

Evaluation of Reconstructed City using the criteria of Sustainable Cities

Case Study of Mingora City, KPK, Pakistan

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Abstract— In coming years, the majority of the world's population will be living in cities. Therefore, societies will need to create cities that can intelligently meet the demands of present and future generations. The concept of sustainable development of cities is very crucial in developing countries especially Pakistan which is also facing a population explosion, and which will be more intense in the coming years. The goal of this study is to examine Mingora City's physical and social environment, which has a direct impact on health, as well as the planning and delivery of sustainable development, which necessitates an integrated approach to create a healthy and social environment, which is an important characteristic of vibrant and sustainable cities. Improving the physical and social environment in poor areas benefits not just the residents' health but also reduces inequities within the city. The main objectives of the research are to analyze the historical traces of Mingora City and its patterns, Mingora City after reconstruction and to analyze the reconstructed Mingora City using the criteria of sustainable cities. In this research, principles of sustainable cities were explored for the selection and evaluation of case studies to be carried out. Furthermore, it will identify and analyze the existing situation of Mingora City's transportation distortion.

Index Terms— Sustainable cities, sustainable development, reconstructed city, fringe growth, case study, mingora city, transportation

INTRODUCTION

Mingora is one of the capital city of district swat, due to increase in population and expansion of city, the region/inhabitants are suffering from many issues, even the planning, patterns and transportation of the city became a problem to the inhabitants. So, one of the major causes of the city is its rapid expansion and population growth. Flood 2010 & swat war against terrorism from 2006 till 2013 is the major threat occurs to the city which affected the overall social, economic, cultural, and infrastructural setup of the city. The buildings constructed in swat state era were almost demolished through war and flood. Mostly buildings were designed/constructed in swat state era through these buildings swat were identified which was called Swati Architecture and was a comfortable living housing and setup. After that an era starts which were called reconstruction that was totally going against regarding to sustainable aspect, the material uses before the region and the style of traditional techniques and construction, Stone, mud, wood was replaced through bricks, blocks and cement. Which is totally going against the local style, a lack of comfortable living, the Swati style of architecture, the skyline of the region, the patterns of transportation, infrastructure, even a single element transformed, which is totally against the human comfort, style and living. The main research question is "What are the Criteria's that makes Cities Sustainable".

SUSTAINABLE CITIES

The world commission on environment and development has put forth a definition of "sustainability" as meeting the needs of the present without compromising the ability of future generations to meet their own needs. — From Our Common Future. [1] However, a sustainable city should be able to feed itself with minimal reliance on the surrounding countryside, and power itself with renewable sources of energy. The crux of this is to create the smallest possible ecological footprint, and to produce the lowest quantity of pollution possible, to efficiently use land; compost used materials, recycle it or convert waste, and thus the city's overall contribution to climate change will be minimal, if such practices are adhered to.

PRINCIPLES OF SUSTAINABLE DESIGN

It is generally recognized that to educate architects to meet this goal of coexistence, we have developed a conceptual framework. The three levels of the framework (Principles, Strategies, and Methods) correspond to the three objectives of architectural environmental education: creating environmental awareness, explaining the building ecosystem, and teaching how to design sustainable buildings. We propose three principles of sustainability in architecture. Economy of resources is concerned with the reduction, reuse, and recycling of the natural resources that are input to a building. Life cycle design provides a methodology for analyzing the building process and its impact on the environment. Human design focuses on the interactions between humans and the natural world. These principles can provide a broad awareness of the environmental Impact, both local and global, of architectural consumption[2].

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SUSTAINABLE DEVELOPMENT

Environmental, economic and social well-being for today and tomorrow, it is defined in much way to describe its aspects and frequently quoted definition is "Our Common Future". (Brundtland Report).[3]

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts.

- The concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be given.
- The idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

BACKGROUND OF SUSTAINABLE DEVELOPMENT

The United Nations conference on environment and development in Rio de Janeiro in 1992 was founded on the notion of sustainable development. The summit was the first attempt at a global level to formulate action plans and strategies for moving toward a more sustainable growth pattern. In the summit he stated that, In order to cover the incremental costs of the actions that developing countries must take to address global environmental problems and accelerate sustainable development, the developmental and environmental objectives of Agenda 21 will necessitate a significant flow of new and additional financial resources.[4] The Brundtland Commission, in its 1987 report *Our Common Future*, proposed sustainable development as a solution to the challenges of environmental degradation.

