

The first three sources of evidence were used mainly as preparatory and background sources of knowledge, giving the researcher the chance to better focus on the characteristics of the case study and understand at which level the interaction with the international elements was taking place. The semi-structured interviews with the students and staff allowed the researcher to investigate the research questions in more depth. These interviews were carried out as group interviews with small groups of students (3-5 people) during the last two days of the workshop, and

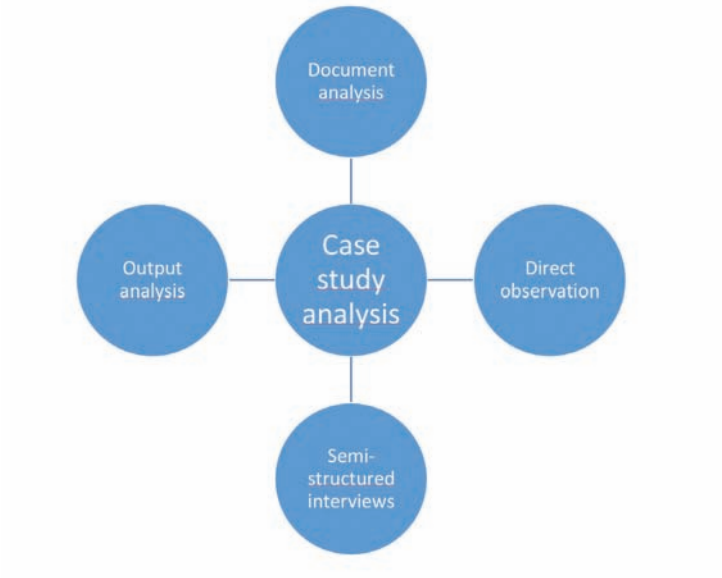

Figure 1: sources of information of the research (image by the author)

followed a research protocol addressing, in particular, the interaction between the two groups and the impact it had on the learning process. The interviews were recorded, transcribed and coded according to the Gioia methodology (Gioia, 2012) to guarantee rigour and reliability in the analysis.

The interview protocol was divided into three parts. The first part analysed the expectations of the Indian students, trying to understand how they were linked to the presence of the international elements. The second part was related to the pedagogical/learning outcomes of the summer school, again tracing which of these outcomes are perceived as resulting from the impact of the international students and staff. Finally, the third part addressed the research question more directly, asking the students what they perceived the interaction with the international group was.

The results of the different phases of the empirical investigation are critically presented in the next section of this chapter.

International cooperation in educational ecosystems

The first part of the empirical research focused on the analysis of the documents and outputs of the workshops "Historic City Centres" organised from 2013 till 2017 by the Department of Architecture, University of Ferrara, Italy, and Department of Architecture, Centre for Environment, Planning and Technology (CEPT), Ahmadabad, India. The objective of the workshops was to teach how to carry out interdisciplinary analysis of historical city centres, using not only the competences and skills of pro-

fessors and staff of CEPT University but also drawing on the expertise of the Department of Architecture of the University of Ferrara. Groups of students (always mixing Indians and Italians) analysed and documented the area of the historic Blue City of Jodhpur for five years (during the summer/winter schools), focusing on vernacular heritage and collaborating with local inhabitants and citizens. This work acted as a stimulus for the local communities; moreover, the results of the students' work (mainly in the form of posters) were exhibited for tourists, officials and local groups as well as for other students of the CEPT University. A mixed group of coordinators from the two universities supervised the group activities and the delivery of final outputs.

Endogenous elements in educational ecosystems for cultural heritage preservation and enhancement

From the first part of the analysis it emerged that the workshop created a strong intertwining of different types of educational micro-ecosystems, given by the different background of the participants in the workshop. For simplicity reasons, we can group the different micro-ecosystems according to two main categories: the cultural background and the university educational background. As a result, we obtain five micro-ecosystems (Figure 2), referring to the country of origin (Italian and Indian) and to the different educational background (urban managers, urban planners, architect, and designers). Among these micro-ecosystems three could be considered endogenous and two exogenous: the ones referring to the Indian context could be considered internal to the local educational ecosystem while the Italian could be considered exogenous, not based only on their exogenous cultural background but also in terms of educational background (in particular, the competences and skills in terms of design that were not present in the micro-ecosystems of the Indian students).

The macro-ecosystem in which these micro-ecosystems interacted is the one of the city of Jodhpur and Ahmedabad; it is composed by different subjects, such as the CEPT University of Ahmedabad (staff and professors supervised the works also in the city of Jodhpur), the local heritage authorities (in particular those of the Mehrangarh fort in Jodhpur) and of course the citizens and communities with whom the students interacted during the field documentation in Jodhpur. Moreover, this macro-ecosystem are completed by the Indian cultural traditions and environment, as well as the underlying socio-political situation of the country. These micro and macro educational ecosystems were also interacting with an external macro-ecosystem element that could be considered as exogenous to the local educational macro-ecosystem in which the summer/winter school was organized.

The resulting complex educational ecosystem is illustrated here, where the interaction between the different levels is exemplified. As explained above, this first analysis helped to better understand the ecosystems' context and further investigate the research questions by means of a series of semi-structured interviews. The research

questions aimed therefore at understanding how the exogenous components interacted with the micro-ecosystem and with the local educational macro-ecosystem.

The first question aimed at understanding whether the international/exogenous element increased the appeal of the programme; the participants were asked if they were interested in the programme because of the possibility of interaction with the international group. If we consider the first-order (informant-centric) analysis, we

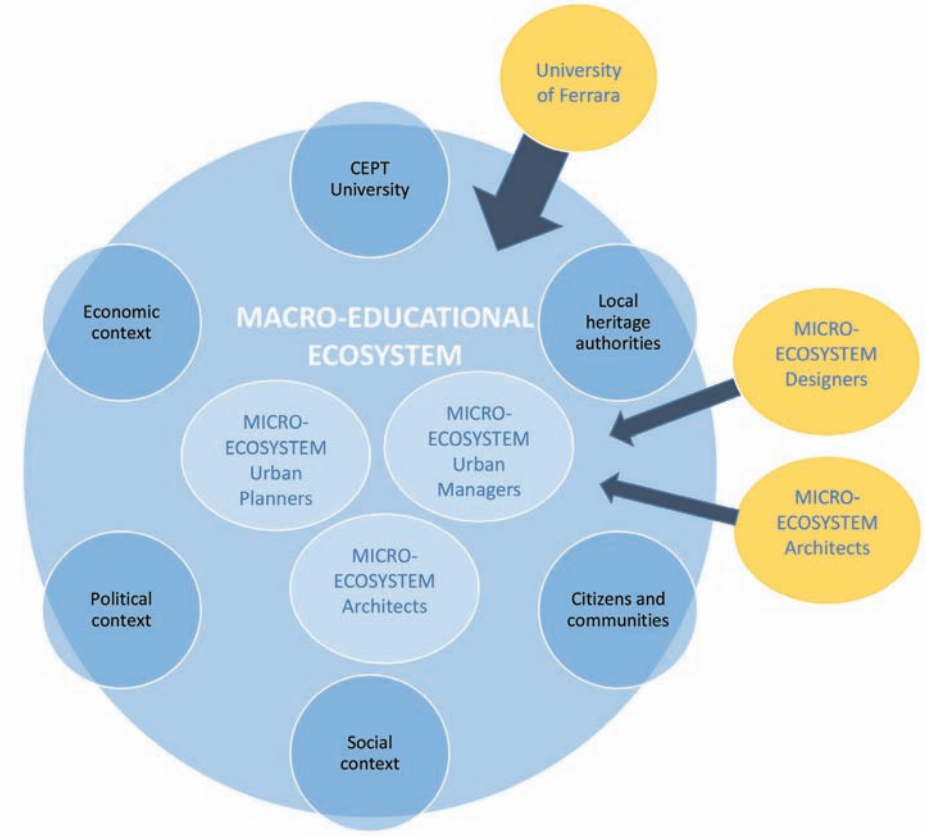

Figure 2: Intersection of different ecosystems in the case of the summer/winter school *Historical City Centers*. The circles in blue represent the endogenous components in the educational ecosystem: the circles in light blue refer to the different endogenous micro-ecosystems (the one of the Indian students divided, according to their educational background, into urban planners, urban managers and architects); the circles in dark blue are the different components of the macro-ecosystem. The circles in orange represent the exogenous elements of the educational ecosystems, namely the micro-ecosystems of the students (grouped according to their educational background, into designers and architects) and the staff/professors of the University of Ferrara that contribute to the variety of stakeholders of the macro educational ecosystem)

can note that the main interest was not in the international elements but in the endogenous cultural elements and in the reputation of the Indian staff. This is more evident in the second-order analysis (researcher-centric), and in the aggregated dimensions: the students were attracted by the possibility of learning more about their heritage or about new techniques for heritage preservation and enhancement, by the reputation of the programme and professors, but the international components were never mentioned (Figure 3).

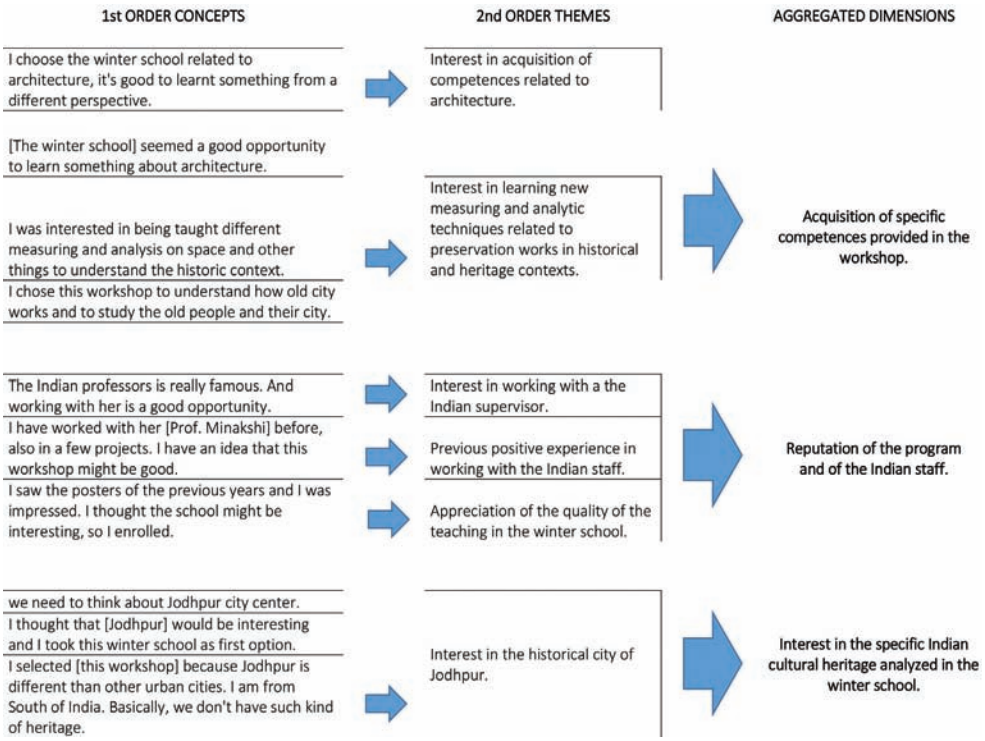

Figure 3: section 1, expectations in enrolling in the educational program (image by the author)

In the second part of the interview, it emerged that the impact of the international team and students was appreciated mainly in terms of their technical competences and skills. In the first-order analysis, one interviewee claimed that they learned new measuring techniques and also a different way to perceive the historical city centre and the interaction with international staff, as highlighted in the figure here below (Figure 4). This is just one aspect of the aggregated dimension of "Learning of techniques and procedures to plan intervention" (aggregated dimension level). However, as evident both in the other first and second-level analysis points, the impact

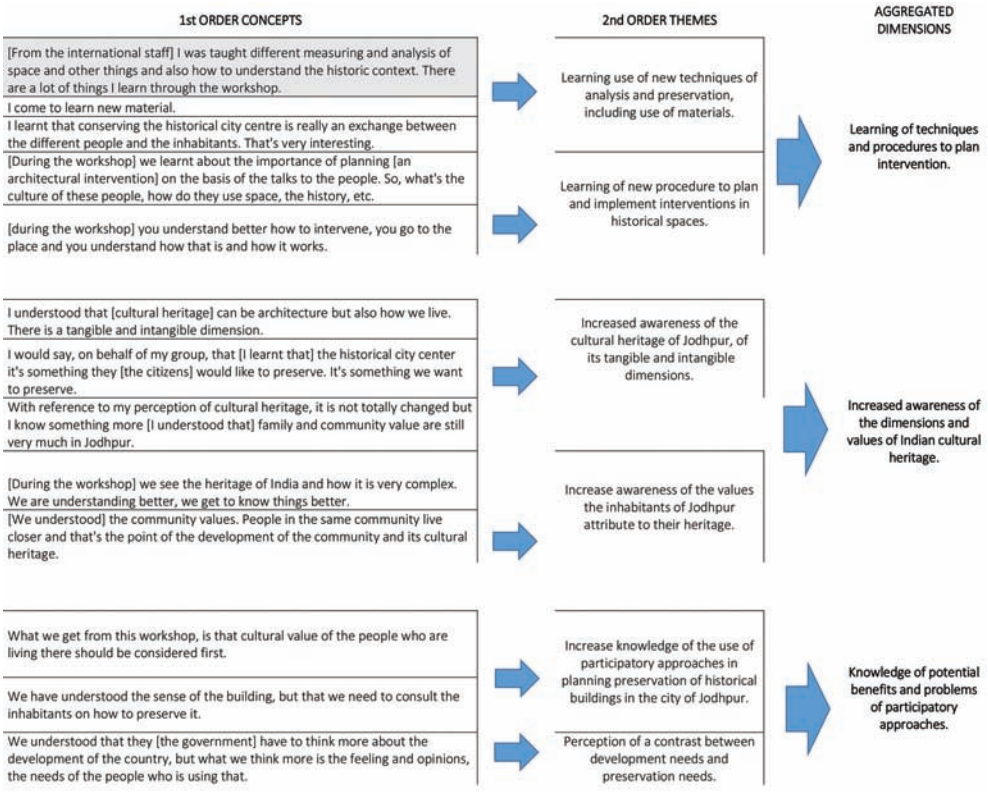

Figure 4: section 2, impact of the international team and students on the pedagogical outcomes of the program (image by the author)

of the international component of the workshop on the outputs was not considered particularly relevant, neither in terms of increased awareness of the dimensions and values of Indian cultural heritage nor in terms of increased knowledge of potential benefits and problems in the implementation of participatory approaches. The importance of the interaction with the exogenous elements seems however particularly important in terms of cultural exchanges, understanding different points of views, and methodological contribution (third section of the research protocol – Figure 5). Indeed, on a first-level analysis it emerged that the interviewees felt that "Italians have different perspectives […]. Maybe for us there is nothing negative and we ignore things because it's normal for us. But for Italians or foreign people they can point out these things easily". They also thought that "the Italian supervisors ... taught us a different approach, to think and be more experimental", showing new methodological procedures in learning techniques and approaching cultural heritage

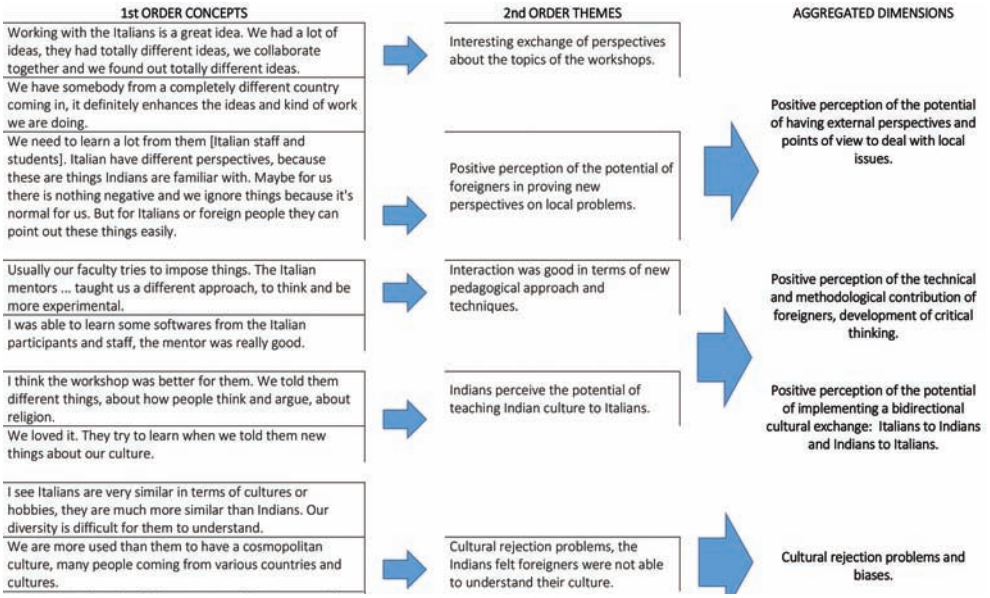

Figure 5: section 3, general influence of the international team and students (image by the author)

preservation and enhancement. They also felt that the exchange was bidirectional; they agreed that they could also teach important things about their culture to the international students and staff. However, the impact was not only positive but also negative. The interviewees declared that "[Indian] diversity is difficult for them [Italians] to understand", or that "they could not understand what India is exactly. It took a lot of time to explain to Italians what was happening". On an aggregated dimension these sentences could be classified as a cultural rejection problem.

In conclusion, the presence of an endogenous/international element in the summer school was determinant neither in the attractiveness of the pedagogical proposal nor in the outputs of the project. It was instead perceived as particularly relevant in terms of the interaction in terms of micro-ecosystem exchange. What the sample felt as important was the personal exchange with foreign students and staff, who helped them to have a better understanding of their culture, taught them to consider other perspectives and gave them the opportunity to share their cultural knowledge with foreign participants.

Concluding remarks

This chapter analyses the summer/winter workshops "Historical City Centres" from the perspective of educational ecosystems for cultural heritage, in order to understand if bringing international exogenous components into a local educational

ecosystem could impact or influence the learning process for cultural heritage.

The literature review highlighted how the concept of educational ecosystems has evolved through time, starting from the botanic context to later include also other disciplines such as economics and management or education. With reference to the educational domain, researchers have underlined that we can talk about the interaction of two main ecosystems: micro-ecosystems- referring to the individuals, and macro-ecosystems- referring to the whole educational context of institutions, staff, buildings and materials, as well as external stakeholders (Säljö, 2010 and 2012; Vygotsky, 1978). A successful learning process depends on how effectively micro- and macro-dimensions of learning environments can work together (OECD, 2010a).

In the case analysed in this chapter, external elements have been interacting both at the micro and macro level of the local educational ecosystem for heritage preservation. These international elements have not impacted on the attractiveness of the educational proposals; besides, the participants have not perceived benefits in terms of pedagogical outputs that could be directly related to the interaction of the exogenous components. However, the impact of the international staff and students has been perceived as crucial in terms of increased awareness of cultural heritage, possibility of communicating cultural heritage and shared experiences, as well as in terms of development of critical thinking or methodological approaches to heritage conservation and enhancement. These points seem particularly important in a dimension of cultural heritage preservation intervention in the long run.

Cultural heritage preservation indeed is essentially based on the perception of its importance and on the awareness that cultural heritage can benefit from sharing with international communities its historical and artistic features. In a changing context such as that of emerging countries, the theme of heritage awareness and critical thinking, related to soft skills and perception, could indeed prove more critical in developing new approaches to cultural heritage that will evolve through time, more relevant than simple learning of techniques and procedures.

The results of the research could therefore only contribute to the theoretical debate on educational ecosystems for cultural heritage, underlining how exogenous and international elements could positively contribute to creating successful education ecosystems for heritage preservation on the level of increased awareness and sharing of perspective, as well as in stimulating in the students the desire to share their knowledge with the international community.

The limitations of the research are, however, that it focuses on a single case study. In order to confirm the research results, future developments of the investigations will be to replicate the analysis in other case studies, possibly in different countries, thus also allowing the influence of the endogenous characteristics of local educational ecosystems on the research results.

Notes

[1]The UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage adopted by the General Conference in 1972, contains specific reference to the importance of education to cultural heritage in art. 27 and 28. This article was at the basis of the creation of several initiatives among which the World Heritage Education Programme, initiated as a UNESCO special project in 1994.

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Standstill and Continuum life of people and the city

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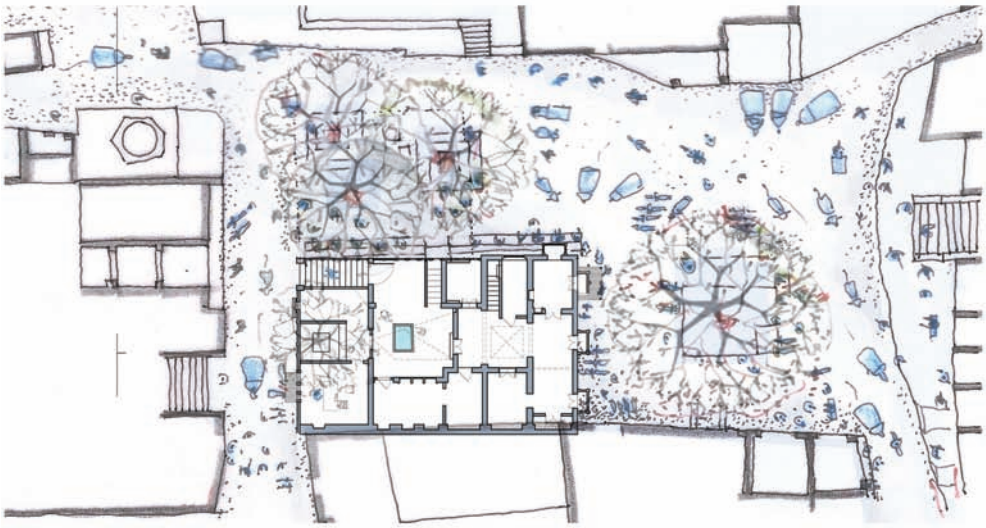
Historic city of Jodhpur is not just a memory, but it is living, constantly modifying and breathing centre. Here people are active agents who negotiate, interpret and adapt; share knowledge and experiences from the past to fulfill the changing and challenging present needs. “It is a process of active regeneration and transformation of knowhow and practices within a contemporary local context, that does not exist on its own or apart from people that transmit it” (ASQUITH, 2006).

While passing through the arteries of the city, trying to peep into the reality of historic urban settlement and traditional houses, some questions always arise to the participants of the workshop about the historicity of the buildings “Why don’t *they* understand the need to protect the historic buildings?”. The process of transformation in built environment with the introduction of new building materials, new forms, and latest technology is inevitable; making it difficult to identify and classify buildings as historic from an outsider’s point of view. “They” are the inhabitants of the city and their role is vital in making the past, present and the future of this place. They make it a home, a street, a bazaar and a city. It becomes vital to understand their side of the coin in order to get a holistic approach before we conclude through design.

In 2016, cases of adaptive reuse were chosen to understand the complex reality; and develop deeper knowledge of things that creates fascination for us as heritage but are part of the inhabitant’s regular routine, livelihood, need, their being. This paper takes a detail look at three cases as to how historic spaces were transformed with need and development.



SITE PLAN

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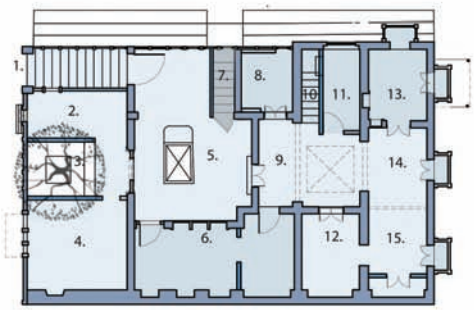
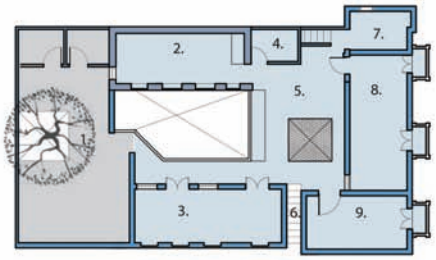


1. Entrance to the haveli (New)
2. Clinic (owned by one of the inhabitants of the haveli)
3. Peepal tree used for religious activities
4. Strorage for medicines
5. Entrance courtyard wih well
6. Bedroom and wardrobe (used as guest room)
7. Old Entrance (Not in use)
8. Toilet (Private)
9. Internal courtyard (shut in afternoon)
10. Steps to upper floor
11. Kitchen (Private)
12. Shiv mandir
13. Store room (Jharokhas also converted to staorage)
14. Images, statues of deities
16. Outer square (peepal, banyan and badh tree)



1. Unused block (4 internal rooms)
2. Kitchen used by upper floor inhabitants
3. Bedroom (clinic owner/doctor)
4. Toilet
5. Ambulatory space (used as dining area)
6. Steps to terrace
7. Toilet
8. Living area
9. Bedroom (priest)

0 5 10m N

Public Private unused spaces New Construction Old Construction

Satyanayaranji Haveli

Satyanayaranji ki haveli is around 400 years old structure located in the middle of chaotic Juni mandi with a mix of sweet shops, Tea stalls, temples and a continuous traffic flow on three sides. Adjoining is a chowk, recently fenced with three peepal trees where women worship throughout the day while men play cards on the same plinth. Haveli sits on a raised plinth accessed through steps that leads to an semi open area with openings. Ground floor remains historic with uneven spatial modifications to accommodate present functions. Though being primarily an inherited residential building it has a homeopathic clinic in one room that opens into the courtyard which has a well and a peepal tree (Figure 1).

