‘LIVING ON THE EDGE’
Water and the city of Pune

Aditya Deshmukh | EMU | Venice2014
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Preface

Pune (India) city is located 180km to the south-east of Mumbai, in the country’s one of the biggest state of Maharashtra. With a population of 3.11 million (Population census, 2011), it is the 8th largest city in India. In the last two decades it has experienced a tremendous urbanised growth but it still remains a place where past meets the present. Recent illustration about Pune city highlights the river as common localized decay in the form of informal settlements. As of 2012, this population also includes economically poor sections from rural areas of the country, resulting in the rise of informal settlements. However, this population also includes those who experience the old tradition-al alleys and vernacular architecture. Urbanisation and mobility (Urban Recycling City) - is cogitated and expressed in the following work on Pune city. How can city and nature be part of the same discourse between urbanization and mobility (Urban Recycling City)? The cultural past of the city cannot be perceived without considering the existence of water in the city. This mixture of old and new in a particular way is the identity of the city today. Thus a true citizen (Punekar) always exclaims by saying: “पुणे तेथे काय उणे!!!” (There is nothing lacking in Pune)

This research, through planning and design will give me an opportunity to investigate and reflect on many topics, such as interdependency of city and nature and the metabolism of the city which encompasses different material and energy flows within and in the city and their reciprocities. Whereas on the other hand this research will also give me chance to contemplate on to the role of different actors in steering up the change, not only through local initiatives, but also top-down decisions, influential on local, regional and metropolitan scale. The knowledge gained in the past two years through different research and design studios in the European post graduate masters in Urbanism (EMU) - the relation- ship between urbanization and mobility (Urban Re- gion Networks), the landscape urbanism approach to study how city and nature are part of the same system (Constructing the sustainable Delta city), the city seen as a renewable resource, subject to recy- cling (Recycling City) - is cogitated and expressed in the following work on Pune city.

However, the two paradoxical faces of Pune share one thing in common, and that is the natural wa- ter courses (rivers and streams) flowing through the city, originating in the range of hills to the west and south of the city. Just like most of the cities around the world which initiate along water courses, Pune too laid its first stone along the right edge of river Mutha (flowing south-west to north-east) which formed its western boundary. River Mutha meets river Mula (flowing north-west to east) at the north- east tip of the city (the confluence termed as San- gem in local parlance). The joint river Mula-Mutha formed the city’s northern edge. Subsequently over the course of time the city jumped over its river to expand its boundaries. Lying base basically to the past, close association of the city with water can be seen through social and cultural production of space along the water edge, in the form of temples and gardens, as water being one of the sacred el- ements in Hindu mythology. However, on the con- trary, today the rivers are not more than sewers in the city. Disposal of solid domestic waste has led to high levels of pollution in the water, and as the mat- ter of the fact these water courses are channelized and engineered to get the water out of the city as early as possible. This as a whole is not only affect- ing the ground water table and ecology within the city, but also influencing the cultural and social association of the city with water.
Introduction

With only 2% of the world population urbanized in 1800, global population reached 15% mark in 1950 and today almost 1, 80,000 people are adding up the world’s urban population every day (Hale, 2011). However urbanism can not only be argued to be the science of the city, but also postulated as a discipline that holds the capacity to steer the transformations of the city’s and its rational development (De Meulder and Shannon, 2008). In order to gain public interest or impose policy agendas, evolving topics and shifting matters like deplorable housing conditions, unsanitary conditions or crumbling infrastructures etc. redirects interest of Urbanism.

Water appears to be one such issue that is (re)surfacing the contemporary agenda of urbanism in the cultural capital of Maharashtra. Probably it is not such a surprise for the city which is in transition, once again, structuring itself along the water edge, today oriented towards the ‘money lanes’ (highways) connecting Pune to the surrounding industries and globalized capitals of the country. This also has led to a strong contrast between old and new urbanization process and continued rise in population, which is resulting in flash floods and ecological damage to the urbanized areas and farmlands downstream. Hence the urban water in Pune can be said to be absent as it is sanitized, covered, canalized or piped.

The following thesis is structured into three main|- top-down and bottom-up approach, reciprocating to the various water related issues in the city. Therefore this thesis will highlight various spatial issues over time which led to water negligence in the city today and in return, it will explore the potential of Communities, Infrastructure, Ecology and Economy to reciprocate the issue by understanding today’s needs and tomorrow’s worries.

The title used as metaphor highlighting the presence of the city’s ‘edges’ not only about the problematic ‘edges’ in between water and the urban fabric, but also about the spatial corners of hydrology with the hinterland. Thus, in order to improve the present state of the city, it is crucial to understand and explore the interaction of the city with water and the evolution of such interaction over time since its provenance. Water and roads each have spatially thematized the directions of the city. City originated near the confluence of two rivers, more precisely in between two streams (Mula and Mutha) that ended up their courses into river Mutha to the north. Hence the urbanization process and continued rise in population, there is an urgency to find a dynamic balance between the city and nature. As a key element of nature, water will play a major role in this rebalancing. Moreover these natural infrastructures have a potential to be the ‘breathing lungs’ for a city like Pune that are extremely necessary for its resilient and sustainable future. Taking this into consideration, as specialists can we question ourselves about the role of urban planning and design, to take up a soft approach where the mitigation is proactive rather than reactive and where strategies and interventions help city and nature benefit mutually?

Collector orders demarcation of flood lines in city

DNA Correspondent

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The following thesis is structured into three main
chapters along with the reflection at the end. The first segment will theoretically and analytically analyse Pune city’s historical evolution with context to water, since the time of Peshwa (Royal family) rule, to the second half of 20th century. The historical insight elaborates the city’s changing relation with water, moreover so highlights the cultural, economical, structural transformations in each era, which helps in analysing the problems faced by the city today. Following, the chapter on territorial symbiosis inspects the relation of the city with its surrounding natural setting on a territorial background. The theme of reciprocities introduced in the thesis, helps to formulate research tools based on the analysis to translate into spatial ideas and concepts for the following interventions. Followed by the key postulations framed from the historical study the second segment analyses the problem field with the help of factual corroborations in the present context. In the third segment a strategy is formulated based on the postulations raised from the historical analysis under the theme of reciprocities with the present day evidence of the conflicting elements in between water and the city explored in the second part. The strategy will be tested with the help of three design case studies. The theoretical background, research themes, methodology and the design exercise will be contemplated through final reflection; moreover the lessons learnt from the design case studies with their possible implications in the contextual contemporary cities will also be discussed.

Although there is a linear structure in the methodology, there have been numerous iterations and redefinitions of the issues that have constructed the thesis. Research and design, instead of being two independent entities of the same process, have a reciprocal relation in this thesis.

