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SEQUESTRATION OF BLUE LAND: AN URBANIZATION CONFLICT IN THE CASE OF JANAKPUR DHAM SUB-METROPOLITAN CITY, NEPAL

BY

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Certificate of Thesis Approval

This is to certify that they have read, and recommended to the Institute of Engineering for acceptance, a thesis report titled **"Sequestration of Blueland: An Urbanization Conflict in Case of Janakpurdham Sub metropolitan city"** submitted by **Ms. Manisha Kumari Sah (078-MSURP-008)** in the partial fulfillment of the requirements for the degree of **Master of Science in Urban Planning.**

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DECLARATION

I hereby declare that the thesis "**SEQUESTRATION OF BLUE LAND: AN URBANIZATION CONFLICT IN THE CASE OF JANAKPUR DHAM SUB METROPOLITAN CITY, NEPAL**" is a record of an original work completed under the supervision of Dr. Ajay Chandra Lal, Institute of Engineering, Pulchowk Campus, and was submitted to the Department of Architecture in partial fulfillment of the requirements for the Master of Science in Urban Planning degree. All of the work in this thesis was completed by me, with the exception of the literature consulted, which has been appropriately referenced and recognized.

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ABSTRACT

Water is the 'elixir of life,' but because modernity and haphazard urbanization have changed human lifestyles and behaviors, people who formerly depended on the Blue Land have been cut off from it. Once thriving centers of activity and culture, ponds now face challenges from waste buildup and greywater drainage, which results in pond encroachment in vital resources to be converted into urban infrastructure such as roads, public buildings, or privately owned assets, often controlled by wealthy people, i.e. mahant. Declared the "City of Pond," Janakpur Dham is situated at the center of a major urban dispute arising from the sequestration of its valuable Blue Land resources by its users. The pond is the basis or evolution of the towns surrounding it. The accelerated rate of urbanization is posing a serious threat to these water bodies, which have immense historical, religious, and cultural value. The objective of this research is to formulate blue land inclusion planning, aiming to benefit the local community, enhance climate resilience, and contribute to disaster risk reduction.

Utilizing a comprehensive research approach, including interviews with local elders, households, and policymakers, as well as site inspections, observations, and photographs, this study investigates the diminishing glory of Janakpur Dham's Blue Lands over time and its impact on the city's settlement patterns. By exploring the multifaceted forces driving the degradation of these ponds and their surrounding areas, we seek to unravel the intricate urbanization conflict. A critical sub-objective of this study is to outline the various factors contributing to the decline of these precious ecosystems. Urbanization pressures, encroachments, and shifting community dynamics have converged to imperil these invaluable resources. Understanding these factors is instrumental in formulating strategies that reconcile urban development with cultural preservation. Furthermore, this research strives to reestablish the contemporary significance and values of Janakpur Dham's ponds in the context of their historical reputation as the "City of Pond." While deeply rooted in the connectivity of blue land with its users in today's context, these resources hold timeless relevance in the context of present-day environmental challenges and water resource management.

The conflict, driven by varying levels of awareness among the populace regarding the religious and historical importance of these ponds, underscores the urgent need to bridge these awareness gaps. Public participation and engagement, coupled with local knowledge, can serve as powerful tools to foster a shared understanding of the significance of these resources. Local knowledge, handed down through generations, carries invaluable insights into the ponds' ecological and cultural importance.
Tragically, out of the 32 ponds encircling the Parikrama Sadak, four have entirely vanished, and 28 have succumbed to encroachments. This stark quantitative data, revealing a decline from 11.26% in 2042 to 7.41% in 2070, underscores the tangible loss. Yet, it also serves as a poignant reminder of the profound intangible connections between these water bodies and the local community, demanding their reawakening. The rejuvenation of Janakpur Dham's ponds, historically celebrated as the "City of Pond," holds promise not only for the city's residents but also for broader development concerns. It provides an opportunity to rekindle the city's cultural heritage, attract religious tourists, and foster sustainable economic growth, all while nurturing ecological resilience.

In conclusion, this research underscores the urgent need to harmonize urbanization with the preservation of Janakpur Dham's sacred ponds, once proudly acclaimed as the "City of Pond." Reviving these sites is not merely an act of conservation but a testament to the city's vibrant cultural traditions and its potential to achieve sustainable development while honoring its religious significance. The primary objective of this study is to rejuvenate Janakpur Dham as a "City of the Pond," recognizing the valuable nature of these resources while addressing the conflict rooted in changing lifestyles and urbanization, and the transformation of ponds from centers of life to public concerns with encroachments and waste accumulation.
Keywords: *Sequestration, Blue land, Conflict, Urbanization, Encroachment.*

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LIST OF ABBREVIATIONS

JSMC	: Janakpur Sub metropolitan city
CAO	: Chief Administrative Officer
CBS	: Central Bureau of Statistics
DOA	: Department of Archeology
DHUD	: Department of Housing and Urban Development
DRM	: Disaster Risk Management
DUDBC	: Department of Urban Development and Building Construction
FGDs	: Focus Group Discussions
JZH /JPH	: Janakpur Zonal Hospital / Janakpur provincial hospital
EIA	: Environmental Impact Assessment
KIIs	: Key Informant Interviews
LGOA	: Local Government Operation Act
LSGA	: Local Self-Governance Act
CC	: Climate change
LGCPD	: Local Government Community Development Programs
MOFAGA	: Ministry Of Federal Affairs and General Affairs
SDG	: Sustainable Development Goals
DRR	: Disaster Risk Reduction
MOCT&CA	: Ministry Of Culture Tourism And Civil Aviation
DWIDP	: Department Of Water Induced Disaster Prevention

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1. INTRODUCTION

1.1 BACKGROUND

The urban landscape of Janakpur is framed by natural (historical and religious) ponds, which have a profound effect on the emotional and attitudinal characteristics of the city's citizens as well as their practices. Because of this, Janakpur is referred to as "Baaban kutti bahataar kund" (52 temples and 72 ponds), demonstrating the important roles that ponds play in a variety of areas, including soil recharge, flood control, climate sustainability, and carbon reduction.

In addition to being ecosystems, wetlands—which come in a variety of forms and include lakes, tanks, and ponds—are also intricate repositories of goods and services. They provide food and shelter to a wide variety of creatures, including migratory birds, and contain essential life-supporting systems. They've been dubbed the 'kidneys of the landscape' due to their work in environmental remediation. These wetlands not only supply drinkable water but also generate protein, lessen flooding, treat wastewater, collect silt, and—most importantly—replenish aquifers. They serve as hubs for scientific and educational research as well as public wildlife sanctuaries due to their rich biodiversity. (Energy & Wetlands Research Group, 2015).

Urban ponds perform vital functions like storing water during dry spells, treating sewage, replenishing groundwater, and collecting rainwater during the monsoon. Regrettably, there is a correlation between increased frequency of flooding and Janakpur's pond reduction. The densely populated core area of Janakpur Dham highlights the need for blue land resource conservation, likened to the preservation of the city's lungs. Their alteration or removal would be like **seperating skin from bone,** radically changing the very fabric of the city.

The changes in the physical characteristics are directly related to changes in society, like the decreasing use of ponds and the marginalization of traditional users. According to some scholars, these alterations are a reflection of ingrained power dynamics and diverse cultural meanings that impact how ponds change as a result of government programs and various people's day-to-day activities. Pond devastation, degradation, and restoration processes represent institutional and socio-political changes in addition to environmental ones. The related meanings of ponds are closely linked to their evolution, and it is our goal to capture these meanings through the concept of environmental imaginaries. This phrase includes ideas of a potential "better" pond landscape in addition to the values attached to currently-existing ponds. (Zimmer & Véron, 2020)

Urbanization, the dynamic process underpinning lifestyle shifts, land use transformations, and the evolving built environment, poses both opportunities and challenges. Yet, the contemporary employment of blueland resources confronts segregation and isolation due to prevailing factors, notably land scarcity, economic exigencies, infrastructure development, a dearth of awareness and appreciation, regulatory inadequacies, and the perception of ponds as mere wasteland.

1.2 PROBLEM STATEMENT

International agreements like the Paris Agreement, the Sustainable Development Goals (SDGs), and the Sendai Framework for Disaster Risk Reduction have resulted in major global efforts. Nepal has formally taken steps to improve climate resilience and has positioned itself in line with these international frameworks. Articles 56, 58, and 59 of Nepal's 2015 Constitution contain provisions for land use management and the preservation of natural resources, ecology, and biodiversity, despite the implied link between conservation and the SDGs. Although these provisions serve as guidelines for sustainable development and environmental protection measures, it is nonetheless difficult to effectively execute them because they are frequently more theoretical than practical.

Ponds that are undervalued or sequestered have resulted in a number of issues, including the elimination of important historical and religious ponds. Ponds are important from birth to death because, prior to cremation, the deceased is immersed in the water, and following the cremation, family members take another dip in the pond. Ponds have long been important components of the city's social and cultural fabric, acting as hubs for everyday routines and community events. These ponds have served as the focal point for daily activities, religious ceremonies, and cultural gatherings. Their departure throws off these group rituals, making the occupants feel disoriented and alone.

In summer, residents are forced to travel long distances for water due to a drastic decline in groundwater levels. The depth of borings has increased from 100 to 500 feet within just five years in the core area, resulting in severe water scarcity. This situation contributes to habitat loss, decreased biodiversity, erosion of the city's identity as the "city of the pond," and elevated temperatures. Moreover, inadequate stormwater drainage has caused flooding and waterlogging issues. This conflict underscores the urgency of implementing conservation measures and sustainable urban planning strategies to counter the adverse impacts of urbanization on pond ecosystems and safeguard local biodiversity. The concept of pond-inclusive planning emerges as a potential solution, aiming to establish accessible, secure, functional, and ecologically sustainable ponds that promote the well-being of both residents and the ecosystem. By addressing the diverse needs of stakeholders and integrating ecological principles, pond-inclusive planning offers the prospect of creating vibrant, inclusive, and resilient pond environments within Janakpurdham.

Chiranjeevi Raj Dhungana, Senior Administrative Officer at the Greater Janakpur Development Area Council, mentioned a plan to protect the ponds by constructing walls to prevent encroachment and operating boats. He added that beautifying the ponds would attract religious tourists to the city and prolong their stay. (NEPAL, 2023).

1.3 RESEARCH OBJECTIVES

SUB-OBJECTIVE

- To study the diminishing glory of Blue Lands over periods of time and its settlement pattern.
- To outline the drivers leading to the degeneration of the pond and its surrounding areas.
- To reestablish the significance and values of pond in today’s context.

MAIN OBJECTIVE

TO REJUVENATE JANAKPURDHAM AS A “CITY OF PONDS”

1.4 RATIONALE OF THE RESEARCH

1.4.1. NEED

To close the current information gap, provide guidance for the creation of policies, and help Janakpurdham strike a healthy balance between environmental preservation, urban development, and the preservation of its cultural heritage.

1.4.2. Importance

Since the loss of historically and religiously significant ponds can result in a variety of losses, it is important to promote positive change through practical solutions, policy alignment, and all-encompassing urban development that respects the environment and culture, including environmental preservation, cultural heritage conservation, community well-being, tourism, and the economy.

1.5 VALIDITY OF THE RESEARCH

The research on blueland sequestration and environmental imaginations in the Janakpur sub-metropolis provides a distinct viewpoint not found in Nepal's current body of literature. This study has the potential to contribute new perspectives to academic discourse and to the field of practical urban planning.

The goals of the study are carefully matched with the research strategy. Stakeholder interviews and municipal sources provided information that illuminated the various environmental imaginations that community members held. Several data sources are examined using a combination of survey and observation, assuring the validity of the results through cross-validation. The rigorous observance of ethical research rules highlights the benefits of this technique in terms of transparency and dependability. The importance of informed consent and participant protection is maintained.
Through adherence to strict methodology and ethical guidelines, this study strengthens the validity of its conclusions. As a result, its influence on academics, policy, and practice increases weight and the possibility of significant transformation.

1.6 SCOPE OF STUDY-

The in-depth analysis of the ponds inside Janakpurdham's Parikrama Sadak ring road offers a singular chance to investigate the complex dynamics of urban conflict resulting from the juxtaposition of development and conservation. This area's great population density adds to the difficulties, making it a microcosm of the larger problems faced by rapidly expanding urban centers. A more complex understanding of settlement patterns throughout time is made possible by the focus on the core region, internal fringe area, and outer fringe area. This helps to illuminate how the community's relationship with its blue lands has changed over time. The study intends to disentangle the complexities of this conflict and offer comprehensive strategies by exploring the physical, social, and ecological variables contributing to the sequestration of blueland. This scope includes a comprehensive investigation, guaranteeing that conservation activities take into account

the long-term sustainability of Janakpurdham's historical and sacred ponds in the face of urbanization pressures, in addition to addressing immediate problems.

1.7 LIMITATIONS

The primary limitation of this study is related to research time constraints. Due to these limitations, pond management is not considered, and the examination of the pond ecosystem is constrained in its depth and comprehensiveness. The study acknowledges that a more detailed analysis of the pond ecosystem, including the dynamics of life within the water of a pond, would require additional time and more extensive management capabilities. As a result, the findings and recommendations provided in this study may offer valuable insights but should be interpreted within the context of these limitations.

1.8 STUDY AREA

Historically, Janakpurdham finds its roots in the Kingdom of Mithila, originally referred to as Videha. This geographical expanse was demarcated by geographical landmarks such as the Koshi River in the East, the Gandaki River in the West, the Ganges in the South, and the Himalayan foothills in the North. Over time, it evolved into the celebrated Janakpurdham, a city defined by its intricate relationship with these natural elements and historical legacies.