The notion of sustainable development received its first significant international recognition in 1972, at the United Nations Conference on the human environment in Stockholm. The entire community agreed on the concept - now key to sustainable development - that both development and the environment, which had previously been considered as separate challenges, could be managed in a mutually beneficial manner, despite the term not being used directly. The term was popularised fifteen years later within the World Commission on Environment and Development's report, *Our Common Future*. (Sustainable development Commission)

CONCEPT OF SUSTAINABLE DEVELOPMENT

According to Brundtland report in 1987. When you think of the world as a system over time, you start to realize that the decisions our ancestors made about how to farm the land continue to affect agricultural practice today; and the economic policies we endorse today will have an impact on urban poverty when our children are adults.

The concept of sustainable development is rooted in this sort of systems thinking. It helps us understand ourselves and our world. The problems we face are complex and serious—and we can't address them in the same way we created them. But we can address them. It's that basic optimism that motivates IISD's staff, associates and board to innovate for a healthy and

meaningful future for this planet and its inhabitants.[5]

SUSTAINABLE CITIES AND THE MILLENNIUM DEVELOPMENT GOALS (MDGs)

Today's cities are part of the global environment. Their policies, their people and their quest for productivity have an impact far beyond the city borders. Today, global policy makers recognize that cities have a tremendous impact on issues ranging from local economic stability to the state of the global environment. Over the past 50 years, cities have expanded into the land around them at a rapid rate. Highways and transport systems have been built in tandem to support this physical growth. Urban populations are expected to grow by another 2 billion people over the next three decades, most worryingly, as UN-HABITAT's state of the World's cities report for 2006/7 points out, is the fact that in many cases urban growth will become synonymous with slum formation. To avoid being victims of their own success, cities must search for ways in which to develop sustainably. Cities and urban settlements don't operate in isolation they are part of a national structure, subject to central government, strengthened or limited by regional and national infrastructure, budgetary policies, development priorities, decentralization. (UNEP) October 2007).[6]

The objective of the Millennium Development Goals is to eradicate poverty in all its facets: income poverty, hunger, disease, lack of adequate shelter, and exclusion, while promoting gender equality, education, and environmental sustainability. The goals also represent the basic human rights of each person on the planet to health, education, shelter, and security.

The eight goals and their corresponding targets are:

- 1: Eradicate extreme poverty and hunger.
- 2: Achieve universal primary education.
- 3: Promote gender equality and empower women.
- 4: Reduce child mortality rates.
- 5: Improve maternal health.
- 6: Combat HIV/AIDS, malaria, and other diseases.
- 7: Ensure environmental sustainability.
- 8: Develop a global partnership for development.[7]

THE MELBOURNE PRINCIPLES FOR SUSTAINABLE CITIES

The Melbourne principles for sustainable cities were developed in Melbourne, Australia, in 2002, during an international charette, sponsored by the United Nations Environment Program and the International Council for local environmental initiatives.[8] "What defines urban sustainability and provide a good starting point on the journey towards sustainability. They can also apply to any city in the world. Although all the principles are central to create sustainable cities, No. 8 "Expand and enable cooperative networks to work towards a common, sustainable future" is perhaps the most pertinent for SustainableMelbourne.com and SustainableCitiesNet.com. This example illustrates the need for multiple approaches, people and institutions to work together to create sustainable urban environments". (Edwards May 23rd, 2007).[9]

FEATURES OF SUSTAINABLE COMMUNITY DEVELOPMENT

The key features which is the major scales or levels, at which actions in support of sustainable community development and barriers to implementation take place:

- The building level, where important features include urban design, the use of renewables, improving energy efficiency, facilitating the 3Rs, and using 'green' materials. There is a considerable amount of work being undertaken in this area, the focus of significant government programming domestically and internationally since the 1970's.
- The development site level where important features include the integration of ecological protection, use of alternative sewage and storm water management, and encouraging alternatives to auto use. This level and the subsequent level have only more recently, in the last decade, become the focus on efforts to develop government programs that support sustainable community development.
- The planning and infrastructure level which includes features such as promoting higher density, supporting affordability, supporting livable communities with vibrant local economies and adequate community services, and implementing regional growth management and protection of watersheds and other significant ecological resources.