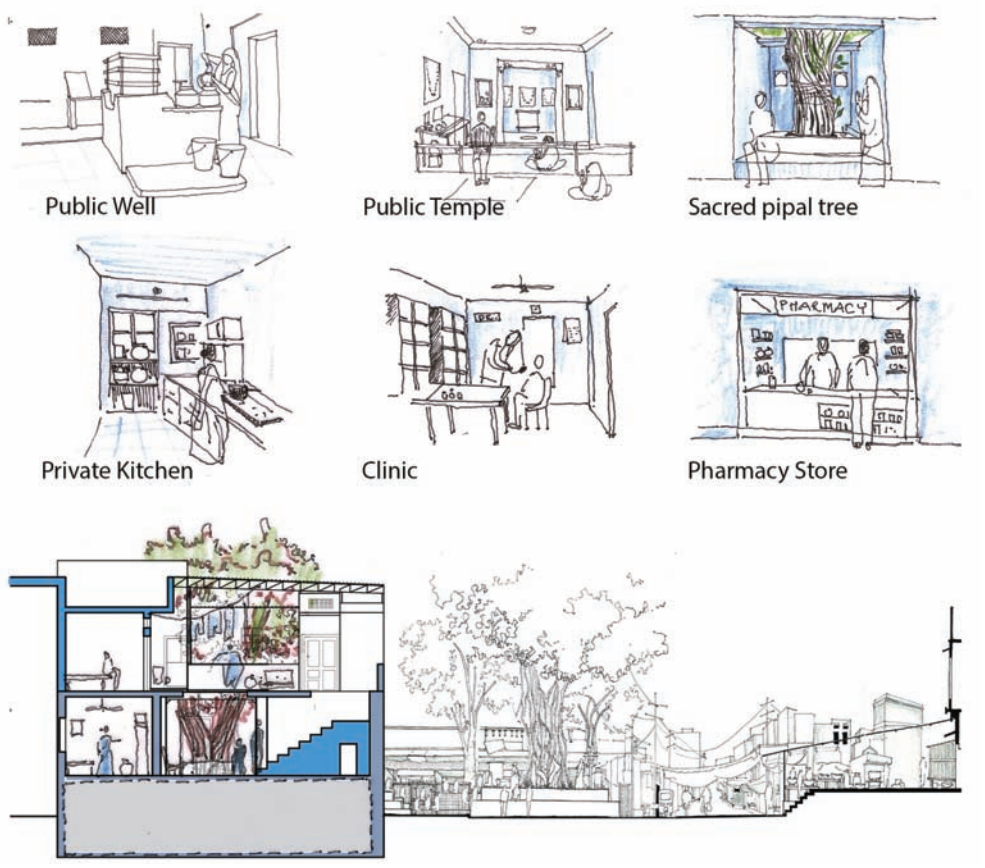


Figure 1: (previous page) Satyanayaranji ki haveli site plan, ground and first floor plan (drawings by the author)

Figure 2: (top) activities at Satyanayaranji ki haveli (drawings by the author)

The well is not only used by the residents but also by the shop owners and people living in the neighborhood. There is also a pharmacy store which is directly accessed from the road. One third part of the ground floor is a temple dedicated to God Satyanarayan, which is often visited by people from the neighborhood. The inner courtyard is covered with the M.S grill and serves as a dinning space on the upper floor. The first floor has been reconstructed with same footprint as ground floor but with brick and concrete as opposed to stone and lime in older construction. What makes it different is the way the haveli lives (Figure 2).

The façade of the house gives clear indication of the public and private areas, and old-newer modifications. Service wall of the toilets are part of the facade facing the chowk, where one can see beautifully articulated Jharokhas on the ground floor, but has neglected the continuation of the style for the upper floors. Jaalis on the north face are filled in to reduce the visibility from the market side.

In between the chaos of these many activities, there is a smooth transition through behavioral patterns around these elements of sacred and profane, public and private but on the other hand it is difficult to find the same in architectural patterns because modifications made are as per their time to time needs making it fragmented (Figure 3). Thus it seems, this things needs control by local bodies through their policies which gives guidance in order to avoid these circumstances. But this cannot be forcefully implemented, it needs to be a joint approach with equal involve of the inhabitants.

Figure 3: (on the left) the façade of the house gives clear indication of the public and private areas, and old and newer modification. Photo by Gandhi, K. 2018; (on the right) the outer public edge of the house with its elements like the extruding Jharokha is now providing space for a kachori shop which has been vandalized. Photo by Gandhi, K. 2018

Sanskrut Vidyalaya

The street leading to the Ada bazaar from Danvir road passes by a beautiful ornamental facade (Figure 4) which was once a palace complex. Sanskrut Vidyalaya, a primary school has occupied a small part of this palace. It is difficult to identify it as a school building from the street Firstly because of the location and secondly because of the structure itself. As one move along the street, layers of adaptation can be observed. In the present situation, original structure is maintained on the first two floors but change in utilization of spaces has encouraged uneven modifications. Most of the ground floor of the building is inaccessible and has been abandoned while the corridor space is used by the market vendors to store their belongings. The building has evolved over a period of time and its evidence is clearly indicated by the façade of the building which shows use of various materials and styles of openings from different times. The temple is used as a staff room; with a false ceiling hiding the original dome where as some classrooms open into a large courtyard on first floor with an articulated colonnade; giving sense of the palace. Adaptive reuse might be a new terminology for the people here but they have been practicing it since years.

This place is now slowly deteriorating and is on the verge of abandoning because of its age and majorly because of inappropriate modification to accommodate their new function. (Figure 5 and 6).

Figure 4: Intricately carved facade of the palace viewed from the market street. Photo by Corneti, E. (2016)

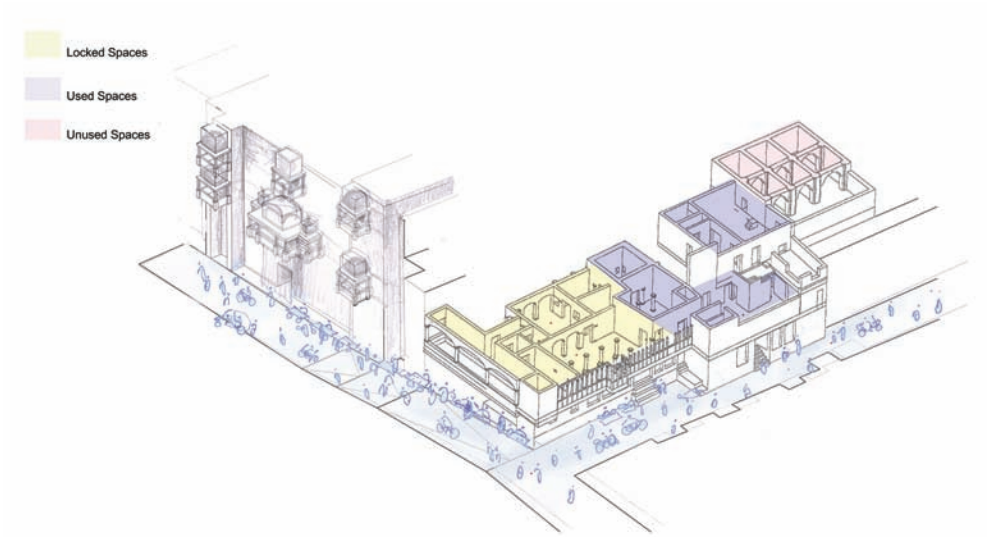


Figure 5: (top) space utilisation of the building

FIgure 6: (left and right) benches and tables accommodated in the old temple structure to have classrooms. The space has been reused but in a very inappropriate way. Image by Elisa Corneti

Mehnot ki Haveli

Mehnot ki Haveli sits on the foot hills of Mehrangarh fort near fatehpol. It is one of the oldest and first to be seen from the entrance of the fatehpol gate. This cluster of havelis are inhabited by three families; one of the owners is Nancy Singh, who is the descendant of the haveli while others have moved in 20 years ago. As his Family has inherited this place since generations, he is genuinely concerned about well being of its historic value. Whereas new owners have modified the other haveli using market available materials. The surfaces are cement plastered, removed articulations from the facade and replaced carved wooden windows with m.s grill (Figure 7).

Students tried different methods to document the sense of spaces not only through measure drawings but with anthropometric reasoning of community living to understand the socio cultural response on the formation of these clusters. These complexities may not be easily apparent but it has evolved over period of time and they have stories of self-expression in between the struggle with the pace of change. As Oliver has mentioned “In vernacular buildings that have been constructed to meet a specific need we may see evolve over decades, or even centuries, structures that have been modified and adjusted in form and detail until they satisfied the demands placed upon them” (OLIVER, 2006).

Figure 7: view of the haveli façade with its different colours, a large gate, and windows on upper floors differentiate it from other havelis around. Photo by Niharika (2018)

Today the built environment is changing with an accelerated rate, people are struggling to maintain balance between the slow traditional know how and modern speed. What is needed is to make the active implementation of such traditional wisdom in a modern or development context and consider the gradual change that is occurring in traditional living pattern with people's desire for aesthetic satisfaction and technological comfort. Before intervening in such built environment it is important to first inquire whether there is fundamental incompatibility in the very concept of the larger benefit and also consider the bearings it will have on the living patterns and value systems of the stakeholders because forceful interventions may lead to abandonment (Figure 8).

As Oliver suggests it is better to consider the architecture form in the context of their environments and essentially, in relation to their capacity to meet the values

Figure 8: first floor plan of two havelis. As one enters it opens to an internal courtyard on one side and doors to enter the rooms on the other side. This floor is used as a living area for the family gatherings

Figure 9: (left) view of the internal street from the Gate and (right) views of the internal courtyards of haveli 1 and haveli 2. This serves as a complete private area

and needs of the society that have built them. Approaches to get a surround understanding, approach can be through first knowing the environment and not just by the architectural form.

Thus by sharing our perception, the dichotomy between those who study Traditional Built environments and those who inhabit it can be reworked leading us to new, lasting and invaluable insights like integrated living patterns, appropriate adaptation, climatic response, material exploration and awareness regarding preservation in the historic urban fabric (Figure 8).

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In-between People and Place: the changing cultural landscapes of historic city centres

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The slowly changing demographics, the ever-changing family equations, assimilation of diverse religions, change in the rule, architectural advancements and innovations, events, all form the many layers embedded deep into the culture of a city. A historic centre of a city is like the trunk of a tree that shows it's many growth rings when cut across; each ring is providing a plethora of information to the person studying it.

The cultural landscape is an ever-changing phenomenon due to continuous evolution and developments of the city. The functions change and accordingly the spaces adapt. The recording of a historic city in this regard is a significant step towards capturing the civilizational fluctuations and developments.

Dwelling

All diverse elements of human nature and its surroundings concur in a special fashion in the individual and form character. (Sullivan, 2012, p. 33). The house or a dwelling is an important signifier of the living characteristic of the people and therefore the city. The houses form significant visual imagery of the place. A lot can be said about a place and its culture through observation of the house form. "The house is an institution, not just structure, created for a complex set of purposes. Because building a house is a cultural phenomenon, its form and organisation are greatly influenced by the cultural milieu to which it belongs." (Rapport, 1969, p. 46).

The blue city of Jodhpur developed in the shadows of the Mehrangarh Fort. It is well known as the blue city of India. The blue

Figure 1: the blue city. Photo credit Sanket Mhatre

houses are the direct result of indigo dye, availability of copper (sulphate) in the vicinity and also rich limestone deposits. The colour helps the homes remain cool during harsh summers. The blue houses quickly turned into a symbolic feat when the blue colour was related to Lord Shiva, and therefore the blue houses were attributed to the Brahmins. Today the blue is the selling point (Figure 1). Many blue houses are now homestays and hotels catering to a large population of tourist that mazes through the city walls every day. The architecture of the place is genuinely resilient, and so are the people; willing to change with the demands of the time.

The historic centre of Jodhpur is a walled city with little or no scope for new development within it. The families that continue to live in the old city face the lack of essential modern amenities like toilets. The large havelis have gotten challenging to maintain due to the increase in vehicular traffic, dust and pollution. However, the boom in tourism (Figure 2) and people willing to pay to experience the royal havelis or modest blue houses has kept the economy from falling apart. The spaces within the walled city now boast of 5-star hotels and restaurants, cool cafes, regal haveli home stays, fashionable boutiques and a vibrant tourist market alongside quiet residential areas and a bustling local market. This kind of a massive change also brings about a shift in the culture of the place.

A city's changing economic dimension brings about a more significant change in its character. ''*Kindly adjust, Jugaad, bending the rules, hack…*These were the words I had used to describe the city centres of India" (Anon., 2014, p. 4).

Patrick Geddes said that bringing in the European planning of a city in India will break the traditions that are a part of the Indian family life. The traditional Indian household consist(ed) of many families grouped around the grandparents. He sug-

Figure 2: the view of Mehrangarh from the Raas Haveli, a luxury heritage hotel. Photo credit Sanket Mhatre

gested that the disconnect that was seen between the neighbours in the European cities may not suit the Indian way of life. What may seem like overcrowding to a western eye is (was) the nature of family life in India. (Subbakrishna Rao, 2007, pp. 59-61).

He was also impressed with the idea that the ancestral homes were a common occurrence in India even in the poorer families. The house is also the reason for the family's pride. Large family life and sociability are not only a traditional part of the family life but also practical economically for the families that also share businesses. However, the idea of a community is always changing, and so are family dynamics. Either due to lack of space, due to lack of opportunities or for better education for the children the families are splitting and living in the newer parts of the city. However, their love for the old town has not declined, and they always find ways and means to keep it alive. This kind of transition is also making way for the migrant population into the historic city (Figure 3).

Water, an important cultural link

A Kannada proverb translates to, "If a woman comes to town, won't she come for the water?" (Ramanujan, 1999, p. 53). Water resources always played the most critical roles in our settlements. They became the nucleus of the city, a community space, a place for gossips to be exchanged and friendship to be forged. Thus the water bodies always have been an essential link to the social life and style of a place. Ramanujan quotes McLuhan's observation (Ramanujan, 1999): "In India…when they tried to put running water, it pulled the village women away from the well. This destroyed community life." (Stern, 1967, p. 52).

The climate of Rajasthan is mostly hot and dry. Droughts are common. Therefore

Figure 3: the blurred boundaries between neighbouring houses. Photo credit Sanket Mhatre

water takes up a more pivotal role in the community in Rajasthan. This can be observed by the nuanced connotational nomenclature they have for their various water bodies like nadis, tanka, bavadis, kund and jhalras based on the type of the steps(in case of stepped wells, based on the size or on the source. (Bharucha, 2003, pp. 66-67). These waterbodies arouse out of necessity, as a means of tapping into the natural water sources or places for collections and storage of rainwater.

It is also interesting to note that the digging or building of the water bodies are more often by the local people and not by the patron or king. (Bharucha, 2003, p. 67) Thus the village or the towns themselves own the waterbodies. This sense of ownership also is an essential layer of the culture of the place. Construction of these water bodies is associated with punya (good deed).

There is also age-old wisdom associated with locating and creating the water bodies at the right place with the right source. Jodhpur city centre is no different; it has a host of water bodies that formed the lifeline of the city. It is evident that the sagars (lakes), the jhalras (stepped wells) and the sars of the historic centre formed the essential community spaces of the city. These waterbodies are the foundation of the historic city of Jodhpur (Figure 4).

The elaborate edges and canopies around the water bodies suggest their importance in the historic centre. Although some of them still form an essential oasis, play a role in controlling the microclimate and are used by the people and the animals for cooling themselves, they may have lost some of their charms in the run for the modern lifestyle. Some of them have fallen to disrepair and have dried entirely due to the encroachment of the watershed areas. Water is an essential element for survival. It

Figure 4: (top) An aerial view of the Jodhpur Historic City with Gulab sagar and Baccha Jhalra. Photo credit Sanket Mhatre

is the fundamental building block of a city's cultural phenomenon.

Narrative Mapping

Kevin Lynch suggests that 'identity, structure and meaning' are the three main components to analyse an environment. In reality, they are inseparable. (Lynch, 1960, p. 8). Although we all come with our ways of looking at things, the observation and documenting of the pedestrians, householders, business owners, vehicular traffic, the animals and the tourists with the backdrop of the signature blue houses, the market, the water bodies and the majestic Mehrangarh, brings about a greater understanding of the life in the historic centre.

Narrative mapping was the method adopted for the study of the historic city centre of Jodhpur (Figure 5). The media included maps, drawings, sketches, photographs, videos and interviews. Narrative mapping is a graphical and pictorial analytical tool. It is a method of observational understanding through sketching, photography, videography and conversations. Architects continuously use the analytical method of narrative mapping as a tool to understand settlements in terms of its people and context.

Measured drawing is a very objective way of looking at built form. When supplemented with narrative mapping, it tends to bring out the human factor into the study. The method of narrative mapping afforded the students a peek into the cultural, historical and lifestyle changes and adaptations of the historic centre of the city.

Cultural exchange

There is a significant distinction between the views of the Italians and the Indians concerning heritage preservation. We Indians believe in the circle of life- birth, death and rebirth and the same are real for our built form as well. While our temples and places of worship are enduring and elaborate, our house forms are (were) consider-

ably temporary. The advent of modern-day heritage conservation and its significance in cultural preservation makes the Italian perspective vital in this exercise.

The exercise brought about broad perspective not just concerning architecture but also crafts, planning and management considering that the participants were from different nationalities as well as varied but allied fields. The perspectives also varied in terms of the sociological and cultural point of view. The city of Jodhpur was culturally unique for the Italians as well as the Indian students.

"My colleague Gunter Nitschke who liked and worked in Japan since 1962, had phrased the term *architectural anthropology*… I was less interested in an inventory of monuments and measured drawings…Beyond the built environment I wanted to grasp the spirit of the place". (Gutschow, 2017, p. 36). The culture of a place has a powerful influence on the architectural developments. It can be interpreted as 'trained and refined' state of understanding manners and taste prevalent at a time or place. The idea of culture itself talks of evolution and change.

The study of this characteristic is an essential tool towards recording the history. Indian cities have a rich cultural heritage and yet a comprehensive study of our city centres and their influence locally as well as globally still needs a lot of in-depth analysis and understanding.

Resilience

Figure 5: example showing a narrative mapping of Manak Street in the Jodhpur historic centre by the participants of the winter school course. Image credit Giovanni Gibertini, Irene Ginesi, Rahul Dagli, Sai Netra Ramesh

Figure 6: (left) a woman at the window overlooking the street. Photo credit Pietro Massai. (right) the everyday rituals of feeding the birds or putting water out for the animals continues to this day.

Some cultural aspect of the historic city continues to remain alive and relevant to this day. When carefully observed every aspect of these 'old' structures is a careful decision. The windows, for example, afford the user privacy and also visual connection with the street and the neighbours as required.

The visual connection between the house and the neighbourhood, on keen observation, is a crucial community aspect. Not only does it build a space for social interaction, but also creates a secure neighbourhood through visual interaction. Today in the era of social media, CCTV cameras and air conditioning they are still a great way of knowing one's neighbours and bringing in natural light and ventilation. After independence, there was a faction of society in India that wanted to break away from traditions completely, but culture itself is an evolutionary process. It cooks to a delicious aroma at a very low flame for a very long period. Therefore the culture of an old city or a historical city is a mix of many factors like tradition, food, lifestyle, economy, religion, political views etc. This culture cannot be torn apart in a swift move but only evolved into something more relevant.

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TANGIBLE AND INTANGIBLE HERITAGE

From Repository of Reminiscence

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Waiting at an otla opposite to Fathepole, there is a sense of pause that one experiences as the scale expands from the narrow streets which opens onto it. At this point, the terrain becomes a bit evident, where the tapered lanes encounter the magnificent countenance of the Mehrangar fort. There is a lot going on around the square apart from the movement of the streets. From children playing in the open space in front of the pol to a group of middle aged men gathered to discuss authenticity of preaching of Ramdev, each were indulged with their own priorities at 9 o'clock in the winter morning (Figure 1 and Figure 2)).

This was complemented by a small temple at the corner where at specific times of the day one could hear the sound of the bell from the adjacent lanes; other times there was recording of the gaitry mantra that played constantly. The volume of the recording was not distracting, but evidently expressed the temples presence in the square. The platform and the space around was enough to accommodate different users with diverse activities. Through the behavioral ease of the participants, one can identify which of the activities were parts of daily practice and which were occasionally exhibited, thus expressing certain degree of belonging to each space

As students were busy orienting themselves with the previous day's documentation, there were two elderly people sitting behind us with a look of curiosity and biddis in hand. They have seen us there for the past three days and had asked students the purpose of our visit on the very first day. Through limited encounter with the students, they made it evident that they are not much com-

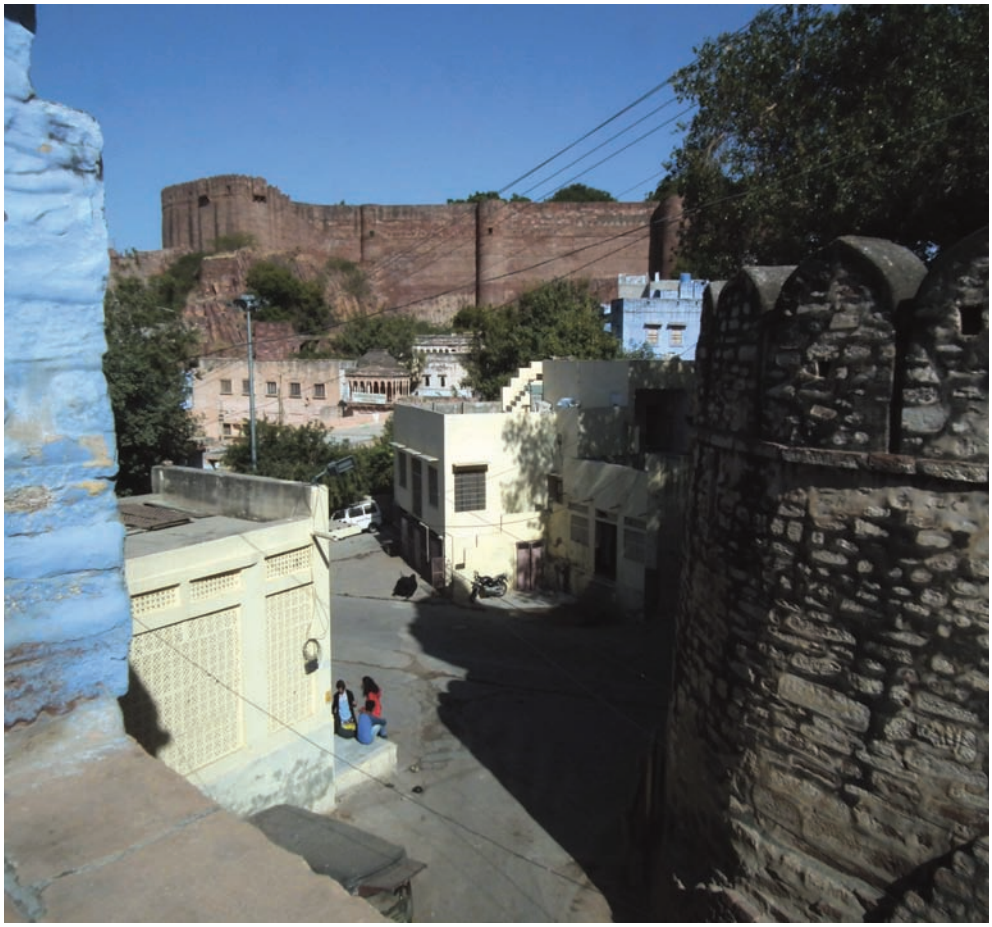
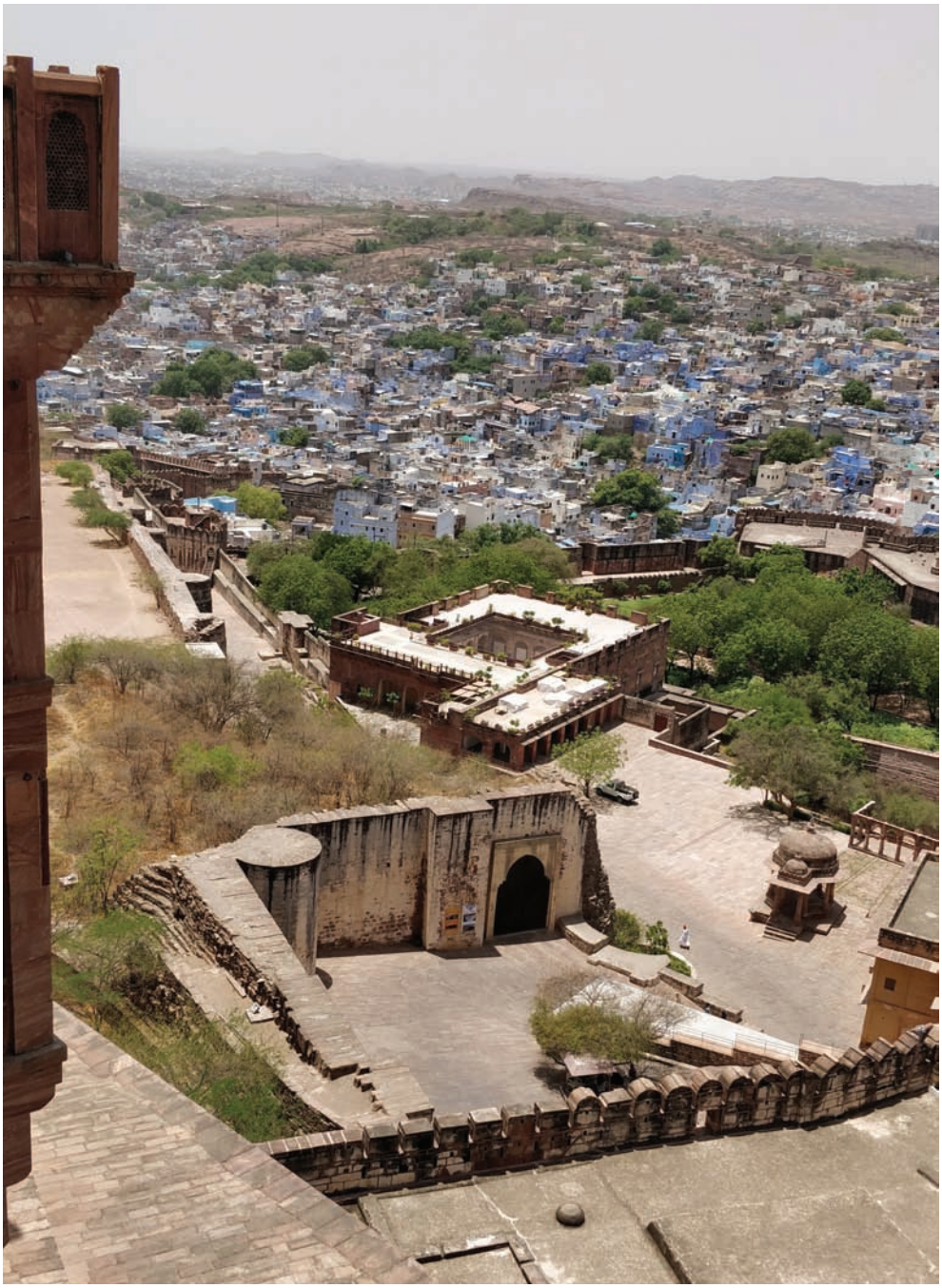


Figure 1: square near Fathepole with Mehrangarh in the background
Figure 2: (next page) view of Brahmapuri from Mehrangarh fort expressing its presence in context of the fort

fortable with us as outsiders and doesn't approve of certain cultural aspects that we practiced. As the otlas were an extension of the houses, there was a subtle intent to express a sense of territoriality. This was evident by the cold look that they gave me each time I expressed a courtesy greet. Each of these situations had their own boundaries according to the subject's sense of belonging. Such tensions are evident when one takes into account the cultural differences.