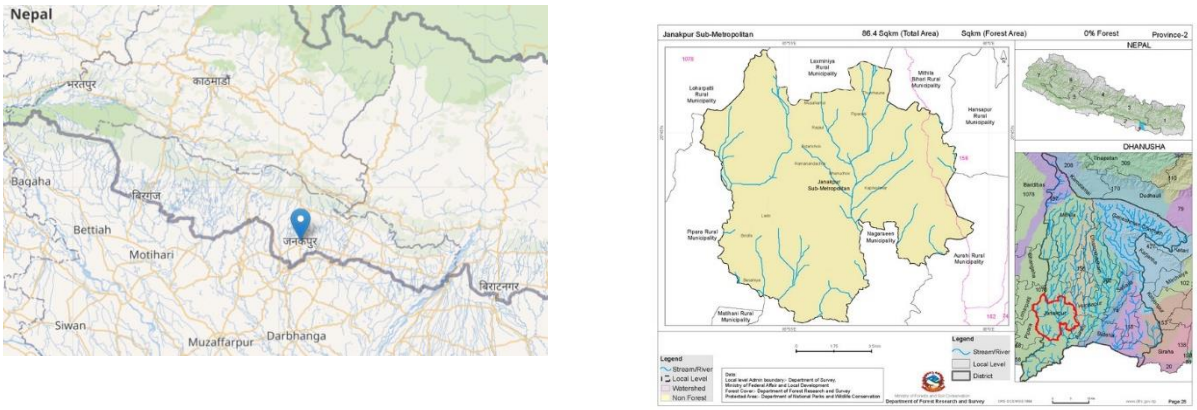


Figure 1 location map of janakpur

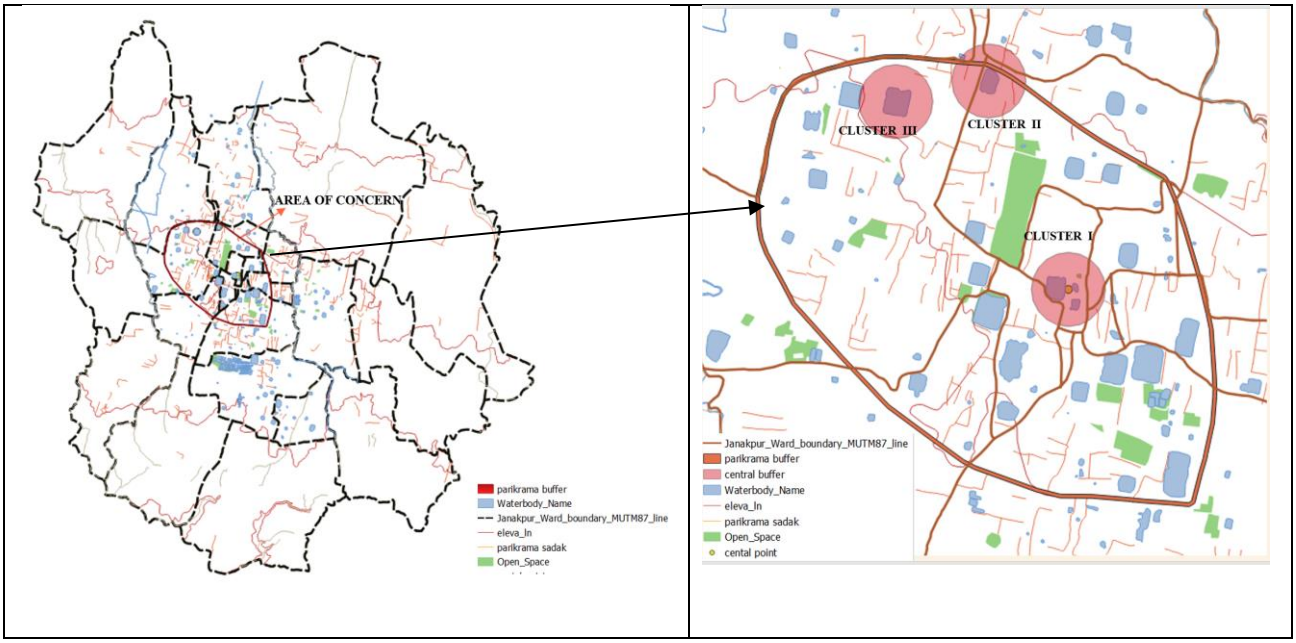
Source: NURP PowerPoint of RISLUP

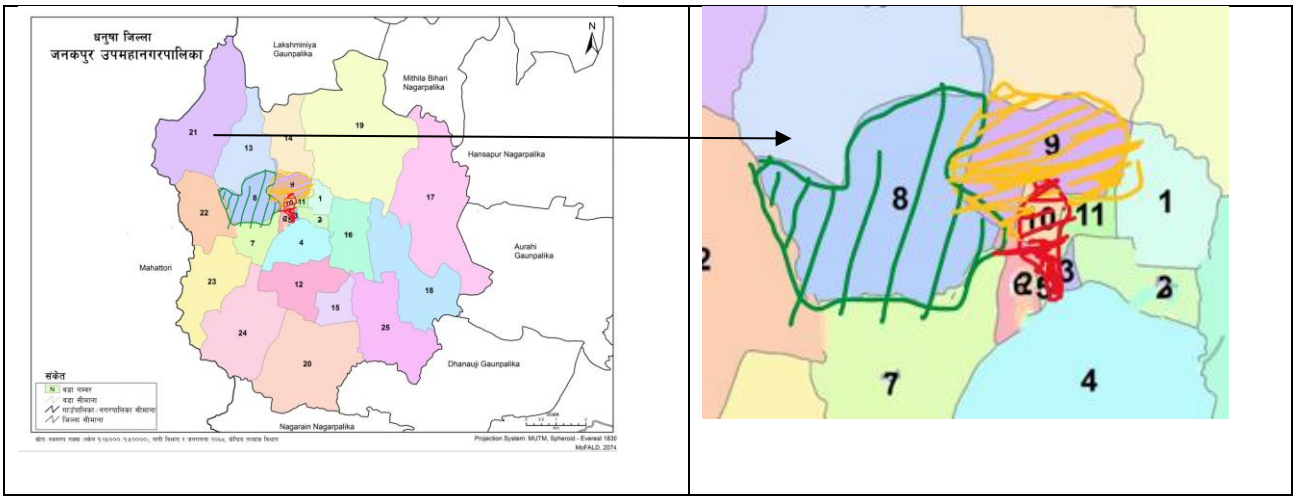
The pond city, Janakpur Municipality, is situated in Central Nepal's Dhanusha district, roughly 24 km south of the East-West Highway and 20 km north of the Indian border. Founded in 1962 A.D., it is among the oldest municipalities in Nepal. Situated between latitudes 26°41'48" and 26°46'30" North and longitudes 85°54'0" and 85°57'14" East, the municipality spans an area of 26.9373 km2 and has an average elevation of 76 m MSL (with a maximum elevation of 85 m and a minimum elevation of 67 m above MSL). (Lal, 2016). About 84 miles (235 km) from Kathmandu, the capital of Nepal's Dhanusha district is Janakpur. Sub-metropolitan Janakpur. Another name for Janakpur is Janakpur Dham (a sacred area in Nepali). (Adhikari, 2018).

The Janakpur Municipality was promoted to a sub-metropolitan city on November 24, 2015, by the minister of the council. This included the neighboring VDCs of Bindi, Basbiti, and Kurtha in the west, Devpura, Rupaitha, and Basahiya in the south, and Benga, Shivapur, Mahuwa, and Lohana in the east. The sub-metropolitan city is home to 1.8% of all urban people in the country and 15.4% of the district's population. After the neighboring VDCs were added, the sub-metropolitan city's population climbed to 169,287, with an estimated population density of 1700 per km2. (Lal, 2016, p. 5) .

The selection criteria for my study is centered around my topic, focusing on the parikrama sadak (ring road) which encompasses a significant number of historical and religious ponds. Within this area, there are a total of 28 pond in present day. However, due to time constraints and the aim of capturing a representative understanding of the broader phenomenon of blueland, I have opted to select specific ponds that serve as illustrative examples. This approach is detailed in the table provided, allowing me to effectively analyze and present the dynamics of blueland within the chosen context.

Case area	ward	Area
Angaraj sar and near by blueland	**10**	**Core area**
paadprakchaalaan gordhoi)	**9**	**Inner fringe area**
Ratna sagar	**8**	**Outer fringe area**





2. RESEARCH METHODOLOGY

2.1. CONCEPTUAL FRAMEWORK

Urban development, though physically manifested in the tangible reality of the world, holds a social dimension perceived subjectively by the local population, diverging from the scientific or natural reality. The disappearance, encroachment, and segregation of ponds, along with factors contributing to the decline of their significance, particularly socio-economic factors, play a pivotal role in the degradation of blue land. The implications are socially constructed concepts, framing this research within the domain of social research. The ontological stance of this study aims to achieve envisioned outcomes by conserving the historical and religious significance and values of

blue land in alignment with contemporary needs and rejuvenating it from deterioration. Similarly, the epistemological approach involves finding the encroached or disappeared areas in the 2050s and today using satellite imagery, aerial maps, GIS mapping, oral surveys from surrounding neighbors, and documents from secondary sources. The change in settlement patterns during these times, the purpose of use, and the value and significance of blue land can be gleaned through direct interactions with users and key personnel in Janakpurdham sub-metropolitan city, ward chairmen, The Greater Janakpur Area Development Council (Bihattar Janakpur), DUDBC, and Khanepani. These aspects are assessed through qualitative and quantitative interpretation.

Various worldviews or paradigms exist for examining the social and natural realities in the world. The term 'paradigm' may be defined as "a loose collection of logically related assumptions, concepts, or propositions that orient thinking and research" (cf. Bogdan & Biklen 1998, p.22). Research needs to be situated in a specific paradigm or sometimes more than one paradigm to address diverse research objectives. The appropriate paradigm for the research will be selected based on which paradigm offers the most convenient choices of methods, methodology, and literature to conduct the research.

In this research, the objective is to rejuvenate Janakpurdham as the "city of the pond." This particular research cannot be approached through the positivist paradigm as it involves the degradation of pond significance over time and its socio-economic growth. The phenomenon taken for this study cannot be tested in a scientific lab, so this research objective can't be achieved through the positivist paradigm.

In the post-positivist paradigm, the idea of truth or reality isn't universal, and the same phenomenon under study might show different results when the research area or the research subject is altered. The assessment of the phenomenon/reality in post-positivist research only gives a probabilistic idea of the truth associated with the phenomenon. Further, in the post-positivist paradigm, the interrelationship between the variables and the outcome associated with the phenomenon and between the variables themselves is approached through the correlational strategy. In this research, the sequestration of blue land over time due to urbanization and the degradation of its significance and values can be processed through the correlational strategy, as it requires qualitative interpretation of the opinions of individuals in the institutions. Thus, this research is located in the post-positivist paradigm.

The interpretive paradigm suggests that reality is socially constructed. The research located in the interpretivist paradigm does not generally begin with a theory; rather, the researchers "generate or inductively develop a theory or pattern of meanings" (Creswell, 2003, p.9) throughout the research process. The factors affecting the sequestration of bluelands can be achieved through interpretation from pond users, while settlement patterns can be interpreted from various key informants and GIS mapping, Satellite maps. This suggests that the objectives of this research can only be addressed through the approaches of the interpretive paradigm.

Any research would be situated in a pragmatic paradigm if it adopts methods within more than one paradigm to meet its research objectives. This should not be confused with an intermix of paradigms, but two different paradigms shall be used to achieve two different objectives. From the above discussion, it has been seen that this particular research is going to be approached only through the methods or strategies within the pragmatic paradigm to address different research

objectives pertaining to this research. In a pragmatic paradigm, a researcher reaches a conclusion after correlational and interpretive paradigms consider the available facts.

This research is based on both primary and secondary information. This research will be approached through a qualitative and quantitative methodological approach. The methodologies, namely literature review, case study, and comparative analysis (field survey and assessments), and consultation (socio-economic surveys and interviews), will be carried out in this study. For this particular research, the review of literature deduces the findings based on more than one fact, so the literature review will be based on deductive logic. On the other hand, a case study will also be conducted in which the ideas are built based upon the observed facts, along with the deduction of the observed facts, which suggests that inductive logic as well as deductive logic will be used in the case study. Likewise, the findings of the literature review and the case study need to be consulted with the experts in personal interviews and consultation sessions.

In the consultations and the brainstorming sessions/workshops with the experts, the abduction of the core ideas from the ideas and opinions expressed by the experts is required to reach a conclusion, suggesting that abductive logic will be used in the analysis of the findings of the consultations and the brainstorming sessions.

2.2. RESEARCH METHOD-

S.N	OBJECTIVE	DATA REQUIRED	DATA COLLECTION (METHOD)	SOURCE	ANALYSIS
1	To examine Sequestration from the physical significance and patterns of the Blue Lands in Janakpurdham over time.	Numbers of ponds within a parikrama sadak. Survey map, satellite map Ariel photographs, local mapping	Secondary data from the literature or document published online or offline and primary data from field survey Transect walk KII,FGD	Google Earth, GIS, survey department Archeology department Greater Janakpur area development council Janakpur sub-metropolitan city. Local community and Guthi	Changes in blue land area and its settlements pattern over a period of time till now must probably early 2040/50s, 2060/70s and today

				Sanstha. pilgrimage	
2	To identify and analyze the factors contributing to the sequestration from religious significance and degradation of the ponds, considering the influence of environmental imaginaries and urbanization conflicts. .	Socio-economic factors - increase in land price and population growth, Disbelieve on mistrust of mythology. socio-ecological transformation Cultural and religious factors - mixed society Institutional factors – policy and implementations Environmental factors – temperature increase, climate change, disaster caused.	Primary data from field survey for the physical encroached area KII, FGD- blue land users, neighbors, secondary from published documents and literature. Transect walk Local community discussion	Local community Janakpur sub-metropolitan city, Greater Janakpur area development council. Mahanta / pilgrimage, Guthi Sanstha Archeology department, site survey,	Area analysis as per today's concept Leading to deterioration and earlier connections to recover in today's concept its values and significance.
	To propose strategies for reestablishing the significance and values of the ponds in today's context, addressing the urbanization conflicts, and incorporating diverse environmental imaginaries	Institutional policy and planning National policy Land use policy Provincial policy Janakpur sub-metropolitan policy policy and planning by pilgrimage and Guthi Sanstha	Primary data from field survey for KII, FGD- blue land users, neighbor and secondary from published documents and literature like the History of Janakpur(Mithila mahatma), cultural heritage of Janakpur, Review of national	Website of concerned institutions Janakpur sub-metropolitan city, Greater Janakpur area development council. Mahanta, Guthi and kutti, Archeology department, site survey, case studies	Differentiate types of pond like Religious and Cultural Pond, Recreational pond, Agricultural pond, commercial pond.

			and international policies		

2.3. METHODS USED FOR DATA COLLECTION:

Literature Review
Site Observation –transit walk
Questionnaire Survey – semi structured.
Key Informant Interview
Focused Group Discussion

During my data collection process, I engaged with 87 key informants, starting my inquiries with the fringe area pond, Ratna Sagar. I conducted site observations through walks at different times of the day, observing both local and tourist activities during early morning, morning, and evening hours. A conversation with the Mahanta of Ratna Sagar took place in the evening around 5 o'clock. Initially, he was hesitant to provide information, citing the lack of action despite people knowing about the issues. However, after persistent requests, he opened up and shared insights into the significance and ceremonies related to Ratna Sagar.