RESEARCH OBJECTIVES

The main goal of this study is to improve the city's economic development, maintenance, and treatment in accordance with sustainable city criteria. The research will to analyses the threats and causes like transportation distortion, social setup, and local facilities and will make recommendations for the city's upkeep and care.

RESEARCH METHODOLOGY

To achieve research objectives qualitative data collection method is used. Two instruments of data collection are used visual study techniques and context analysis. The reconstructed Mingora city is chosen as a case study. Through visiting the study area, the existing condition of Mingora city are identified and analyzed. The context analysis includes studying and analyzing the obtained data, maps and documents from Mingora municipality community, and the available literature about the study area to determine the physical development, existing condition and the recent changes of the traditional spatial structure. The existing Condition of Mingora city requires maintenance and development in different aspects, are highlighted to apply the sustainable development concept.

STUDY AREA

Mingora is the largest city in Swat District, Khyber-Pakhtunkhwa province of Pakistan. It is located at an altitude of 984meters 3,228ft and lies on the bank of river swat about 2 kilometers (1.2

mi) from Saidu sharif, the present capital of Swat. Mingora is located on the left bank of river swat in the picturastic swat valley in northern Pakistan. The city is surrounded by hills from three sides; Janbil and Marghazar valleys open to the city and two riverine of these valleys meet in the mid of the city. Mingora and saidu sharif were considered twin cities, Mingora was the business hub and saidu sharif was the administrative seat.

The city of Mingora is the main town and it is the only urban settlement of this District. Due to its ideal location, Mingora is the leading center of administration, Law, health & education, trade & commerce, circulation & interaction and transportation in the region. Mingora is therefore considered as an intermediate city for businessman, traders, visitors and tourists etc.

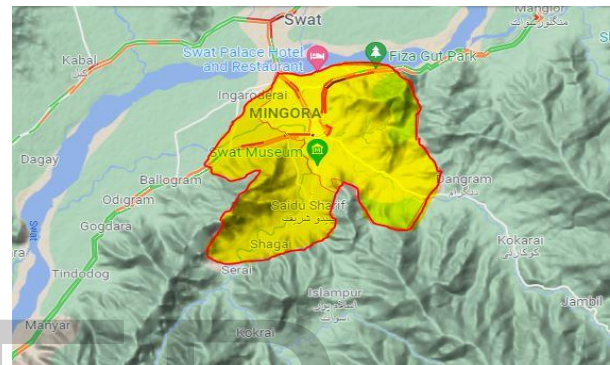


Figure 1-Map Highlighting Mingora & its boundaries (Source: google map)

RESULTS AND DISCUSSIONS

Evaluation of Fringe Growth in Mingora

The process of fringe growth in Mingora is divided under five different categories. These categories are established with reference to different phases of its historical context and different time periods in which the urbanization/expansion in Mingora occurred. These five divisions of fringe growth represent the specific changes and transformation that occurred in the city and its fringe areas from time to time which tells the story about the due course of urbanization/expansion and its impact on Mingora and near Saidusharif.

1st phase of fringe growth and development is considered from historical context when swat was independent state and Saidusharif was the capital of the state. The original location of the region was saidusharif GulKada in south east of the area which is nowadays known as butkada.in that area major residential area was existed. This was the time of 1st akhund of swat before 1835, at that time in early 19th century there was a rat invasion occurred which compelled the people in the region living at the site of butkada to shift from here. As a result, a mass migration took place and people living at butkada shifted to present main town centre Saidusharif and the bazar area of Mingora.

2nd phase of fringe growth and development is considered from the merger of swat state in Pakistan in 1969 to 1981 when census in Pakistan took place. This phase includes the change in administrative set-up, institutional set-up, economic activity

morphology and housing commercial development. Commercial expansion and development occurred on major road/route and streets and housing is developed at the back of these commercial activities.