In each of the conversations with people this was evident in one form or the other. As I started to make small talk with them, inways, I came into terms with the social



construct of such behavior. These attempts helped surpass the gap and know the aspects that shaped their environment. An underlying layer of the study was to understand such aspect of their livelihood dueling upon believes and morals evolved through time. A large part of such conversation was based on their memories of the past, a reaction to the changing pattern of the present time.

Association through narratives

Place, in relation to time and space, is an interaction of an individual with environment and memory. According to Heidegger, it is not necessary for an individual to be physically present in the space to know its essence; it can be a projection of a memory too which relates them to the space (Heidegger, 2010, p. 251). Wondering in the narrow streets, one comes across pockets which act as breathers to a cluster of households. In cases they are small courtyards, a chowk or a terrace with a demarcated entrance, suggesting that at one point of time it might have belonged to a single social entity (Figure 3). Sometimes there are paradoxical situations where it's hard to assign these to be a part of the street or of a defined cluster.

The scenario has changed in present times. Due to economic or social constrains some inhabit nuclear families with diverse backgrounds as they live on rent; some are empty since a long time. As I entered one of them out of sheer curiosity to know what's inside, I came across a cultural phenomenon which is mainly practiced by the female members of the households. There were three women sitting on the steps leading to their respective houses. Each afternoon they spend quite a period of time with each other gossiping. The awkwardness of me being a stranger barging in was a bit blurred when few students followed me inside and started talking to them. They were more comfortable talking to the women which acted as an icebreaker. As the students continued with their documentation I started enquiring about their livelihood. At times we were accompanied by their children who kept hovering around the students at intervals.

The matter of conversation started where we found a common ground, the change that the place has exhibited through time. Though two of them were not originally from this place they gave a perspective of what they had obsrved since they came here. One of them shifted because of change in nature of husbands work, the other lived with her in-laws. Her mother in law used to join in the conversation but left as she didn't quite fit in. Through their stories one could get a glimpse of the nature of place that enables certain activities.

The stories and memories had an association with the spaces giving an identity to them. One women said when her nephew was young she used to guide her towards his education. Even while working in the kitchen, she always had one eye towards what he was doing. As guests came by he got distracted and used that as an excuse to run out of the house to play with the neighborhood kids. He liked to sleep on the

Figure 3: (next page) a small court when entered through a door leads to multiple houseforms

carpet near the kitchen while listening to radio played by his grandfather.

The grandfather spent most of his morning time on the courtyard peeping out to the street, reaching out to every known person to indulge them for a conversation. The other women talked about how this was an outer world for her after she came to this house as a newly married wife. Initially she had to cover her face with the sari, abiding by the traditional believes that was imposed on her, which withered out as time passed by. Similar stories went on further and further, complemented by tea and snacks they served us with immense eagerness.

These associations gave them meaning and relation to the space. The changing culture and practices acted as a catalyst to preserve such memories complementing the nature of acceptance of these spaces (Figure 4).

Carriers of stories

Sometimes there are mediums to carry stories, objects which acquire relevance for just being present. Their association with certain period or events of the past imparts meaning for their existence. "The significance of objects in our process of remembering is the main reason why we like to collect familiar or peculiar object around us; they expand and reinforce the realm of memories, and eventually, of our very sense of self. Few of the objects we possess are really needed strictly for utilitarian purpose; their function is social and psychological" (Pallasmaa, 2012, p. 27). Sometimes their value comes from a particular event for an individual or a group, or acts as a reminder for being a part of their tradition.

What we came across a built notion of the past for each individual, helping them anchor to it. Sitting in one of the houses listening to an old lady as she blabbered about her achievement of holding the family together through generations, my eyes went to a very old trunk at the corner. The faded color of the wood and the rusted metal ties were a witness to the age of it. There were ornamentations on it made up of brass and had a broken vintage lock hanging. The pile of newspapers and books above it suggested that it was not used much. As I asked about it, I came to know that it has been in their family since ages. One of the household members started to clear the junk above it for me to see, the lady started to talk about it with enthusiasm. It was gifted to her by her father in law. At times it was used to store jewelry and copper and silver utensils, now is a dumping station for old books.

Similar kind of units were present in each individual house at one point of time but only few have survived. A person in the same neighborhood showed us old manuscripts in Sanskrit which were used by his grandfather and generations before that to perform religious ceremonies in the city. Though he is a banker now and does not practice such occupation, he takes pride in talking about it. There were exceptions to this, as for some, these were items of decore bought from a flea market. From stories of how people from the neighborhood gathered to listen to radio which is now an

Figure 4: (next page) a collection of items in a shop (Isha Silk) at clock tower kept for display


Amco

abandoned piece in the corridor, to old family photographs and the story of how a person was fascinated by a camera, each were well engraved in peoples mind. The values of these were evident from the keenness with which the story tellers were describing us the details.

The main protagonist varies from story to story; it is place, event or people in most, whereas in some it was believes or cultural practices. These act as souvenirs imparting significance to their presence, giving particular identity to it.

Holding reminiscence

As we went into casual discussions with people on the public chowks and neighborhood clusters, their inclination towards dwelling upon the past was quite evident. A reason might be because we were mainly taking to people of a particular age group. There was less young audience as they moved to different city for better opportunities, others who stayed back were involved in their occupation so were absent from their household. As time changed the city witnessed certain limitations in terms of growth. Now it is a common phenomenon that the current generation does not inherit believes and practices of the previous ones. Thus there is a change in sociological structure because of change of inhabitance.

"The memories present within a narration do not represent the past so much as the individuals attempt to come into terms with this past in a given discursive context" (Jedlowski, 2001). In most cases the past came up as a reaction to change of character of present time. Change of clothing, medium of commute, change in lifestyle due to technological advancement; these were some of the factors around which discussions revolved. As Brahmapuri was an area inhabited by Brahmins, cast played an important underlying factor which surfaced quite often in discussions. In some there was an attempt to idealize the past, believes and rituals without much rational approach to reasoning.

These were the methods by which they established resilience towards change, retaining some of the traditional aspects. Every city has an image beyond which there are people who form the backbone of it. In case of Jodhpur, apart from the picturesque nature, lies people and society which gives meaning to it. Through interactions, one gets to know the socio-cultural construct which often duels upon the nostalgia of the past. The sentiments of such act as a catalyst, keeping the tradition and believes alive, at least parts of it (Figure 5).

This gives meaning to their livelihood, imparting value to it. Memories of such, in some way or the other, contribute to building up their existence, putting imprints of it on the identity of community and the city as a whole.

Figure 5: (next page) at the entrance of a house at Singh Pol

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Thresholds: a vital link between the worlds

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Historic cities are the ones that showcase their memories with minimal efforts. Evolved from a natural setting, these cities also consist of certain physical environments made up of man-made objects. Since these elements don't exist in isolation; their understanding often goes unobserved. The unique character of these environments become spontaneous on the arrival of a group of architectural elements, well known as Thresholds.

Urban forms continuously house social, cultural and traditional forces which end up defining the spatial essentials of the city itself. When the public life ambiguously defines the outdoor areas (e.g. streets, outskirts), the indoor spaces are formed by the privacy of the adjoining users. But the thresholds are the ones who craft the ambiguity in order to transit from the former to later or vice versa.

The old city of Jodhpur is one such excellent example which exhibits thresholds on different occasions. Three-dimensional spaces formed to divert the harshness of the sun, mediate between the light and dark spaces (Figure 1).

The daily life on streets is full of an intricate network of activities which are enclosed by equally active participating facades. Public open spaces born due to different purposes manipulate and converge bustling lanes. The city itself serves as a doorway to the Mehrangarh Fort on the top of the hill.

Influence of the climate

Blue houses of Jodhpur, bear a simple form adorned with ornamentation. However, they are comparatively dynamic from inside. Built to take shelter from the hot climate of the region, the

Figure 1: open space near Ada Bazaar displays a complex character which hard to assess (image by the author)

traditional dwellings have evolved around a small open space. Known as courtyard, this space does not only control the microclimate of the interiors but also brings in exceptional light quality into surrounding space.

The peripheral space becomes a perennial zone in the house. Although being visually less critical than the courtyard, it holds equal functional importance. As the courtyard provides light to the entire house, the thresholding space allows human access to the open-to-sky space. This scope spontaneously enables multiple activities to take place, the spread of activities into the adjoining void and development of private life due to their confining nature. Since the location of such space is secluded from the external realm, there is a freedom the way it is used in the context of the house. That is why the common usage along the courtyard is found to be of kitchen, dining or living spaces. Acting as a hub, such thresholds host congregation of families or even communities in some instances. This space informs, what Amos Rapoport has precisely hinted about as, the "Creation of the ideal environment is expressed through the specific organisation of space, which is more fundamental than the architectural form." (Rapport, 1969, p. 49).

Houses at Hazaari Chabutara are equipped with open courts which define the core of the house. Antique articles, traditional crafts and manicured plants beautifully adorn them (Figure 2). Some curiosity is required to discover the little plinths and doorways surrounding this space which are dominated by the previous observations. But on a closer look, one may find that these adjoining spaces behave as a portico towards the internal open space. However, in this case, the nature of their use remains somewhat exclusive as compared to their external variations.

Figure 2: (top left and right) spaces around the courtyards with different functions are decorated with crafts, frames and vegetation to make a lively atmosphere, image by the author. (bottom) levels of the peripheral space around the courtyards being comparatively higher are used during household activities which eventually can spillover into the open space. Photocredit Giovanni Gentil

Thought-provoking perceptions

A threshold plays an exceptional role in defining boundaries. It helps in channelling the movement of a diverse group of users. A simultaneous outlook into the hierarchies set up by this detail elaborates further about the societal behaviour. The balance between the constraint and flexibility dictate the scope for spontaneity and formality of activities. In Jodhpur, the character of the streets is as remarkable as the evolution of house forms. The friction between the public passage and the individual existence gives rise to the formation of a significant in-between realm. (Figure 3).

"Transitions that mediate between public and private space are by far the most complex. They carry strong social and territorial implications. Whether space is public or private is always relative. It depends upon implicit cultural assumptions; how territorial control is physically asserted; and relationships between individuals, between spaces and/or between observer and observed." (Habraken, 2014, p. 45).

Figure 3: (left) individual thresholds in a street create an intriguing image, photo by the author, (right) by allowing many activities to take place. Image by Gaurav Banerjee, Pratik Parmar, Andrea Samory

Streets in Jodhpur are narrow in proportion as a response to the harsh climate. However, even in this less width, their sides are filled with many architectural features. A series of platforms run along the ground floor, change in heights, as they are just extensions of the building plinths. The fluctuating arrangement breaks the visual

Figure 4: Thresholds on the streets provide exciting opportunities for interaction with friends and neighbours (image by the author)

linearity of the street, offering an autonomous interface to each house.

This element also known as otla is a necessary threshold which links the outside street to the inside. This space, due to its location does not only retain the privacy of the house but at the same time allows the users to interac with their neighbours and activities on the street. (Figure 4).

Ada bazaar which lies on the east side of the Mehrangarh Fort is a principal thor-

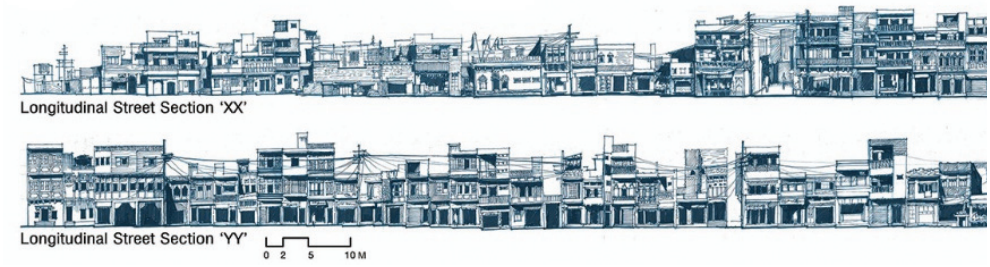

Figure 5: Ada Bazaar is a street with dynamic physical and functional characteristics. Image credit Gaurav Banerjee, Pratik Parmar, Andrea Samory

oughfare in the old city. The busy nature of the street motivated a mixed-use in the earlier residential quarters. This network of activities bordered by the interplay of otlas contributes a charismatic quality to the space.

The open nature of these thresholds allows marginal spillover of the user functions onto the street leading to some curious exchange between the diverse stakeholders. This lively atmosphere on the ground is further made visually rich by intricate jharokhas and other openings on the upper stories which take this interaction to a higher level. (Figure 5).

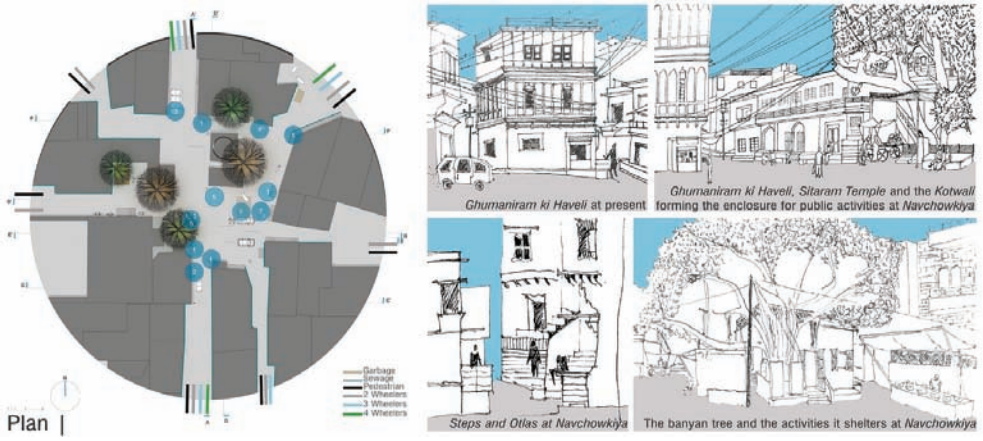

Figure 6: the junction at Navchowkiya behaves theatrically, connecting various parts of the city and hostinga multitude of activities around the well in its centre. Image credit Parshati Dutta, Bhoomi Parmar, Gitesh Gupta

Articulation of multifaceted values

The streets culminate into the nodes which possess a comparatively larger space. These junctions often form as a breathing space that links different parts of the city; like a threshold. Sometimes these open spaces are historical or natural landmarks which have developed the streets. Connections between such markers determine the pattern of the city. Conceived each node, mysteriously, displays a unique spatial character. The generosity of their scale indeed offers an elaborate composition of the multitude of activities (Figure 6).

The incredibly active cultural life of Jodhpur has led to the formation of many such nodes each differing in their usage as a whole. Intersections of mixed-use lanes have retained their commercial nature. Juni Mandi is one such open space which although being a local marketplace is also utilised as a meeting place and short time interactions. The square offers a platform to different users who come from adjoining

Figure 7: market at Ghantaghar becomes a transition between the old and new part of the city. Image by the author

schools, temples and houses. A later addition into the city Ghantaghar market serves as a threshold between the old and the new fabric of the town, bringing people from both areas close for an exchange of ideas (Figure 7).

Open spaces abutting religious buildings have merged with the surrounding streets making room for related activities. Katla Bazaar lies in front of the old Kunj Bihari temple which has a higher massing. The square enclosure formed due to this development is a formal space that on one side bring forth commercial interactions and on the other hand continue with religious rituals. The massing and existence of two diverse activities bring a unique halt as one stumbles across this place.

Possible draught dangers of the region have introduced the sensitivity towards water conservation. Traditional infrastructure spread across the old city tell a lot about such efforts; kunds, kuvas and jhalaras to name a few. Large bodies like Gulab Sagar do not only fulfil the water requirements of the city, but they also facilitate recreational life along their peripheries. The congregational nature of such features develops a sense of belonging among the citizens.

Figure 8: market at Ghantaghar becomes a transition between the old and new part of the city. Image by the author

Topography as a threshold

"It was natural that a town should take advantage of every suitable feature in the land on which it was built. Because the town took so much of its character from the nature of the land, it generally fitted into the landscape and became an integral part of it." (Rowland, 1966, p. 9).

Owing to occasional sandstorms, the city of Jodhpur took shelter on the foothills of Mehrangarh. Consequently, the slope of the hills has become an additional reason which has shaped the city accordingly (Figure 8). One can see various responses as the topography begins to change locality wise.

The experiential qualities offered by the town on a gradual slope is undoubtedly different from that taking place on a steep gradient.

"'Transition places are important in the ways static places relate to each other. They play a part in the relationship between a place and its context." (Unwin, 2003, p. 198). A high gradient eludes large activities from taking place. Therefore experience of such precincts turns out to be quaint. Such atmosphere can be experienced when travelling from Hazaari Chabutara to Vaidon ki Chowk (Figure 9). While the location of the former provides views of the fort, the latter is a small node enclosed by houses. The street here quietly descends onto the neighbourhood below manip-

Figure 9: (top) street from bustling Hazaari Chabutara makes a sudden descent into the quiet neighbourhood below. This sloping transition is also evident in areas below the Fort. Image by the author
Figure 10: (bottom) the old city acts as a threshold between the new town on flat ground and the Mehrangarh Fort on the top of the hill. Image by the author

Figure 11: interior voids, winding nature of the streets, open community spaces and the influence of topography, all together create numerous transitional features in Jodhpur. Image by the author

ulating the contemplative nature of the human mind.

At this place, the physical constituents have been built while negotiating the topography. The resulting meandering streets, structures that stand on varying levels and the intermittent vista of the fort build up the visual characteristics of the city. The settlement starts to fade as the massive fort is approached.

Similarly to access the old city from the high fort one needs to experience this precinct which becomes a crucial transition of experiencing Jodhpur (Figure 10).

Conclusion

Meaning of a city can be understood in changing depths. Evaluation of interiors of the house, exchange of atmospheres near the street, the metamorphosis of the roads into open spaces and the placement of all these features on the natural terrain give insight towards the interactive ability of the city. The historic city of Jodhpur is host to numerous such platforms that develop relationships between users and built components and their integration with the local lifestyles. Initially created as a response to the harsh climate, the city has evolved into a spontaneous, exhilarating and compassionate atmosphere (Figure 11). Alison Smithson emphasises on

the need to understand the relationship of space-quality to life-quality, she claims further that "Man's need of identification-in-space through built-environment corresponding to 'ownness' has more to do with the kind of space he uses than with the amount of space he owns. (And I think this is true for all scales, from house to region)." (Smithson, 1964, p. 12).

Since the elements of transformation are efficient in maintaining this relationship; a threshold can be estimated as a powerful tool to bring and sustain life around city structures. The old city of Jodhpur expresses such transitional fundamentals on varying scales.

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CULTURAL HERITAGE PRESERVATION

Documenting Jodhpur: a tool for heritage's protection

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The search for a harmonious coexistence between old and new is present in all debates about heritage protection. Regarding the preservation of cities, this dispute shows in its built part, behavioral and technological changes of society. Therefore, when you think about heritage protection, it is not enough to establish technical criteria for recovery of buildings and monuments. It is necessary to consider a wide range of actions that may put society in the process. After all, the responsible for the preservation of a building, ultimately, are the people who live there, who daily attend such site.

We start from the following premise: it is necessary to know what is intended to be protected. Such knowledge ranges from basic information about the object, to very specific aspects, such as physical characteristics and its conservation status. In the present essay, we consider this knowledge not as a mere historical research or technical investigation as a basis for a project's design. We consider knowledge as one of the main tools for the development of public protection policies and incentives. For this reason, the experience that has been developed in Jodhpur, in documenting its historical center, is essential.

About documenting as preservation

Before addressing the Jodhpur case, it is worth to mention the role of documenting in heritage preservation. The term "protection" today has taken on a broader meaning, not only referring to physical interventions in heritage, with preservation, conservation and restoration actions, but also including management and en-

hancement actions (Kühl, 2008; Rolim, 2017). The last two involve legal instruments, heritage educational programs, conservation plans, development of public policies, etc. The act of protection, more than preservation, is no longer merely a technical operation, involving also ethical issues. When we answer the question "how can we protect our heritage?" we now have to consider aspects connected to technical and theoretical aspects and to the place from which we are talking about. Moreover, when we consider local issues, our concern is not only about its political organization, but also about its culture, its worldview (Zanchetti & Lacerda, 2012). That is why the importance of a close contact with local populations in developing protection strategies.

Within the various issues to be addressed within this enlarged view of protection, this essay deals with the production of knowledge from the heritage documentation. As regards the built heritage, one of the steps to achieve this understanding about the object must be through the archives. A bibliographic search is always necessary and important, although, going to primary sources is fundamental. Thus, we consider several types of documents: photographs, maps, drawings, sketches, travelers' journals, letters, etc.

However, when we speak of a built heritage, the survey of the object to be protected is crucial. The architectural object itself is the most direct primary source, from which it is possible to formulate several historiographical and sociological hypotheses.

In addition to the historical aspects, it is also possible to create databases with information that record the current state of the object. From technical issues such as materials, structural characteristics, color, state of conservation, when we speak of the documentation of an urban heritage are also registered aspects related to urban morphology.

We have already highlighted the relevance of the research processes, of knowledge production within the actions for protection. Considering the urban dimension, during the process of survey, the population becomes involved in it, mainly to better understand how the relationship of these people with such heritage takes place. Here we have the documentation work gaining strength of education: when working close to the population, it gets to know details of the place where it is. The process of documentation becomes, in itself, a form of disclosure to the residents of the historic center on the importance of that place and, consequently, of its protection, of its conservation. This is a first strong point of the documentation process: the creation of a dialogue between the heritage and its inhabitants.

The second point is the contribution to the management of this heritage. Except in cases of countries with strong culture of preservation, such as Europe, urban heritage is usually poorly documented. The main exceptions are the American cities of pre- Columbian origin and those classified as World Heritage. Therefore, the creation of databases with minimal information on typology, location, conservation status of historical centers, is an important subsidy for the establishment of more effective

policies for its management. In particular, the register of the transformations the city suffered are of paramount importance, as they allow the understanding of the social and economic dynamics of that place.

The historic center of Jodhpur

Considering the various possibilities that a historic center survey can give us, how could such a process contribute to establish the protection of historic center core of Jodhpur?

Figure 1: Small altars present in the houses of the historic center of Jodhpur. These are an example of the cultural intangible heritage of Jodhpur, of how people's way of life is reflected in the city. Photo credit M. S. Rolim, 2015

Initially, we have to remind the need to understand and identify the distinct forms of heritage existing there. A city's cultural heritage goes beyond its streets and houses. It is necessary to remember the intangible aspects lying there.

Concerning the built heritage, the mapping of streets and houses and the identification of typologies allows the historic center to be visualized in sectors with different characteristics. This can be a first step towards a better understanding of the current state of conservation of the historic center and, above all, the origin of its problems. The identification of areas with similar characteristics could lead to the elaboration of specific materials for each area, pointing out to the residents minimum knowledge for the conservation of the original characteristics of this or that sector. However, we cannot take the risk of a pure and cold analysis of architecture: it is important to keep in mind the local culture. As obvious as it may seem, it is necessary to remember where we are. Most of the theories and concepts of conservation and restoration have their origin in Western notions, strongly based on the built form. Which begins with premises of a worldview quite different from that existing in blue city.

The reality of Jodhpur is common to many Asian cities, which are experiencing a moment of economic growth, with the insertion of contexts that can have a strong impact on urban heritage (Logan, 2002). Due to pressures of political ideology or of a globalized economy, it is necessary to establish scenarios that allow changes brought by an economic development different from the traditional, combined to the protection of the core values of its heritage. A clear identification of the intangible heritage present in the city, especially those related to religious practices or the traditional festivals, allows such scenarios to be not only theoretical (Figure 1).

The survey of the current situation, the points of strengths and weaknesses, contributes decisively to the construction of a plan that allows the insertion of new policies in a historic fabric. Logan also emphasizes the impact of tourist activities. Jodhpur is a major tourist destination in India, but the city still does not feel the weight of predatory tourism, as has been happening in Venice, Barcelona or some islands of Thailand. However, the historic center suffers with its urban infrastructure, with problems in garbage collection services, pavement, sewage and rainwater systems. Residents who struggle daily with these problems might see with difficulty investments in restoration or conservation of original aspects of the historic center. After all, each one of them has a different vision and expectations about the future of that area. Amid different expectations of what would be the desired progress, one of the main features of Jodhpur historic center has been threatened: its blue color. On that subject, the students' contact with local residents was important for valuing such characteristic. That is, if the result of the documentation process contributes to the development of policies and plans, the work of documentation itself is also

Figure 2: (next page) students during work on site, talking to a local resident, in Jodhpur. Photo credit M. S. Rolim, 2015

helping the protection of that heritage.

Towards protection policies

The process of documenting and organizing the survey's results into a database is crucial to any government to have mapped out the points to be dealt with emergency. It is also important to draw incentive policies, especially considering the socioeconomic conditions of the resident population. Is there any area that presents a higher risk of decharacterization? Why? Where does the most vulnerable population live? What is the state of conservation of the area? The answer to these questions may lead to understanding that an action of tax incentives can help. Or that to provide technical subsidies to residents for simple maintenance actions can be a turning point. Or yet that it is a matter of disseminating the information collected, and encouraging actions of awareness of this heritage by the local population (Figure 2).

Anyhow, the documentation process carried out could provide the necessary information to the governments, to settle more effective protection strategies. It also allows us to think in a more integrated way, considering the different realities and the other actions developed in the city. Therefore, the work of survey and documentation of the historic center can contribute positively to the construction of a more effective protection policy. Both through the governments, as the population itself.

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Technologies to survey and to catalogue Cultural Heritage in a global south country environment

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Definition of technologies that are useful, available and usable and that have the possibility to provide working data in an environment as the one of emerging nations is nowadays a matter of debate.

Many research activities by European Universities and Specialized Research Centers in different fields were done (Tillotson, 1987; Archaeological Survey of India, 1998; Whiteside, 2005 and Gupta, 2007): a high number of them, thanks to interested local institutions, were supported by on-site cases. This possibilities brought the literature to a possible classification of different study cases. On the other hand, the problem should be on the possible usability of technological instruments and tools, created for different environmental typologies, on countries that have a very different scale of detail in architectural heritage dimension.