Moving on to the inner fringe pond, Gordhoi, I faced limitations due to the ongoing construction of both the pond and the nearby highway. Nevertheless, being familiar with the area, I was already aware of the pond's importance. I engaged in a conversation with an elderly local who had deep connections with an old, lesser-known temple. Due to his hearing impairment, nearby individuals assisted in relaying my questions and collecting his responses. Additionally, a focus group discussion was held with locals and farmers who cultivate rice and use the pond for cattle feeding, aimed at understanding historical activities.

Transitioning to the core area, including Angraj Sagar, Telha Pond, and Marha Pond, I initiated discussions at the Janaki Temple with Tapesar Das, the Mahanta or Chairman of Janaki Mandir. We scheduled a meeting for the following day at 10 a.m. During that meeting, I administered a semi-structured questionnaire to delve into the significance and religious activities related to the ponds. I further gathered information about the timing of religious ceremonies linked to the ponds. Afterward, I engaged with Janaki Mandir Guthi to collect data about various ponds within the temple's jurisdiction. Subsequently, I conducted focus group discussions with locals who congregated near Angraj Sagar at the Bibah Mandap during their morning walk and yoga sessions. These gatherings comprised elderly individuals from the vicinity, facilitating the capture of various people's activities and memories. This approach also allowed for cross-checking of information as multiple participants corroborated each other's responses simultaneously.

In the interviews conducted, mainly with elder users of the ponds and community members, information about the following issues was sought and observed:

These were followed by questions about:

Uses of the pond at different timings.

Significance and value of this pond.
Different religious ceremonies conducted in this pond.
Times when the pond is used for specific purposes.

Key Informant Interview

To address the evaluation questions and extract insightful information from each informant according to their area of expertise, the key informant interviews were informally organized. Specifically tailored to each informant, the interview guides included both general open-ended questions and targeted, targeted questions that helped guide the conversation in the right direction. When the interviewee had a lot to say about any subject, the interviewer was also allowed to delve deeper.

3. LITERATURE REVIEW

For this study, the review of various literature documents pertaining to the objective of the study have been reviewed. The literature review for this study covers the following aspects:

I. theoretical aspect of urban blueland and its Importance of historical and religious pond and its benefits.
II. theoretical aspect sequestration on the basis of encroachement and how urbanization impacts on blueland and settelment patterns.
III. Global and national perception or environmental imaginaries on blueland and its use
IV. Impacts of intangible or social concern of sequestration of blue land and how it can be minimized.

The aspects stated above are categorically discussed in details below:-

3.1. URBAN POND

The word "pound," which denotes an enclosed body of water, is where the word "pond" first appeared. Pond definitions differ according to factors such as light penetration, wave motion, and the presence of rooted macrophytes. Unfortunately, because it is difficult to measure simplicity and reliability, there isn't a single definition that is accepted worldwide. Ponds are basically smaller than lakes, and they can be created artificially or exist naturally. They have standing surface water. (Padhy, 2015)

Any type of input water body, whether artificially created or naturally occurring, is referred to as a pond. Ponds of all kinds, man-made, natural, and historical, can be found all over the world. Over 277,400,000 ponds are less than one hectare, out of 24,120,000 water bodies that range in size from one to ten hectares. Ponds can be classified into numerous groups based on the type of material used for construction, drainage design, and water supply. Ponds can take many different forms, but they are commonly used for ice harvesting, livestock farming, fishing, swimming, golfing, aesthetics, and human activities including mining and soil extraction. They are also utilized as a source of water for plants and animals. Water is a precious and plentiful natural resource that accounts up 71% of the earth..

In addition to being essential for many daily requirements, it sustains families, livestock, and crops, makes drinking water available, and makes communication and transportation easier. Ponds are smaller in size, but they are crucial to biodiversity and have numerous positive effects. They provide homes for a vast array of plant and animal groups and support a diversity of floral and faunal compositions. Ponds also provide important ecological processes related to water management and climate change, such as carbon sequestration, rainfall interception, and nutrient retention. Ponds have a major positive impact on human societies and the environment and are necessary for the maintenance of many biological processes in intensive agricultural contexts.. (Deka, Historical ponds of Darrang district: Identification and mapping, their ecological relevance for management planning. , 2021).

The primary driver of degradation, urbanization, is causing major issues for urban ponds worldwide. Natural ecosystems will be impacted by the estimated trebling of built-up areas

between 2000 and 2030. In order to lessen these consequences, national and international urban development plans advise including green (vegetation) and blue (water) spaces into metropolitan environments.criteria for categorizing the level of urbanization around a pond.

Table 1. Examples of criteria used for characterizing the level of urbanization around a pond in a selection of recent publications, showing the diversity of approaches.

Type of urbanization metric	Measure	Spatial scale of the measure	Example of studies
Presence of buildings	Percentage of built-up area, that is, percentage of area covered by buildings	50 m–3.2 km radii	Gianuca et al. (2018)
	Percentage built-up area, that is, surface area occupied by buildings, houses, and industrial infrastructure, with roads and parking lots excluded	3.2 km radius	Brans et al. (2017)
	Percentage built-up area, that is, surface area occupied by buildings	200, 500, 800 m radii	Blicharska et al. (2017)
	Built-up area	500 m radius	Holtmann et al. (2017)
	Areas with buildings (low + high rise buildings)	200 m radius	Heino et al. (2017)
	Percentage of buildings: commercial, residential, and parking lots	1 and 2 km radii	Zhang et al. (2016)
	Areas of low, medium, and high urban residential density (six per class), based on city classification	Surrounding landscape	Mimouni et al. (2015)
Presence of roads	Road length within buffer area	10, 100 m, and 1 km	Villasenor et al. (2017)
	Road density in a buffer area	300 m to 10 km	Marsh (2017)
	Road density and urban infrastructure	500 m radius	Roe et al. (2011)
Impervious surfaces	Impervious surfaces	50, 100, 250, 500 m, 1 km, and 2.5 km	Thornhill et al. (2017)
	Impervious surface cover in a buffer area	300 m to 10 km	Marsh (2017)
	% covered in impervious surfaces	catchment	Mackintosh et al. (2017)
	Percentage of impervious surfaces: pavement, driveways, footpaths, and other human-building sites.	1 km and 2 km radii	Zhang et al. (2016)
	Cover of impervious surfaces (buildings and roads)	500 m, 2 km, 5 km radii	Straka et al. (2016)
	Impervious cover (Ontario Geospatial Data)	0.2 km to 2.6 km radii, at 0.2-km intervals	Patenaude et al. (2015)
	Percentage of surface covered by artificial surfaces (FAO GLC-SHARE)	watershed	Castilla et al. (2015)
	Percentage of impervious surface	sub-watershed	Vincent and Kirkwood (2014)
Urban land use	Proportion of urban land use in a buffer	100 m, 200 m, 400 m, 800 m, 1.6 km radii	Le Gall et al. (2018)
	Proportion of urban land use in a buffer	1 km buffer	Hill et al. (2017)
	Type "Urban," from merged types from the Land cover Florida Natural Areas Inventory	2 km buffer	Faller and McCleery (2017)
	Proportion of urban land (Land Cover Circa 2000 dataset) in a buffer	1 km buffer	Hassall and Anderson (2015)
	Land cover (urban industrial, urban residential (including gardens)) from the South African National Land Cover dataset (NLCD)	100 m, 400 m, 1 km radii	Calder et al. (2015)
Distance to city center	Distance to city center	no limit	Pawlikiewicz and Jurasz (2017)
Human population	Number of residents living around ponds	200, 500, 800 m radii	Blicharska et al. (2017)
	Human population density in a buffer area	1 km radius	Hamer and Parris (2011)
Development	Development in a buffer area	300 m to 10 km	Marsh (2017)

3.1.1. Religious and Historical Ponds and Their Application –

Historical ponds, which may be found all throughout the world, were essential to the demands of huge people in past civilizations. Nonetheless, folktales and beliefs about these ancient ponds continue to circulate among people all across the world. Every area has a different kind of pond, but historical ponds are very important because ancient rulers purposely dug them out for a variety of uses. Particularly in India, there are many historical places with ponds, sculptures, monuments, and other features. Even though historical ponds are common, very few studies have been done on them, thus there is still much to learn and discover regarding their importance, background, and cultural setting.. (Deka, Historical ponds of Darrang district: Identification and mapping, their ecological relevance for management planning. , 2021). The religious and historical ponds have their own meaning and value as:-

I. Myth and beliefs
II. Cultural and socio-economic values
III. Ecological relevance

Ponds are disappearing as a result of government authorities' and local communities' carelessness. In addition, many historic ponds are in danger of disappearing, which calls for immediate action to stop the possible loss of aquatic biodiversity (Hoverman & Johnson, 2012). For example, the illicit harvesting of tortoises for meat by local populations is driving the tortoise population into extinction in the Suri and Paskiya ponds. In order to preserve these priceless water bodies and the variety of species they support, conservation and protection measures are desperately needed, as this situation makes clear.

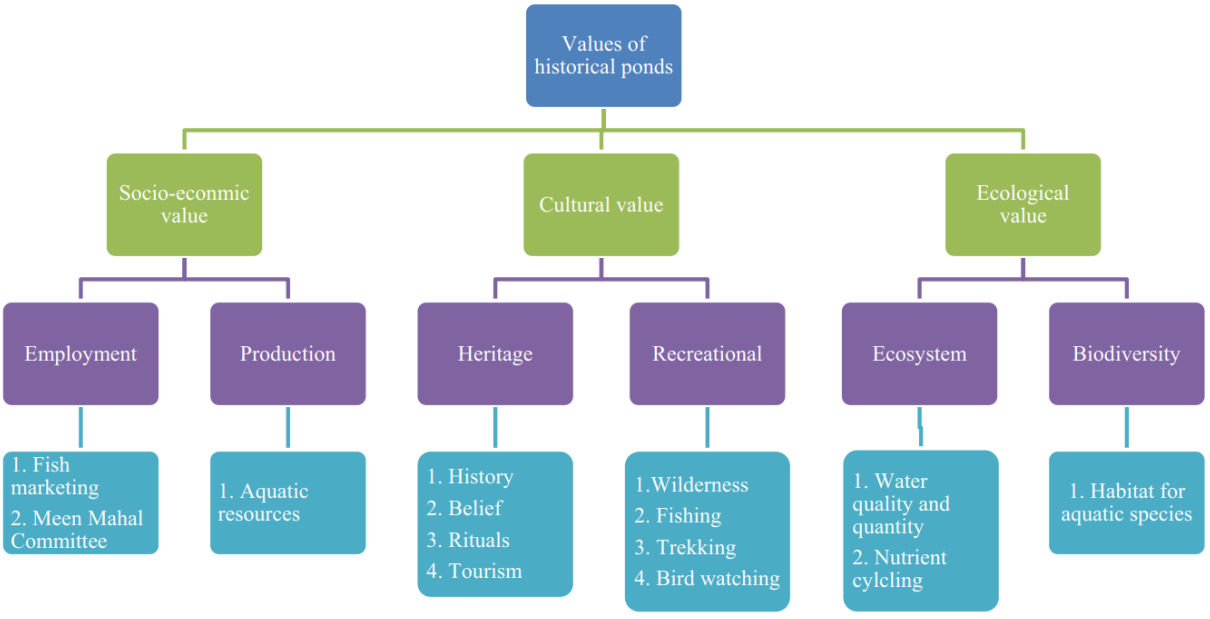


Figure 2 values of historical pond

Increased nutrient levels in religious ponds are a sign of higher cultural pressure from a variety of activities, including bathing large numbers of devotees, washing clothes with detergents, disposing

of solid waste, and washing utensils. These activities also involve the disposal of organic materials (flowers, rice balls, linseed, banana, curd, ghee, etc.) after performing rituals. A low amount of suspended algae and a growth of filamentous cyanophycean members are shown by the examination of algal diversity. The effects of nutrient enrichment in the pond are further highlighted by the presence of higher biomass growth, productivity, and the spread of aquatic plants such as Vallisneria spiralis, Nymphaea nouchali, Certophyllum demersum, and Blyxa species. Excessive growth of these species causes internal nutrient loading, which increases nutrient enrichment and subsequently deteriorates the water quality. (Deka, Historical ponds of Darrang district: Identification and mapping, 2021)

3.2. URBANISATION-

Indicators of development in the contemporary world include urbanization. Urbanization is the process of urban bodies expanding over time and space.. (Beura, July 2018) Densification of people and wealth is known as urbanization. (Lal, 2016) when personal needs take precedence above environmental concerns, and plans for incursion arise for personal gain at that point, forcing an unbalanced ecology. Nepal's urbanization trend is speeding up like a rocket. Currently, over 50% of the world's population lives in cities, and by 2050, that number is predicted to rise to 68%. (UN-Habitat, 2020a).

Cities frequently invade natural environments, such as ponds and other bodies of water, as they grow. Ponds are significant ecosystems that offer vital habitat, water resources, and ecological services to a wide variety of plant and animal species. The fundamental resource shortage, which affects both larger cities and smaller communities, affects things like water and power. The global water crisis has become one of the most important issues facing cities. Every urban growth has, as is well observed, swallowed up nearly every body of water within its borders and into the surrounding areas. The absence of ponds comes at the expense of developing urban infrastructure. Pond depletion has had a negative impact on groundwater development, the local climate, and the supply of water. Even though the current urbanization trend cannot be immediately reversed, it is crucial to organize and put into practice sound management strategies in order to safeguard and enhance urban water bodies. (Beura, July 2018).