3rd phase of fringe growth and development is considered from 1981 to 1988 when institutional anarchy reached to its zenith and Mingora and Saidusharif became one of the educational hubs of the district. During this phase the major physical growth and change occurred. The limits of the town exceeded in north up to Janbil khwar and Mingora city, in south reached toward shagai village, in west it expands toward the bank of Marghazar khwar, and at east it expands and reached towards the ilum mountainous range.

4th phase of the fringe growth and development is considered from 1988 to 1998, when the problems had become a major crisis of the region and the land covered with buildings. it was a peak of expansion and transformation both in physical growth and institutional set-up. This includes the ending of tax rebate and Saidusharif and Mingora status as tax free zones. The other thing that Afghan trade transit become closed.as a repercussion of these development at policy level the growth of city with respect to silk clothe factories stopped to some extent but instead cosmetic and silk industries started to taken place.

5th phase of the fringe growth and development is considered from 1998 to 2010. This phase was one of the crucial times when swat was in grave danger due to swat war conflict. This was the era from 2007 up to 2012 when swat was suffered from Talibanization and natural disasters like flood and causes a heavy destruction and somehow it broke the expansion and new construction as well. Mostly migration takes place in this era when the inhabitants became IDP's. They migrated to other part of the country and later 90% of the migrants back to the region and remaining settled there in other part of the country. The informal housing development presently occurring in agricultural land nearly on the bank of Marghazar khwar on west without concerning the details of infrastructure, which are necessary to make housing as efficient as possible.

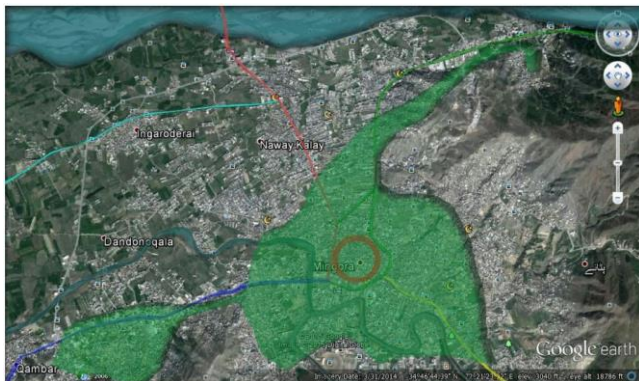


Figure2-Highlighting City Center in red circle and old city its patterns in green.
(Source: Google Earth).

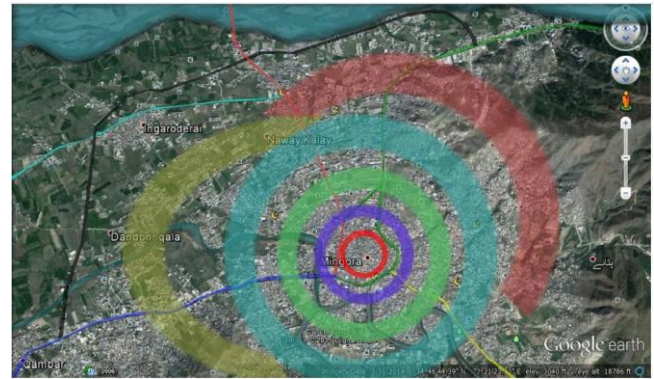


Figure3-Highlighting city center in red, Expansion of city in phase 1 in blue through 360-degree, Phase 2 Expansion in green all around, Phase 3 expansion in sky blue all around, Phase 4 Expansion in Red towards Elum range and Fizaghat, Phase 5 Expansion in yellow towards WestBypass. (Source: Google Earth).

SKYLINE OF THE CITY



Figure4-skyline of the city (Source: Web).

As the skyline of Mingora developed before 2006 have many aspects like the ancient Gandhara remains were still there after the Gandhara the people local masons inspired from there technique of construction and their skills and they tried to copied their layers and course systems in construction, later on in the city of Mingora and its surrounding there are some remains which were badly destroyed due to flood the natural disasters that were the Dajji construction, Later on, when was under the rule of Yousufzai state of swat, there were a major diachronic influence of Britain's elements and materials which were used here on a huge scale like wadudia hall, royal palace, white palace etc. which are mentioned in figures. (5, 6). Before that period the wooden details and style of work were found in the buildings constructed in the region, it flourished between 1700 and 1800. So, after my research I found that the style of Gandhara, the wooden techniques and elements and the Britain's elements and materials all blend together and flourished its own style of architecture which were called SWATI architecture. Here you can see the synchronic and diachronic influence in all these styles and the most important

part of that architecture before reconstruction phase is that were basically designed according to the living style of the people, were place or oriented according to sun path and its directions, which were thermally, psychologically and visually comfortable and was famous all around in Pakistan, through these elements and skyline swat played a vital role in its architecture to attract the tourists and people all around the globe.