One of the problems conservation experts, architects and urban planners, are facing working on a developing country as India, is the analysis of the urban structures and their quick changes in the last decades. As a matter of facts, the post-colonial period in India brought a visible mixture of styles and deferent influences from all over the world (PANICKER et al., 2008). Nowadays the western influence converted the shape of old towns into something else: as it is possible to see in the old Delhi center, as the Manak Chowk area, or in the neighborhoods of the famous Gateway of India in Mumbai, the ancient building tradition has been mixed in the past with a new western tendency, sometime with functional and fascinating results. Nevertheless is important to highlight that the development in the two mentioned city centers have been carefully

planned. On the other hand, many cities' unplanned plots are changing in different ways. One of the examples can be a part of the city center of Ahmedabad and the problems faced in the conservation of the old center (Ghosh, 2015), in Gujarat, as the Madan Gopal Haveli Margh, near the Jama Masjid. In that case the creation of a rule set by the municipality is difficult because of many development's monitoring factors, leaving freedom to the owners that are converting the city center almost without a comprehensive development plan, subtracting facades (to be sell in other parts of the country), adding encroachments, creating new concrete car boxes etc.

In this environment, the difficulty of discerning old and new architectural objects, the renovated and the decadent, sometimes is complex because of many historic layers added during the decades. The blame is partially the lack of documentation of the previous composition and shape of building and urban asset. This allows citizens and owners to sell elements and make changes in the asset of the building without big problems. Municipalities have to face a quick development with a lack of documentation and, sometimes, of monitoring possibilities. The risk is to face in the next years a complete conversion of the heritage areas into new ones, because of the inadequacy of documentation preparatory for the creation of good quality urban planning and architectural conservation.

The idea of creation of a heritages cities' census was born in the period in between the last years of 80s and the first of 90s by INTACH thanks to Jain Associates, Ahmedabad. In the census, that regarded some cities, Jaisalmer, Jaipur, Ahmedabad and Jodhpur, were surveyed some of the main traditional characters of the heritage areas: Street and Squares; Residential areas and houses; Infrastructures; Social Aspects; Important Historic Buildings and others. The Jodhpur Report was named "Lok-Kshetra: Heritage Conservation Zone, Jodhpur" (Jain, 1989). The heritage areas of the blue city of Rajasthan has been surveyed thanks to the help of the Mehrangarh Museum Trust, the body in charge of the management, conservation and enhancement of the Mehrangarh Fort and the Maharaja of Jodhpur's, His Highness Gaj Singh II, properties. In the report, even though the papery format and the scale of representation that shows the main features of the areas (as trees and front facades of buildings), the documentation is a high quality representation of the characteristic of the urban structure and the typical house forms of certain areas. The survey includes a limited but exemplificative quantity of study cases. For each city development stage one part of the survey has been conducted. However, one of the problem in creating a methodology to approach to the whole heritage city of Jodhpur is the impossibility to find the same type of documentation for the other parts of the city.

Since 2013 researchers of the Department of Architecture of the University of Ferrara study the methodology of usage of modern tools to solve the documentation problem of areas that have not a previous report. The approach is various and involves different factors: as a matter of facts, the identification of the most appropriate analysis procedure is still on going. Aim of the research is the definition of a cheap, usable, useful and quick methodology to survey and catalogue the data. Fur-

thermore, the classification of "what to survey" is itself a research topic: this involves the decision on the representative scale, the quantity of data and the level of detail (Balzani et al., 2015).

The decision of testing many technologies on different study cases was conducted basing on different stakeholders' possibilities and heritage's levels of detail complexity (Figure 1). This approach gives the chance to analyze, together with the typology of architecture and the urban complexes' main characters, the many documentation methodologies to approach a stratified complexity as a city like Jodhpur has. On the other hand the possibility to study different areas all over the city, thanks to the help of the experts of the Mehrangarh Trust, allowed the research to inspect zones with and without a previous documentation. This long research conducted by the Department of Architecture of Ferrara, together with CEPT University of Ahmedabad at the end inspected the comparison between different areas highlighting issues and opportunities, conservation problems and revolution in the urban aspects that have similarities and brought the identification of Indicators. The indicators have been used as basis for the documentation of other areas: the aim was to understand if the indicators were detailed enough to create a catalogue of buildings inside a precise region, analyzing the average variation of urban form of the last few decades that brought problems in the old city's area.

Of course the procedure has to be checked concerning the historical aspects and the morphological one. To achieve this double check a first comparison of the historic data and contemporary ones was done to inspect the veracity of historic variation documentation. On the other hand modern technologies as photogrammetry, point cloud analysis and 360° photos were adopted to check and catalogue the actual morphology of the buildings.

Actually, 3D Laser scanner technology is a well-known technology employed mostly in industrial and manufactural sectors, where investment possibilities are high and already many researches have been discussed and are nowadays a matter of study on the application of point clouds on heritage buildings and sites (Parrinello and Picchio, 2013) (Brusaporci et al., 2012).

On the other hand, as analyzed in 12.a Analysis of Actors' behaviors, there are corps in India with possibilities and interests in conserving heritage of old city centers, but sometimes what is missing is the idea of using determinate tools.

However, the 3D laser scanner is just an instrument: the decision on what and how to survey is crucial. For the aim of this research, as the main documentation is done thanks to other tools the 3D Laser scansion is useful in the checking phase. In fact, the methodology consider this tool just with a quick and high range usage purpose, in order to reduce the hiring cost and rent the object just in the final phase of the on-site survey. Nevertheless the actors with possibilities demonstrated the willingness to use them (Balzani et al., 2015): however, sometimes the results are not directly usable because initial operation on a wider study, actors are more impressed by costs then the results, also because of the need of have results to work on in short

time. The quick changes of the urban context is evident and sometimes if the results are not as fast as the mutation process, tools results useless. On the other hand is easy to survey a high quantity of data but with a low resolution and check the previous documentation processes.

Thanks to the use of a low quality grid on the survey sphere, depending on the size of the surveyed area: the quality of information because of the use as a check of the main morphological aspects of the building that is necessary to the aim of this research is not very high because of the object of survey.

The strategy is to check the main shape of the street scenario interested: under-

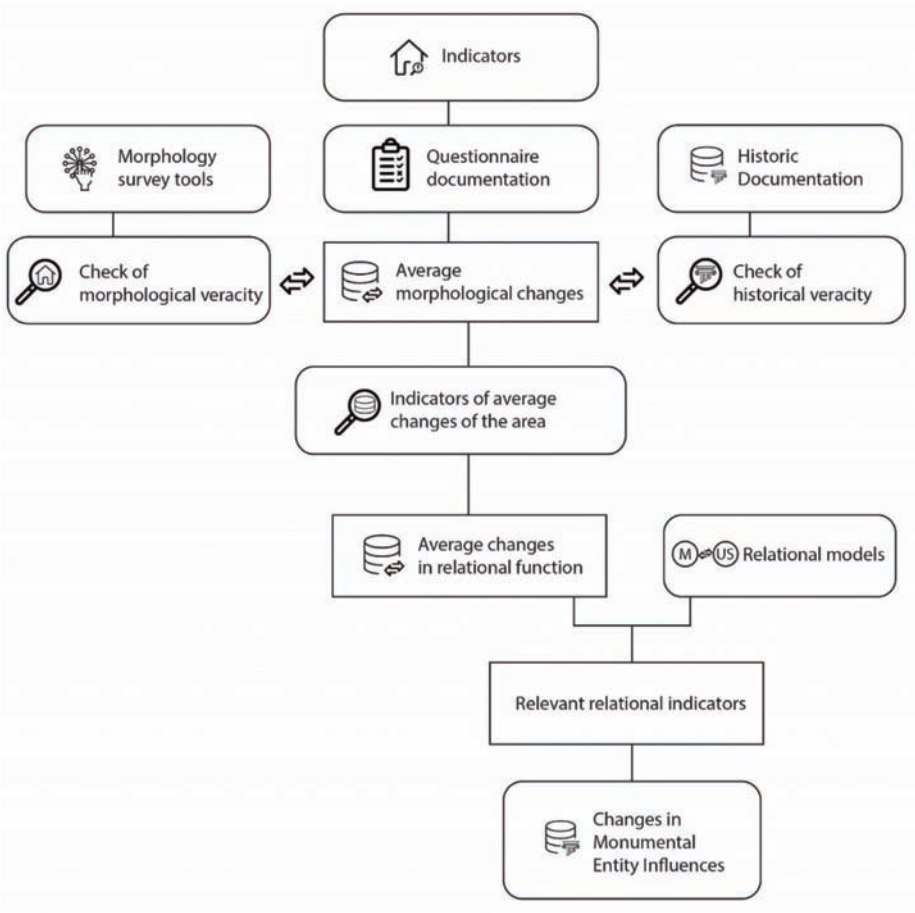

Figure 1: Methodology of inspection of heritage centres with double check (historical and morphological features) to analyse critic factors of areas (image by the author)

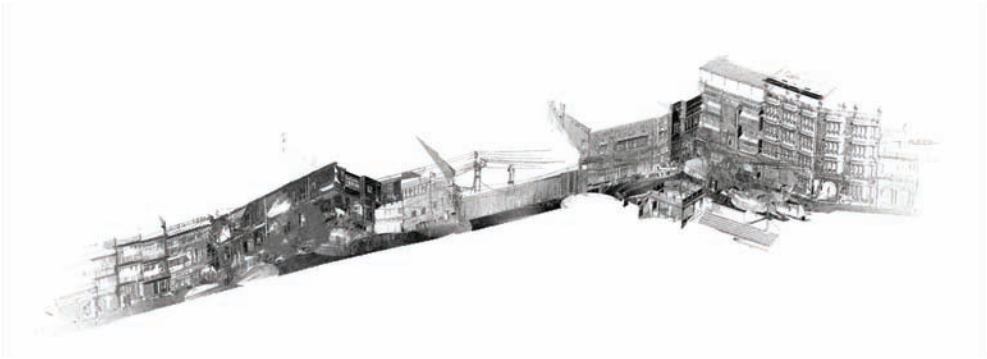

Figure 2: Point cloud of the Toorji Ka Jhalra stepwell square in Jodhpur surveyed in 2014 with a 3D Laser Scanner (image by DIAPREM Center, University of Ferrara)

standing the shape of the building and overlaying with the other surveys. Actually, this is very useful in certain specific cases: for example to check the distance (then to judge as pressure or proximity) of an urban complex in some not reachable areas or high elevations. Concerning the representation, the point cloud in this study represent the most reliable tool to use and to achieve in order to check the main feature of the street scenario composed of the entire amount of building that are present (Figure 2 and Figure 3).

Figure 3: on the left, detail of Point cloud of the Toorji Ka Jhalra stepwell square in Jodhpur surveyed in 2014 with a 3D Laser Scanner, on the right Point cloud of a case study in the Mathuron Ki Pol, Jodhpur. (This point cloud has been created by the author with a photogrammetry operation and reconstructed).

However, as important other prerogative of the tools to use the research highlighted the importance of economic investment. As the study already highlighted, one of the factors that can make the methodology be adopted and use is the cheapness of the used instrument. Therefore has been considered as necessary to identify possible other cheaper technology that can keep the detail of the documentation on the same level of the one that is necessary and that is previously examined.

Taking in mind that the quality is not the focusing element for this kind of environment is possible to define other technology that can give us the possibility to have an overview and a check of the encroachments on the urban environment. Encroachments that are important for the study and that have a quantitatively influence on the relational function of the area are elements that are easy to check with a well-done operation of photogrammetry and reconstruction.

The case study of Mathuron Ki Pol area and the questionnaire documentation

The Figure 4 represents the area under exam. The main image has been taken from the previous documentation and checked onsite for the main additive changes. One of the highlights is the fact that there are not in the area completely new constructions. This peculiarity, that have no influence on the documentation, is because of the morphology of the ground: it is on the slopes that grows towards the Fort. Another reason could be the narrowness of the spaces in between the houses.

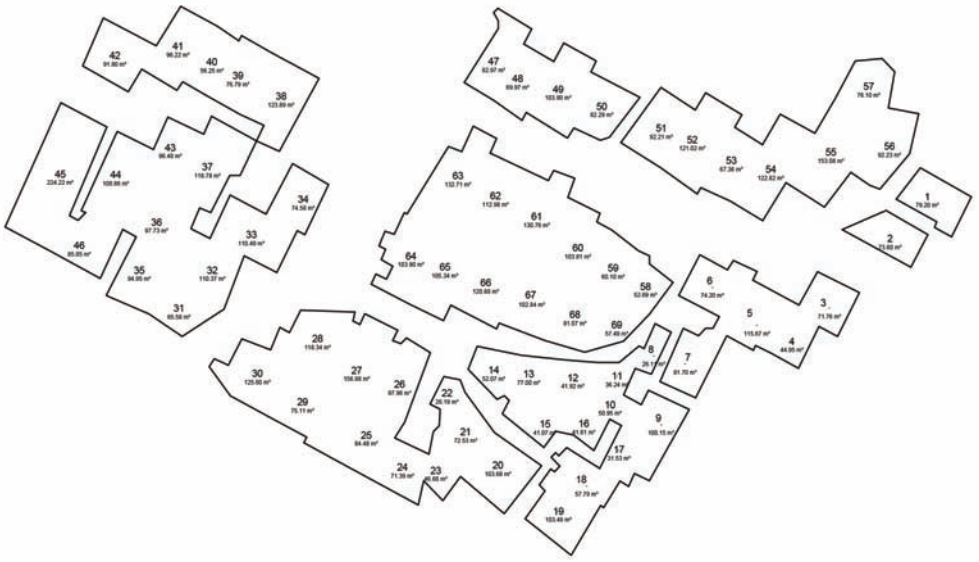

Figure 4: draft plan of the Mathuron Ki Pol area, with the main outlines of building as reported in the INTACH Report

The surveyed data are the followings for each building inside the map as shown in Figure 5.

The data have been documented in a 7 days period during the month of June 2017 by one inspector.

From the previous data, it is possible to extract, for example, the following average quantities (Figure 6):

- 10 % average horizontal growth of the buildings toward the street
- 64 % average vertical growth

MATHURON KI POL		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Inhabitants	2017 (quantity)	6	4	0	5	3	6	5	20	15	18	6	2	4	12	9	7
	1989 (quantity)	4	4	4	6	4	10	8	27	32	15	4	2	6	10	8	12
Residential Area Presence	yes / no	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Commercial Area Presence	yes / no	N	N	N	N	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	Y
Architectonic composition Indicators	Total Area Occupied by the house sqm	30	55	105	105	75	25	45	70	85	97	155	120	75	125	65	110
	Addition Orizontal (encroachments) %	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,2	0,0	0,2	0,0	0,0	0,2	0,0	0,0	0,2
	Addition Orizontal (encroachments) sqm	0	0	0	0	0	0	0	14	0	19,4	0	0	15	0	0	22
	Addition Vertical (new floors) quantity %	1,0	1,0	1,0	1,0	0,0	0,5	0,5	1,0	0,0	0,5	0,1	0,0	0,5	0,3	0,5	0,2
	Addition Vertical (new floors) sqm	30	55	105	105	0	12,5	22,5	70	0	48,5	15,5	0	37,5	37,5	32,5	22
Architectonic modification Indicators	Addition of new internal walls	0,2	0,0	0,0	0,2	0,0	0,2	0,0	0,4	0,2	0,2	0,1	0,6	0,4	0,2	0,2	0,4
	Reduction natural ventilation elements %	0,2	0,0	0,0	0,0	0,0	0,4	0,4	0,6	0,0	0,4	0,4	0,4	0,2	0,4	0,4	0,2
	Total Variation of the initial composition	0,2	0,0	0,0	0,1	0,0	0,3	0,2	0,5	0,1	0,3	0,3	0,5	0,3	0,3	0,3	0,3
Historical Decorative Elements	Elimination of elements %	0,2	0,2	0,6	0,2	0,4	0,6	0,4	0,2	0,6	0	0,4	0,4	0,2	0,4	0,4	0,2
	Conservation of elements %	0,4	0,2	0,4	0,2	0,4	0,4	0,4	0,4	0	0,4	0,2	0,4	0,4	0,4	0,2	0,6
	Adaptive reuse %	0,4	0,6	0	0,6	0,2	0	0,2	0,4	0,4	0,6	0,4	0,2	0,4	0,2	0,4	0,2

Figure 5: case studies from 17 to 32

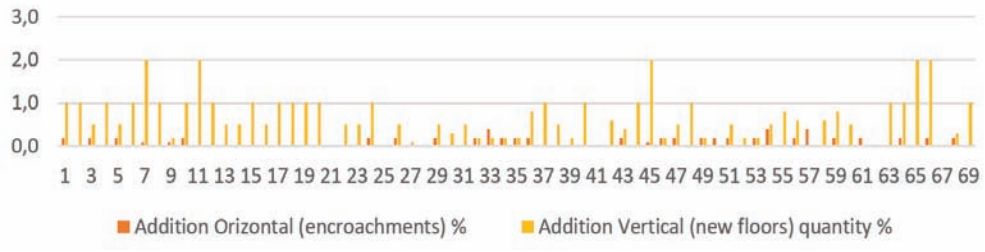

Figure 6: architectural composition indicators

These kind of checking morphologically different clusters have, of course, differences in between the entire belonging set: however, the factor of "standard deviation" from the representative sample will decrease in case of higher exemplificative case studied. These kind of checking morphologically different clusters have, of course, differences in between the entire belonging set: however, the factor of "standard deviation" from the representative sample will decrease in case of higher exemplificative case studied (Figure 7).

For a higher veracity level's precision of the documentation it will be needed a future research on the minimum necessary number of double checked cases, thanks to a deeper statistic study.

Figure 7: the tree images shows typical cases of over-volumes present in the areas. It is possible to distinguish (middle photo) the Fort walls and how the new building growth on it As previously said the situation of growth of the size of the building is moving towards the vertical direction due to the lack of space along the streets. However, the growth has a very high factor with an average of 64%. This creates high-density areas)

Double-check detailed operation on cases 24 and 26

As it is possible to see from the reconstruction the questionnaire, from a morphological point of view was completely true regarding this area: building number 24 has an historical initial shape on the ground floor but an over structure has been created in order to make the whole building higher of one floor.

The other building 26 has an over structure of a half floor. The addition on the ground (towards the street) is of the 20% of the basic area of the house. The problem created in this area is evidently a reduction of the carriageway. Thanks to a replace-

Figure 8: morphological identification of case study 24 and 26 (image by the author)

ment of the new plans (from photogrammetric survey) and the old ones of the area is possible to highlight a difference in the building plan.

A rough comparison in between the old surveys and the new ones highlight the differences in between the morphology of the area.

Thanks to a comparison in between the plans and the horizontal section is possible to define some areas with differences inside the checking case study of the building 24/26 (Figure 8).

In fact, with a comparison in between the 80's survey and the photogrammetric one is possible to distinguish the differences highlighted on Figure 9.

And finally thanks to the comparison between the questionnaire and the quick point cloud it is possible to check the level of veracity for the documented data as shown in Figure 10.

Conclusions

Municipalities that find difficulties in monitoring the informal structures' developments inside the heritage centres can approach the usage of this methodology in order to have first overview of the possible areas where to start new non-intrusive monitoring actions. This gives the possibility, in the same moment, to launch awareness actions on the significance and the opportunity of the already present heritage. So the methodology presented in this research could be one first step in the creation of that mutual conservation and enhancement process: with a precise and detailed action of documentation, followed by planned conservation, planning and awareness activities, it will be possible to preserve in a more efficient way that Heritage. The same Heritage that nowadays, is not even named as Heritage: the same one that in future can be one of the most important and ancient, all over the planet.

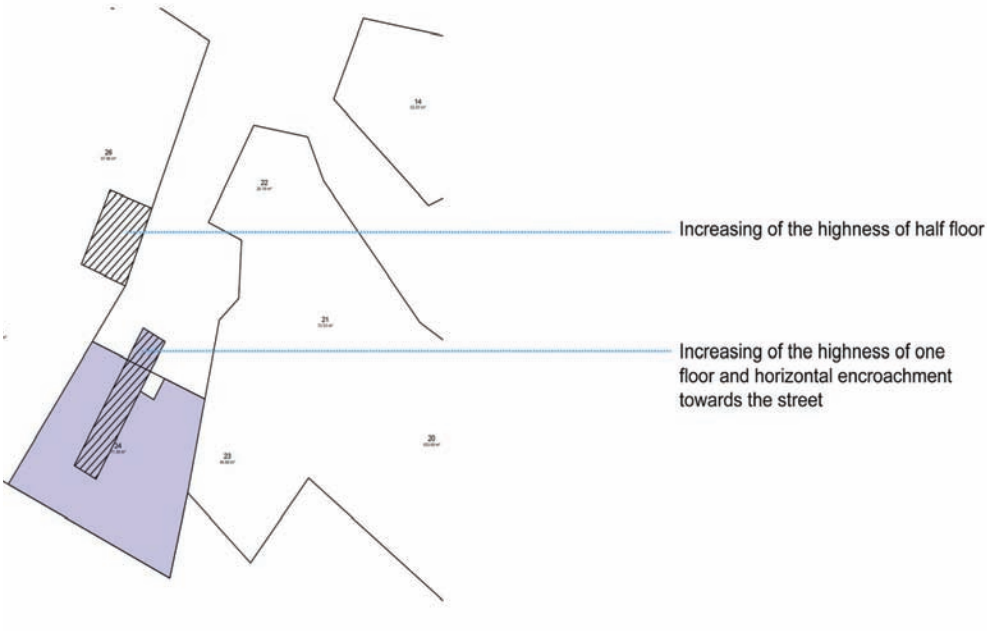

Figure 9: heritage modification by comparison between the 80's survey and the photogrammetric one (image by the author)

MATHURON KI POL		24	25	26
Inhabitants	2017 (quantity)	20	15	18
	1989 (quantity)	27	32	15
Residential Area Presence	yes / no	Y	Y	Y
Commercial Area Presence	yes / no	Y	N	N
Architectonic composition Indicators	Total Area Occupied by the house sqm	70	85	97
	Addition Orizontal (encroachments) %	0,2	0,0	0,2
	Addition Orizontal (encroachments) sqm	14	0	19,4
	Addition Vertical (new floors) quantity %	1,0	0,0	0,5
	Addition Vertical (new floors) sqm	70	0	48,5
Architectonic modification Indicators	Addition of new internal walls	0,4	0,2	0,2
	Reduction natural ventilation elements %	0,6	0,0	0,4
	Total Variation of the initial composition	0,5	0,1	0,3
Historical Decorative Elements	Elimination of elements %	0,2	0,6	0
	Conservation of elements %	0,4	0	0,4
	Adaptive reuse %	0,4	0,4	0,6

Addition of 20% of the total volume horizontally:
- veracity 100% for case number 24
- veracity 50% for case number 26

Addition of 100% of the total volume vertically for case 24 and 50% volume case 26:
- veracity 100% for case number 24
- veracity 100% for case number 26

Ventilation:
- veracity 75% case 24
- veracity 100% case 26

Figure 10: comparison in between the questionnaire and the quick point cloud

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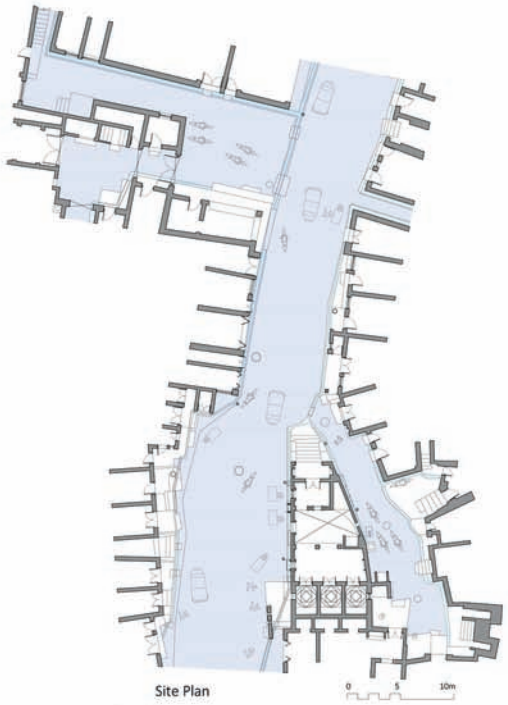
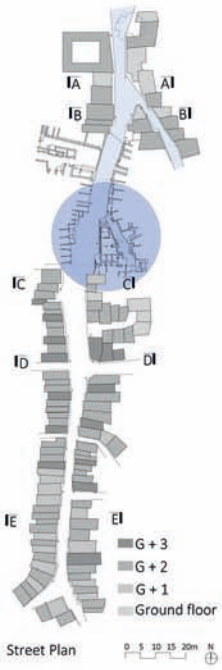
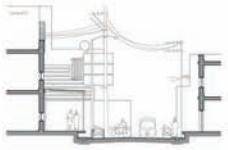
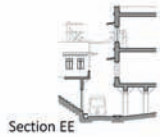
ANNEXES