3.2.1. Urbanisation Conflict –

The idea of "conflict" is commonly employed to denote inconsistencies and disagreements, regardless of the presence of violence. When controversial or against popular opinion acts are performed by the government, conflicts in that particular context and time period tend to arise. (Karki, 2020).

3.3. ENCHROACHMENT

The expansion of man-made structures, utilities, pathways, roads, and other infrastructure into naturally occurring areas is referred to as "encroachment". These natural areas include floodplains, river corridors, marshes, lakes, and ponds in addition to the buffer zones that encircle them. Encroachment also includes actions like as removing vegetation, filling in gaps, and altering the topography of these natural areas. The ecological values and functions of these natural areas are negatively impacted by these incursions, which can have a negative impact on a variety of factors,

such as the ability to attenuate floods, the health of ecological processes, the loss of aquatic and terrestrial habitats, and the degradation of water quality. (conservation, 2017).

3.3.1. Factors Of Enchroachments And Its Impacts

I. Population growth and urbanization-

II. Land tenure dynamics

III. Draining of wetlands for mosquito control

IV. Conversion of wetlands for agriculture

V. Pollution of wetlands

VI. The lack of an integrated management for wetlands

Impacts from Encroachment	
Rivers and Floodplains	
Changes in Hydrology	Changes in Geomorphology
*increase in magnitude and frequency of severe floods	*stream disequilibrium: channel widening, downcutting
*increased frequency of erosive bankfull floods	*increased streambank erosion
*increase in annual volume of surface runoff	*elimination of pool\riffle structure
*more rapid stream velocities	*stream channelization
*decrease in dry weather baseflow on stream	*stream crossings form fish barriers
Changes in Water Quality	Changes in Aquatic & Terrestrial Habitat
*massive pulse of uncontrolled sediment during construction stage	*shift from external to internal stream energy production
*increased washoff of pollutants	*reduction in diversity of aquatic insects
*nutrient enrichment leads to benthic algal growth	*reduction in diversity of aquatic and terrestrial species
*bacterial contamination during dry and wet weather	*destruction of wetlands, buffers, and springs
*increased organic carbon loads	
*higher toxic levels, trace metals, and hydrocarbons	
*increased water temperatures	
Lakes and Ponds	
Changes in In-Lake Habitat	Changes in Terrestrial Habitat
*decreased submersed woody habitat	*decrease in natural woody vegetation along shore
*decreased rocky habitat/increased embeddedness	*decrease in habitat for species dependent on riparian areas
*decreased leafy debris	* loss of connectivity between aquatic and terrestrial habitat
*decreased shading/ insect fall	
*increased fine sediment (muck and sand)	
Changes in Water Quality	Changes in Physical Function
*increase in local nutrient availability	* increased adjacent erosion when one shoreline is armored or altered
*increase in attached algae growth	* increased risk of mass failure
*increase in temperature	
*increase in phosphorus loading to the lake	
*decrease in water clarity	
Wetlands	
Loss of the Functions and Values that Wetlands Provide:	
*Water Storage for Flood Water and Storm Runoff	*Rare, Threatened, and Endangered Species Habitat
*Surface and Ground Water Protection	*Education and Research in Natural Sciences
*Fish Habitat	*Recreational Value and Economic Benefits
*Wildlife Habitat	*Open Space and Aesthetics
*Exemplary Wetland Natural Communities	*Erosion Control through Binding and Stabilizing the Soil

Modified from: *Metropolitan Washington Council of Governments. Watershed Restoration Sourcebook. Washington D.C.: Anacostia Restoration Team, 1992.*

3.4. LAND TENURE

3.4.1. LAND TENURE in the Nepalese Perspective

Land tenure has historically been shaped by a number of legal and cultural ideas. Various frameworks, including Hindu, English, Romanic, African, Islamic, and customary notions, are used to determine land tenures globally. The main sources of land tenure in Nepal are Hindu and traditional ideas. Land ownership has been established by the state via both legislative and customary means. Notably, up until 1950, the land tenure system was shaped by the crown's historical supreme ownership of all land.

Various traditional tenures, such as Birta, Guthi, Raikar, and Kipat, among others, have been in place and have formed intermediary ownership systems. These tenures coexist because of the

state's long-standing belief that it is the primary landowner. Prior to 1950, there were multiple classifications of arable land, such as Raikar, Birta, Guthi, Kipat, Rajya, Jagir, Rakam, and so on.

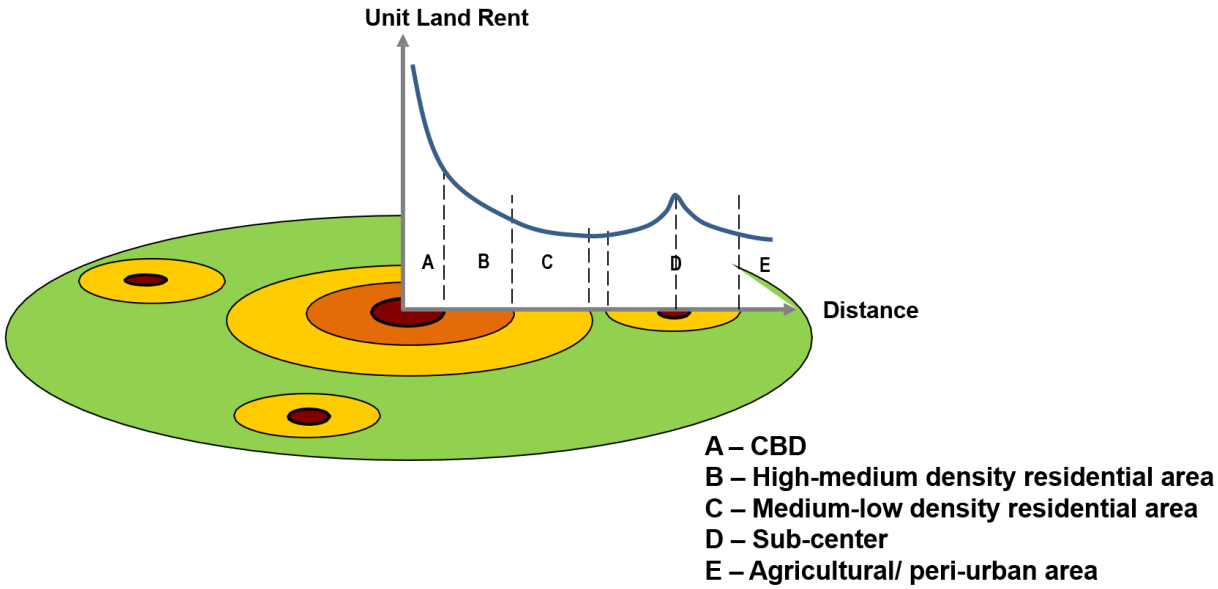
Land designated for philanthropic, religious, or charitable organizations is referred to as GUTHI. Guthi tenure takes many different forms; instances where it is handled by the state are referred to as "Rajguthi." Guthi estates may also be used for religious purposes as "Duniya Guthi," privately run, or registered as "Darta Guthi." Guthi land can also be owned by monasteries. Among the notable groups of Guthi territory are Nigi Guthi, Raj Guthi, Guthi Adhinastha, and Guti Tainathi. (Babu Ram ACHARYA, 2008).

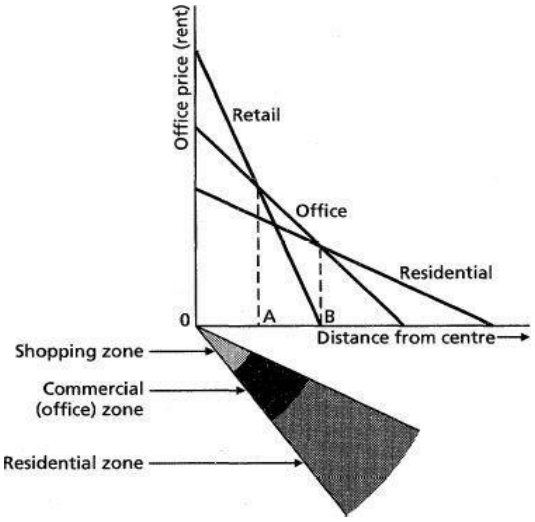
3.5. CITY PLANNING TECHNIQUES ON ECONOMIC PERSPECTIVE

- Cities exist because individuals are not self-sufficient.
- People need land to produce food and other resources, and living in dense cities separates us from the land where food is grown.

3.5.1. Bid Rent Theory: Modification

Bid rent theory basically explains a monocentric city but could be extended, to some extent, to include sub-centers.





3.6. GENTRIFICATION

- Gentrification is the term used to describe the quick transformation of a low-value city neighborhood into a high-value area.
- Gentrification-related increases in rent and living expenses frequently result in the displacement of local populations.
- Strong job growth, competitive housing markets, a preference for city amenities, and more traffic congestion are some of the factors that contribute to gentrification; it also raises complicated social concerns and has both positive and negative effects, frequently involving political tensions.

3.6.1. CAUSES OF GENTRIFICATION

- Rapid job growth
- Tight housing market dynamics
- Preference for city amenities
- Increased traffic congestion.
- Targeted public-sector policies. (PICARDO, 2022)

3.7. SEQUESTRATION (REMOVAL OR SEPARATION)

Sequestration is the process of keeping someone apart from other people, which frequently leads to their disengagement from necessities for survival. This idea includes both material and immaterial components. Sequestration in modern living is demonstrated by the trend toward single-family homes, where people isolate themselves from larger family units. This can take on physical manifestations like moving to a new state or nation, or it can take on emotional manifestations like the thinning emotional bond between grandparents and the families of their offspring. The practical and emotional aspects of human interactions are impacted by this process, which represents a progressive distancing and alienation.

3.8. ENVIRONMENTAL IMAGINARIES –

Environmental imaginaries are conceptual frameworks, or mental images, that people use to understand the natural world and formulate moral and ethical relationships with it and their fellow humans. These imaginaries are important spaces for discussing norms and ideologies. Given that these imaginaries have a significant impact on people's interactions with the environment and the way they shape their material-environmental practices, Watts and Peet (1996) recommend investigating the genesis and evolution of these imaginaries. Gaining an understanding of environmental imaginaries facilitates a more profound exploration of their impact on the dynamic interaction between nature and society. (Zimmer & Véron, 2020)

3.8.1. Environmental Imaginaries on Urban Pond-

Water resource conservation is critical to achieving the Sustainable Development Goals (SDGs) of the United Nations. Water is essential to all 17 Sustainable Development Goals (SDGs), impacting things like food, health, and a thriving economy. It is essential to the survival of every animal that depends on it. Our future economy and general well-being depend on having a steady and dependable water supply, especially in light of the 30% rise in water needs that is anticipated by 2030.

In addition to meeting our requirements, water serves other essential purposes. Wetlands serve as organic pollutants filters, and healthy aquatic ecosystems function as natural infrastructure. Because these ecosystems offer free water infrastructure services, protecting them could result in potential worldwide savings of US$29 trillion. Achieving human and water security requires an understanding of the significance of ecological and ecosystem security. Ecosystems and biodiversity frequently bear the brunt of the battle for scarce water resources when water demands rise as a result of expanding populations and unsustainable patterns of use and production.

Biosphere resilience is diminished by ecosystem degradation and biodiversity loss, which impacts human health as well as biotic populations. Prioritizing ecological system preservation and water conservation is essential for securing a sustainable future since these goals are essential for accomplishing the SDGs and guaranteeing the welfare of all living things on Earth.

1.8.1.1 Ponds as instruments for water security

Ponds are important resources in the water security industry that present a lot of opportunity to solve problems pertaining to water. Many places, particularly those with higher overall rainfall, are likely to see increasing rainfall variability as a result of climate change. But even in areas with such heavy rainfall, problems with water scarcity occur in the dry months. All of the vital water sources are at risk due to this shift in rainfall patterns. Ponds are useful tools for improving water security in this situation because they can efficiently collect and hold water during heavy rainy spells, giving users a valuable supply to utilize during dry spells and lessening the impact of water scarcity.

1.8.1.2 Ponds as biodiversity hotspots

Ponds are common landscape elements that are essential to the maintenance of biodiversity and the functioning of the global ecosystem. When it comes to sustaining aquatic biodiversity, they are just as significant as rivers and major lakes. Ponds serve as distinctive habitat islands that are home to a wide variety of aquatic life. Ponds provide crucial ecological services and are important hotspots for biodiversity, according to research, both in terms of biological features and species composition.

It's interesting to note that ponds that are close to one another have different hydrological behaviors, which results in different types of ponds and their respective habitats. When comparing these small water bodies to rivers and major lakes, a wider variety of physicochemical features are evident. Their numerous features and ecological uniqueness make them vital contributors to the overall ecological balance and the protection of biodiversity, as well as the health of the surrounding ecosystems. Ponds and other small aquatic systems are well known for having a high level of biotic complexity and richness. Three distinct food web components, one based on cyanobacteria and algae, one based on big plants, and one based on decomposing plants, can coexist in a pond and support a variety of life forms. This gives a pond a diverse range of food sources, which could account for the existence of many animal species that flourish in these kinds of habitats. Multiple food sources are present in ponds, which enhances their richness and life abundance, creating thriving ecosystems that are home to a wide variety of species.

1.8.1.3 Ponds as Structures for Carbon Sequestration-

Ponds are essential for providing long-term answers to a number of problems, such as managing limited water supplies and climate change. These tiny bodies of water help to mitigate climate change and have a major effect on the global carbon balance. Ponds are highly capable of digesting carbon, even in spite of their small size. They are frequently more heterotrophic than big ecosystems and may effectively process significant amounts of carbon that come from the environment or the land.

Ponds have an amazing ability to store carbon since they have lower oxygen concentrations than larger bodies of water. They really make up around one-third of the continental seas, which makes them essential locations for the biosphere's organic carbon storage. Ponds store more organic carbon in their sediment than do major aquatic systems; only the world's farm ponds have the capacity to store more organic carbon annually than the oceans and around 33% more than the world's river systems contribute to the ocean.