To understand the present, historically changing context of water with the city is scrutinized in the first section. This will not only highlight the changing relation of the city with water, but also help comprise and define the problem field through sequential overlapping of the same. The historical periods defined here are based on the major transformations happened during different political rules in the city. Hence, each era was theoretically reviewed, interpreted and subsequently hypothesized, highlighting the dominant spatial character of that period. The observations and interpretations are illustrated either with the help of mapping, sketches or by abstract, symbolic representations. The overall theoretical background is then postulated with precise observations that led to the formation of research questions for the following analysis and design interventions.

The statistical data, infrastructure and spatial study help to analyse the current form of the city and also answer the questions from the postulations. Along with the analyses, interviews and cognitive mapping helped to identify local potentialities and understand conflicting metaphorical spatial environment. This in totality will help narrow down the problem field to formulate “problematic edges”. Therefore the strategy is built on the lessons learnt from the past with the conflicts occurring at present, for a resilient future. In the strategy the reciprocities between Community, Economy and Ecology play a pivotal role in mitigating the conflict between city and nature. Consequently three design case studies are meant to test the strategy addressing the problem at three different scales which is along the stream, along the river and the confluence.

Methodology
Living on the 'Edge': In between Water and Urban fabric of Pune city

The Colonial City 1820-1890

Land of Peshwa’s 1720-1818

Floods of 1961 1950-1970

Territorial Symbiosis 1961-2013

Urban WATER Negligence Problem field

POSTULATIONS

Research questions

CITY Profile

Hypothesis

‘Negative’ Reciprocties as ‘EDGES’

Strategy

Reflection

Case study1: Urban ‘Balcony’

Case study2: Looking back to the flure

Case study3: Sangam

Territorial Symbiosis 1961-2013

1961-2013
Cognizance of water can be vividly seen, practically in most of the cultures around the globe. Water is given a significantly high status in these cultures. Praying and worshipping water in many cultures and religions, such as Indian, ingrained a sense of respect, importance and value in appropriate use of it (Samant, 2004).

Since the ancient times, water has been given a unique status in the social and religious traditions of India. Water is ‘very closely referred to as “nectar”, “source of life”, “blessed of life”, “generator of prosperity” and so on. In the mythological descriptions rivers are considered to be divine and hence worshipped as Goddesses, for its use for daily rituals and ablutions, and its ability to create an environment favouring spiritual peace and contemplation (Sharma, 2009).

‘Ghats’, an built form on the edge of a water body, exemplifies the symbolic and religious significance towards water, making them spiritual centres and places for human congregation. The ghat establishes contact between land and water, varying from small pond to a major river and everything in between (De Meulder and Shannon, 2008). The word ‘ghat’ has originated from the Sanskrit word ‘Ghatta’, meaning a landing place or steps to the water body (Samant, 2004). These are linear elements built parallel to the water edge, to not only allow easy access to the water, but also to stabilise and define the banks and protect the settlements from flooding in the case of rivers. Ghats are also used as major economic resource, bustling with activities and acting as hubs for formal/informal transport and commerce (De Meulder and Shannon, 2008). Ghats, in terms of design and engineering delineate water architecture of South Asia.
“Ghats represent a totally different physicality to an urban space and is the ‘platform’ where the sacred and the profane make subtle distinctions, not only by a demarcation of domains but also by emphasising their conjoined nature”
U. S. Andhare (1993)

Maintaining discipline with respect to Nature was strictly followed in ancient times. However, it is paradoxical, that ignorance of these facets of water cultures and exploitation of these natural resources for personal benefits has got us to this critical present of global climate change, scarcity of water and problem of water pollution, and is leading us to a dark and unpredictable future.

Why did the meaning of water, from being a source of life, key stone of the constructed urban tissue has changed over time to be the subject of negligence? What are the urban processes that can be held responsible for this change?

Trying to find answers to the above questions, I will highlight the cultural, social, political, technical and ecological changes over time, in the urbanisation of water, focusing on to the case of Pune city.
Urban water Negligence

The Land of Peshwa's
Colonial City
12th July 1961 - A day that changed Pune!
Shifting realities
Territorial Symbiosis
Reciprocities
Postulations
As aforementioned, Pune originated as a small hamlet precisely between two streams (Ambil and Nagzari) and on the right bank of Mutha River. The river meets Mula River at the north-east tip of the city, place known as Sangam or the confluence. This joint river formed its northern boundary and the east was bounded by Nagzari stream ending its course into the river to the north.

Pune's good times began after the emergence of Peshwa (Royal family) empire by defeating the Mughals in the 18th century. Peshwa made Pune as their capital city, and hence the period of the Peshwa rule has been described as the golden age of Pune's past (Diddee and Gupta, 2000). River Mutha being a non-perennial, Ambil stream was regarded as the major source of water supply to the settlement. Bajirao Peshve (first ruler of the Peshwa empire) was a visionary behind the expansion of the hamlet to a system of peths (wards structured with regards to different occupations within the community) and hence each peth was named after a day of the week, when the occupants of that a particular peth could set up their open market (Dhoot, 2005). Moreover the king not only built numerous wadas (vernacular residential buildings), temples, ghats along the river and the stream, but also set up many community baugs or gardens within the neighbourhood's to maximize social cohesion (Narkhede, 2008). Sarasbaug was one such temple garden built on an island of an artificial lake to the south of the city along the stream. Hence a strong north south oriented urbanization pattern could be seen in the Peshwa city.

As Pune lies within the moderate rainfall zone, the city witnessed a heavy monsoon rains in the year 1753 (Diddee and Gupta, 2000), resulting in flooding of many streams and river. The floods in the Ambil stream affected the peths to a larger extent, which led to many casualties in the settlement. To avoid future possibilities of such events, the ruler took a decision of diverting the stream from the lake temple (Sarasbaug to the south) towards the river Mutha to the west of the settlement. This diversion of the stream led to the spread of the wards (which was prior mostly oriented north-south) to spread east-west.

Diversion of the stream had some negative consequences too. As the stream was a major source of water to the settlement, turning the watercourse led to water scarcity in the settlement. To tackle this issue, the king undertook, what is said to be the most remarkable water management projects of that time. Two masonry dams, roughly ten kilometres to the south of the city, were built upstream on the Ambil water course. First dam was meant for filtration and setting of soil in the water while other was aimed for storing water. Moreover and underground network of aqueduct channels was built leading to the city and supplying water to the neighbourhoods via disconnecting chambers known as uchchwas, ending up into an underground storage tanks or Hauds. These underground tanks were designed for an easy access to the water and performing domestic activities like washing clothes, bathing etc. These areas later turned out to be spaces for public congregation.