Section AA


Section EE

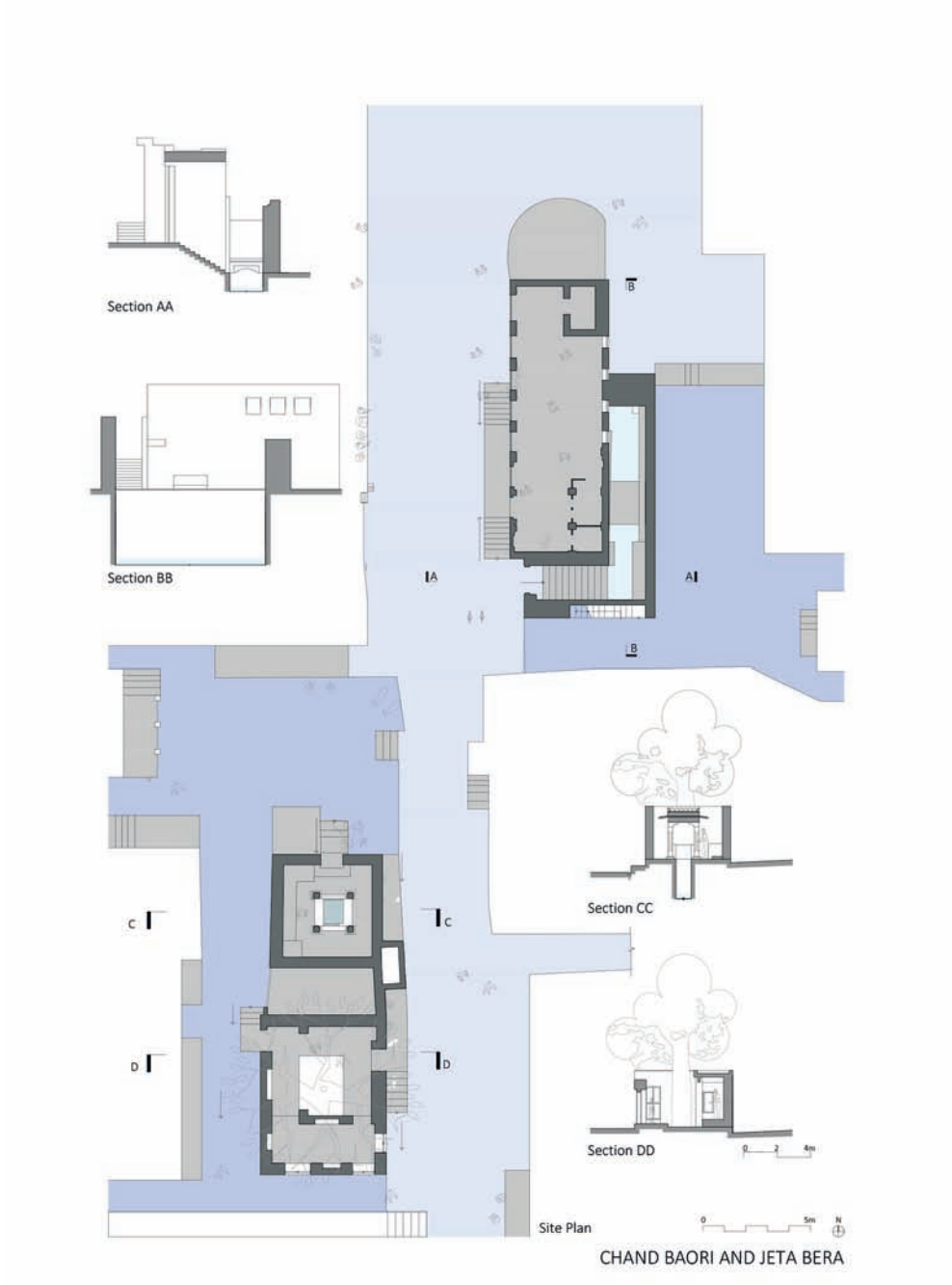

Section BB


Section CC

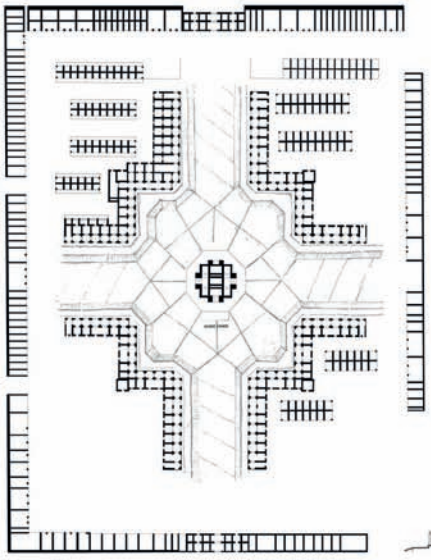

Section DD


Sketches of the proposed street

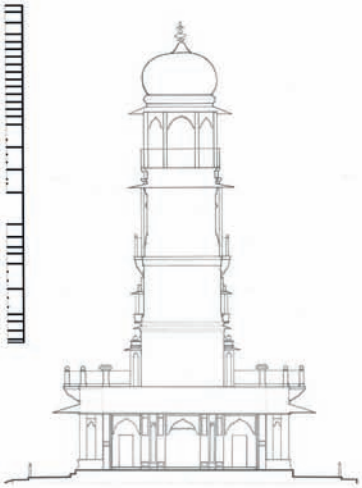
ADA BAZAAR



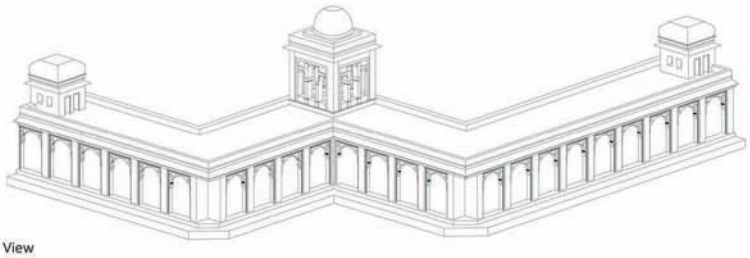
CHAND BAORI AND JETA BERA



Site Plan

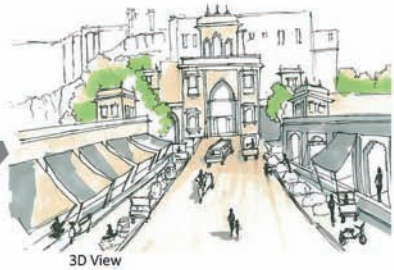


Section



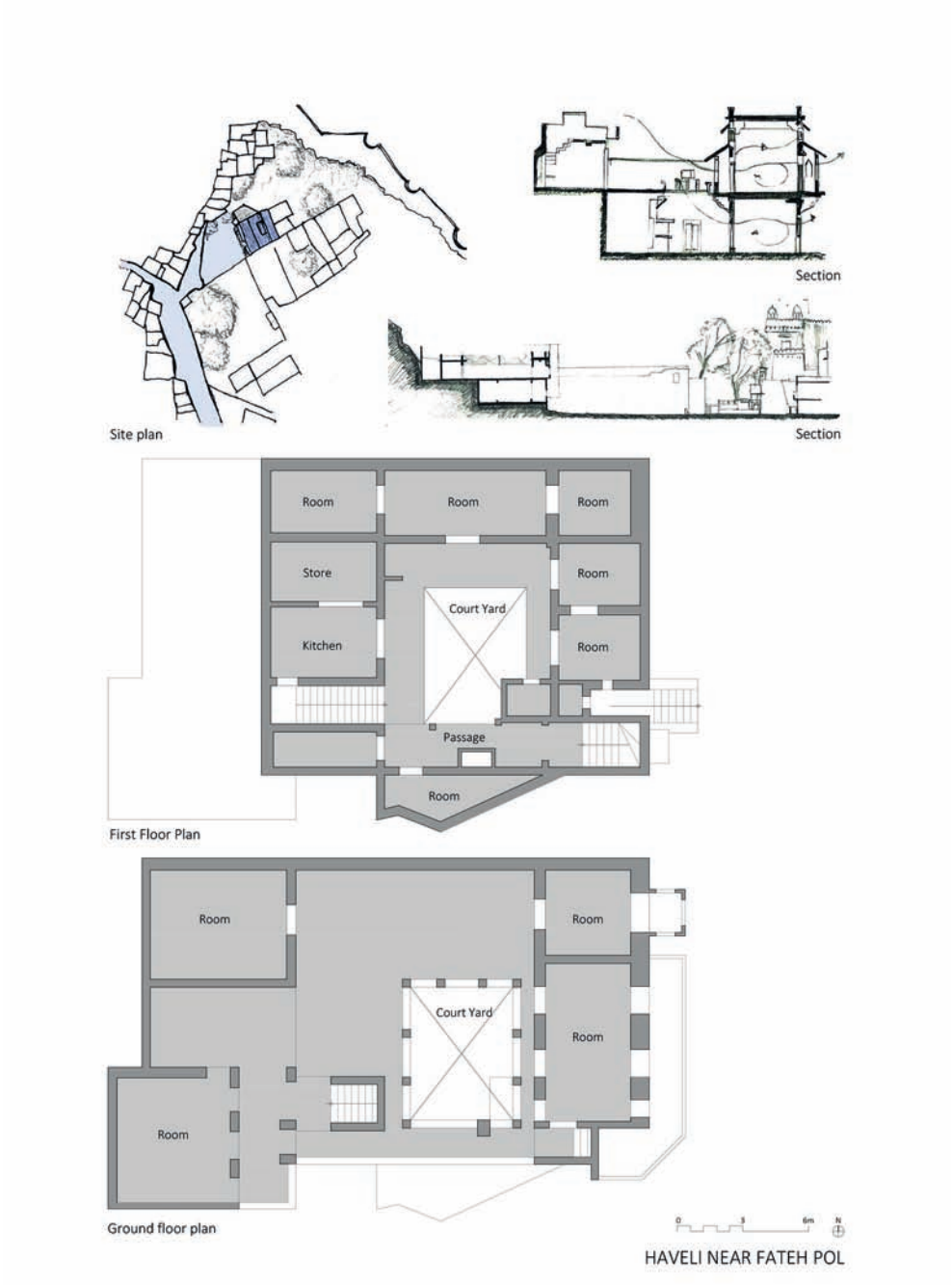
View

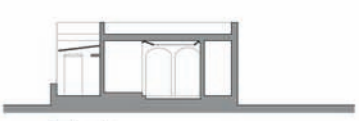
Sketch



3D View

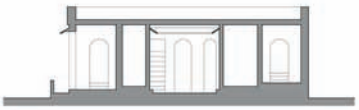
GHANTA GHAR


Site plan
Section
Section
Room
Room
Room
Store
Room
Court Yard
Kitchen
Room
Passage
Room
First Floor Plan
Room
Room
Court Yard
Room
Room
Ground floor plan
HAVELI NEAR FATEH POL



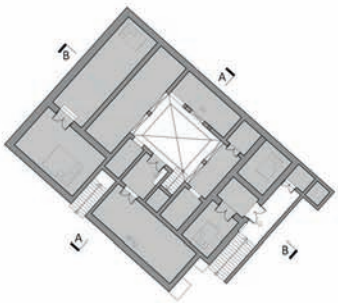
Section AA

Section DD



Section BB

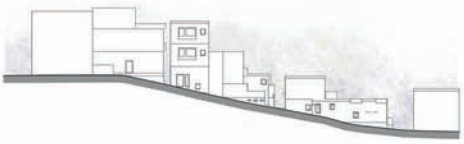
Section CC



Plan

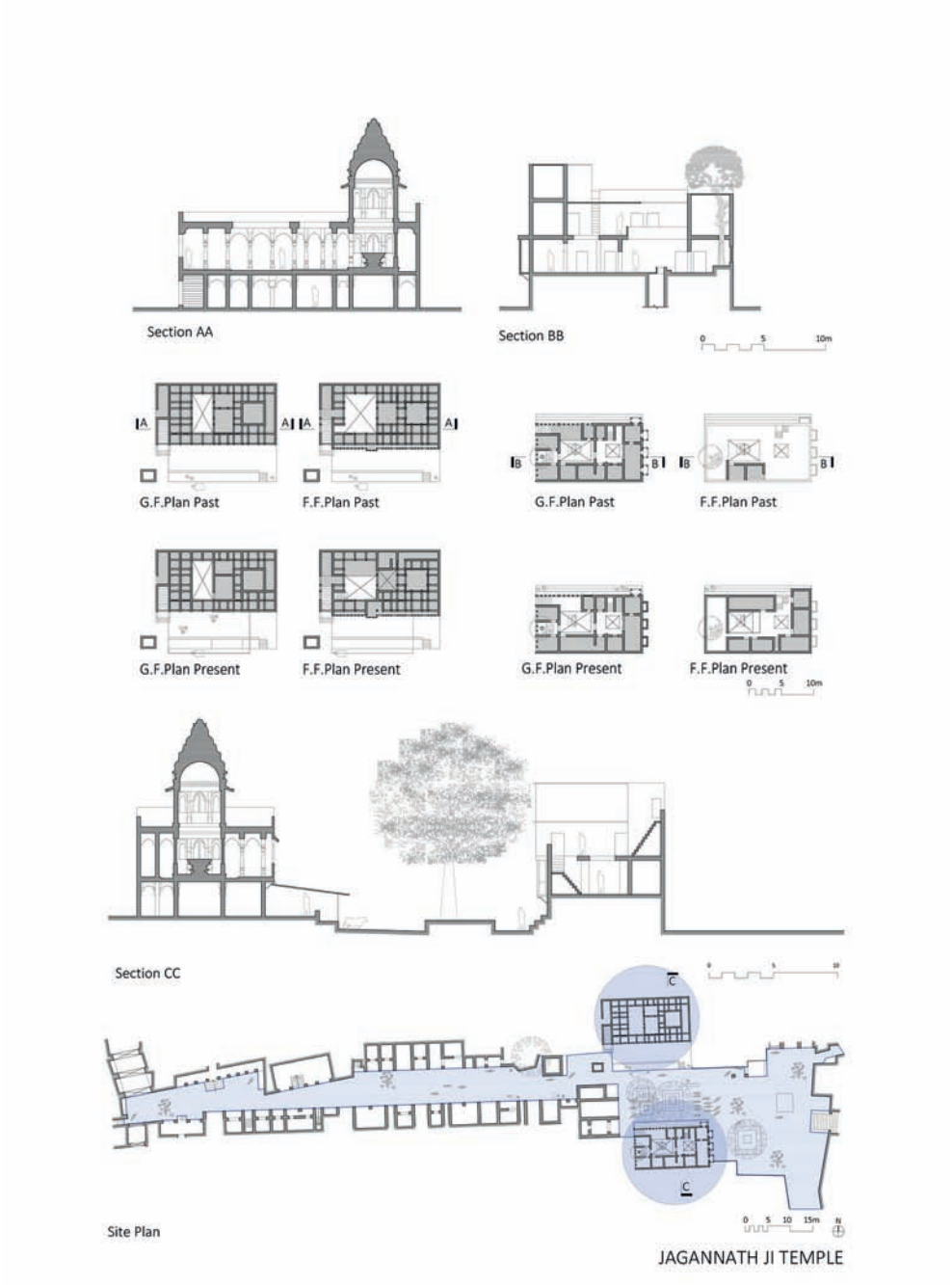
Plan

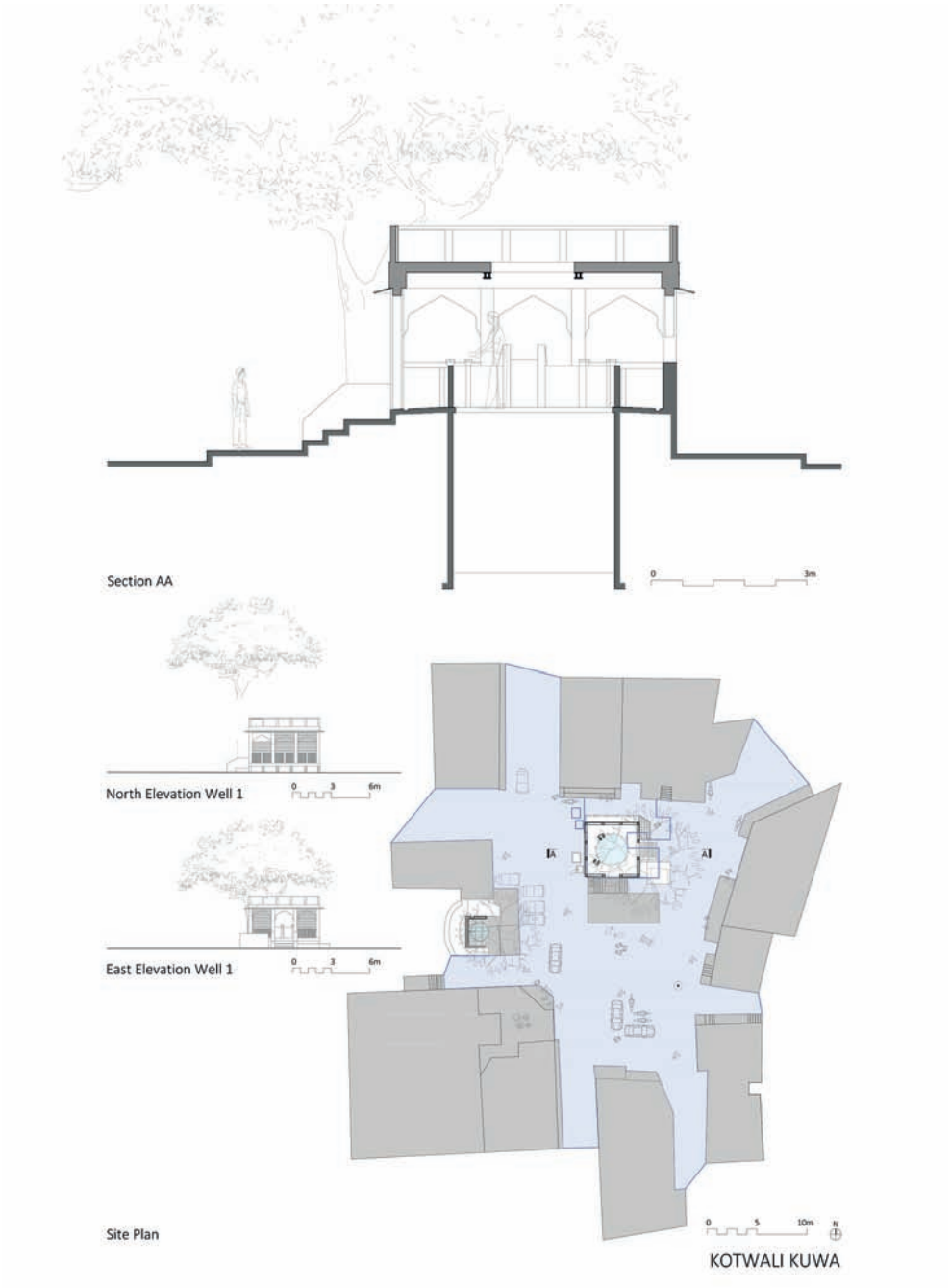
Site Plan

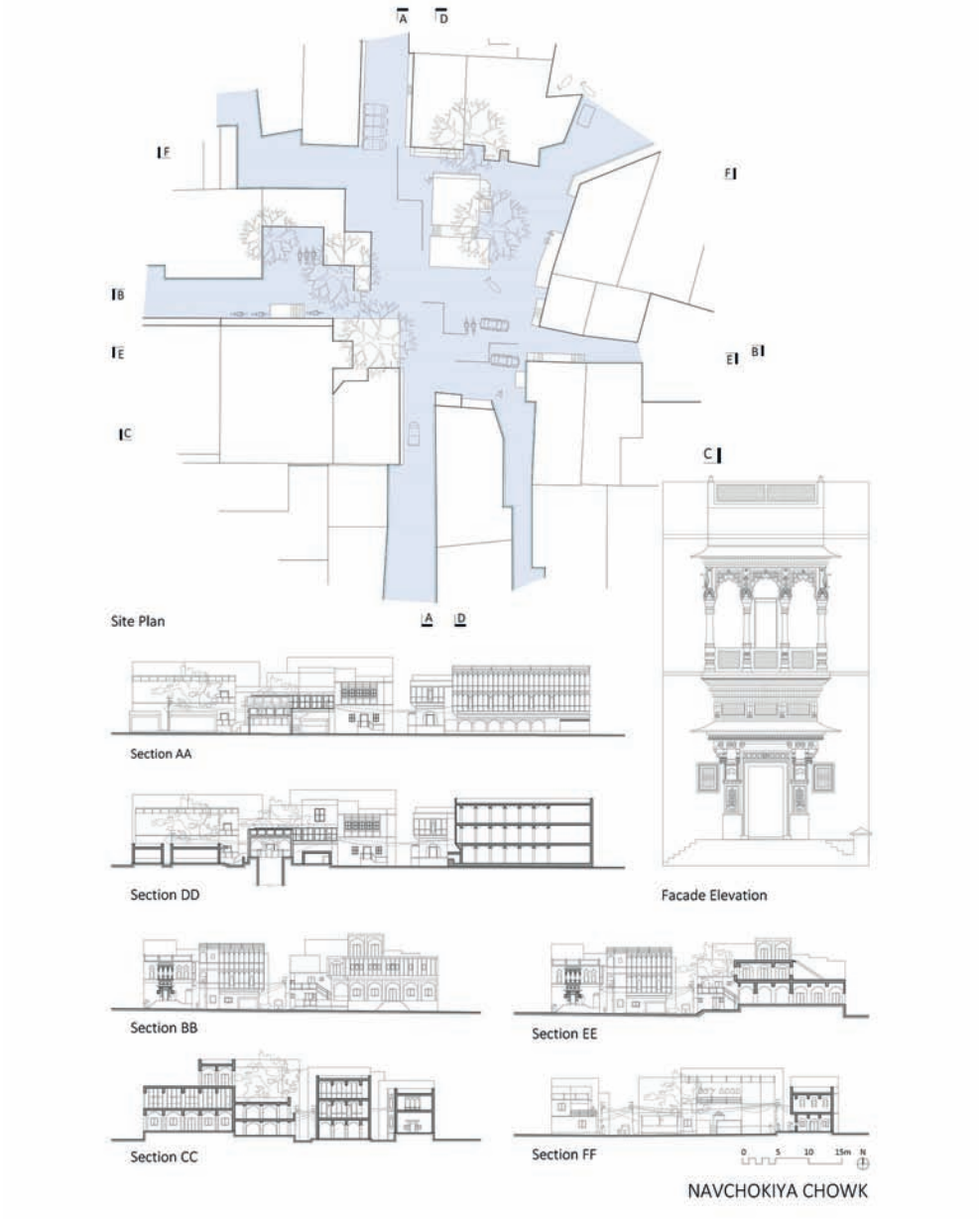


Street Elevation

HAZZARI CHABUTARA

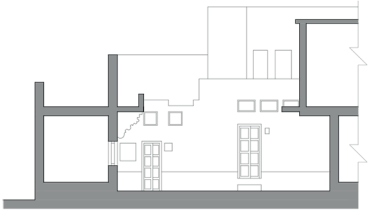

Section AA
Section BB
0 5 10m
A
A
G.F.Plan Past
F.F.Plan Past
B
B
G.F.Plan Past
F.F.Plan Past
G.F.Plan Present
F.F.Plan Present
G.F.Plan Present
F.F.Plan Present
0 5 10m
Section CC
C
C
0 5 10 15m
N
Site Plan
JAGANNATH JI TEMPLE


Section AA
0
3m
North Elevation Well 1
0
3
6m
East Elevation Well 1
0
3
6m
A
A
Site Plan
0
5
10m
N
KOTWALI KUWA

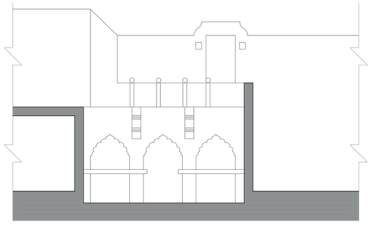

A
D
F
F
B
E
B
E
C
C
Site Plan
A
D
Section AA
Section DD
Facade Elevation
Section BB
Section EE
Section CC
Section FF
0 5 10 15m N
NAVCHOKIYA CHOWK

Section AA

Section CC

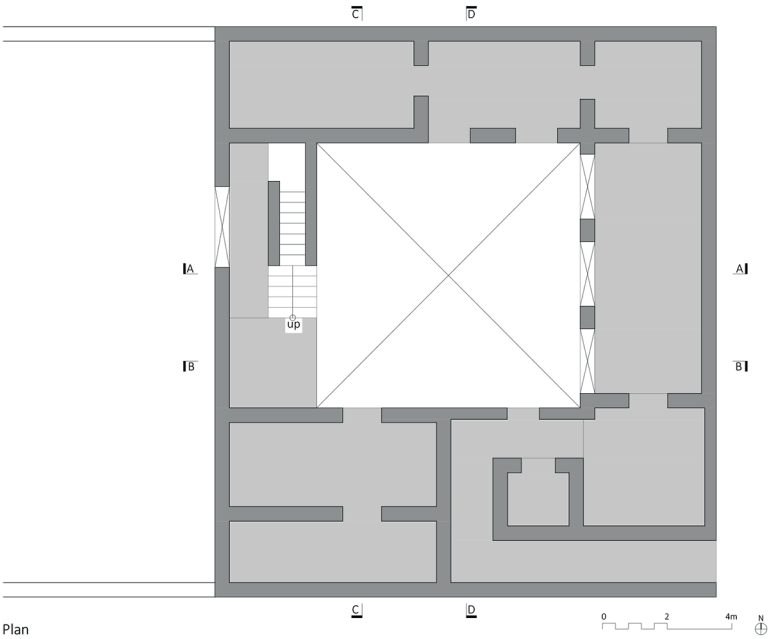


Section BB



Section DD

0 2 4m



Plan

TIVRY HAVELI


Roof Plan
Elevation A
Elevation B
S.F. Plan
Elevation C
Elevation - D
Section AA
F.F. Plan
G.F. Plan
Site Plan
VAIDON KI CHOWK