Ponds store more carbon than huge lakes and have a larger surface area, thus their combined effect is significant. For example, a 500 square meter pond may store about 1000 kg of carbon per year, which is the same amount of carbon emissions as an automobile produces in the same amount of time. These results demonstrate the important part ponds play in sequestering carbon and support broader initiatives to mitigate climate change and protect the ecosystem.

1.8.1.4 Ponds as Pollution Alleviation Factors

Ponds work as nutrient retention structures and sedimentation ponds, making them useful instruments for controlling the quality of the water. By these means, ponds are essential for clearing sediments, phosphorus, and other dispersed contaminants from surface waters. Ponds can be placed strategically along drainage systems to intercept water before it gets to receiving bodies of water. This lowers the amount of nutrients in the water and improves the quality of the water in these bodies of water. Ponds are important tools for managing and protecting water resources because of this method, called nutrient retention, which serves to regulate and enhance the general water quality in the surrounding area.

1.8.1.5 Other Miscellaneous Services

Ponds have several positive benefits, one of which is that they help control humidity and temperature, which in turn helps control the microclimate. Ponds, although tiny in size, are an important part of a connected landscape because they serve as important stepping stones and offer several advantages to the nearby ecosystems. They have the power to affect local hydrology by affecting the rates of evaporative water loss and groundwater infiltration.

Ponds are important both historically and culturally because sediment records from them can reveal important details about our ancestors' way of life. Additionally, they strengthen the bond between humans and wildlife, which is essential to preserving and promoting biodiversity. Ponds also provide enormous recreational benefits, which increases their significance in social and ecological situations. (Manoj, 2015)

3.9. GLOBAL ENVIRONMENTAL CONCERNS OF PONDS

Ponds are extremely important to human civilization since they are important supplies of water for industry, agriculture, and residential usage. They also yield food resources, which are necessary for human survival. However, because of a variety of disruptions brought on by humans, these freshwater ecosystems are under constant assault.

Due to sedimentation and runoff from agriculture, hazardous substances such as pesticides have accumulated in ponds as a result of human development activities. The use of ponds is dangerous and useless due to this degradation. Pond habitat degradation is also caused by contaminated inflows, damaged buffer zones, excessive fertilizer loading, and atmospheric processes.

Pond evaporation is accelerated by anthropogenic activities including fertilizer runoff from agricultural areas and sewage disposal. In comparison to larger lakes and rivers, ponds are more susceptible to pollution loads because of their smaller size and low buffering capacity. In contrast to bigger bodies of water, artificial feeding of ducks can potentially have a negative effect on ponds.

The declining number of ponds and rising pollution levels present two challenges. These changes in hydrological circumstances have the potential to upend the aquatic system's ecological structure, which could have an impact on fish production, species composition, aquacultural activities, and even trigger eutrophication.

Pond ecosystems are seriously threatened by a number of anthropogenic disturbances, such as nutrient enrichment (eutrophication), contamination by hazardous chemicals and trace elements, acidification, invasion by exotic species, global warming, and climate change. It is imperative that these issues be resolved in order to maintain the ecological integrity and vital functions that ponds in the landscape offer. (Padhy, 2015) Figure provides a summary of the present factors endangering pond habitats.

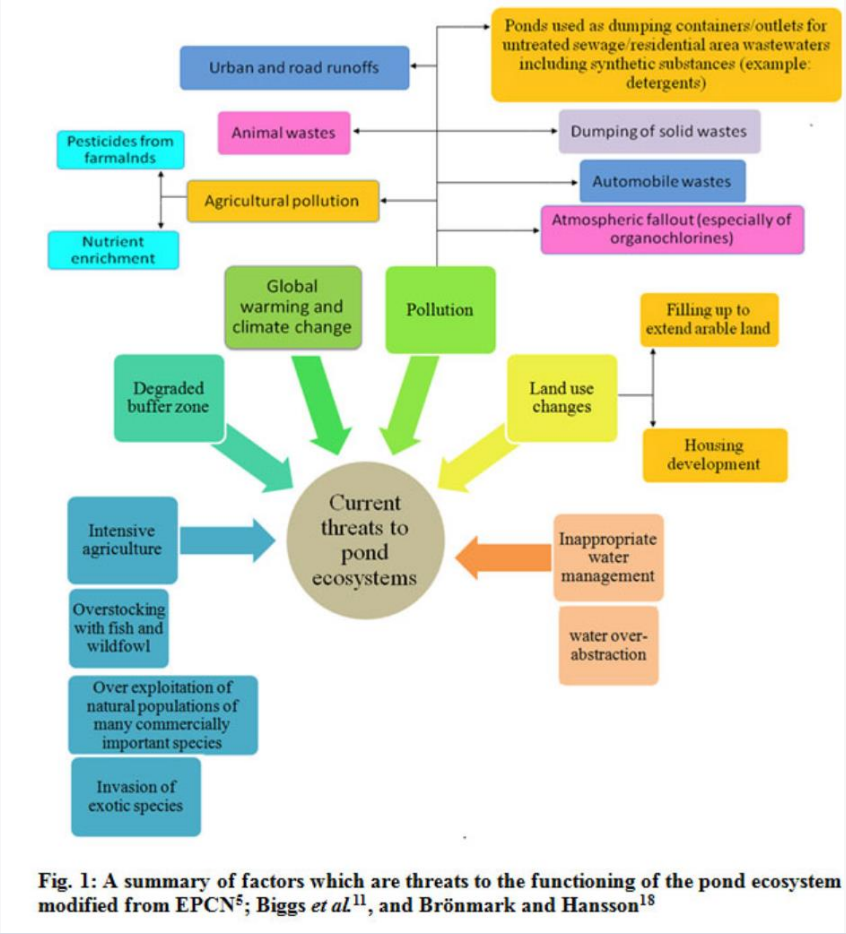


Fig. 1: A summary of factors which are threats to the functioning of the pond ecosystem modified from EPCN[5]; Biggs *et al*.[11], and Brönmark and Hansson[18]

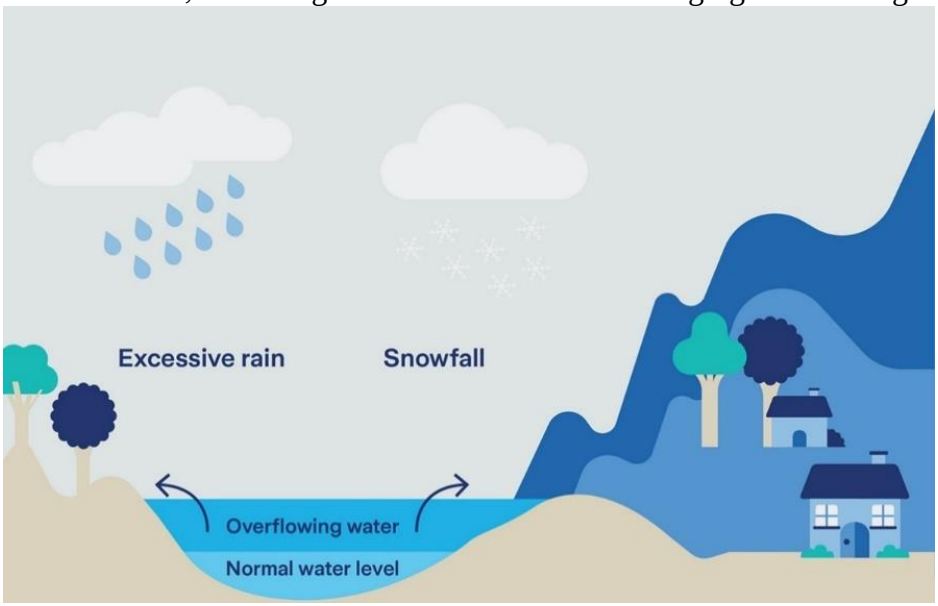
3.10. FLOODING

Fluvial floods, sometimes referred to as river floods; pluvial or flash floods; and coastal floods, also referred to as storm surge, are the three main forms of floods. Every kind of flood has a distinct occurrence and forecasting method. Every sort of flood has a different effect, and so do the steps you need to take to prevent or lessen flooding damage.

3.10.1. Fluvial Floods (River Floods)

When the water level of a river, lake, or stream increases and spills over onto nearby land, it's known as a fluvial, or river, flood. The river's rising water level may be the result of snowmelt or heavy rains.A river flood can inflict extensive damage since the overflow might affect smaller

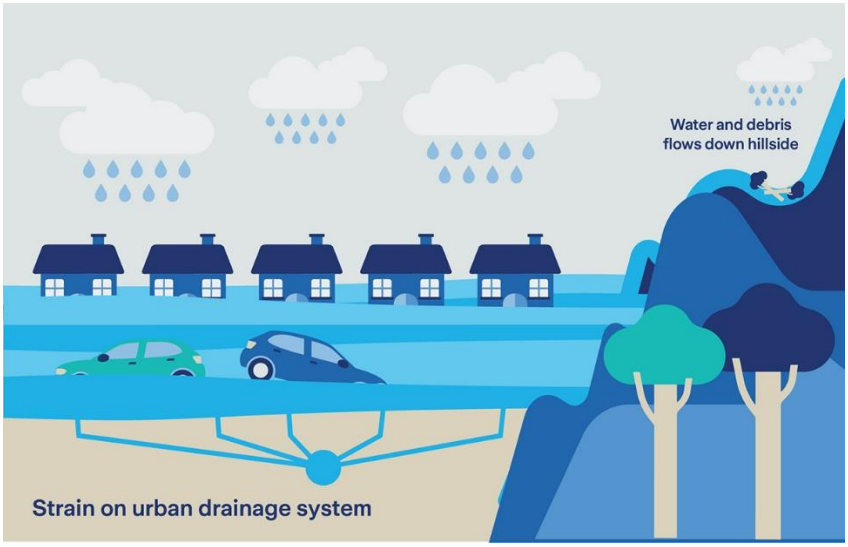
rivers downstream, shattering dams and dikes and submerging surrounding areas.



Models take into account present river levels, soil and topography conditions, previous and predicted precipitation, and river flooding probability.
The topography profile and the amount and length of rainfall in the river's catchment area influence how severe a river flood will be. The effects of climate change on the length and intensity of rainfall are additional elements. Soil water saturation is another. Floodwater rises more slowly and is shallower in flat locations, yet it can stay for days at a time. In regions with hills or mountains, floods can happen minutes after a significant downpour, drain very fast, and result in damage from debris flow.

3.10.2. Pluvial Floods (Flash Floods And Surface Water)

River flooding probability, past and projected precipitation, terrain and soil conditions, and current river levels are all taken into account by models.
The severity of a river flood is determined by the topography profile and the quantity and duration of rainfall in the river's catchment area. Other factors are how the length and intensity of rainfall are affected by climate change. Another is saturation of soil with water. In flat areas, floodwater rises more slowly and is shallower, yet it can remain for days at a time. In hilly or mountainous areas, floods can occur minutes after a heavy rain, drain quickly, and cause damage from debris flow.



There are two common types of pluvial flooding:

When an urban drainage system is overloaded and water overflows onto the streets and adjacent buildings, **surface water floods** happen. Usually occurring gradually, the water level is shallow (rarely more than 1 meter deep), giving people time to evacuate to safe areas. Although there isn't a direct risk to life, it could have serious negative effects on the economy.

A **flash flood** is defined as a sudden, strong, high-velocity downpour that occurs in a short period of time in the surrounding area or on adjacent elevated terrain. They may also happen as a result of a dam or an upstream levee suddenly releasing water. In addition to the power of the water, flash floods can do great harm due to flying debris that gets caught up in the current.

3.10.3. Coastal Flood (Storm Surge)

The inundation of land regions adjacent to the shore by seawater is known as coastal flooding. Intense windstorms that coincide with storm surges, or high tide, are common causes of coastal flooding, as are tsunamis. (ZURICH, 2023)

3.11. SOCIETY CREATING RISK

Risk is the actual or possible possibility of a calamity that could cause significant losses in terms of lives, livelihoods, and infrastructure. It is the possibility of something happening and the effects if it does. A risk is comprised of three elements: exposure, hazard, and vulnerability. These elements are symbolized by the three sides of a triangle known as the risk triangle. The area of the triangle grows when any one of its sides rises, which also increases the amount of risk, and vice

versa.