Thus, the stream which played an important role in structuring the Peshwa city was in a way re-introduced to the urban fabric for practical benefits. This in turn engineered a reciprocal response in form of cultural production of spaces.
Living on the 'Edge': In between Water and Urban fabric of Pune city

North-South street pattern
Old river course
Present river course
Temples
Gardens
Present street pattern

(Left) Map showing north-south urbanization pattern along the stream.
Source: Based on theoretical description

(Above) Vernacular housing typology (wada) in one of the alleys of the old city core.
Source: Sketch by Nikhil Chaudhary

Original flow of Ambil stream with series of Temples, gardens (baug's) and the fort (Shaniwarwada) along its edge.
Street pattern
Old river course
Present river course
Aqueduct (Uchchwas)
Water tank (Haud)

(left) Map showing the trajectory of the aqueduct built by the Peshwa’s with their outlets as underground water tanks (Hauds).
Source: Based on theoretical description.

(Below right) Picture of the lake temple taken in 1860.
(Below left) The present condition of the aqueduct.

Schematic section of the underground aqueduct’s built by the Peshwa’s.
Source: Author’s own illustration based on written description in the book ‘Pune: Queen of the Deccan’.

Drainage of the streams led to densification within the neighbourhoods (Peths).

Aditya Deshmukh
The cultural and social developments discussed in the last chapter were governed by the British in India after one of the great Anglo-Indian wars in 1818.

Period between 1820-1890 is considered to be the face changing period for the city in true sense, as a strong impact of the colonial rule can be seen on the form and structure of the city (Diddee and Gupta, 2000). After taking over the city administration, British East India Company planned a cantonment area to the west of the city (Khadki). This cantonment was basically planned for the army infantry and residential districts for administrative officials. Further, another cantonment was set up to the eastern edge of the city, leaving a wider berth between the old city and the cantonment. The belt of fields and gardens became a natural barrier between the old and the new district of the city.

Two major events that shaped the civic growth of the city took place in 1850. In this decade, the great Indian peninsular railway reached Pune and the Municipality was formed (Dhoot, K 2005). The rail connection not only paced up the commerce within the city, but was also seen as a connector and transporter of troops and officials to the other parts of the country.

In 1863, the Municipality of Pune, put A. H Leith in charge of an enquiry into the sanitary conditions of the city (Diddee and Gupta, 2000). The natural drainage had become inadequate and the two main streams (Ambil and Nagzari) were polluted by sewage, due to the congestion in the old peths of the city. The street pattern of the city during the Peshwa period was mostly north-south as most the urbanisation was along the Ambil stream. Therefore Leith’s immediate reaction to the sanitary problem was east-west thoroughfares. Many temple complexes, and vernacular residential buildings were demolished not only to improve traffic congestion, but also to remove slums and densely settled areas. Thus sanitation and road making became the main motives in town planning for the colonial government.

Implementation of these town planning principles resulted in social disruption within the city as many traditional public spaces in forms of temples or tanks were demolished. To make the community more socially cohesive, the government built many vegetable markets within the old city and the cantonment. One of them was Mandai market, located on the southern edge of the city. These new neo-gothic structures were juxtaposed against the traditional vernacular temple architecture, to its sides and formed a curious contrast, signifying two historical periods. Moreover, they also were the pioneers in setting up many educational institutions and governor’s residence across the river, for which Pune was also known as the Oxford of the east.

However, British hydraulic interventions in Pune city were the most significant of all developments, throughout the course of nineteenth century, which naturally transformed a vast spectrum of precolonial hydraulic relationships that had defined and sustained complex equations between land and water.
Water during the British rule can be discussed in two overlapping but distinct clusters. The first cluster can be explored through the aspects of decline and elimination of traditional water supply technologies (D’Souza, R., 2006). The second cluster explores colonial experiences with control over society and nature.

Concerned with the growing population in the old city and the cantonments, the British government became instrumental in sanctioning four major water management projects in the city. First was the construction of a dam over Mula River, ten miles south-west of the city. The second was, construction of a dam over a stream flowing north-west, for supplying water to the governors house to the west of the city, over the other side of the river. The third was construction of a dam downstream of river Mula-Mutha flowing eastwards to overcome water scarcity in the cantonment area. Fourth was the drawing of two canals, Mutha Left and right bank, aimed for encouraging agricultural activities in and around the city. As a result, there was a large influx of population coming to the city. But, in return to this, heavy water tax was charged for a ‘regular’ supply of water to the fields. On the other hand this water management also reduced the dependency on the aqueduct system built by the Peshwa’s, naturally suffered from neglect. Instead of incorporating the excellent system into the new arrangements, a good source of precious water was lost.

However, these canals are also significantly ending up reorienting ecological relations between land and water, notably through ‘irrigation science’. That is, the waterworks with commercial and revenue calculations for colonialism also worked to order distinct social and physical colonial contexts. Thus, the term ‘colonial hydrology’ can be argued to be the varied hydrologic interventions of colonialism to simultaneously alter the city’s economical, social and fluvial worlds.

Section showing the transition of architectural style from vernacular during the Peshwa empire to Neo-classical by the British.

Source: Nari Gandhi competition entry, SKP College of Architecture
12th July 1961– this fateful day will remain forever etched in Pune's history. After the independence in the year 1947, construction of major waterworks was one of the prime agenda of the Indian government. One of them was a much bigger reservoir, by damming the river Ambi, further upstream to Khadkwasala reservoir built by the British. This proposed reservoir was a feeder or secondary water supply source to Khadakwasa lake.

Construction of this dam began in the year 1955 and was complete by 1961. In the very same year, onto the onset of monsoon the reservoir was seen filling up at a greater pace. At the same time some cracks were observed in the masonry construction of the dam wall. Last minute efforts were made to save the dam failed, and the dam breached. Due to the excess overflow of water into Khadakwasa lake reservoir downstream with its storage capacity stretched to the limits, a decision was taken to mechanically breach the dam built by the British. This lead to inherent flash floods cutting a wide swath through Pune city, the furious river dislocated civic life. By the time that the water went down the next day, it had not only damaged to the old Peshwa Pune, but also destructed the new urban developments on the west bank of the river Mutha.

After this incident the old face of the city changed completely. Many temples, residential buildings (wadas), river front ghats were washed off. While taking efforts to resettle, the compact form of the city broke and it rapidly began to spread outwards, forming new neighbourhoods to the south (Lokmanyanagar, Sahakarnagar), Gokhale nagar to the west and Kothrud to the south-west of the city. Arguably, Kothrud later on went to become the fastest urbanizing suburbs of India.

On the other hand, water which was culturally important in the city planning for the Peshwa and economically useful for the British government was looked onto as a element of threat after the flash flood incident. This led to the construction of flood retaining walls along the banks of the river and along smaller network of streams within the city in order to avoid similar casualties in the future.

Therefore the consequences of this event can arguably catalyzed the start of the segregation between nature and the urban tissue, resulting in the change of social and cultural relations of the city with water.