LIVING STYLE USED BEFORE/TILL 2006

It was found that the people and the approach of living and its style in the region were so simple. Architecturally they were rich regarding to their energy sufficient and sustainable buildings as mostly the used vernacular architecture and materials. For transportation still 2006 there were some towns and villages where tanga's were famous and were used for the traveling, their way of living, their dresses and mostly their food are healthy and simple. Having a rich culture, norms and traditions they got famous in the country, the judicial and administrative setup were well organized due to the British's inspire Yousufzai state of swat.

ARCHITECTURAL STYLE AND TECHNIQUES USED BEFORE 2006

In the research I explained regarding the style used before 2006, skylines etc. that there were 3 different diachronic influences and some synchronic influences on the region, mostly the local skilled masons were their architects they inspired and construct. I found two different buildings one is the swat fort remains here in the surrounding of the city which is totally meets to the construction used in kalam valley was a type of Dajji construction. The material used in Dajji construction specially the stone, mud and wood. In state era till 1968 mostly buildings were constructed according to Dajji techniques and also mostly govt buildings were constructed according to diachronic influential Britain's style of architecture, which were called state architecture. Jahanzeb College is one of the examples, the materials used were stone masonry walls having maximum width than 18 inches, cement were used and introduced for plaster and the mortars used were lime and mud. For roof detailing chowka bricks and wooden timber were used in these buildings. Between all these techniques wooden architecture, elements and techniques played their role in both styles. This all was a part of Swati architecture and techniques.



Figure6: Wadudia Hall. (Source: Web)



Figure7: Historical Mosque in swat Valley (Source: Web)

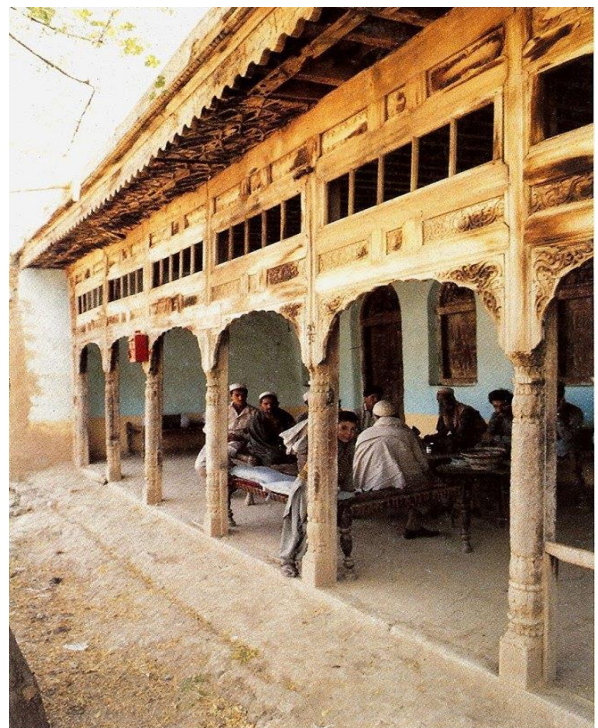


Figure8: A residential Hujra Constructed in Wood (Source: Web)

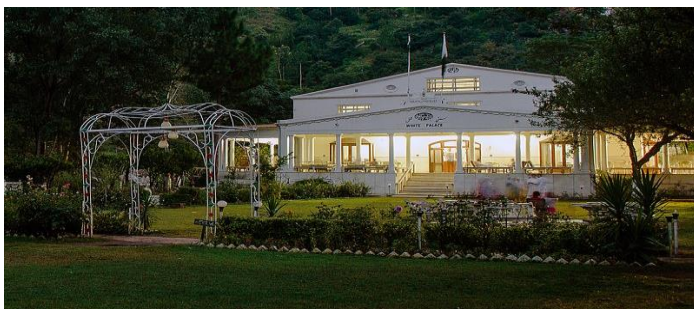


Figure5: White Place a master Piece of the Era. (Source: Web)

ARCHITECTURE STYLE AND TECHNIQUES USED AFTER RECONSTRUCTION.