Figure 4 Risk Triangle

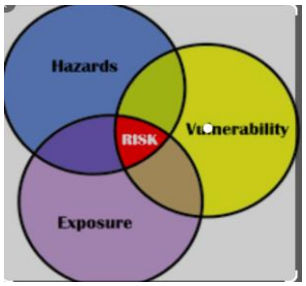


Figure 3 Relationship between risk, hazard, vulnerability and exposure

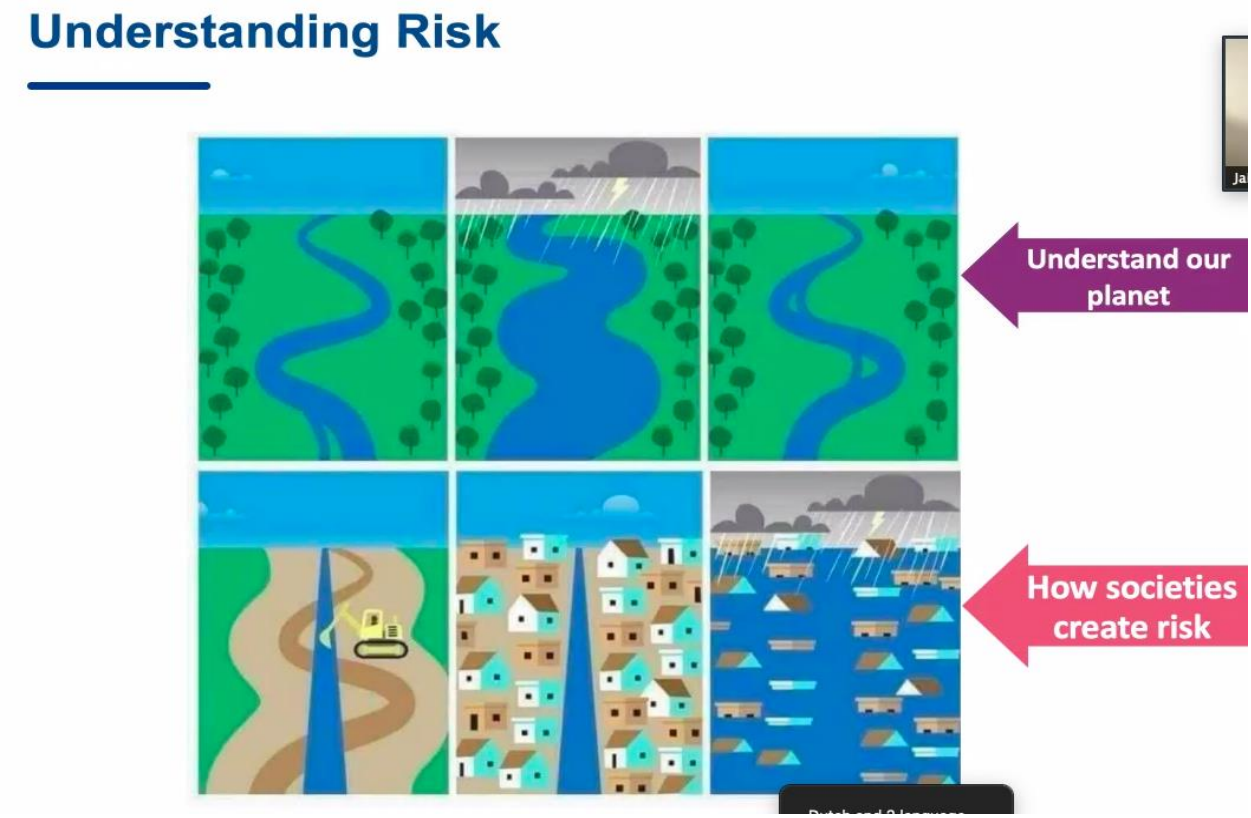


Figure 5Community creating Risks (Adopted from Theories of Risk, Inclusion and Land Use by Suman Kumar Karna)

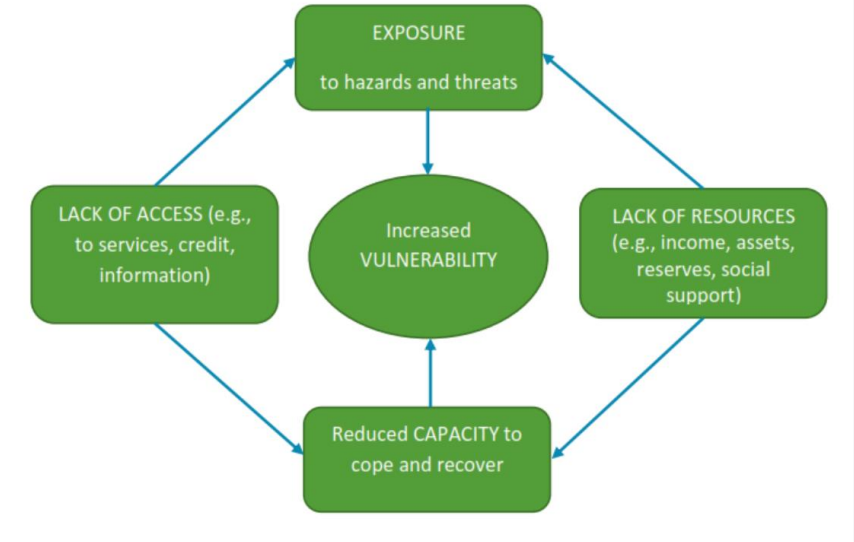
There are moments when communities and cultures themselves create risk. As the image above illustrates, there is a naturally occurring water flow that is normally modest but occasionally surges. When a settlement begins to expand along a riverbank, it does not take into account when the largest flood will return; instead, it grows throughout time. The river rises and then falls to its initial level at a specific time, inundating the entire community. People are putting themselves at greater risk here.

3.12. HAZARDS, EXPOSURE, VULNERABILITY, IMPACTS AND ADAPTATION IN WETLAN DS

In the context of climate change and disaster risk, this analysis contrasts the concepts of hazards, exposure, susceptibility, impacts, and adaptation. A hazard is defined by the United Nations Framework Convention on Climate Change as a possible incident that endangers people's lives, property, or the environment. In a similar vein, a hazard is defined by the United Nations International Strategy for Disaster Reduction (UNISDR) as a dangerous occurrence that has negative repercussions on multiple dimensions.

The IPCC defines exposure as the existence of entities in environments where adverse impacts are likely to occur. Exposure in disaster risk literature refers to substances that can be harmed in locations that are prone to hazards. While UNISDR defines vulnerability as the characteristics that make a community or asset susceptible to hazard impacts, the IPCC defines vulnerability as sensitivity to harm and a lack of coping mechanisms.

While UNISDR provides a broader scope that includes effects on physical, mental, and social well-being in addition to property damage, disturbance, and environmental deterioration, the IPCC defines impacts as consequences for natural and human systems. (ISUNJU, SPATIOTEMPORAL ANALYSIS OF ENCROACHMENT ON WETLANDS: HAZARDS, VULNERABILITY AND ADAPTATIONS IN KAMPALA CITY, UGANDA , 2016)



3.13. PLAN ,LEGAL AND INSTITUTIONAL FRAMEWORK:

3.13.1. Sustainable Development Goal

3.13.1.1. SDG 6: Clean Water and Sanitation:

Target 6.4: "By 2030, substantially increase water-use efficiency across all sectors and ensure

sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity."

3.13.1.2. SDG 11: Sustainable Cities and Communities:

Target 11.3: "By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated, and sustainable human settlement planning and management in all countries."

3.13.1.3. SDG 13: Climate Action:

Target 13.1: "Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries."
Target 13.3: "Improve education, awareness-raising, and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning."

3.13.1.4. SDG 15: Life on Land:

Target 15.1: "By 2020, ensure the conservation, restoration, and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains, and drylands, in line with obligations under international agreements."
SDG 16: Peace, Justice, and Strong Institutions:
Target 16.7: "Ensure responsive, inclusive, participatory, and representative decision-making at all levels."

3.13.1.5. SDG 17: Partnerships for the Goals:

Target 17.16: "Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology, and financial resources to support the achievement of the sustainable development goals in all countries."

3.13.2. Parris Agreement

The primary goals of the United Nations Framework Convention on Climate Change (UNFCCC), an international convention, are to reduce greenhouse gas emissions and strengthen coordinated efforts to address climate change worldwide. This is known as the Paris Agreement.

Article 5 of the Agreement expressly states how important it is to preserve and improve greenhouse gas sinks and reservoirs, such as wetlands and forests. In order to increase the amount of greenhouse gases removed from the atmosphere, it promotes the adoption of initiatives that support sustainable management of wetlands and forests.

3.13.3. Department of Archeology

There are regulations governing the ownership, preservation, upkeep, and restoration of public ancient sites. The Department of Archaeology is the owner of public ancient monuments. These monuments must be preserved, kept up, and renovated by the Department. The local government or involved parties, under the direction of the Department of Archaeology, are in charge of conserving privately owned historic sites that are not located inside protected areas. In case the Guthi Sansthan has jurisdiction over a private ancient monument, it is overseen by the Department and is maintained by them. Penalties for destroying, altering, or stealing these monuments include

fines and jail time.
On the advice of a Technical Committee, the Department sets construction criteria for areas designated as protected monuments. When a private or occupied structure is altered or rebuilt, public signs outlining the construction standards and styles are put up in the affected area.(ARCHAEOLOGY, 2046).

3.13.4. Ministry of Urban Development Department Of Urban Development And Building Construction

3.13.4.1. Planning Norms and Standards 2013

The practical application of land for a range of human endeavors or commercial objectives is referred to as land use. According to the Government of Nepal's Land Use Policy-2069, it can be broadly divided into two categories:
• Area Discouraged by Settlement: This category includes a range of land uses inside a certain area, including agriculture, forests, water bodies, and more.
• Area Encouraged for Settlement: This area includes land used for institutional, commercial, mixed-use, open space, residential, and industrial purposes.

S.No	Types	Norms	Standards					Source
A	**Physical Infrastructure**							
1.	Road	Express way , Arterial, Sub Arterial, Collector street and Local Street All or 90% of household are within 0.5km from motorable road		ROW	Setback	Footpath	Cycle Track	Nepal Urban Road Standard, 2011
			Expressway					
			Arterial	30	1	2	2	
			Sub Arterial	22	1	2	1.5	
			Collector	14	1	2	1.5	
			Local	10	1	2	-	
2.	Water Supply System (with storage and treatment facilities)	Metered house connection and distribution Non domestic demand Treatment Plant (lab, dosing and guardhouse) with storage facility: Elevated or Underground Reservoir (24 hrs requirement) Provision of Rain Water Harvesting in Public Buildings (catchment area, Storage and Treatment Facility)	Quantity: 120 lpcd Minimum diameter of distribution pipe: 80mm 8 to 10 % 2 ha per site (2 Nos) Storage Capacity: 25 % of the total treatment capacity					National Urban Water Supply and Sanitation Sector Policy, 2009 Human Settlement Planning and Design, South Africa, 2000 Conversation with Consultant, STIUEIP, January 2013
3.	Sanitation (Sewerage System)	Full coverage by public sewer system Sewage Pumping Station Treatment plant Provision of public latrines (male, female, disabled)	Min diameter of trunk line: 200mm 0.01 ha – 0.02 ha per site 5 ha – 7 ha per site (2 Nos) 1 public toilet at a distance of 5km along the main road.					Consolidated Design Criteria Report, STIUEIP, 2012 Conversation with Consultant, STIUEIP, January 2013
4.	Integrated Solid Waste Management	Household level waste separation Collection Point (0.4 kg/person/day) Transfer Station	Community collection/ Door to Door collection. 1 collection point/container/ roadside pickup point serves a radius of 200m 1 Transfer Station for 1 city if the final disposal is within a distance of 10 km					Human Settlement Planning and Design, South Africa, 2000 Conversation with Consultant, STIUEIP,

Table 1 INFRASTRUCTURE NORMS AND STANDARD FRO SUB-METROPOLITAN CITY

3.14.2. National Water Supply And Sanitation Act 2016.

The extension and transfer of environmental permits.
(1) "Environment permits" for the purposes of this section refers to:
(a) all environment permits issued under the Environment Act 2000 (including permits originally issued as water investigation permits or water use permits under the Water Resources Act 1982 that was repealed) that are currently held by the Waterboard prior to the Act's implementation; and

(b) all other environment permits that the Waterboard has been granted under the Environment Act 2000 since the Act's implementation that may have expired without being renewed.

3.14.3. National Urban Development Strategy 2017

3.14.5.1. Urban Infrastructure

Urban Form

Urban forms are evolving in an unorganized way, marked by conflicting land uses, less open spaces and parks, and detrimental effects on the social and cultural fabric of neighborhoods.

3.14.5.2. Infrastructure Services.

Water Supply

Urban infrastructure is deficient in many areas, including electricity, housing, transportation, waste management, sanitation, and water supply. There exists an ecological discrepancy in the availability of piped water supplies; households in urban Tarai areas have access to 32.9%, while households in urban hill areas have 81.2%. All metropolitan areas still lack enough drinking water, both in terms of quantity and quality. An annual spend of NRs 3500 per capita, or 75 billion, is required to address these issues by 2017 AD in order to enhance sanitation and water delivery.

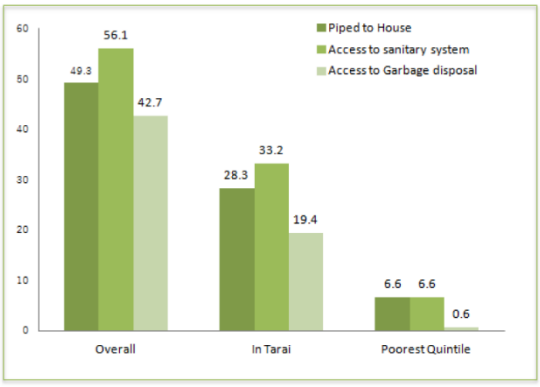


Fig 2.2: % Access to basic services in urban households, Source CBS 2011

3.14.4. Water Resources Strategy Nepal

Output 6: Economic Uses of Water by Industries and Water Bodies by Tourism, Fisheries and Navigation optimized.

Diverse Utilization: The strategy extends beyond necessities such as power generation and home water supply.
Boosting industries: Works to support the tourism, fishing, cultural, and navigation industries.
Business & Employment: Designed to promote employment creation and economic expansion.
Harmonious Approach: Balances impending demands and current water utilization.
Sustainability Priority: Stressing sustainable and eco-friendly methods.

Overview of Activities:

- Promotion of Cultural & Environmental Tourism
- Support for Spring Water Bottling

- Exploration of Floodplain Productive Usage
- Potential Investigation for Navigation
- Progress in Fisheries and Aquaculture
- Enhancing Industrial Water Use

Metrics:
Create and Implement Action Plans (by 2007)
Significant Investment from the Private Sector (by 2017)
A substantial contribution to GDP (by 2027)
Determine Additional Use Cases (by 2027)
Staged Approach: Finding gains without sacrificing current applications is the main goal of the first phase.
business Sector Investment: Water use initiatives should be prepared to receive funding from the business sector.
Government Partnerships: MOWR and MOCT&CA working together to create integrated river basin plans.
Preserve Cultural Heritage: Keep cultural places away from bodies of water.

Definition of Responsibilities:
Potential projects are identified by MOCT&CA.

- The Ministry of Industry encourages the bottling of spring water.
- DWIDP evaluates projects in floodplains taking flood hazards into account.
- MOPPW monitors industrial water consumption and investigates opportunities for navigation.
- Aquaculture and fisheries are improved by the Fisheries Department.
- Long-Term Vision: Seeking to significantly increase Nepal's GDP through economic means.
- Setting Sustainability as a Top Priority: Keeping in line with Nepal's goals and principles.

Output 8: Enhanced Water-Related Information Systems are functional.

Activities:

- Enhance information collection and sharing methods.
- Extend and upgrade the hydro-meteorological network.
- Create a snow/glacier hydrology information system.
- Establish comprehensive basin-wide water accounting systems.
- Integrate water resource database with environmental data.