Section AA

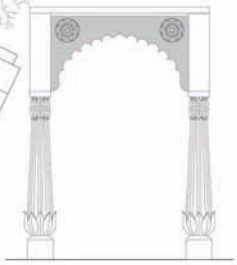
Section BB

Second Floor Plan

First Floor Plan

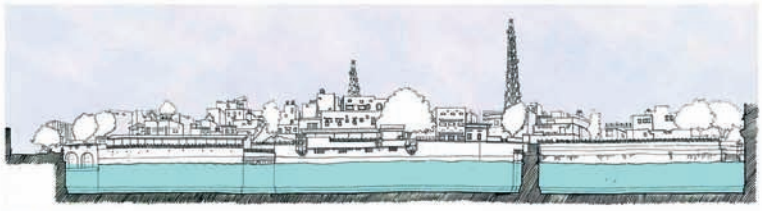
Ground Floor Plan

Stone fixing method:
interlocking of stone

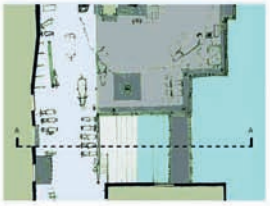


Arch Elevation

VYASJI KI HAVELI

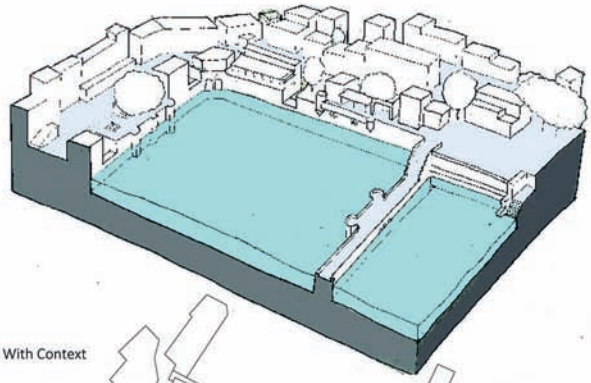


Sketch Section

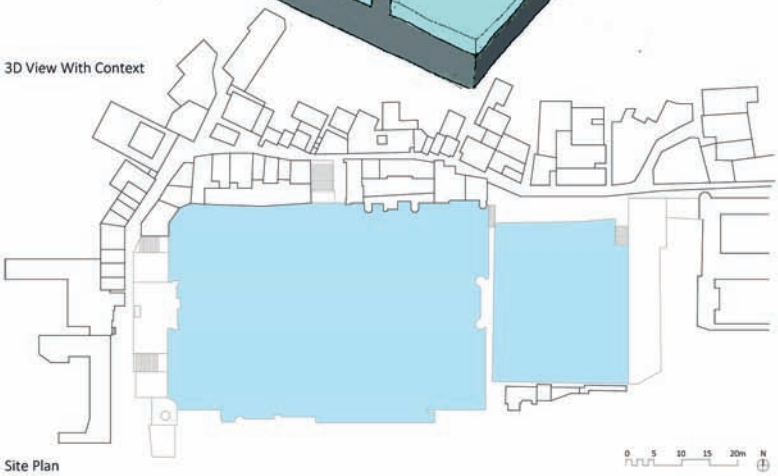


Part Plan

Section AA

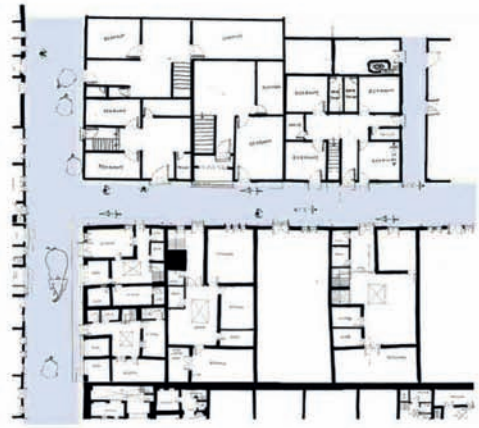


3D View With Context

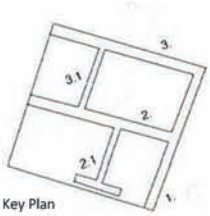


Site Plan

GULABSAGAR



Part Plan



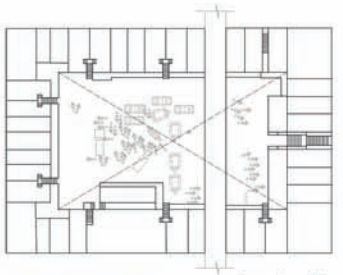
Key Plan

Street Plan

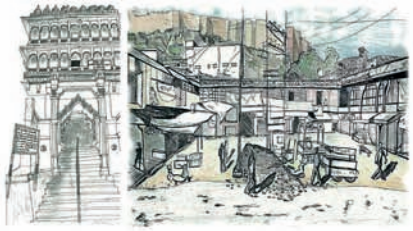
Street Elevation

Photographs showing the character of the street

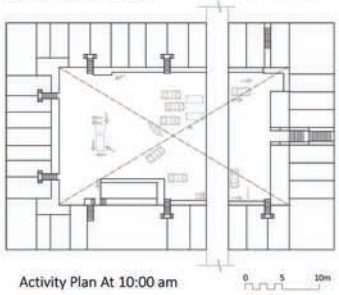
CHAUHANJI KA NOHRA



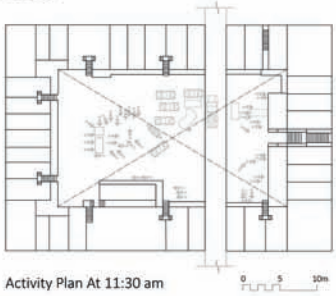
Activity Plan At 1:30 pm



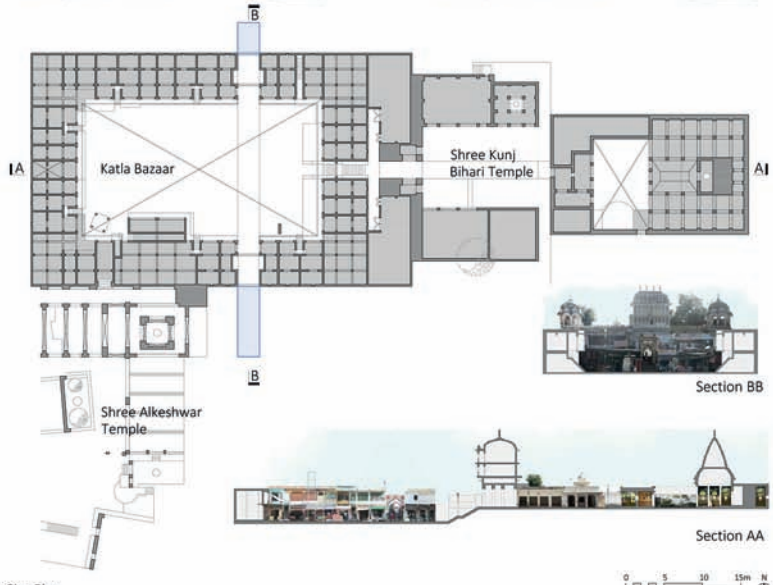
Sketches



Activity Plan At 10:00 am



Activity Plan At 11:30 am



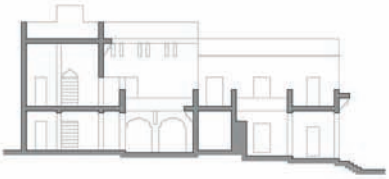
Section BB

Section AA

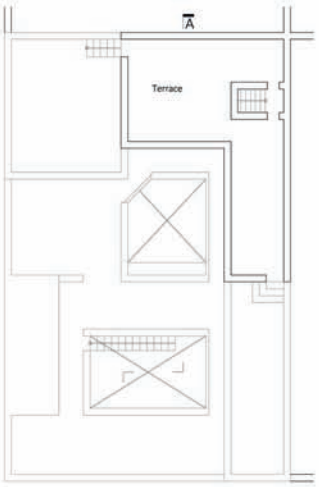
Site Plan

KATLA BAZAAR

Key Plan

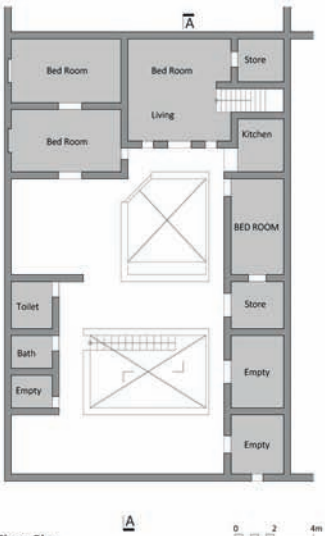


Section AA



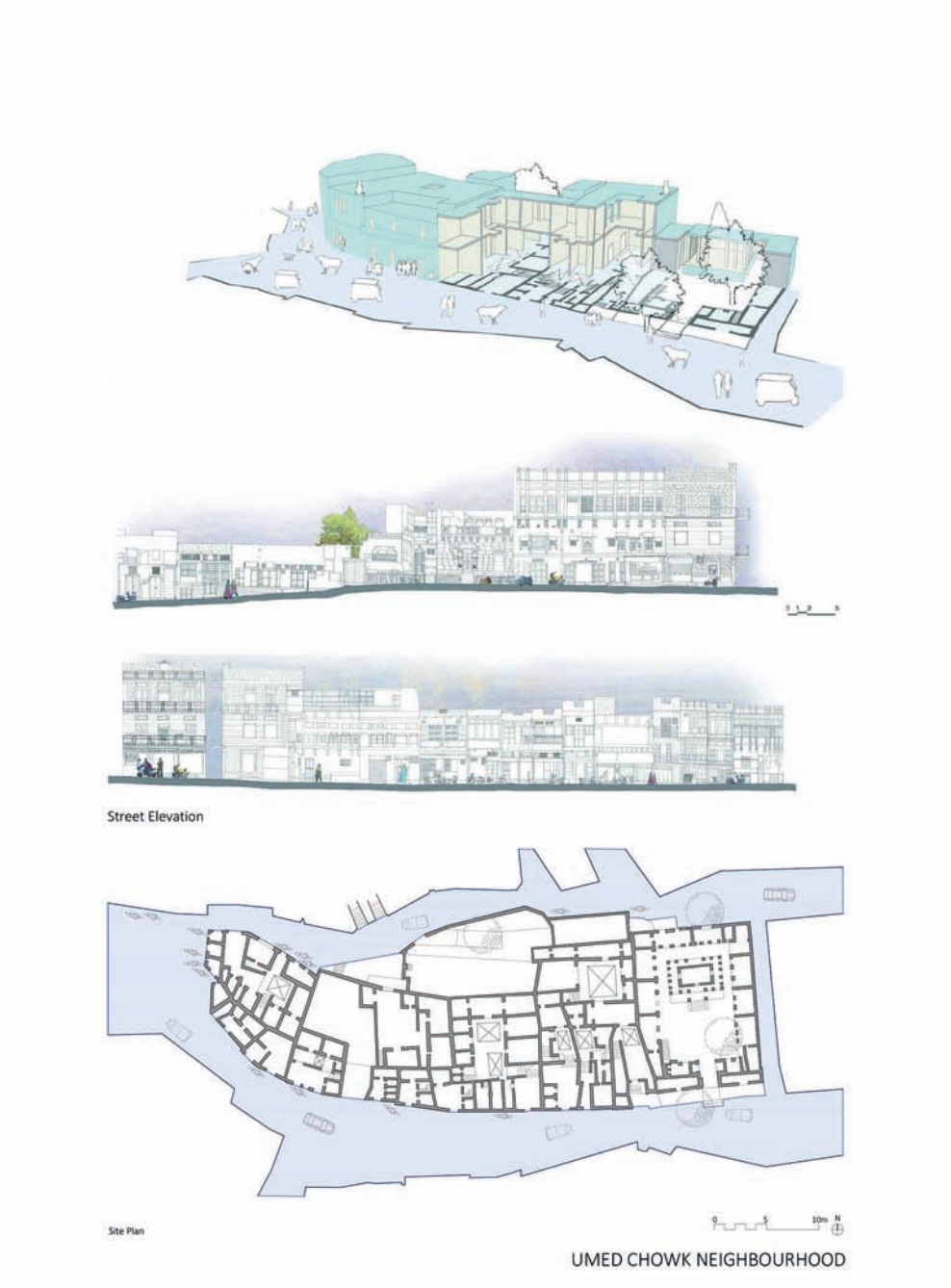
Second Floor Plan

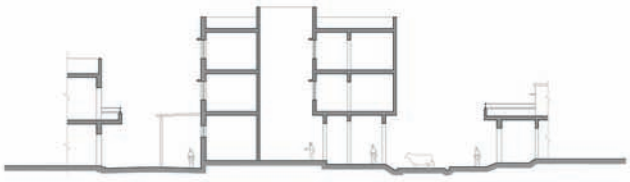
Ground Floor Plan



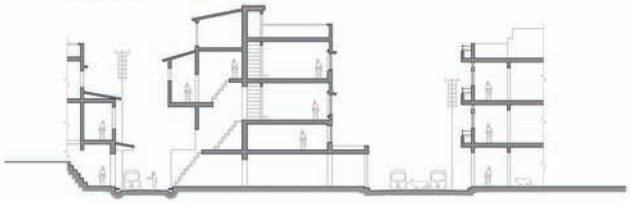
First Floor Plan

BACCHA CHOWK, SUBEDAR'S HOUSE

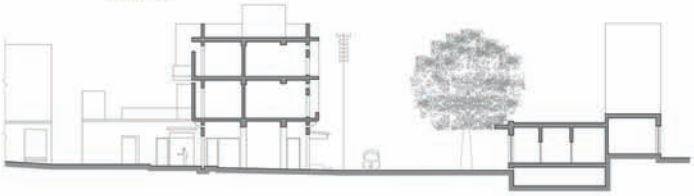

Street Elevation
Site Plan
0 5 10m N
UMED CHOWK NEIGHBOURHOOD



Section 11

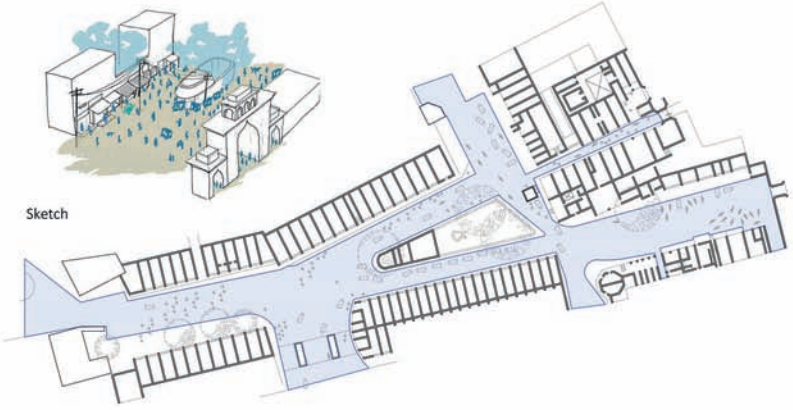


Section 22



Section 33

0 5 10m

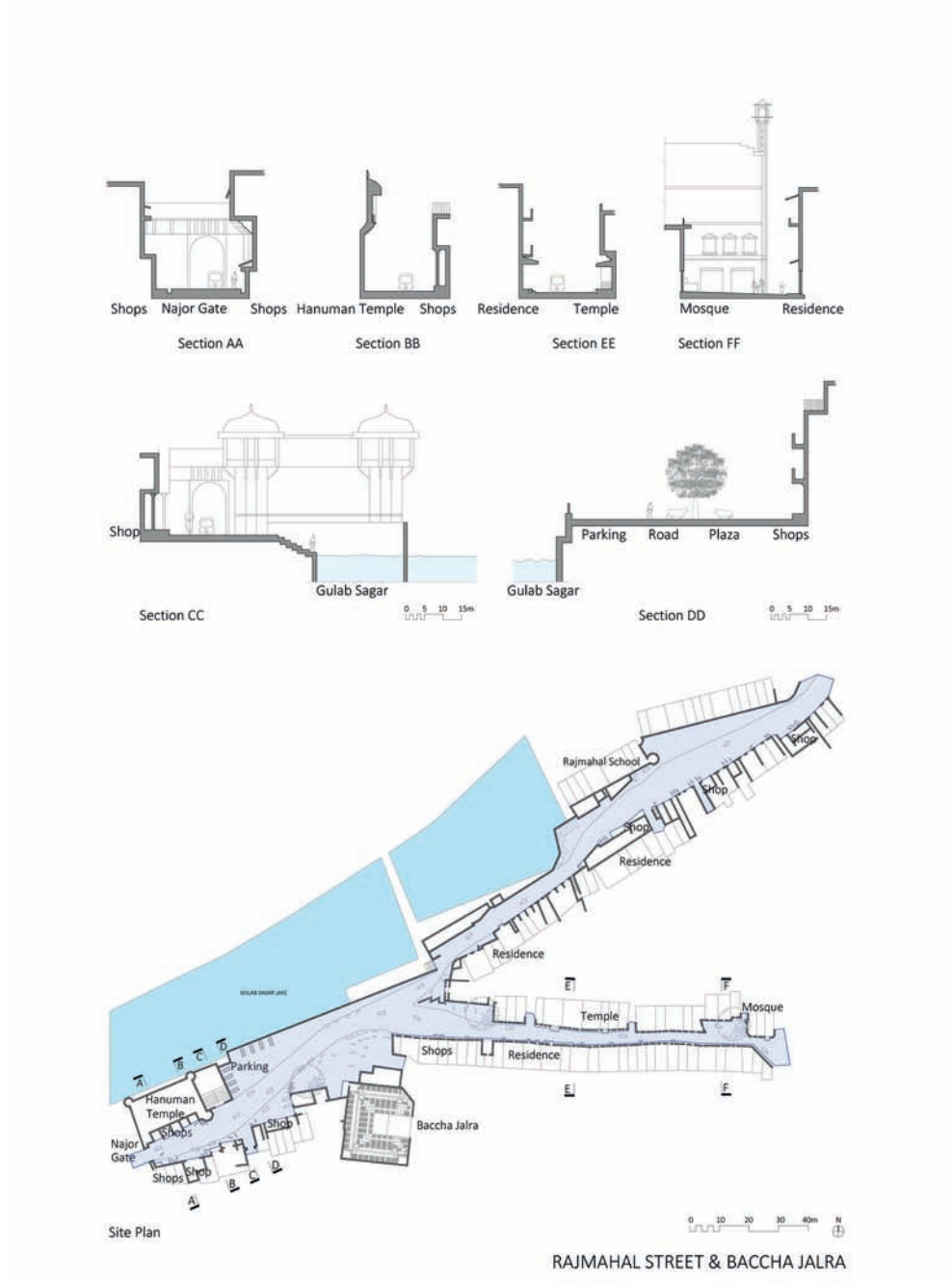


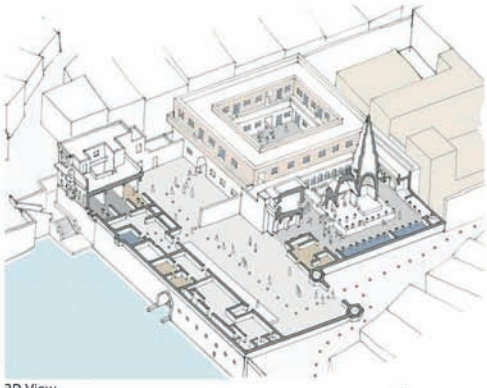
Sketch

Site Plan

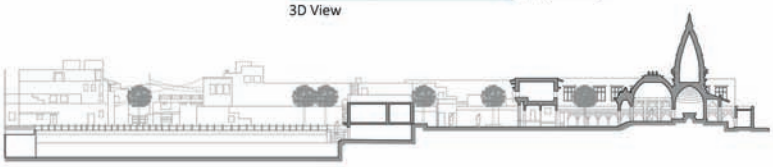
0 10 20 30m N

SARDAR MARKET


Shops Najor Gate Shops
Section AA
Hanuman Temple Shops
Section BB
Residence Temple
Section EE
Mosque Residence
Section FF
Shop
Gulab Sagar
Section CC
Parking Road Plaza Shops
Gulab Sagar
Section DD
Rajmahal School
Shop
Residence
Temple
Mosque
Shops
Parking
Hanuman Temple
Najor Gate
Baccha Jalra
Site Plan
RAJMAHAL STREET & BACCHA JALRA

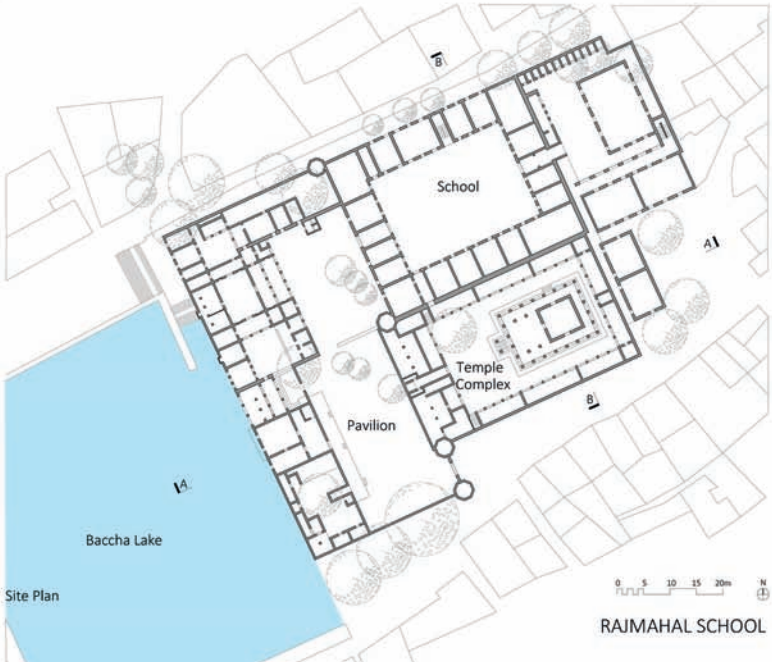


3D View



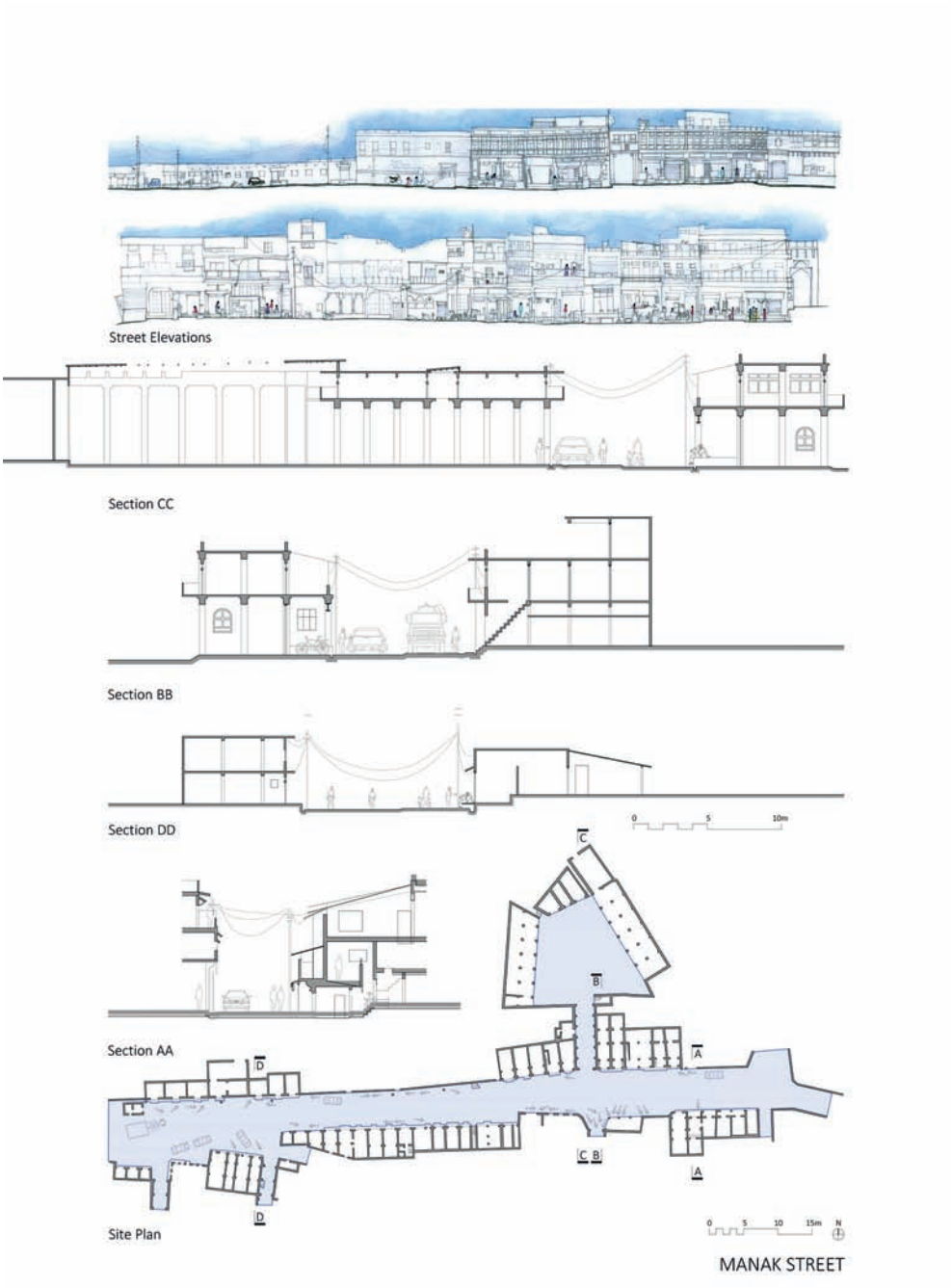
Section AA

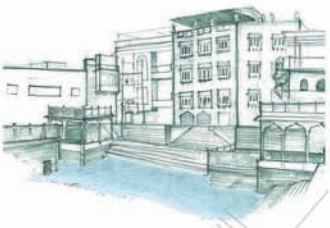
0 10 20 30 40m



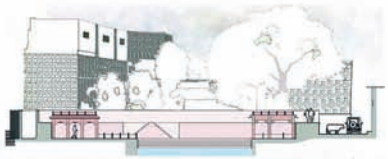
Site Plan

RAJMAHAL SCHOOL


Street Elevations
Section CC
Section BB
Section DD
0 5 10m
Section AA
C
B
A
D
C B
A
D
0 5 10 15m N
Site Plan
MANAK STREET