[Image: Flood affected areas]
After the disastrous floods of 1961, urbanization in Pune started to spread like a sheet of water. In the year 1961-62 Mumbai-Pune corridor suddenly emerged as the most vibrant economic belt of the nation, due to a proposed industrial district in the twin city of Pimpri-Chinchwad to the North of Pune. The establishment of large scale industries led to the growth of ancillary and small scale industries in and around the industrial zone.

The booming industries to the north-west of the city led to a proposal of highway connecting Mumbai-Pune and passing down further to the south of India (Chennai). Taking the industrial development into consideration, the highway was supplemented by Mumbai-Pune expressway in the year 2000 (Bhalume, 2011). Knowing the financial importance of the corridor between Mumbai and Pune, India’s second biggest software technology park was proposed along the expressway, next to the industrial belt. Furthermore Pune emerged as the forefront of the Indian software technological revolution that changed the business dynamics of the service industry.

As a result of this, the employment base widened and Pune experienced a tremendous increase in migrant population. These changes led to an urban development in a ribbon form along the highway stretch, resulting in hybrid patterns of urbanization (Pakdar M, Kesker, T, 2014). As this hybrid urbanization was oriented more to the ‘hard infrastructure’, the natural land parceling formed by the fluvial processes in the river. On the contrary, Pune still struggles with many of its basic needs. At present 32.5% of the population of the city is living in informal settlements and 70% of the total number of slums are located along the dense network of natural water streams within the city (Times of India, 2012). As a result of unsanitary conditions and appalling settlement, most of the streams are getting polluted by the direct solid waste disposal by the slum dwellers in to the streams. This in turn is affecting the entire hydrology of the city.

The combination of flood barrier walls meant for preventing floods and the piling of pollution in the rivers and streams, has resulted in the city classically turning its back to its own rivers (Dandekar, 2010). In the time of Peshwa’s, when water was part of the city, today has become an element of neglect. Urban water in the city of Pune has just become an object of mere sanitation and, river/streams are being channelized to get the water out of the city as early as possible. Hence the era of ‘clean urbanism’ (De Meulder, 1997) has begun with the visual banishment of water. Hence the urban water in Pune can be said to be absent as it is either sanitized, covered, canalized or piped.

‘Tradition’ does not imply that everything should remain as it was. Tradition provides a basis for the manner in which a system can accommodate change without the necessity of forgetting, without “breaking with the past” (Henco Bekkering, 2001).
The southern and the south-eastern side of the city is surrounded by hills where most of the natural streams originate. Today 70% of the informal settlements reside along these streams converting them to sewers by disposing off domestic solid waste.

Informal settlements in red
Four dams additional to Khadakwasala dam built by the British supply water to Pune and Pimpri-Chinchwad city.

Source: GIS
Pune lies on the western margin of Deccan plateau at the confluence of Mula and Mutha. The rivers originate from Mulshi and are Monsoon-based. They together form a tributary of the Bahrin River in the plateau. The Panavas and Indrayan rivers traverse the northwestern outskirts of metropolitan Pune. This water system was the backbone of the urbanisation pattern in the pre-colonial period when the city sprawled on one side of the river. Infrastructural developments during the British rule in the 19th century started to take lead in structuring the city. The rivers were dammed to cater to the increasing water demands of the expanding city.

During the second half of the 20th century, due to Pune’s emergence as an important industrial node in the western part of the country, Pune started to develop global infrastructural connections. As Pune came in light as an important emerging city, the city’s infrastructure knew no bound to grow. Many roads, bridges, high speed highways were built for easy connectivity. The migration increased and people started to reside wherever possible, resulting in unplanned sprawl of the city. To cater to the economical prosperity, four more dams were constructed in addition to Khadakwasla Dam built by the British. At the local scale, the occasionally flooding river Mutha was channelled to minimise the threat of flood. Till today, the municipal corporation seeks to line the river banks, create retaining walls and dredge the river.

These infrastructural advancements had positive and negative consequences on the territorial and city scale. Though they were aimed for economical sustainability, global connections have led to densification and heavy urbanisation within the city affecting the river and its ecology to a greater extent. The river is providing water for all but is it ready to take the waste of urbanization all? Is there a symbiosis between natural element and the ‘urban’ city?

The question arises strongly especially when one can see a reciprocal relationship between dams and the ecology in the south-west part of the city. The dams built along the mountain ranges, have been positively responded by nature, which can be seen through flourishing flora and fauna in this corridor.

The interaction between these natural and man-made systems always needs a closer attention. It is all about the correct human interference between ecology and economy that helps in boosting both simultaneously. Therefore it is an important aspect to consider, how economy and ecology in a way have an interrelation, with a hidden conflict between city and nature. There is a need to find out model of symbiosis between river and the city.
As already seen, water which played a prime role in cultural and economic vibrancy of the city has been sidelined from the daily routine of the city. During the Peshwa regime, water was seen as a cultural and sacred commodity and thus the infrastructure development was directed towards building Ghats, temples along the river edge. The city responded to it positively and the water was seen as a sacrosanct resource. Even after the stream was diverted, water was re-introduced to the fabric for practical benefits, water was used for cultural and social production of space.

In the British period, when dams were constructed to get the water in abundance for the city, the idea was to get economical benefit out of such valuable resource. But it ultimately revived the ecology of the area around dams. Today, this positive relationship between a water resource and the urban fabric is nowhere missing and moreover the pessimistic approach of the city towards the water has turned it into more dismal state. River has become a place which no one wants to explore. The edges of the streams have turned into ‘reserved’ spaces to reside for the informal settlements. Further these informal ghettos have ‘turned their back’ to the streams converting them into garbage bins. The ecosystem of the river and its catchment area is getting affected and the river which once was a proud element of the cityscape has become an ignored drain. The infrastructure development happening around the water is no longer being beneficial to the water, nor the residential development being beneficiary of the presence of water along it.

Reciprocities: A mutual cooperation by doing a good deed for another and the favour will be returned.

In its true sense, the relationship between the city fabric and the river in ancient times was reciprocal. Moreover, the fact is the birth of the modern civilization is also a result of the reciprocities between cities, their surrounding hinterlands, technology and the human being. But over the years, the augmentation of urbanization has scratched the natural resources to such an extent that this mutual cooperation between them has come to an end.