After the reconstruction phase the material used were non sustainable and were against the climatic factors which was present over there. For the sake of reconstruction mutable techniques of architecture were used that was totally against the fabric and identity of the region. Which was non sustainable and UN friendly according to the climatology as well. Mostly the fabric was replaced as swat museum which is shown in the figure was reconstructed schools were replaced government and official buildings were reconstructed, bricks, cement and steel were used on excessive amount which were became a cause of global warming and played a vital role to increase the temperature of the city. That was esthetically pleasing but was totally against the Swati architecture and the climate.



Figure9: Daewoo bus terminal (Source: Web).



Figure10: Restored Swat museum by Italian mission after reconstruction
(Source: Web)

JUDGMENT OF PATTERN BEFORE 2006 AND AFTER RECONSTRUCTION

The increasing vehicular traffic in Mingora city has multiplied public woes, creating numerous problems for the residents

and business community. People in Swat say that the traffic issue remains unaddressed for the last 35 years, resulting in massive traffic jams. They cited various reasons, including traffic pressure and congestion in Mingora, for the worsening situation. They say that the heavy inflow of noncustom paid (NCP) vehicles, a huge number of illegal rickshaws, poor traffic control system, negligence of traffic wardens, parking on main roads and encroachments have added to their woes. Lack of parking facilities in Mingora is another problem. There is no parking facility in Mingora and those who come here for shopping leave their vehicles on both sides of roads, adding to the traffic jams everywhere, said Hazir Gul, a civil society member.

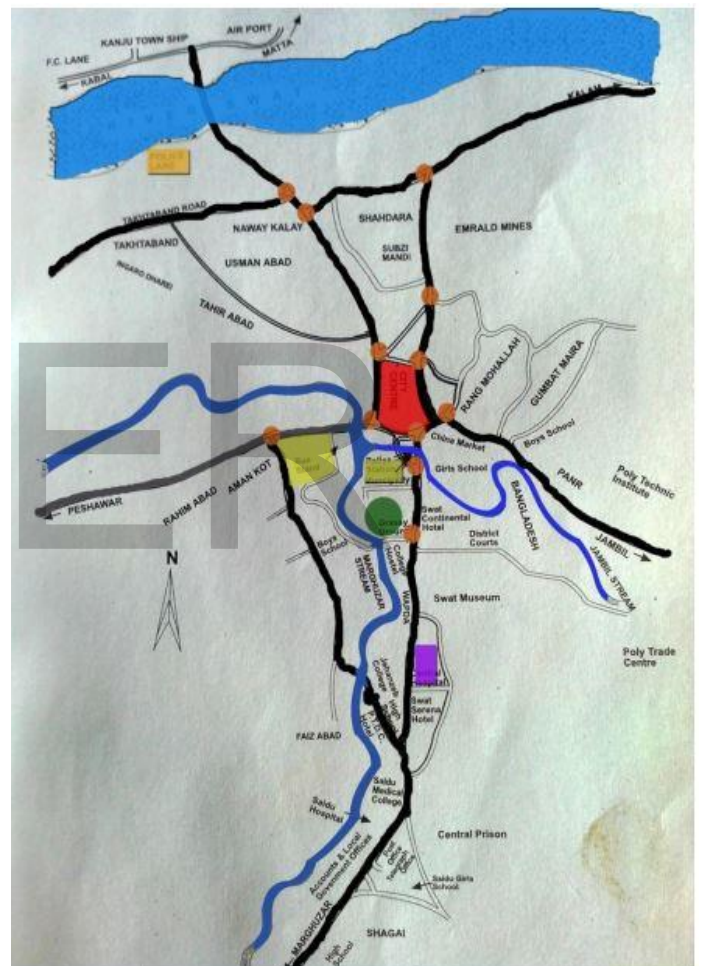


Figure 11: Old map highlighting Mingora city center in red, its road maps in black, river Swat in blue, Janbil and marghazar khwar (Stream) in blue, bus terminal in yellow, grassy ground in green & central jail in purple. (Source: Town municipal administration Mingora)