Indicators:

- All 120 DHM hydro-meteorological stations well-equipped and operational by 2007.
- Establishment of Himalayan Climate Change Study Centre by 2007.
- Successful dissemination of water quality data by 2007.
- DHM stations meet WMO standards for coverage, data quality by 2017.
- High satisfaction level among public and information system users by 2027.
- Increase in number of well-equipped hydro-meteorological stations to meet Nepal's WMO standards by 2027.

Output 9: Appropriate Legal Frameworks are functional.

Activities:

- Develop an Integrated Water Resources Policy and revise the Water Resources Act.
- Coordinate and modify contradictory laws and regulations.
- Integrate legislative provisions for groundwater use and management.
- Enhance the enforcement of existing acts and regulations.
- Establish fair and effective water use rights.

Indicators:

- Approval of an integrated national water policy by 2007.
- Amendments made to conflicting water-related laws by 2007.
- Review and amendment of all water-related acts, regulations, and policies by 2007.
- Functional conflict resolution mechanisms by 2017.
- Resolution of 90% of water-related conflicts by 2017.
- Sustained compliance with acts and regulations by 2027.
- Reduction in water-related conflicts and timely resolution of remaining conflicts by 2027. (Secretariat, 2002)

Summary of Strategy Outputs

GOAL		**LIVING CONDITIONS OF NEPALI PEOPLE SIGNIFICANTLY IMPROVED IN A SUSTAINABLE MANNER**			
TIMEFRAME		5-Year Strategy	15-Year Strategy	25-Year Strategy	
PURPOSE		The comprehensive Water Resources Strategy implementation providing tangible benefits to people in line with basic needs fulfillment, supported and managed by capable institutions of all stakeholders	Water Resources Strategy operationalized to provide substantial benefits to people for basic needs fulfillments as well as other benefits supported and managed by capable institutions of all stakeholders.	Sustainable benefits of water use to Nepal maximized	
OUTPUTS	SECURITY	1. Disaster Management	Institutional capabilities enhanced to manage water-induced disasters	Effective measures adopted to manage water-related disasters and mitigate their adverse effects	Effective water induced disasters management systems are functional
		2. Environment	Institution strengthened for watershed and ecosystem protection / management	Full scale watershed/aquatic ecosystems activities implemented	Watersheds and Aquatic ecosystems managed sustainably
	USERS	3. Water Supply	Access to water supply and sanitation expanded / enhanced	With increasing sanitation and drinking water coverage, service level and quality improved	Adequate supply of and access to quality potable water, sanitation and hygiene awareness provided for all people
		4. Irrigation	Irrigation systems planned, developed and continued for sustainable management.	Reliable irrigation service expanded on the basis of sustainability and wealth creation	Appropriate and efficient irrigation available for the optimal use of irrigable land in a sustainable manner
		5. Hydropower	Hydropower developed for domestic needs and viable exports	Hydropower development maximized for different uses (including energy intensive industries and export of power) providing substantial benefits	Hydropower optimally developed
		6. Other Economic Activities	Economic activities for fisheries, aquaculture, recreation, tourism, navigation, and industrial water uses implemented	Economic uses of water and water bodies by recreation, tourism, fisheries, aquaculture navigation and industries enhanced	Economic uses of water and water bodies by recreation, tourism, fisheries, aquaculture navigation and industries optimized
	MECHANISMS	7. Information Systems	Functional water-related information & Dissemination system strengthened/ established	Water- related information/ dissemination system functioning	Water-related information systems enhanced
		8. Policy & Legal	Appropriate policy and legal framework including equitable water use rights established	Adequate legal framework functioning	Adequate legal framework functioning and adopting to changing circumstances
		9. International Cooperation	Regional/ bilateral cooperation framework/ norms operationalized	Effective mechanism for regional/ bilateral cooperation functioning	Regional/bilateral cooperation for substantial mutual benefits achieved
		10. Institutional Mechanisms	Appropriate institutions established / activated	Institutional mechanism for integrated water management functioning	All Institutions functioning efficiently in tune with changing circumstances

Note: The long-term Water Resource Strategy envisions a continuous process with some thresholds in between. Broadly speaking, the 5-year strategy is oriented towards fulfillment of basic needs of people; the 15-year strategy is for consolidation of sub-sector programs for maximization of these benefits and the 25-year strategy is for their optimization.

4. CASE STUDIES AND ANALYSIS:-

Case studies are selected as per my topic requirement like

Two International case based on quantitative measures that are physical or tangible concerns like i.e "**Spatiotemporal Analysis Of Encroachment On Wetlands: Hazards, Vulnerability And Adaptations In Kampala City, Uganda"**. while,

Second case on the basis of social concern and perceptions or environmental imaginaries on urban blueland i.e **Urban Ponds, Environmental Imaginaries and (Un)commoning: An Urban Political Ecology of the Pondscape in a Small City in Gujarat, India**".

For National case study is based on conflict arises due to different stakeholders. i.e "**Rani Pokhari Reconstruction & Conflict Settlement**" and its mitigation measures from strategy and policy to target my objectives are mentioned below:

4.1. SEQUESTRATION OF BLUELAND ON THE BASIS OF PHYSICAL FACTORS -URBANIZATION AND ENCHROACHMENT

4.1.1. Population Growth And Encroachment.

On 24th November 2015, the minister of the council upgraded the Janakpur Municipality to a sub-metropolitan city encompassing the surrounding VDCs of Benga, Shivapur, Mahuwa, and Lohana in the East, Devpura, Rupaitha, and Basahiya in the South and Bindi, Basbiti and Kurtha in the West. The sub-metropolitan city comprises 15.4 % of the district population and 1.8 % of the national urban population. The population of the sub-metropolitan city has increased to 169,287 with estimated population density of 1700 per km2 after the addition of the surrounding VDCs.

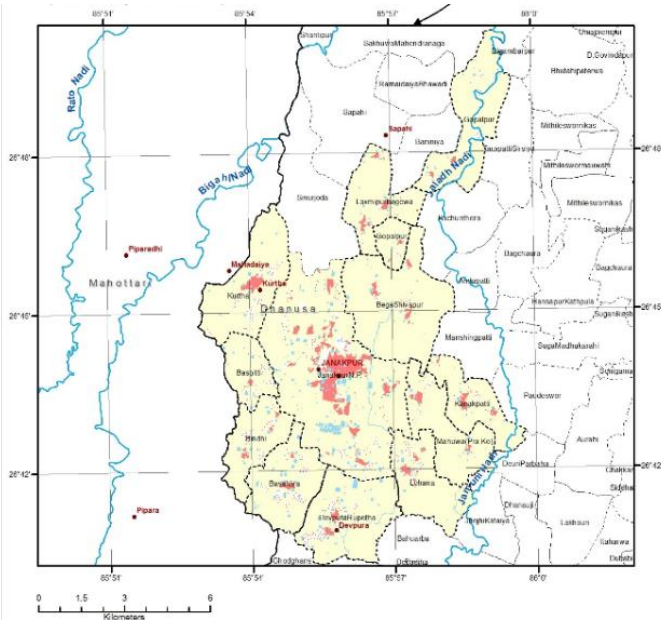


Figure 6 landuse of janakpur2015 (Source: LGCDP-II (MOFAGA))

If we look at the existing land use situation, it is found that the agricultural sector occupies the most land in this sub-metropolitan city. Residential sector occupies 12.6%, commercial sector occupies 0.6% and institutional sector occupies 0.9%. There are streams and rivers like Jalad, Dudhamath, Vimala, Vighi, Hardinath, Jamuni, Old Jalad, Rato Bamwohi etc. in various wards of the sub-metropolitan city (NURP, 2079).landuse map over period of time shows how the urbanisation spreaded and densely populated in a core area similarly as in bid rent theory.

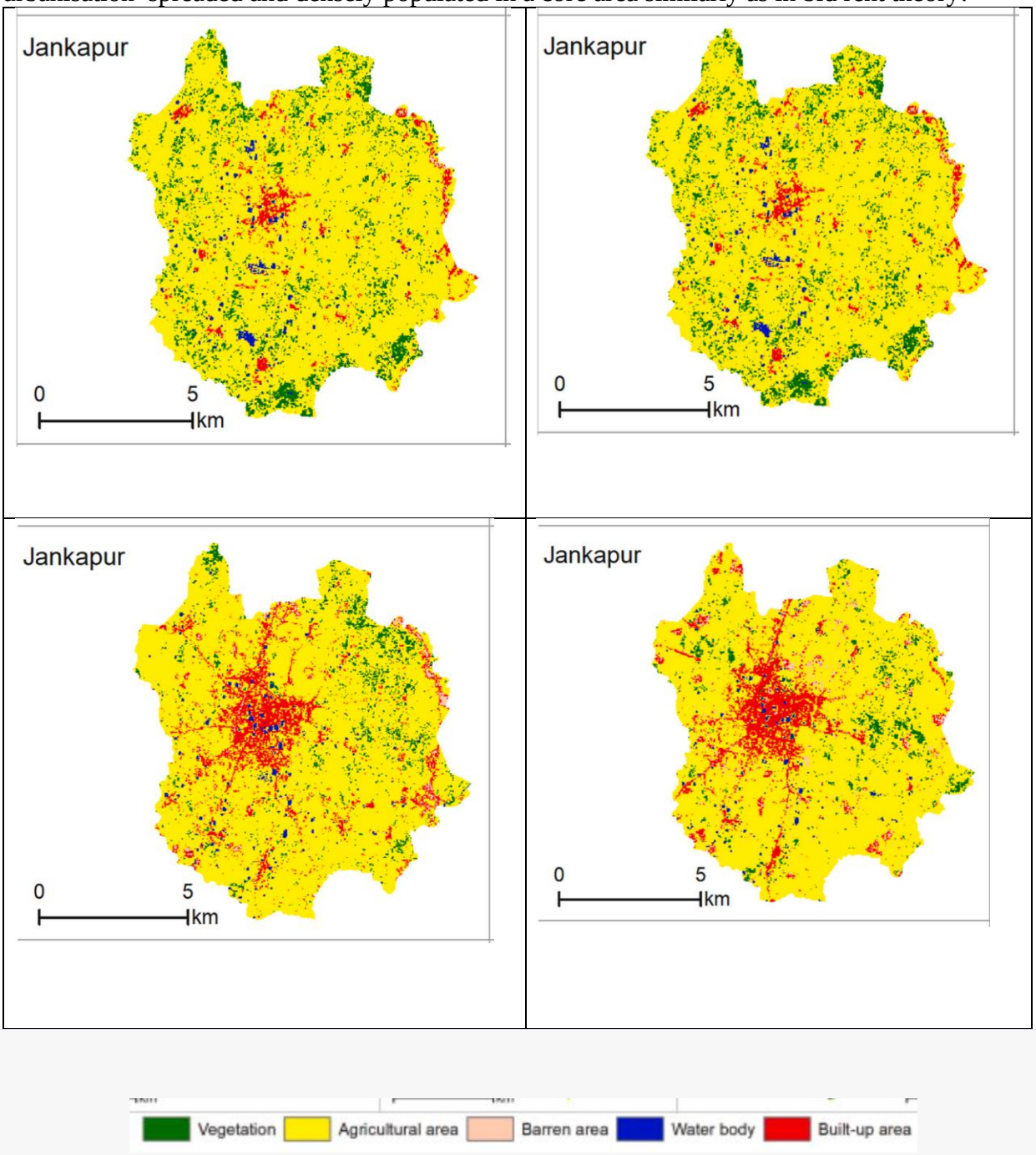


Figure 4 landuse landcover map 1990,2000,2010 and 2020 (Praval Devkota, 2023)

AREA (SQ.KM)	24.61	91.97
POPULATION SIZE	98,446	194,556
POPULATION DENSITY (person per sq km)	4,000.24	2,115
HOUSEHOLDS	19,195	40,409
MALE	52,481	99764 (51.3%)
FEMALE	45,965	94792 (48.7%)

(Office, n.d.).

This presents a decrease in population density from 2011 to 2021, the actual situation is more intricate. The population has grown, and the lower density is a result of incorporating larger areas into the municipality. This has caused the core area to become more densely populated due to migration. Such rapid and unplanned urbanization can result in problems like flooding and waterlogging, impacting both inner and outer agricultural lands within the municipality.