“Infrastructures, which were mutually reinforcing and totallizing, one becoming more and more competitive and local: they no longer pretend to create functioning wholes but now spin off functional entities. Instead of network and organisation, the new infrastructure creates enclaves and impasses: no longer the grand recite but the parasitic swerve” - Rem Koolhaas

Historically, urbanism is considered not only as the study of character of this urban life and physical needs of the society, but also is regarded as the discipline that holds the capacity to steer the transformation of the city and its rational development. In other words, urbanism documents and interprets the city (De Meulder, Shannon, 2008). Urbanism, over the course of time has been redirecting its needs to understand the present relation between water and the urban fabrics of Pune and come up with solutions so that together they work for the betterment of both.
Living on the ‘Edge’: In between Water and Urban fabric of Pune city

With that into consideration, can we ask ourselves that boundaries will, in time effectively disappear. Taking to the point, where traditional spatial and political nodes connecting them will aggregate and chaotic as the number of economic, material going, urban productivity needs to be intensified. Versely and the cities are expected to accommodate going to affect the greenhouse gas emissions ad-

On the other hand, according to United Nations, the world population is expected to increase from 7 billion to over 9.3 billion by 2050, a 40 percent increase in population in less than 40 years. The number of urban dwellers is expected to rise from 3.6 to 6.3 billion while the rural regions will see their population plunge by 300 million within the same time period (World’s bank, World development re-
port, 2009). A 95 percent of urban growth will be in developing countries and by 2050 an expected total of 3 billion people will live in informal settlements in developing countries and by 2050 an expected total of 3 billion people will live in informal settlements (United Nations, 2012). This rise in population is going to affect the greenhouse gas emissions ad-

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ty will continue to flock to cities for the foreseeable future and natural resources are dwindling. We also know that earth’s natural systems that provide our resources are slowly failing and our current way of life is unsustainable. In case of urban water man-
agement the challenges in Indian cities are im-

Architect Christopher Alexander once rightly stat-
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banism might not be the philosopher’s stone that instantly solves climate change and resources crisis, it offers opportunities for pragmatic and resil-

et design of new and existing areas based on the principle of decentralized, interconnected and poly-
centric urban systems. Not only will urban planners need to re-examine traditional political and geo-

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**Living on the ‘Edge’: In between Water and Urban fabric of Pune city**

**The Land of Peshwa’s Colonial City**

**Ambil stream played an important role in North-South structuring of the Peshwa city.**

**Construction of Dams, canals and weirs, ‘Colonial hydrology’ completely changed the land water dynamics of the city.**

After the devastating floods of 1961, urban water was seen as a threat to the city.

**Industrialization and economic prosperity led to developments away from the city and its hydrological context.**

**Floods of 1961**

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**Shifting realities**

**What are the effects of change of reciprocities over time on Pune?**

**How can the urban fabric be adjusted to requalify the problematic edge conditions?**

**Can the cultural relation of water with the city be revived by contemporary methods of urban designing?**

**Can the informal settlements be made resilient to mitigate the problem of floods and pollution?**

**Can the water corridors be used as network for slow movement?**

**What type of interventions do we need to reciprocate economy and ecology at the same time?**

**Utilitarian way of reintroducing water to the urban fabric, in turn engineered a reciprocal response in the form of cultural production of space.**

**Water was for socio-economic regeneration of the city.**

**Construction of flood walls made the city safe, but disconnected the urban life of the city with its hydrology.**

**Water edge, which in the past was place for social cohesion became a place for social exclusion.**

Though human interference on city scale is leading to degrading ecology an opposite effect can be seen on territorial scale where nature reciprocates to human interventions.

**Possile research and design concepts**

**Postulations**

**Urbanization and sprawl due to the infrastructural developments is degrading the ecology in the city.**

**Community, Economy and Ecology have played an important role in structuring the city in the past. Can the reciprocities between them help to deal with the problem of water negligence?**

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**Research questions**
City today?!
Pune hosts a population of 3.11 million with an average density of 603 per sq km (Census, 2011). The city centre being one of the dense areas in the city, a donut shaped ring of high density can be observed. These are the areas where most of the informal settlements can be found. (Areas in white are army cantonment areas which operate administratively as different municipalities)

Source: GIS
The city centre which is highly integrated and dense puts pressure on the natural water system flowing through it. To cater to the increasing traffic river side roads are proposed, which are adding to the water pollution. Moreover the river is most heavily channelized reducing its width to some meters. Maximum (red): Minimum (blue).

Source: Tracing based on Google street maps.
Workshop drawings

Based on the cognitive mapping methods described by Kevin Lynch in his book ‘Image of the city,’ similar exercise was undertaken during the time of field visits. Citizens and professionals in the field of architecture, engineering were asked to visualize and sketch their perception about the river and the streams in the city and their spatial relations. Whereas through most of the drawings it was evident that citizens considered the crossings over the river as spatial reference points. Landscape architect Tanuja Godse scrutinized the fact that why people consider the river as a spatial reference point. For some its crossing the river (which was also quite prominent in the illustration we saw at the start of the thesis) while others are encouraged by the commerciality of the place.
Urbanization patterns

The parceling of land formed by the natural flow of the river has been completely disturbed by the recent urbanization process. The street pattern evolved is contradictory to the parceling creating uneven disturbed landscape. As the parcels are naturally designed drains, overlapping street patterns are creating conflicting ‘edges’ which is causing flash floods on local level during high monsoon season. In order to understand this complexity and conflicts we should understand the limits this complexity sets for future developments. Instead of fighting against this fragmented nature can we cooperate with it and attempt to enhance its existing qualities (Palmboom, 1987).

Natural parceling

Present urbanization pattern

Koregaonpark

Balewadi

Kaluni nagar

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Living on the ‘Edge’ in between Water and Urban fabric of Pune city
Conflicts between the urbanization and the natural water courses
Living on the 'Edge': In between Water and Urban fabric of Pune city

- Sewage line
- Flood barrier
- Informal settlements

Historic bridge
River channel
Sewage lines
Residential Complex
Living on the ‘Edge’: In between Water and Urban fabric of Pune city

A - Channelized rivers and streams
B - Sewer lines along the water body
C - Streets along the river, leading to pollution
D - Neglected historical water fronts
E - Flood barriers
F - Informal settlement along the streams
G - Urbanization on the edge along nature reserve
H - Urbanization along the open canals

The floods of 1961 and the recent economical shifting realities has resulted in negative reciprocities where the river is no more the part of the city, the streams are encroached by informality. Therefore it will be important to understand what types of negative reciprocities the city is facing today.
Strategy
Strategy

Learning from the history suggests that, water has played a pivotal role in shaping the urban life, of Pune city since ages. Water bodies in the city have had positive or negative reciprocities either with Community, Economy or and Ecology of the areas around them. A stream, which once was a place for social cohesion (first ghats and later tanks or Haads along the water) today has become paradoxically a place for social exclusion (informal settlements and illegal constructions).

Whereas to contrast with the history when the commercial hubs evolved in close proximity to the river, today’s shifting realities exemplify that water is no longer considered as an element for economical regeneration. Lastly water on one hand has been flourishing ecology through human intervention on the other as a result of same human interventions, ecology around the urban water is degrading.