All the present roads in Mingora were constructed keeping in view 100,000 populations at that time. Today, the population of Mingora has exceeded 700,000 using the same roads, said Niaz Ahmad, resident. He said that there was an immediate need for building a circular road, bypasses, etc. to ease the traffic pressure. (F.Khaliq July 26th, 2015).[10]

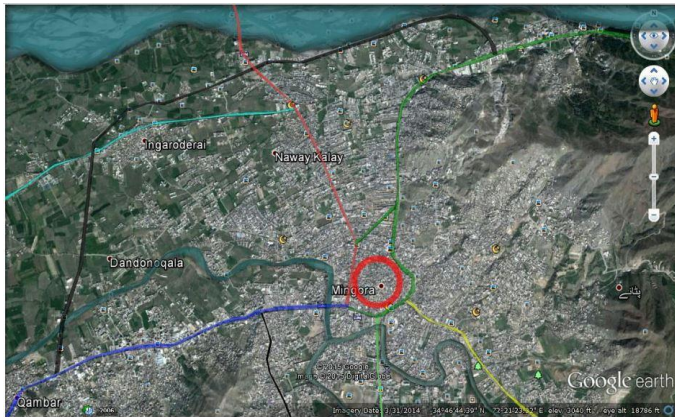


Figure12 – Highlighting Land use, Voids in green, Solid (Pink), mountains (yellow), Janbil & Marghazar Canal in blue. (Source: Google Map).

JUDGMENT OF SKYLINE BEFORE 2006 AND AFTER RECONSTRUCTION

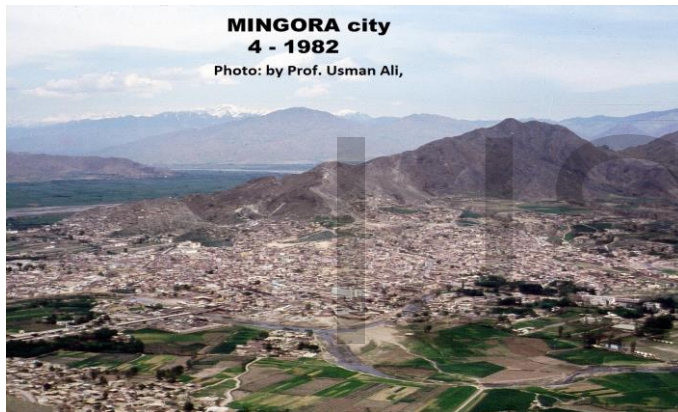


Figure13– Aerial view of Mingora city and Elum 1982 (Source: Web)



Figure14–Aerial view of the city now (Source: Web)

EVALUATE ALL THE ASPECT TO HIGHLIGHT APPRAISAL OF RECONSTRUCTED MINGORA ON THE CRITERIA OF SUSTAINABLE CITIES

In the context of increasing urbanization, sustainable cities

imply a balance of the economy, society, and environment. An effective assessment of city sustainability could lead a city in the right direction. Mingora was the forefront of KPK, Pakistan's reform and opening up, but it has now become a "sore point" in national development. Mingora city plays a crucial role in the process of realizing the revitalization of kpk Province Pakistan. The research showed that the sustainability level of mingora city is not ideal. Furthermore, the performance on the three dimensions of sustainability is unplanned. The people mostly the un-official started their setup of designing and planning mostly the un-skilled masons involved in these activities, they started their own mutable style of construction and the fabric/skyline transformed totally against the criteria of Swati Architecture, which was the identity of the region and the way of sustainable for the sake of contemporary architecture. The transportation patterns became more congested, there were an absence of solid waste and proper garbage system of the city. The city's dwellings, where there are no by-laws or a formal legislative framework. The study conducted various case studies of the region that were completely opposite to the criteria of sustainable cities.

PROBLEM STATEMENT

Due to Mingora City fringe growth interim of development, the building style, techniques of construction, and transformation of skyline are lacking its rich cultural identity, resulting in a rise in temperature and environmental degradation, which impacts the inhabitant synchronously and diachronically. While reorganizing the spatial framework of land use and zoning. It gains value as a commercial urban land use.