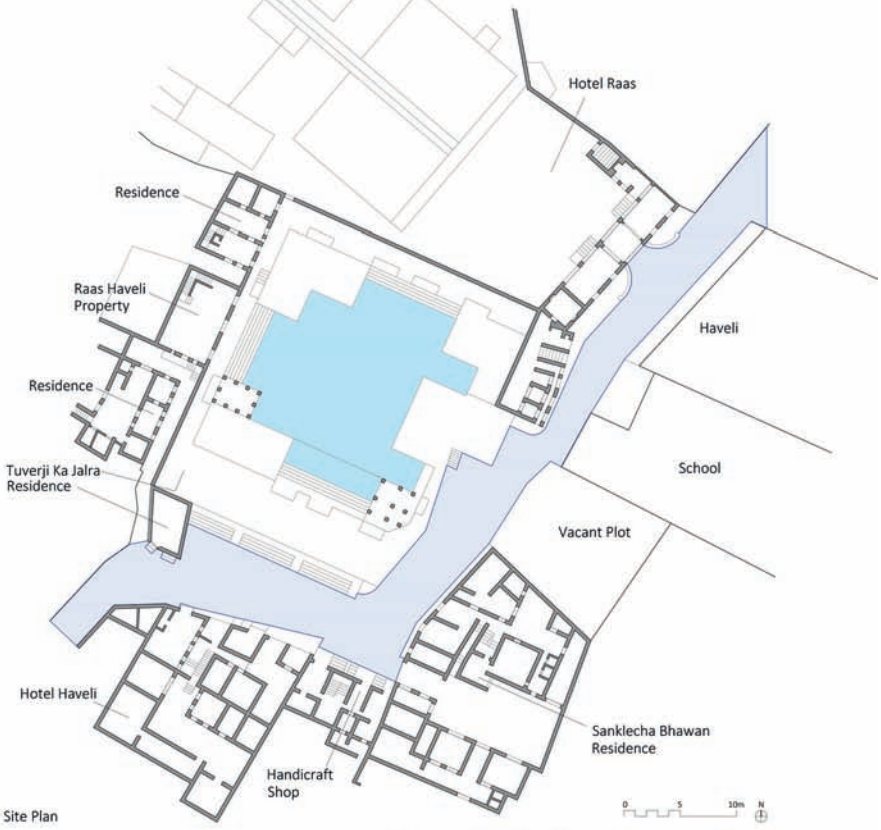


Sketch



Section

Section

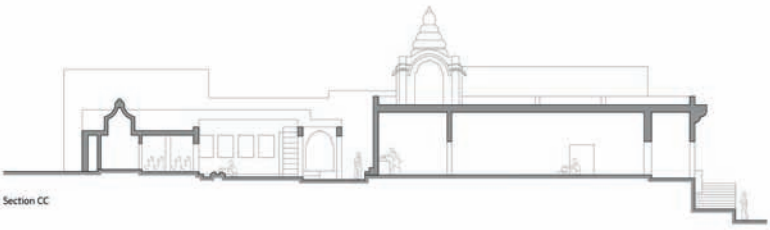


Site Plan

MAKHARANA MOHALLA & TUVERJI KA JALRA

Section DD

Section BB



Section CC

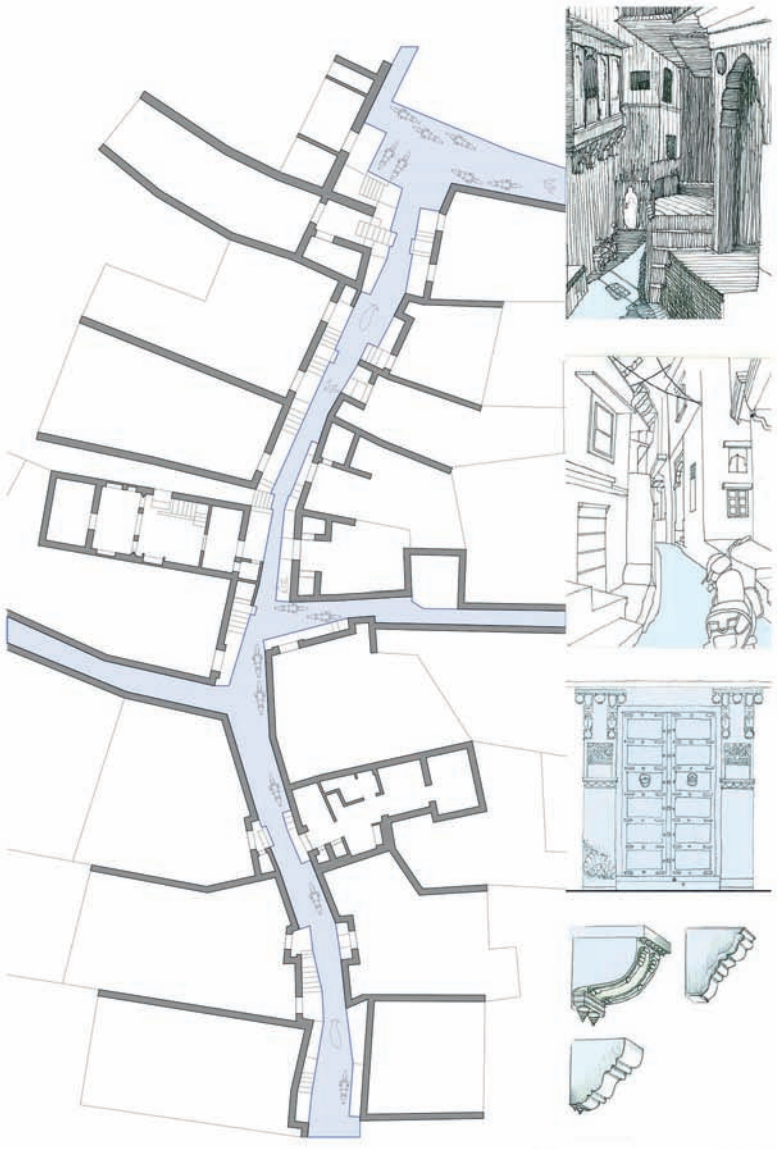
Section AA
Street Elevation

0 5 10 15 20m

Site Plan

0 5 10 15 20m N

BICHLA BAAS

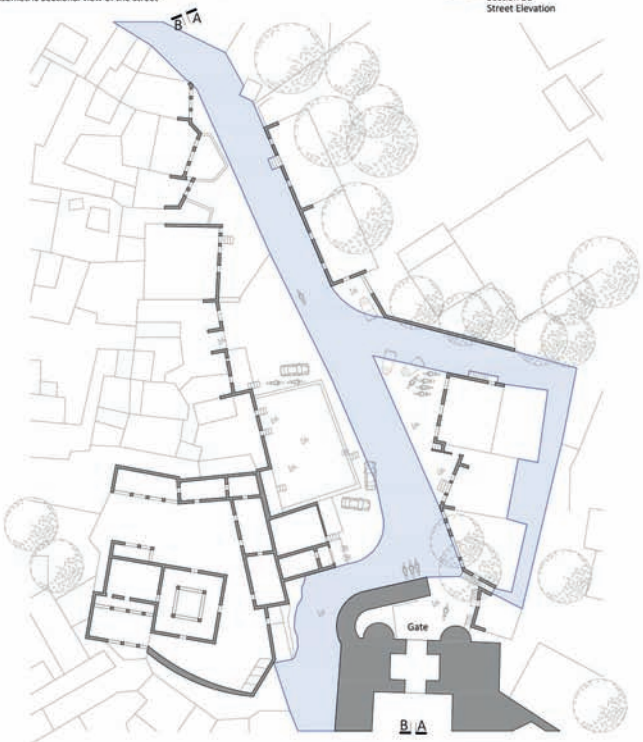


BRAHMAPURI, SATH GHARO KA BAAS

Isometric Sectional view of the street

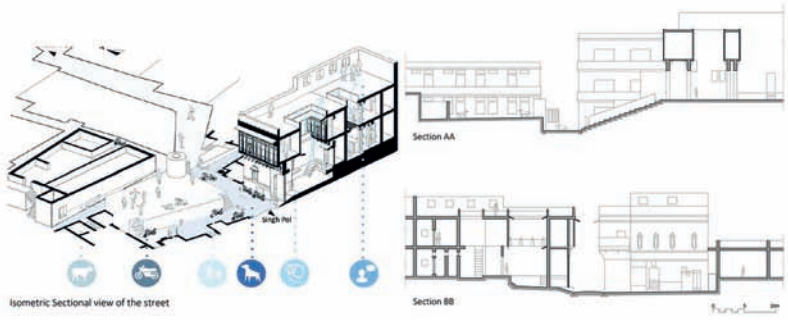
Section AA
Street Elevation

Section BB
Street Elevation

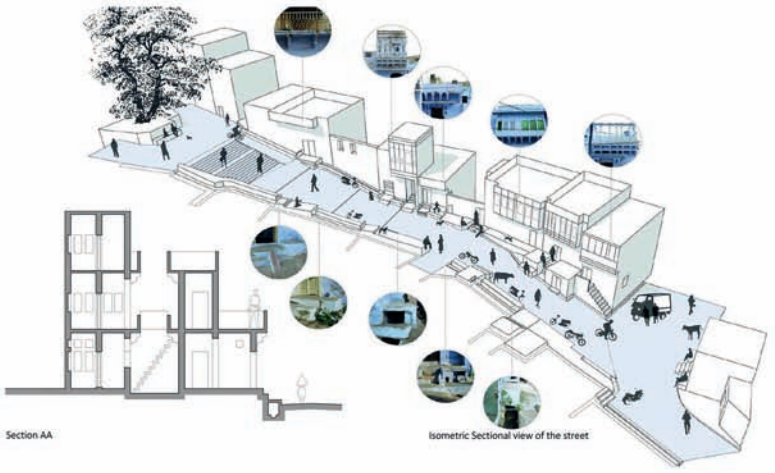


Site Plan

FATEH POL

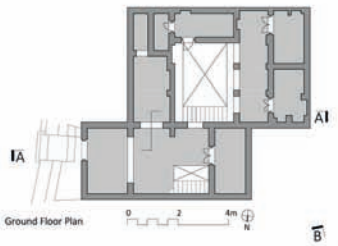

Section AA
Section BB
Isometric Sectional view of the street


Fateh Pol
Ganesh Chowk
Singh Pol
Site Plan
GANESH CHOWK

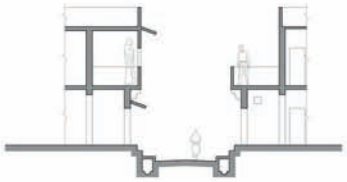


Section AA

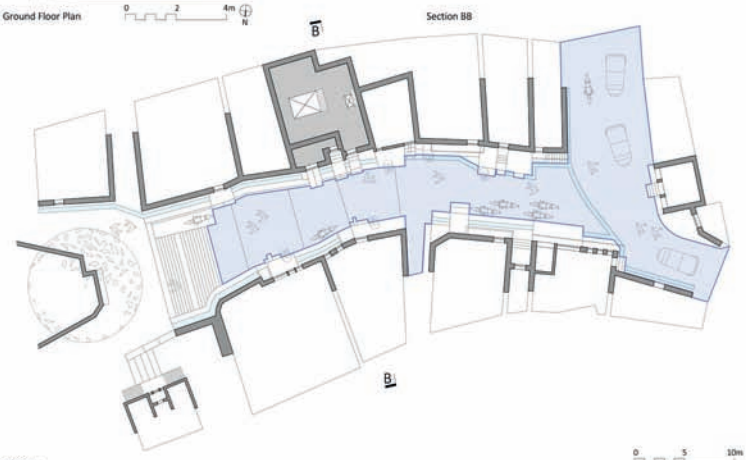
Isometric Sectional view of the street



Ground Floor Plan

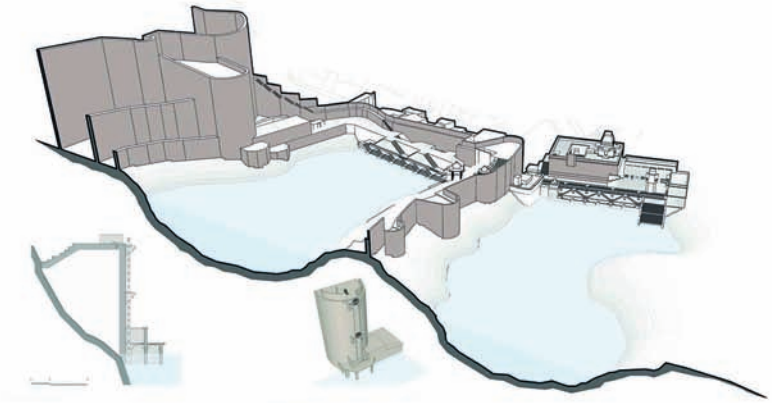


Section BB



Site Plan

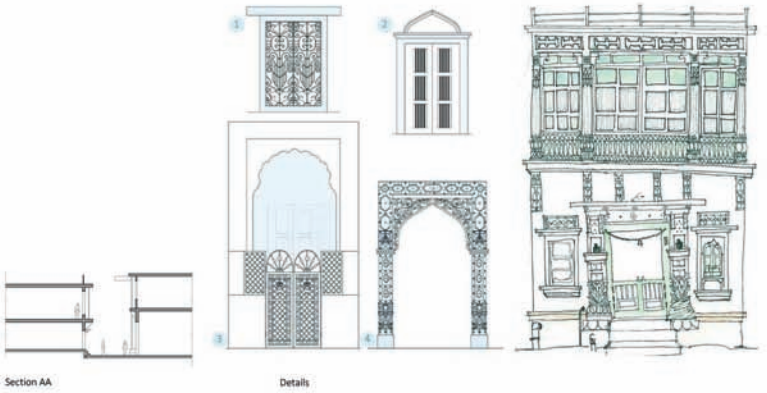
MUTHA STREET



Section
Detail of Persian wheel

Site Plan

PADMASAR LAKE AND RANISAR LAKE



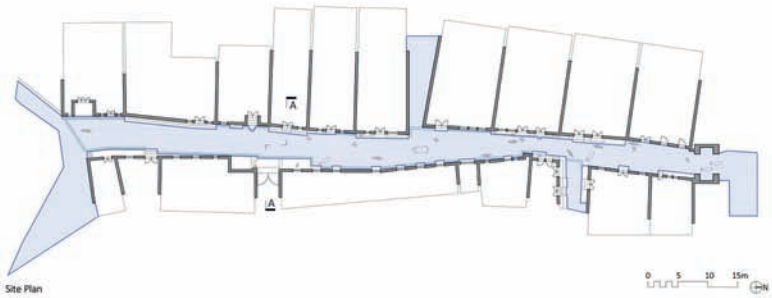
Section AA

Details

West Elevation

East Elevation

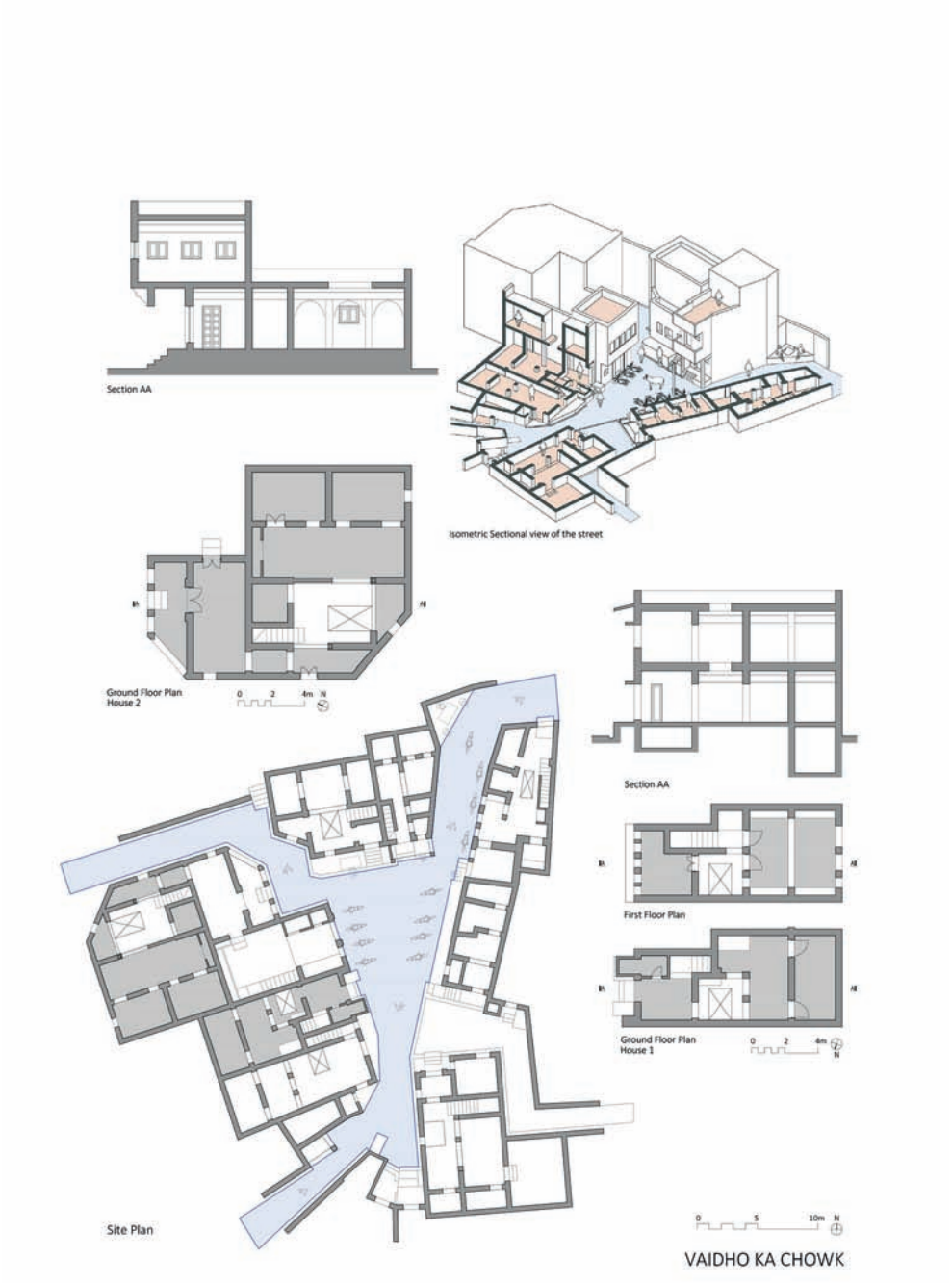
0 5 10 15m



Site Plan

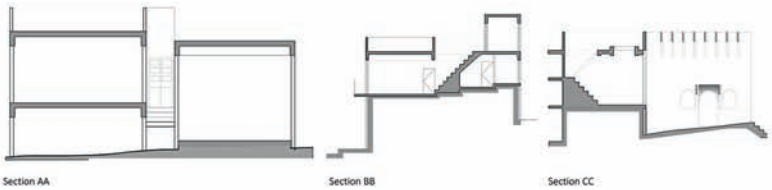
0 5 10 15m N

SINGH POL

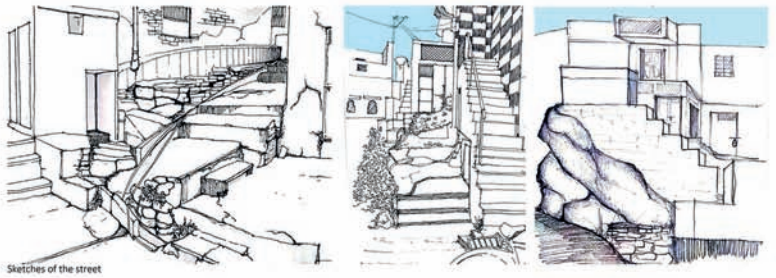

Section AA
Isometric Sectional view of the street
Ground Floor Plan
House 2
0 2 4m N
Section AA
First Floor Plan
Ground Floor Plan
House 1
0 2 4m N
Site Plan
0 5 10m N
VAIDHO KA CHOWK


Present Condition
Issues
Proposed
0 5 10m
Key Plan
DANVIR SHRINATHJI MARG

Site Plan

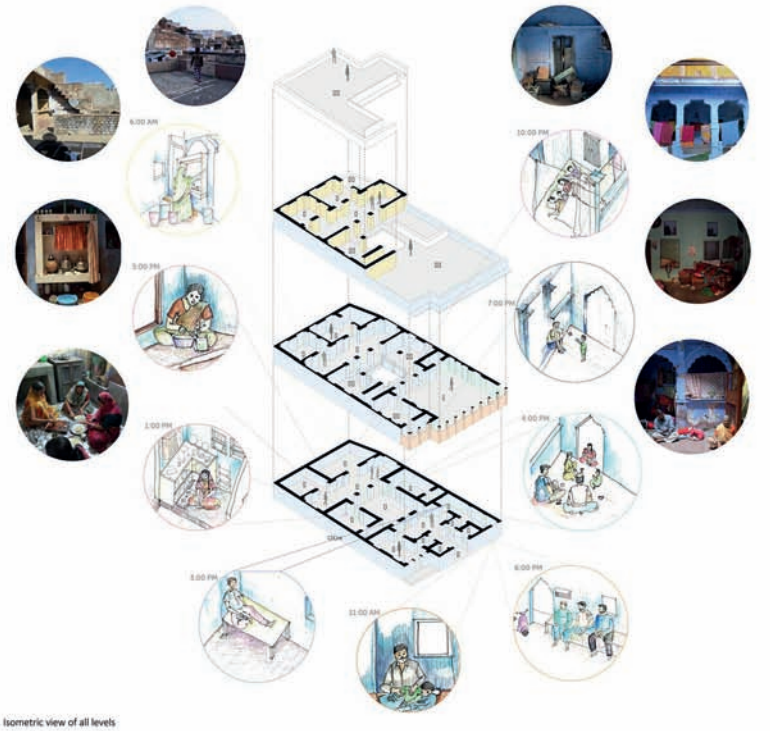


Section AA Section BB Section CC

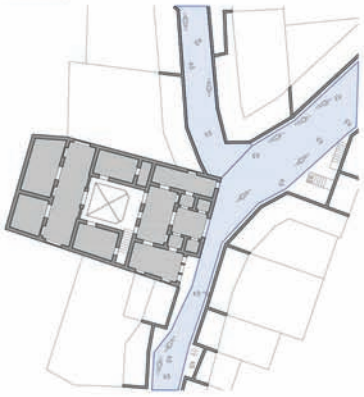


Sketches of the street

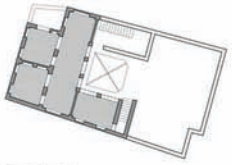
LALLA KI KOTHARI, FATEH POL



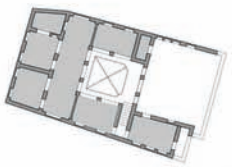
Isometric view of all levels
Activity Mapping