Hence in order to rethink the mutual co-operation of city and nature by understanding today’s needs and tomorrow’s worries, reciprocities between Community, Economy, Nature and the urban fabric will play an important role. To understand the coherent inter relation in between these components, the strategy is articulated at three different scales and locations, where relative varying degree of importance is assigned to each of the components considering the contextual negative/positive reciprocities. To connect it back to the history from where it all began, the sites chosen for testing the strategies are:

1. Informal edge along the historical Ambil stream.
2. Riverfront along the historical city centre.
3. Area along the confluence of two rivers (San-gam).
CASE STUDY 1:

_Urban ‘Balcony’_
Ambil stream

Covering a surface area of 2.4 hectares and population density of about 3,500/hectare (Shelter associates, 2013), informal settlement along the historical Ambil stream is one of the densest slums in Pune city. Encroaching a privately owned land in the year 1965, this settlement since then has been politically and socially one of the most sensitive ghettos in the city. Interestingly till date the inhabitants pay regular monthly rent to the land owner as per the type of dwelling (Kuccha - temporary structure, Pucca - Permanent structure). Due to its geographical position along the informal settlement is juxtaposed in between the old and new part of the city. Close proximity of the stream makes the settlement susceptible to seasonal flooding during heavy monsoons (Seasonal flood level is +1m , while heavy monsoons can give rise to the water levels upto +1.75m). Therefore, as precautionary measure, the municipality has built concrete walls along the full lengths of the stream; additionally it is also channelized to avoid water stagnation. On the other hand, lack of basic infrastructural facilities within the settlement the stream acts as a garbage disposal site for many of the dwellings along its edge. Poor maintenance by the municipality and negligence by the inhabitants, ambil stream today is no more than an open sewer.

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As the site mingles between the old and new part of the city, it is, at the same time heavily bounded by congested streets and a host of commercial activities. One of such activities taking place at the roundabout to the north of the site (picture) is known as ‘Majoor adda’ or a labour camp, which essentially is a job hunting place for most of the unskilled construction workers from the settlement on daily basis. Therefore the prioritisation of commercial activities along congested streets adds up to the negligence towards the stream.
In spite of close proximity to the water, the informal settlement is deprived of green cover due to pollution in the stream and congestion within the settlement. On the other hand it is well connected to the rest of the city by a main north south street passing through it.

Though the southern edge of the stream is abutted by densely packed informal settlement, northern edge on the contrary has small fragments of abandoned open spaces are a result of formal settlements ‘turning its back’ to the stream.
“There is no provision for garbage disposal in the neighbourhood. Naturally people end up throwing garbage over the wall, but they don’t see what is piling up in the stream. We are aware that this has a severe impact on our health. I would be happy to be a part of any community development programme.”

“We do not have open space to play within this settlement. And my mother does not allow me to play near the stream as she tells me that it is unhealthy.”

“I don’t like the place where the major adda (informal labour camp) is at present near the roundabout. Limited space, no basic amenities, traffic jams during morning peak hours has made that place unbearable.”

“My tenement is just next to the flood wall. Though we are protected by flood wall, still every year we have to be prepared for the monsoons, as the drainage chokes and overflows anytime due to the waste accumulated.”

What they have to say!...
One can seriously question if the term ‘natural water stream’ can be used for the Ambil stream. The uncontrolled disposal of waste into this stream has practically turned it into a sewer. Therefore the ultimate goal of the proposal is to re-orient the settlement towards the water and give the settlement a place of their own, which today is virtually non-existent. Step-by-step re-activation of vacant and underused spaces by engaging the community will give an additional leverage to the re-orientation. Through this project it is proposed that by redesigning the edge condition we can initiate the process of rehabilitation and provide guidelines for further in-situ rehabilitation of the entire settlement.

Creation of unitary framework, where in the local community will take control of the development and sustainability of their surrounding environment. Involvement of local NGO’s working in this sector will additionally help in reactivation of the vacant spaces along the stream with activities planned keeping in mind the needs of the inhabitants.

Whereas, municipality will play an instrumental role in maintaining the engineering works in the stream. On the other hand to start of the cleanliness drive municipality can also work on formulating policies regarding garbage exchange programme. Today garbage collection is not provided as garbage trucks cannot enter the densely populated informal areas. With the money that is invested for the minimal cleaning of informal settlement, an garbage exchange program can be setup where in compensation in the form of food and other domestic products can be given in return of certain number of waste bags per family given at the collection centre. This will not only drastically reduce the amount of waste thrown into the stream, but also in return will help the municipality in maintaining the stream.

During the phase of re-construction of the informal settlement, along with planners and architects, the community can be involved in the planning, designing and construction process. As most of the working population in the settlement are construction workers, involving them in the re-building can help reduce the extra costs.
As mentioned before the framework starts with re-activation of vacant, underused and leftover spaces. One of such plot is to the east of the settlement, on the other side of the stream. A pedestrian bridge over the stream connects this plot with the settlement further to the main street. Considering the area of the plot (3000sqm) and its strategic location in between formal and informal settlements, an allotment productive garden is proposed, where small scale flower and food production can be done. This gives an opportunity to the housewives within the settlement to earn a living for their family.

**Productive allotment garden**

**Majoor adda**

The existing Majoor adda (labour camp) is creating as well at the same time facing many problems due to limited amount of space and traffic congestion caused by it during morning peak hours. Therefore a leftover space, which essentially is a ‘backyard’ of an existing office building, is redesigned, by taking its topographical advantage, into a stepped profiled public space, which also houses the labour camp with the contractors offices occupying the ground floor of the office building. This will not only provide a comfortable interaction space for the workers but will also ease out traffic issues at the roundabout.

**Majoor adda**

**Informal commercial**

In January 2014, land previously occupied by informal settlement was ‘bought’ by a private developer and the settlement as rehabilitated away from the site in a multi-storied low cost apartment building. A shopping complex is proposed on the site. Therefore with the help of various governing and non-governing bodies, the proposed shopping complex is integrated with the existing urban framework by housing the informal commercial shops abutting the street to be proposed along the water edge of the shopping complex.

**Informal commercial**

After re-qualifying these fragmented plots by local initiatives, the municipality gets an added pressure to valorize the stream corridor by cleaning and maintaining the engineering works of the same. Hence this corridor is proposed as a corridor of slow movement which will not only weave all the water side activities but also will give an easy access to the nearby destinations (Sarasbaug to the east and river basin to the west). This in totality will give an additional leverage to initiate the process of re-orientation.

**Slow movement corridor**

**Living on the ‘Edge’: In between Water and Urban fabric of Pune city**

Aditya Deshmukh
Along the edge of the allotments, a buffer of wetlands is proposed which will to some extent help in the cleaning process. Furthermore, during high waters in monsoon this buffer along with some allotments will accommodate excess water.
An elevated pedestrian deck can be built upon the existing concrete flood wall. Houses along the water edge can be easily accessed and this space can also be used for semi public activities.