- The city's automobile population has exploded, but there has been no corresponding increase in road capacity. In practice, traffic regulations and rules do not exist. Traffic congestion is caused by haphazardly parked vehicles, and drivers tend to horn their way through the jungle of various vehicles. Vehicle emissions contribute significantly to air pollution.
- Poor physical living conditions, lack of maintenance of old structures, lack of space and infrastructure.
- Construction is haphazard, and materials are not used in a sustainable way.
- Avoiding building codes and bylaws.

CONCLUSION

The research concludes that the sustainable community development requires new ways of thinking about the interrelationship between economy, environment and community and new ways of examining the full costs and benefits of alternatives to conventional approaches to development. There are many barriers to the implementation of sustainable communities. The benefits of implementing sustainable communities can be significant in both the short and long term – for developers, residents and society in general. This framework should help those who are working to implement sustainable community development projects by bringing a more holistic, rather than the current piecemeal approach to these developments in the

region of swat. The Swat region contains some significant traditional and cultural buildings that represent the State Architecture (Swati Architecture). The research's key finding is that in order to increase the appeal of Mingora city, tactics for promoting transportation, its pattern, skyline, and using the city as a location of innovative mix-use functions and activities must be implemented.

An integrated strategy for sustainable development policy is required to fulfil the Sustainable development goals and objectives. The city's issue and problem, as well as its finance, management, and operational instruments, should be studied by the regulatory authority. The integrated plan consists of interconnected initiatives aimed at improving the city's physical, socioeconomic, and environmental conditions. Within administrations, the implementation and development of action plans necessitates a sectorial and inter-departmental strategy including a diverse range of performers from government, civil society, and the business sector.

The Mingora city requires introducing new functions to meet the present needs of both inhabitants and tourists. New land use functions, should be uses for the attraction of the city which is important for cultural and commercial aspects. Adding value to the area and improving the quality of life in the region by building areas for cultural activities such as green spaces, pleasant pedestrian and vegetation would add value to the area and improve the quality life of area. To creating cultural and public activities it enhances the city's worth and makes it more fascinating and distinctive to tourists.

RECOMMENDATIONS

The municipality is the most important collaborator in encouraging, enabling, and coordinating city development efforts. The research report focuses to sort out all the issues and threats in Mingora city. I have analyzed all threats and causes now I'm able to give suggestions for the maintenance and treatment of the city. The city administration is to consider the following in development plans.

- To avoid the transportation problems Mingora city, need a bye pass road all around the city which will connect all these routes which are a link to the city, so flux will decrease instead to use the routes of city.
- The housing of the city where we haven't any by laws or proper legislative system.
- The city needs proper legislation for further development. Solid waste needs proper management and disposal system.
- The authorities should bound to fulfill or aware the masons and local planners to use the elements and try to use the material and techniques which were used before.
- Solid void ratio like city is fully expanded towards its all side and orientation; it needs recreation spaces and parks for the inhabitants.
- A proper sustainable transportation needs in the city instead the use of thousands of auto rickshaws. Pedestrians and vehicular access and movement should control through a proper traffic control system.

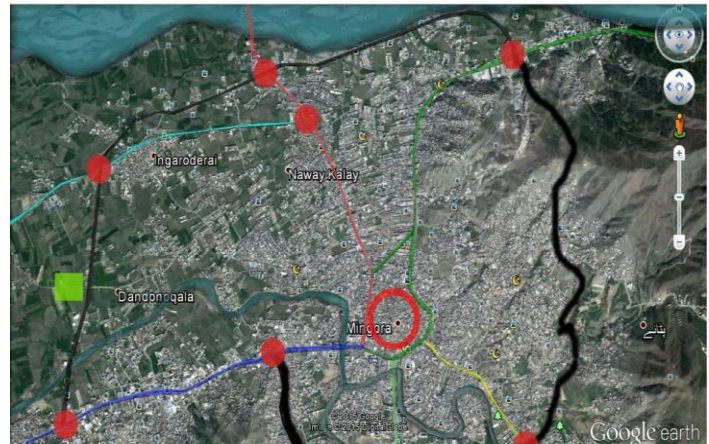


Figure 15–Proposed by pass all around the city on 360-degree angle, different junctions in red spots connecting all other tehsils /towns of swat.

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