Site Plan: Ground Floor Plan



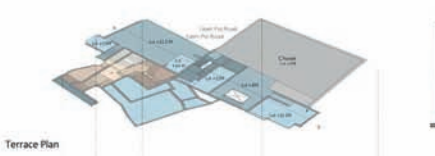
Second floor Plan



First Floor Plan

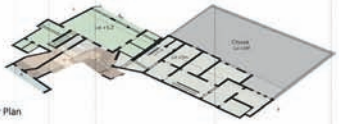
0 5 10m N

MANCHA RAM JI HAVELI



Terrace Plan

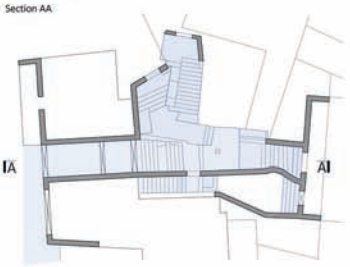
Section BB



First Floor Plan

Section AA

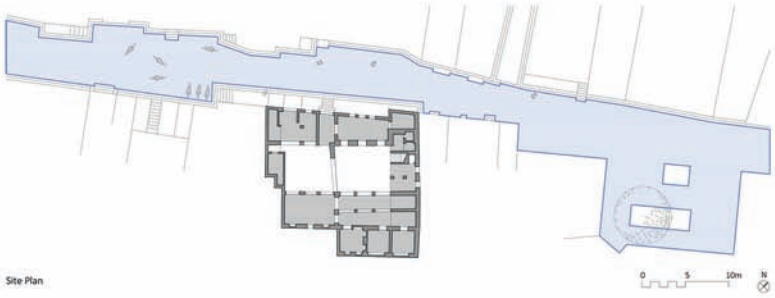
Ground Floor Plan



Plan

Photogrammetry Views

MEHNOT HAVELI, FATEH POL



Site Plan

Second Floor Plan

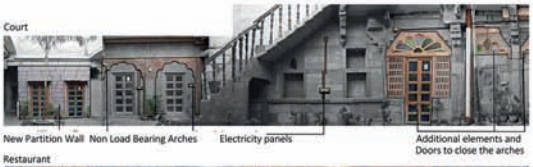
Sketched Street Elevation

First Floor Plan

Ground Floor Plan

Room

Court



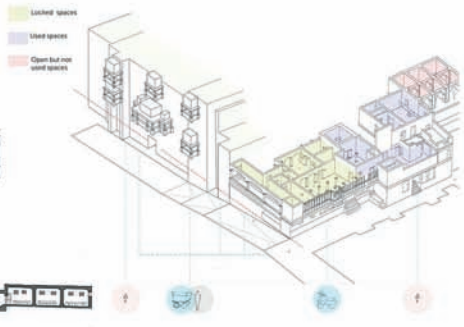
Restaurant

RANI MAHAL

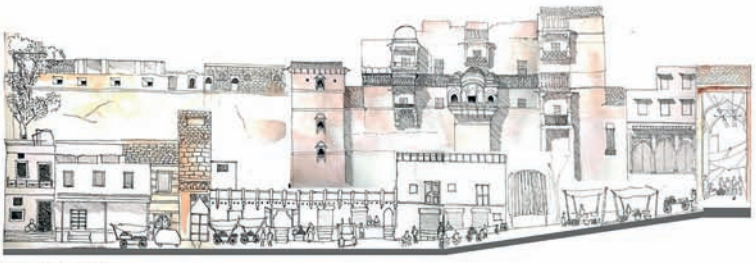
Site Plan

Section AA

Section BB

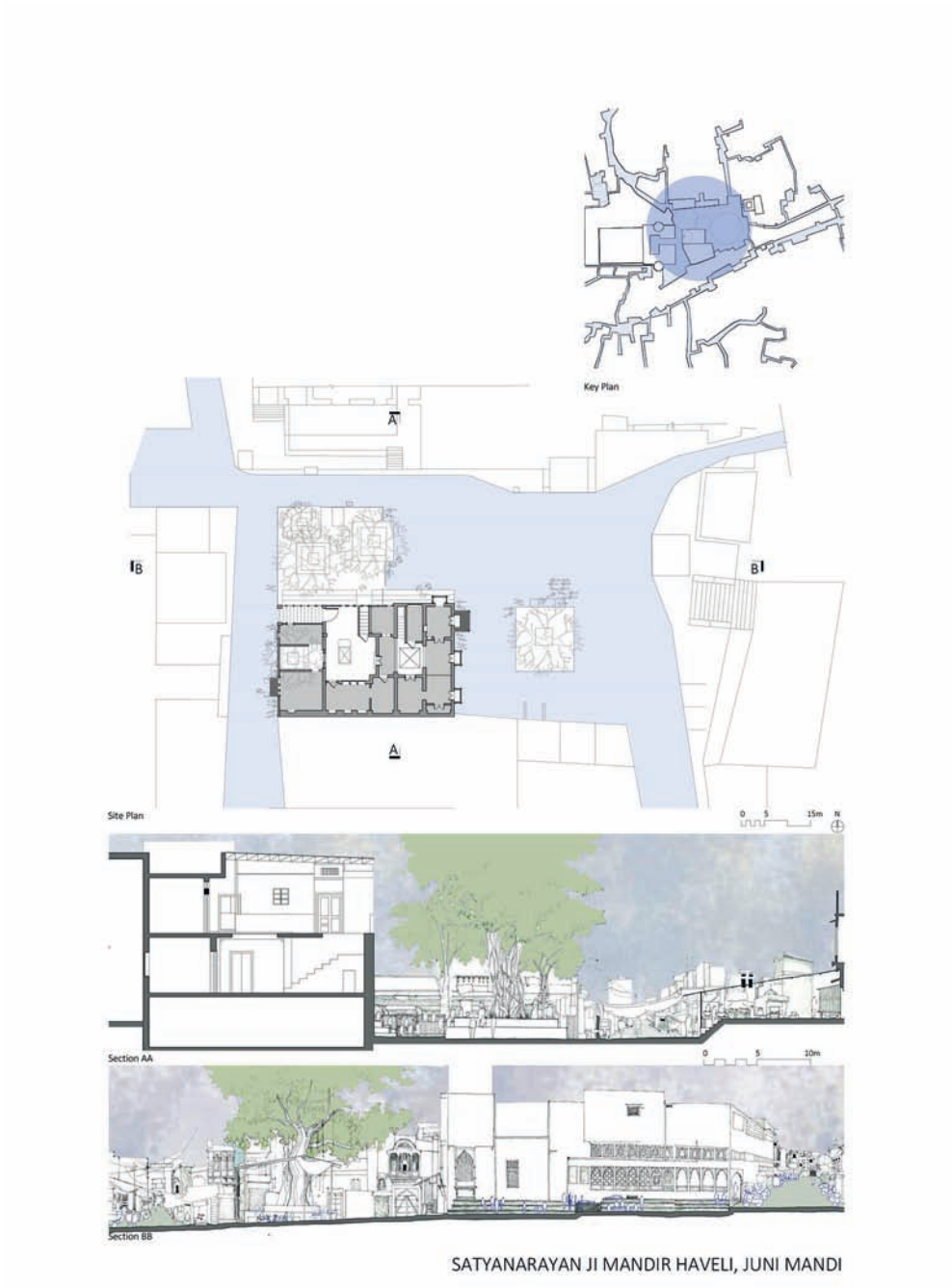


Isometric view of the building

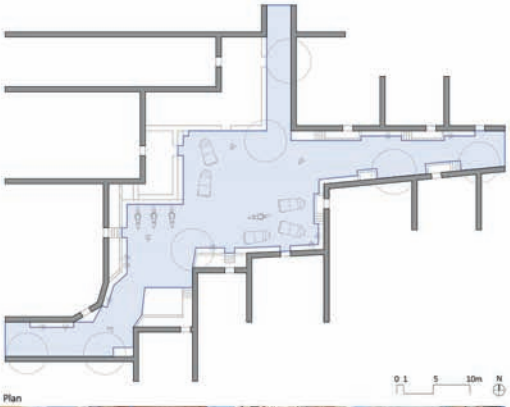


Sketched Street Elevation

SANSKRUT VIDYALAYA

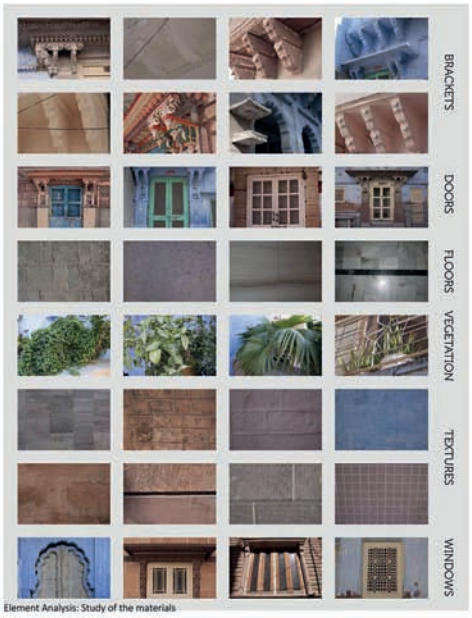


SATYANARAYAN JI MANDIR HAVELI, JUNI MANDI

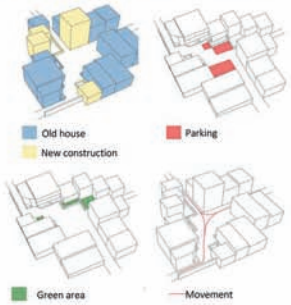


Plan

Panoramic view of the square



Element Analysis: Study of the materials



Shadows

BANAVTO KA BAAS

Panoramic View Of The Square

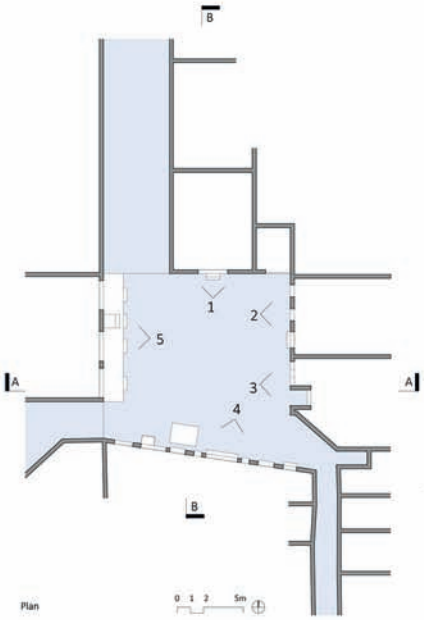
Residential And Commercial Building (1955)

2 Residential Building (1955)

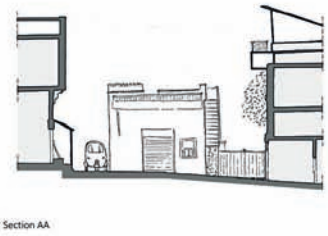
3 Residential Commercial (1955)

4 Residential And Commercial Building (1955)

5 Residential And Commercial Historical Building



Plan



Section AA

Section BB

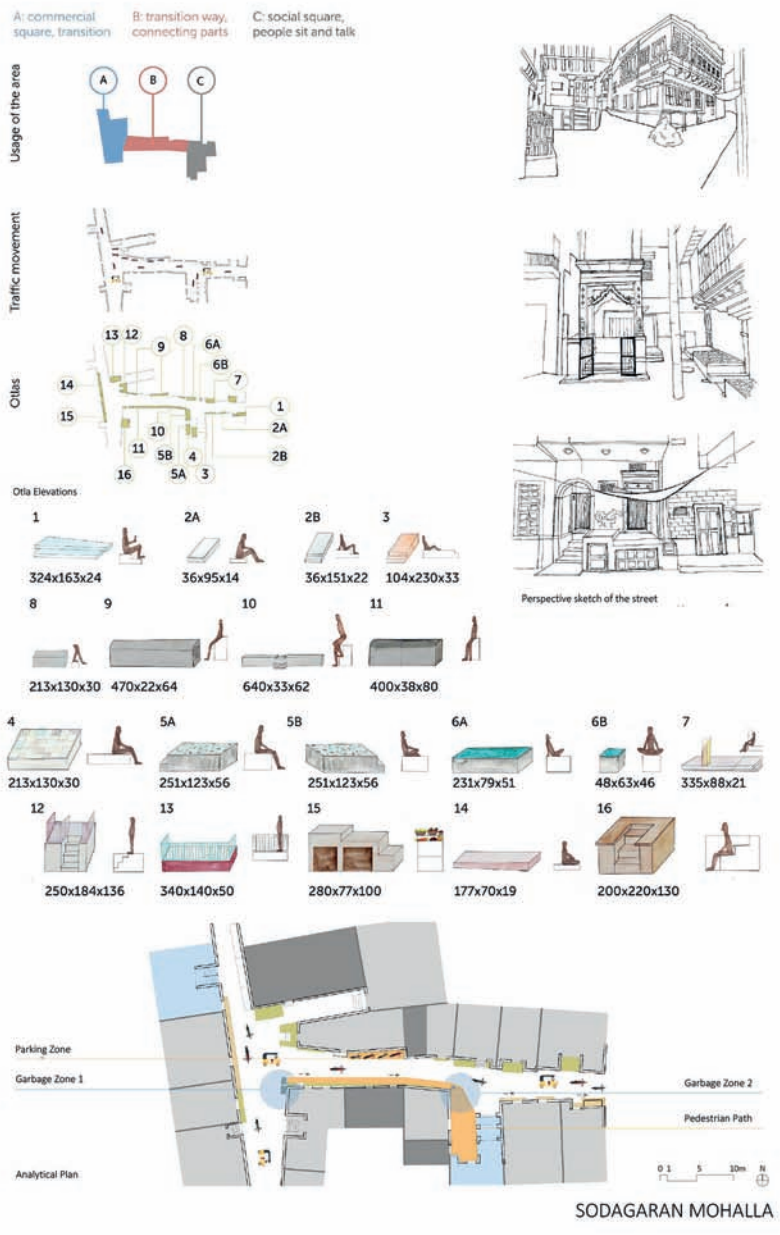
Elevation AA

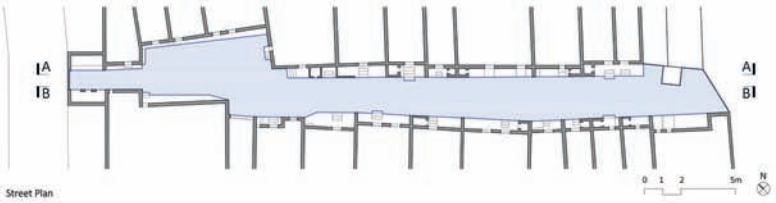
Elevation BB

Elevation CC

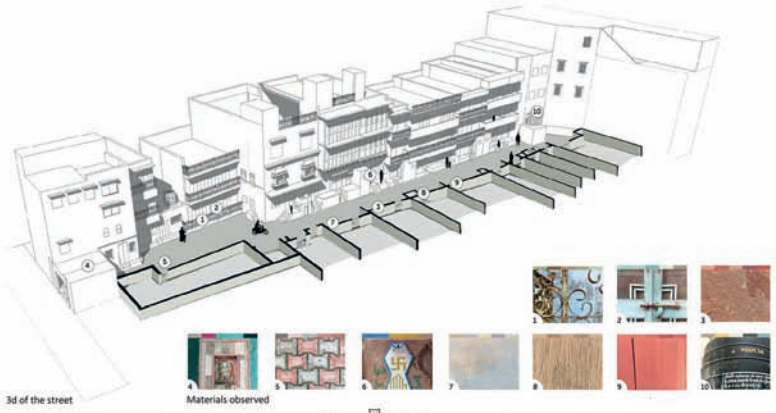
Elevation DD

CHANDI HALL SQUARE


A: commercial square, transition
B: transition way, connecting parts
C: social square, people sit and talk
Usage of the area
A
B
C
Traffic movement
Otlas
13 12 9 8 6A 6B 7 14 15 1 2A 10 11 5B 4 2B 16 5A 3
Otla Elevations
1 324x163x24
2A 36x95x14
2B 36x151x22
3 104x230x33
8 213x130x30
9 470x22x64
10 640x33x62
11 400x38x80
4 213x130x30
5A 251x123x56
5B 251x123x56
6A 231x79x51
6B 48x63x46
7 335x88x21
12 250x184x136
13 340x140x50
15 280x77x100
14 177x70x19
16 200x220x130
Perspective sketch of the street
Parking Zone
Garbage Zone 1
Garbage Zone 2
Pedestrian Path
Analytical Plan
0 1 5 10m N
SODAGARAN MOHALLA



Street Plan



3d of the street

Materials observed

Section AA

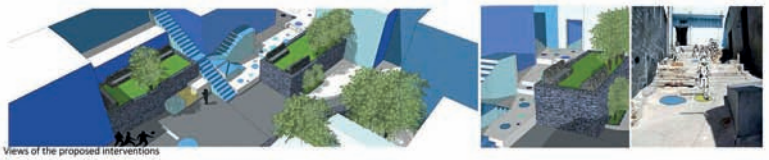
Section BB

GOLIYON KI POL

Sectional Perspective XX

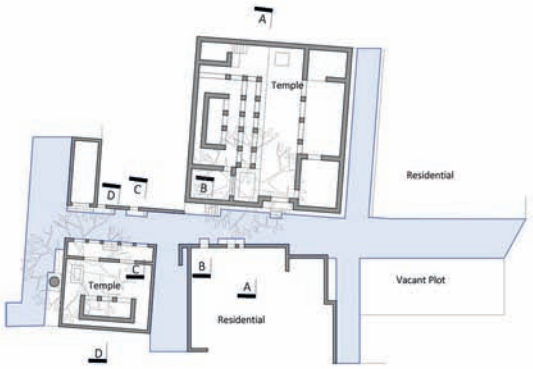
Section WW

Site Plan

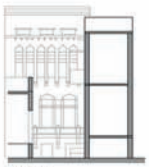


Views of the proposed interventions

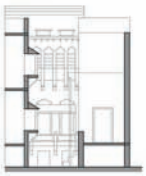
HARIJAN BASTI



Plan



Section CC



Section BB

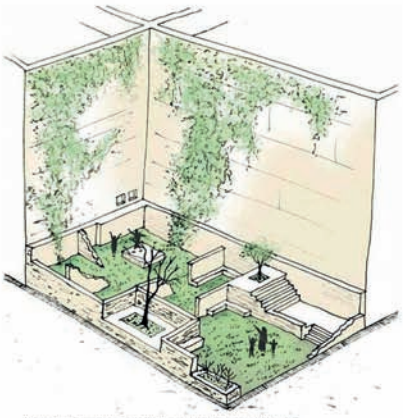
Madan Mohan temple existing section DD

Laxmi Naraya temple Exisitng section AA

Existing Section

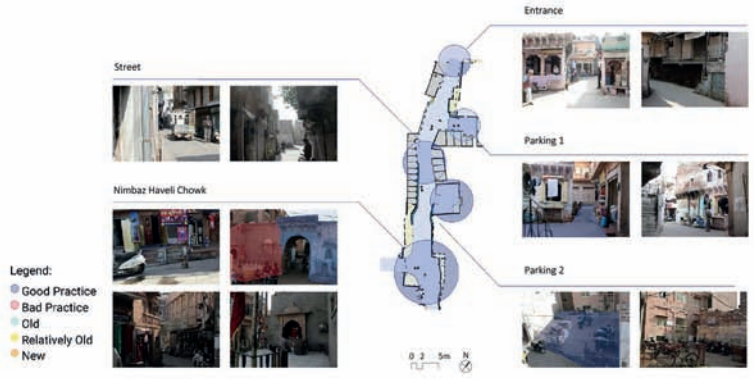
Conceptual Section

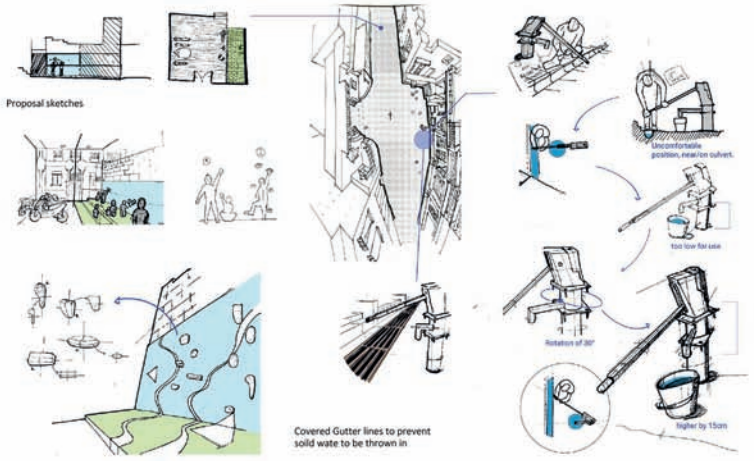
Conceptual Elevation



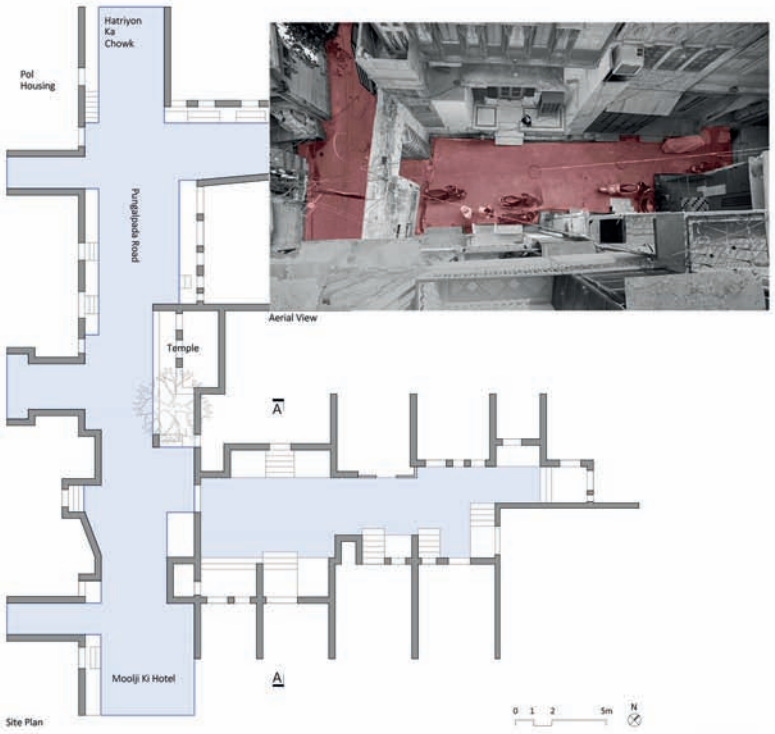
Proposal : to conserve the ruins byproposing interaction spaces

JALANI STREET





NIMBAZ HAVELI CHOWK



PUNGALPADA ROAD (MUNDRO POL)

Acknowledgements

Marcello Balzani
Minakshi Jain
Luca Rossato
Editors

It is always challenging to list all the people that have actually helped us along this 5 years academic path. First of all we'd like to express our deep gratitude to the Mehrangh Museum Trust (and specially to His Highness Gaj Singh, Maharaja of Jodhpur and Dr. Karni Jasol, director of MMT), partner of many initiatives linked to this experience.

The authors would like to thank also the institutions that made this possible, CEPT University and Ferrara University. Their support on this projects was essential on both logistic and academic aspects.

Special gratitude goes to our colleagues (who are also the authors of this book chapters) who helped us on field coordinaing every year big group of students, we have been a strong group since the beginning but first of all we became friends.

For their affection and help in a country where sometimes things are not as easy as they appear, we would like to thank the Indian colleagues Arch. Mana Sarabhai Brearley and Arch. Mischa Gorchov Brearley.

Special thanks go to the the Inn Season Hotel staff, every year so kind and cooperative: they made us feeling really at home in Jodhpur.

Finally, and obviously, special thanks to the young students that take part into these experiences, the book's drawings are a compilation of Winter workshop' outputs by Indian and Italian undergarduates. This book is a memory of that story and their names are listed on the next pages.

2013 Jodhpur Workshop (43 students)

From CEPT: Karan Makwana, Pratik Parmar, Akshita shah, Shivansh Shah, Bageshri akar, Srinivas Narayan, Megha Gadhavi, Jaldhi Gohil, Divya Gandhi, Shree Panchal, Tanushree Patel, Manali Shah, Zoya Khan, SHrushti Sharma, Gaurav Banerjee, Dhwani Sanghvi, Anukriti Pathak, Dhruv Patel, Nidhi Chowdhary, Kumar Abhishek, Koshangi Sharma, Vaidehi Kanada, Viral Lalwani, Bhoomi Parmar, Kruti Shah, Bhavika Baraiya, Jeny Dave, Gitesh Gupta, Payal Jindal.

From UNIFE:Manuel Consolaro, Beatrice Corsini, Caterina Dallolio, Miriam Gallerani, Giovanni Gentil, Giulia Ghiotti, Matilde Giordani, Irene Giovannini, Xian Lu, Maya Namaki Eraghi, Laura Palara, Andrea Samory, Giulia Scrascia, Alessandra Strinati.

2014 Jodhpur Workshop (41 students)

From CEPT: Aashini Sheth, Abhinav Verma, Harshwardhan Joshi, Kanika Garg, Kshitij Shah, Mansi Nagar, Maulik Parmar, Meet Jetly, Nelvin Raphael, Netra Bafna, Nikita Dongre, Nusaibah Khan, Rahul Dagli, Ram Dan, Salil Mohan, Sai Netra, Siddharth Soni, Tanay Timblo, Tubai Choudhury, Vedant Jani.

From UNIFE: Allegra Fornaca, Allegra Zanirato, Ambra Marconi, Fiorenza Maero, Francesca Vanelli, Giacomo, Toselli, Giorgio Scanelli, Giovanni Gibertini, Giulio Marchetti, Elena Tredici, Irene Ginesi, Luca Michelini, Anna Macrelli, Oreste Montinaro, Rachele Logli, Riccardo Simioni, Sofia Perini, Sofia Spallina, Stefano Caposciutti, Michele Millosevich.

2015 Jodhpur Workshop (29 students)

From CEPT: Kaushal Umesh Bhai, Lungragia Nirali, Rohit Raj, Shristhina Shrestha, Monisha Ghosalkar Pooja, Sreepada Sai, Vandana Dhilawala, Murtaza Chaudari, Pruthviraj Desai Milan, Patel Mansi, Kavan Arun, Berawala Makawana Ravikumar, Upadhyay Komal, Qureshi Mohamadsalim, Shah Harsh, Sidhhant Patni, Surti Yogiraj, Misri Patel, Hetina Shastri.

From UNIFE:Laura Abbruzzese, Federica Recla, Francesca Fasiol, Anna Volinia, Annalisa Bettini, Fabio Planu, Lucia Brandoli, Marta Ducci, Eleonora Folli, Thais Fernandes Otto

2016 Jodhpur Workshop (20 students)

From CEPT: Kajol Brahmbhatt, Kinjal Shah, Monica Chaudhary, Dharini Tamakuwala, Dweeta Dawda, Divya Mehra, Nitish Vidyadhar, Chiara DCruz, Karn Dev Singh, Gauri Varshney, Kaninik Baradi, Amita Pathri, Harsh Panchal, Shruti Suneja, Aditi Sharma.

From UNIFE: Carla Carubelli, Elisa Corneti, Helena De Zuani, Elena Moroni, Michela Gessani,

2017 Jodhpur Workshop (28 students)

From CEPT: Surabhi Garg, Aditya Akash, Kishor Kumar, Ragul Manish, Nikhil Makhijani, Kajal Sarang, Chandani Patel, Pooja Patel, Nikhil Rodrigo, Purti Joshi, Soumya Anshul Kumar, Shubham Bhavya Jain, Lakshita Munjal Utkarsh.

From UNIFE: Maria Mazzotti, Laura Cabbia, Marco Periz, Sara Franchi, Simone Zinani, Giacomo Calistri, Mario Di Giorgio, Lucia Scanelli, Francesco Dal Molin, Alice Caporale, Federica Braglia, Dario Licciardello, Nicola Da Dalto, Alice Tonelli, Eros Tartaglia.

This book describes the outputs of a cooperation path between the Department of Architecture of the University of Ferrara and CEPT University of Ahmedabad, India.
When we started this experience, in 2013, we firstly identified the crucial features of a possible educational approach in dynamic and changing contexts such as those of Global South Countries. In order to address this topic, this book presents the results of the educational project developed in the Blue City of Jodhpur (India) as an academic cooperation involving professors, researchers and young students from the two countries, local authorities and professionals.
The book aims at examining the role that heritage documentation and representation can play in emerging countries such as India if they are implemented as joint activities involving different stakeholders.
Jodhpur, the so-called "Blue City", is an outstanding example of the extremely relevant role of mixed research and documentation methods applied in a context where tangible and intangible heritage are closely linked and in a great risk of loss, due to population pressure, growing tourism and other threats.
The book presents several on-field approaches concerning visions about cultural heritage documentation in terms of research, future directions, methodologies and working tools in the field of education for heritage preservation and enhancement.
As the reader will understand the workshops experience have been organized over a period of five years, consisting in research and on-field surveys carried out by the group of students supervised by professors coming from the two institutions.
During the last year the workshop was open to students with a background of design coming from the University of Ferrara as well as to students of urban management of CEPT University. In these workshops, different urban areas of the historical city center have been analyzed and surveyed, setting up a methodology able to meet the main needs of knowledge, understanding, refurbishment and conservation. In this direction, integrated survey processes were tested and applied in order to provide tools for an overall "reading" of the uniqueness of the local heritage and to point out possible conservation strategies.

Marcello Balzani

Architetect, Full Professor (ICAR / 17) at the Department of Architecture, University of Ferrara in Italy. Since January 2006 he is the Director of the DIAPReM centre (Development of Integrated Automatic Procedures for Restoration of Monuments).
He was scientific responsible for several national and international research projects and his activities took place in various important world archaeological sites, in monumental contexts and in relation to several small centres in many regions of the Italian peninsula.
He has developed restoration and urban regeneration projects in several Italian historical centres.
He is a member of the Italian Union for Drawing, of the National Institute for Urban Planning, of ICOMOS and of the Focus Area Cultural Heritage, Horizontal Issue Archaeology. Since March 2010 he is scientific director of TekneHub and Scientific Coordinator for the Construction Platform of Emilia-Romagna High Technology Network.

Minakshi Jain

Architect, visiting Professor at the department of architecture, CEPT University, (Center of Planning and Technology) , in Ahmadabad, India. She worked on an exhibition under Charles and Ray Eames in 1964 and studied under architect Louis Kahn in 1966.
Her project of conservation of Nagaur fort won the UNESCO Asia-Pacific award of excellence in 2002 and was shortlisted in 2013 for AGA KHAN award and she received Silver Medal from Domus Award for Restoration and Preservation in 2012. She has several conservation projects to her credit, such as Amber fort and palaces, Jantar Mantar, Hawa Mahal in Jaipur and Dalhan pur fort, Gagurn fort, Mauborda fort and Garh palace in Jhalawar.
She has authored a few books with Prof. Kulbhushan Jain, "MUD architecture", "Architecture of Indian Desert", "Arid cities", " Thematic spaces" and "Architecture of the Royal Camp". She has jointly conducted workshops on old city centers of Jodhpur and "Hands on" workshops at Nagaur.

Luca Rossato

Architetect, Research Fellow (ICAR / 17) at the Department of Architecture, University of Ferrara, in Italy.
Since 2008 he started to cooperate with the University of Ferrara Architecture Department as Grant Researcher and later as Research Fellow.
His areas of investigation are both the vernacular and modern architecture documentation, representation, and enhancement. In these fileds he was coordinator project for DIAPReM centre activities in India and Brazil.
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