Indian government under the JNNURM (Jawaharlal Nehru National Urban Renewal Mission) scheme initiates a grant of euro 4500/ per family for incrementation of houses in the informal settlement. Taking an advantage of this scheme, incremental housing can be proposed for in-situ rehabilitation. These housing blocks can be transformed and altered according to the needs of the inhabitants. As most of settlement dwellers are construction workers, the whole community can be engaged in the construction.

The proposed housing can be clustered around series of interconnected courtyards, which can be used for festivals and community gatherings. Moreover, by doing this the organic patterns evolved over time can be preserved giving respect to the existing social networks.

The proposed houses along the water edge can be oriented along the pedestrian deck. These blocks also need to have raised plinths for easy access and to also to create necessary space for services.

Hybrid access routes to the courtyard from the deck should be provided.

Possibilities...

One of the architectural projects which can be implemented within the specified framework, is an incremental housing project proposed at Netaji nagar(Pune) in 2008 by Brazilian born architect Filipe Balestra in association with SPARC (Society for the Promotion of Area Resources, India) and local architect Prassnna Desai. A flexible strategy for in-situ rehabilitation is developed wherein the designed housing typologies can also be implemented elsewhere with similar needs and conditions.

Inhabitants can choose from three different typologies. House A is a two story home, engineered like a 3 story home to ensure safety in future vertical extensions; House B has incremental ground floor, which is left open for either parking or for the family to turn that open space into a shop. House C has an incremental middle floor, to hang clothes or to be used like a living room. All proposals are for one family and 270 sq foot area. These typologies when arranged in permutations and combinations form an interesting architectural composition.
End possibility
Public space (Majoor adda) and re-oriented settlement
The proposed public spaces and the semi-public courtyards with the settlement are articulated by series of pedestrian crossings over the stream.
Living on the 'Edge': In between Water and Urban fabric of Pune city
CASE STUDY 2:

Looking back to the future
River Mutha

The site of the second project is one of the most important stretches of the river Mutha. It is situated in between two historically important bridges of the city, one to the south, which exists since the time of the Peshwa’s (Lakdi Pul), whereas the other built during the British rule (Nava Pul), to the north. The old city centre adjoining the eastern edge of the river was greatly affected during the disastrous floods of 1961. The retaining wall built has gradually cut off the river from the city. The bridges help you cross only a barren riverfront and a stream of polluted water. The traditional value of the river has ceased to exist. Poor maintenance of the sewage lines and pollution caused by the river side street and illegal parking lots add up to its ecological degradation. During the seasonal monsoon floods these streets cannot be accessed. Even though negatively, this stretch interacts the most with the city due to the number of crossings (six) connecting the old commercial areas to the new residential districts. This explains why it is considered to be a reference point in the city, which was also quite evident in many of the workshop drawings we saw earlier.
City’s two most important commercial shopping streets, namely Laxmi road; a traditional shopping street which is a result of the east-west thoroughfares proposed by the British, and J. M road a contemporary shopping street, converge at Lakdi pul. This makes it an important node in the city.
The flood walls not only restrict the interaction of the city centre with water, but also the possible interaction between the old and new parts of the city.
The site has a potential to showcase its rich contrast between the cultural past and the globalising present. Bridging the gap between its degrading identities via contemporary strategies will give the city a new image of its own.

Taking the inherent qualities of the two contrasting worlds into consideration, the proposal is programmed into different zones. First is the ‘commercial node’ where two spatially and thematically different shopping streets converge. The second zone is defined as ‘cultural green’ wherein the existing green areas are valorised and extended to the congested city core. Whereas the third one is showcased as a political zone where the ‘old Peshwa capital (Shaniwarwada)’ stands opposite to the contemporary capital of the city—Municipality. All the three zones are interlinked with proposed slow movement corridor.
To untangle the complexity of the site the proposal starts with the implementation of green corridor in the central region of the site. This region has a historical importance due to the presence of a Omkareshwar temple (built by the Peshwa’s) in the river basin. Whereas the other side of the bank hosts an old drama theatre exemplifying the artistic side of Pune. Both the structures are surrounded by dense cover of trees, in private and communal gardens, which stand isolated in between the river and the urban fabric. Moreover the riverside street disconnects the virtual reality between the river and the temple. Therefore taking advantage of the green potentialities the proposal integrates the two banks of the river by extending the green areas while de-channelizing and eliminating the existing street. An archipelago of wetland mounds are proposed in the river bed, which help in natural cleaning of the water. Moreover they are interlinked by pedestrian decks connected to the slow movement corridors along the banks. Whereas the vehicular bridge connecting the two sides is transformed into a open street market during the weekends. Further the green areas alongside the temple are extend to the city centre, with areas hosting traditional schools and educational facilities through ‘green fingers’ promoting slow mobility in the centre.

Convergence of two important commercial streets at Lakdi-Pul makes this area an important node and a point of spatial reference in the city. Global connection through Lakdi pul and more local connections via crossings in the river bed make this area highly integrated. On the other hand the accessibility is negatively reciprocated by the urban life. Encroachment of food stalls, informal car parking lots, riverside street are in totality degrading the ecology of the water course. Taking advantage of its commercial proximity, identity as a place for social gatherings and as a spatial reference point right from human scale to city scale, a business district encapsulating local and regional business with a contemporary waterfront is proposed. Real estate investments along the waterfront will act as anchors for the development and economic sustainability of the area. Whereas pedestrianizing of the waterfront and allocated public spaces acting as water retention zones during heavy monsoon floods will cater to its social and ecological needs. Moreover the dramatic experience of the floods can be experienced from proposed floating platforms along the...
The third zone is juxtaposed by two ‘political’ capitals of their times. One is the historical fortress (Shaniwarwada) and the other is the new municipality building. The open area in front of Shaniwarwada was recently transformed into a public space by proposing an open-air amphitheatre for social and communal gatherings with the fortress as its backdrop. Though the project is a success in terms of formulating an open space in highly congested area, it is disconnected with the surrounding urban fabric due to heavy traffic lanes bordering it. On the other hand, the area in front of the municipality is highly congested and chaotic due to the presence of a public transit node and lack of pedestrian infrastructure.

The proposal aims to connect the two fragmented public open spaces by restoring the waterfront. The amphitheatre is connected to the waterfront through a pedestrian subway crossing the street to the riverfront. A pedestrian plaza is proposed in front of the municipality by taking the existing public transport terminus four meters below ground level. The public plaza overlaps the transit node and connects the riverfront to the proposed courtyard park within the municipality building. The two sides of the waterfront are connected by a parabolic viewing platform which gives an overview of the two ‘capitals’. Linking the river environment to the existing open spaces shall bring life to the deserted riverfront. The development on the land-water interface shall address the importance of river in the changed urban context.
Aditya Deshmukh
Living on the ‘Edge’ in between Water and Urban fabric of Pune city
CASE STUDY 3:

Sangam
A place where two or more river meet is known as San-gam in Sanskrit language. Historically and geographically the confluence of rivers Mula and Mutha hold a special position in Pune city. The city centre being to the south of the confluence, the southern side is heavily urbanized, whereas the northern side has an agglomeration of variety of different ‘green’ covers in the area, which also includes an island to the east of the confluence which has a forest of dense trees (Naik bet).
For easier access, a bypass connecting the north and south of the city passing through this area was proposed, which today has lead to encroachments in the form of informal bus terminal and sprawl in the existing settlement (Sangamwadi). Though this part of river is free from channelization, the northern edge of the water course is embanked by stone wall to lessen the severity of floods during monsoons and prevent the edge from eroding.
The site has a potential to showcase its rich contrast between the cultural past and the globalising present. Bridging the gap between its degrading identities via contemporary strategies will give the city a new image of its own.

The proposal aims to integrate and valorize the existing variety of green by strictly regulating laws with regards to the interference of the surrounding urban context.

Programme

- Downgrading the existing north-south bypass route to light traffic.
- Relocation of the existing private bus terminal to the north of the bypass route.
- No further extensions of the existing settlement towards the farmlands and re-formulating densification strategies within the settlement.
Green infrastructure integrated with the existing vegetation to create a buffer zone together with sports and leisure activities. The existing embankment will be replaced by natural vegetation suitable for defending soil erosion which will in turn help in purifying the water to some extent. Moreover low lying areas along the buffer zone will be water retention zones during monsoon high waters.

Agriculture land will be protected from public interference and supported by research centre and learning centre for the farmers is proposed. This action for the economic sustainability of the farmers in the neighbouring community (Sangamwadi), but in return will also ensure the ecological prosperity of the area.

The island (Haik bet) with thick forest of trees will be protected and isolated from human interference. Whereas the small adjoin island will host small scale water sports and nature watching facilities, along with water board office and small scale hydrology study centre will be merged with the existing engineering faculty.

All the areas will be interlinked with green infrastructure and further extended to the adjoining urban areas (Agriculture and engineering college, city centre, train station, Boat club etc.)
In the drawing shown is the small island adjoining the much bigger one (Naik bet), hosts series of small scale water sport and nature watching facilities. Extension of the adjoining engineering faculty will bring water board office and small scale hydro research facility to the island. The green infrastructure intersecting the site will further extend to the city centre, train station, boat club etc.

'Top-down' actions reciprocating to the ecology of the water have a great potential in transforming the area into a 'Green heart' for the city of Pune.
The case studies not only on three different scales but three different approaches are meant to negate the conflict between city and nature by ‘opening’ the city to its hydrological context, which in return interact in more symbiotic way with its wider territory.

Possible applications

A symbolic representation of applications of the principles derived in three case studies at various possible locations within the city. The red ‘butterflies’ which represent the context of informality along the stream, instead as a weakness can it reinforce the city’s natural asset?
The spatial outcomes of the case studies demonstrated here are just images of various possible solutions of dealing with an issue. The concepts and principles which guide an outcome are more important in this case. Therefore it is possible for us to speculate the array of possibilities of instrumenting these concepts and principles to achieve a desired outcome. What role does water play in unfolding the complexities of an urban environment.

The approach of re-integrating water into the urban fabric may not be limited to the city of Pune itself. The concepts and strategies used to bring back water as an integral part of the urban fabric by fostering a symbiotic relationship of water with the city to achieve social, economical and ecological reciprosities can be implemented in other cities as well, that have neglected their water-edges.

Cities are a result of a complicated superposition of different spatial, political, ecological and social transformations over time. Therefore while attempting to tackle urban problems, it is important for us planners, designers and professionals to understand the city layer by layer by studying its hidden complexities. Same philosophy applies in the context of the study of natural water systems in the city. Historical overlaps since its provenance unfold the close relation of the city with the water. In the case of Pune, over the years each political rule defined its own way of tackling with the water system. This sometimes not only changed the spatial structure of the city, but also played important role in the socio-economical dynamics of the city. Therefore the present state of the water structure or the problem associated with it is a series of different transformations and translations.

Can the water courses be the ‘backbone’ of urban environment in the cities?

With growing population and ever increasing migration, human intervention in nature to maximize the utilisation of natural resources is inevitable. But depending on the extent of such human intervention, the adjoining ecology has a drastically different response on the territorial and the city scale. The contrasting response arises strongly when one can see a reciprocal relationship between the human intervention (dams) and the ecology in the south-west part of the city. The dams built along the mountain ranges, have been positively responded by nature, which can be seen through flourishing flora and fauna in this corridor. But when the same water enters the city, excessive human intervention breaks down this equilibrium. The river provides water to the city but in return only gets neglect in addition to the pollution and waste that comes from the city. In order to resolve this conflict between city and nature, the interaction between these natural and manmade systems needs a closer attention. It is all about building a symbiotic relationship between ecology and economy so that both the natural element as well as the urban city supports each other as they themselves thrive.

The second theme which is discussed here is that of ‘Reciprocities’. In its true sense, the relationship between the city fabric and the river in ancient times was reciprocal. In fact the birth of the modern civilization is also a result of the reciprocities between cities, their surrounding hinterlands, technology and the human being. But over the years, the augmentation of urbanization has burdened the natural resources to such an extent that this mutual cooperation between them has come to an end. In the case of Pune, water bodies in the city have
had positive or negative reciprocities with Community, Economy and Ecology of the areas around them. The river, which once was a place for social cohesion (ghats built along the banks), today, has paradoxically become a place for social exclusion (informal settlements and illegal encroachments). In contrast with the history when the commercial hubs evolved in close proximity to the river, today’s shifting realities no longer consider water as an element for economical regeneration. Lastly water on one hand has been flourishing ecology through human intervention on the other as a result of same human interventions, ecology around water is degrading. Hence in order to rethink the mutual co-operation of city and nature by understanding today’s needs and tomorrow’s worries, reciprocities between Community, Economy Nature and the urban fabric will play an important role. Moreover I think that the reciprocities between these three components cannot be just constrained to the relation of water and the city, but these reciprocities will also play an important role in stabilizing the cities suffering from great social divides, economical crisis, natural hazards etc. For a sustainable and resilient world reciprocities within different entities within the urban and rural agglomeration will be crucial.

To sum up, this thesis is an attempt to Work on the Conflicting and potential relationships between water and the city. It is about the strategies and interventions which will help the city and nature benefit mutually.

The territorial symbiosis, the reciprocities all are telling a story about a strong bond between water and the urban fabric. Hence though there are still open questions, about the issue of urban water negligence, but at least have been framed and speculated in the case of Pune.
Living on the ‘Edge’: In between Water and Urban fabric of Pune city

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