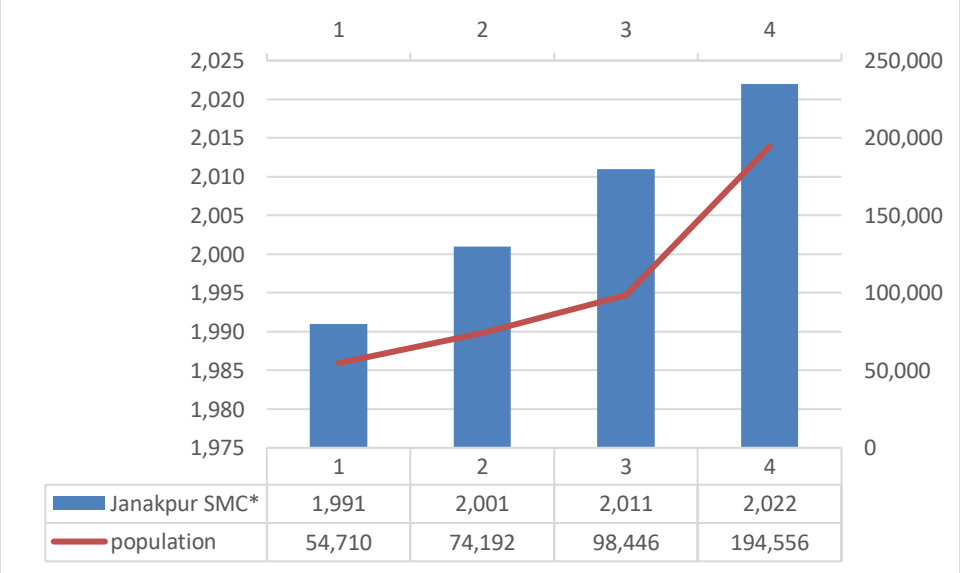


Table 2 population growth in Janakpur sub-metropolitan city

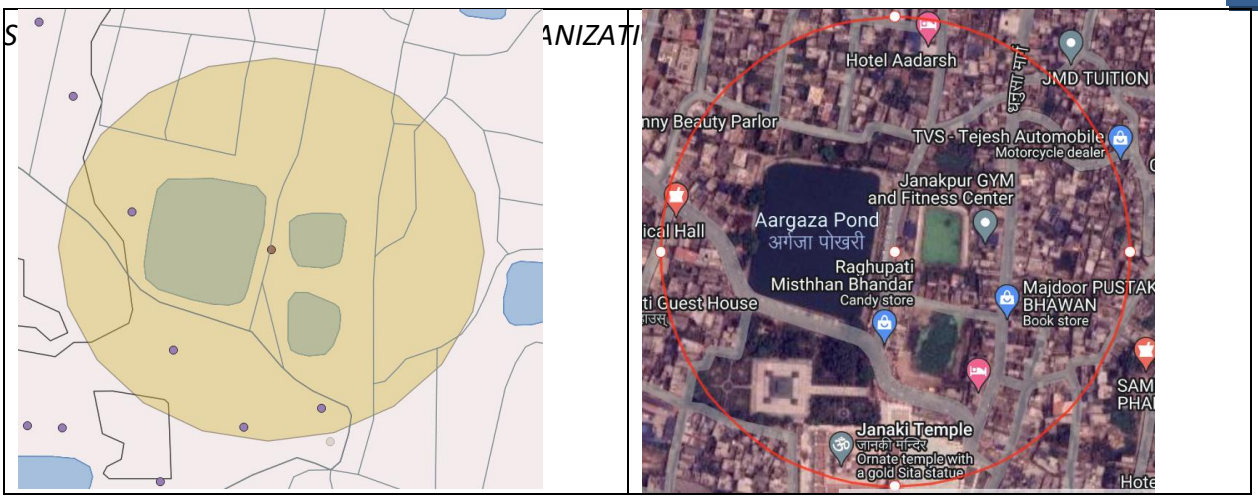
This swift and unplanned urbanization has ushered in a host of challenges, with encroachment emerging as a significant concern. The subsequent encroachment on land has triggered a domino effect leading to the dwindling number of ponds. The haphazard expansion into these areas has disrupted the natural landscape, giving rise to problems such as flooding and waterlogging is illustrated by below maps.

In core area of pond-

With in a 200 meter radius buffer in a map of 2042 and 2080 shows how the phenomenon of transformation and displacement of position of blue land.

In case of Angaraj sagar

As per the KII and FGD with local elders rememberance, the enchroachment is due to roads and Nepal telecome office.



In case of telha and marha pond-

This pond is never used for bathing and it is filled with wastages and garbage from 40 years ago after this activity the pond are partially or more than half is enchroached where one floor shops are constructed from road side while back of this is used for waste dumping but telha and marha cannot cannot be visible from road side. In 2060 B.S. the ramainning area is filled to construct residence of mahant relatives after that this in 2072B.S the construction around this pond are demolished and again revived which is in construction phase and displaced from original position.

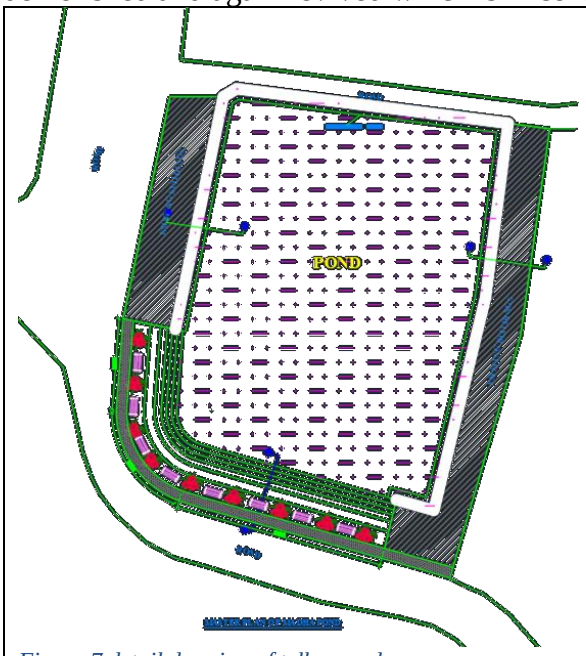


Figure 7 detail drawing of telha pond

Source-DUDBC

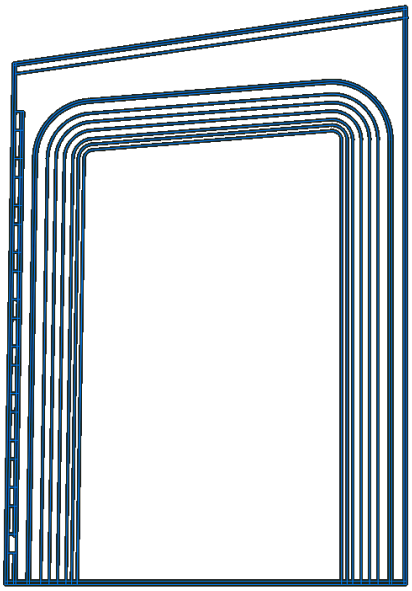


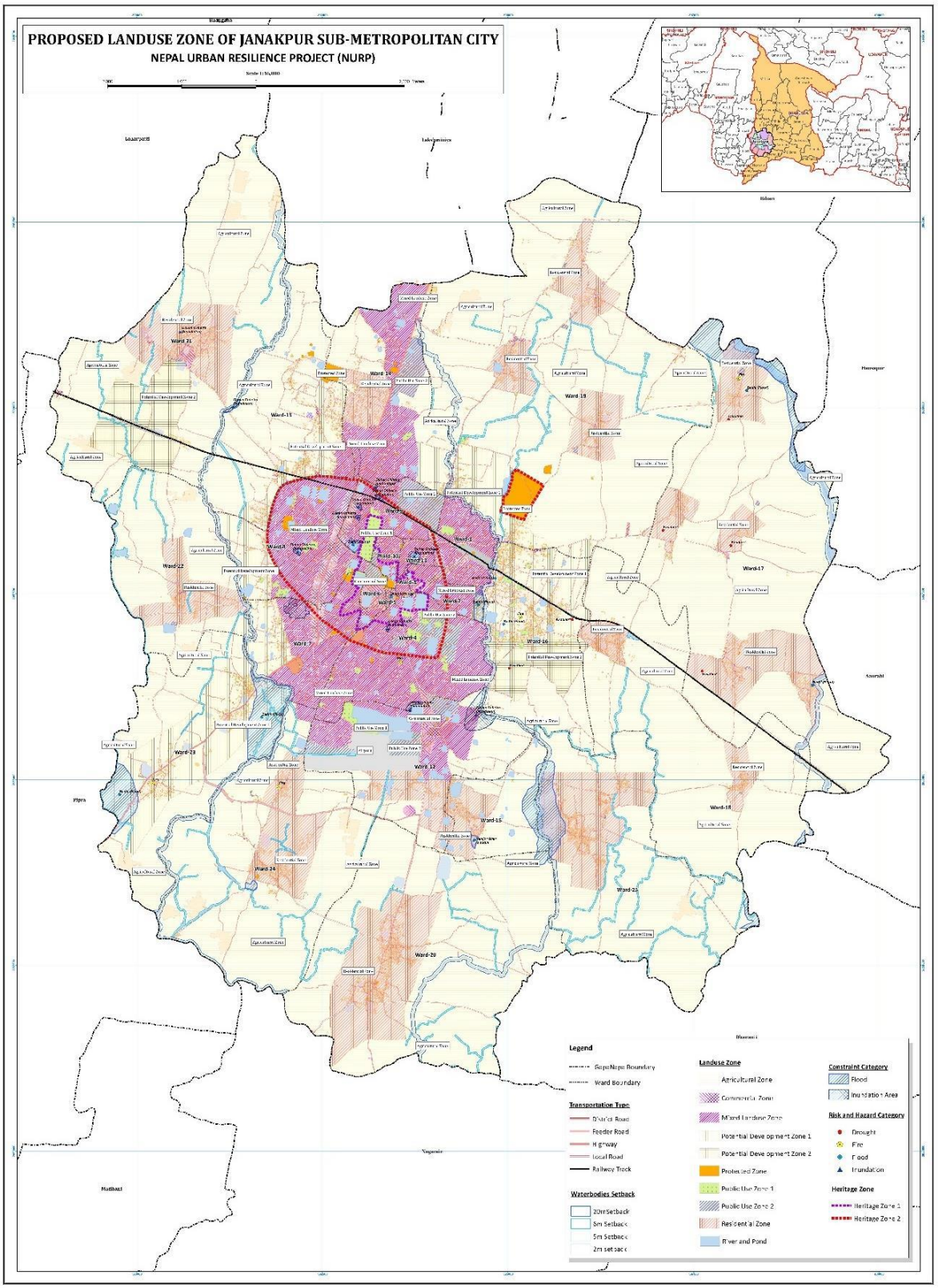
Figure 8 detail drawing of marha pond

In case of gordhoi, high is the more concern to reduce its size to one third per as per locals and in ratna sagar is in good condition that others.

As the population influx presses against urban limits, agricultural land both within and beyond the municipality has been affected. The implications of this trend are significant not only for the environment but also for the social fabric of the region. The disappearance of ponds, which previously played a vital role in the local ecosystem and culture, serves as a stark illustration of the consequences of unchecked urban growth and encroachment. The following table shows the

area of enchroached over period of time.

S.N	NAME	AREA in 2042	AREA in 2054	area in 2067/70
1	paap mochan	0.523182	0.935	0.935
2	laxman sar(balram sar)	1.336723	1.148	1.269
3	telha(tel dhirghika sar)	0.464334	0.332	0.2426492
4	argajja(angrag sar)	3.186066	1.18	1.23879
5	marha(mandan sar)	0.384344	0.22	0.133085
6	bidal (birat or birarahi or barahi sar)	1.336723	0.979	1.090261
7	rukmini	1.630509	0.904	0.8794228
8	ratna sagar	2.996432	2.258	2.040304
9	dashrath(maharaj sagar)	3.388008	2.48	2.6727
10	madhyama	2.406801	1.909	1.4136
11	bihar kund	1.184338	1.081	0.97755
12	agni kund	1.701167	1.304	0.764
13	sita kund	0.340736	0.242	0.142224
14	janaki sarowar	1.851856	1.341	0.831786
15	purandar	2.600231	2.528	2.0962
16	gordhoi pokhari(pad pralakshara sar)	1.746881	1.196	1.039499
17	murli sar	0.848684	0.748	0.738
18	dirgha sar (dadhi or dighiya sar)	2.192182	1.86	1.925
19	dewan pokhari (chandra kup)	0.624317	0.344	0.323745
20	dhanush sagar	2.555384	1.96	2.061768
21	ganga sagar	3.760047	2.86	3.07629
22	ram sagar	0.987109	0.812	0.313822
23	vishara	3.194985	2.975	2.975
24	balmiki kund (chaudhary)	0.422791	0.4379	0.41379
25	anurag sar	0.694821	0.289	0.289073
26	kamal pokhari/pakwati sar	3.078244	1.067	1.057767
27	kapal mochani(todanochani)	3.73264	2.54	1.364
28	sooraj kund	0.545	0.412	0.38
	total	49.714535	36.3419	32.684326



In case of janakpur , number of ponds are disappear and enchroached due to haphazard urbaization while similary, in case of Uganda has one of Africa's fastest population growth rates at 3.03%, with urban areas growing even faster at 5.1%. Kampala, the capital, holds about 25% of Uganda's

urban population and has a high density of around 9,000 people per square kilometer. This density has led to challenges like overcrowding, informal settlements, and encroachment on wetlands and protected areas. Rural-to-urban migration has been a major factor in wetland encroachment, as many continue farming practices in the city, affecting these vulnerable ecosystems. (ISUNJU, SPATIOTEMPORAL ANALYSIS OF ENCROACHMENT ON WETLANDS: HAZARDS, VULNERABILITY AND ADAPTATIONS IN KAMPALA CITY, UGANDA , 2016)

4.1.2. Land Tenure Dynamics-

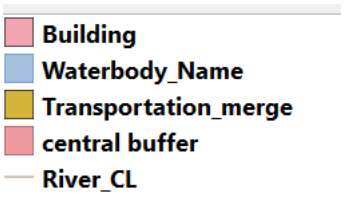
Land Tenure Dynamics in Janakpur: Gentrification And Urbanization

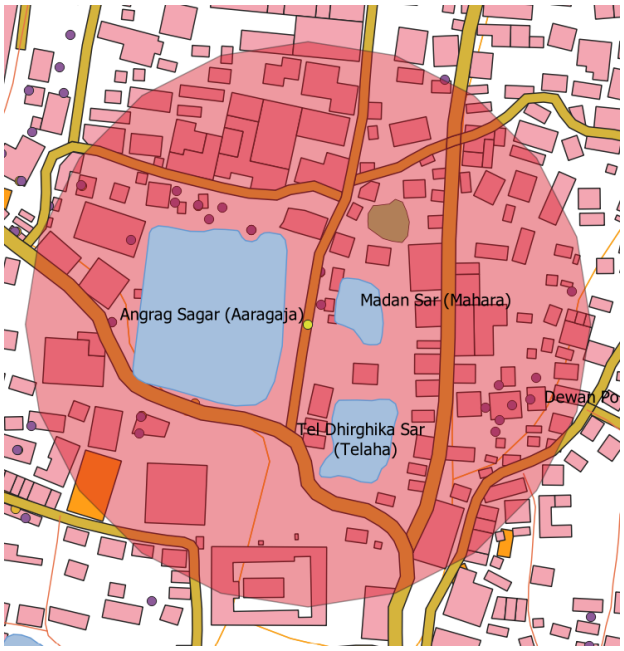
In Janakpur, the surge in land prices owing to infrastructural development and urbanization has instigated a process of gentrification. This transformation is evidenced by the shift in settlements from a social fabric to a predominantly commercial and economic one. This shift reflects a prioritization of economic interests over environmental considerations which shown in below sketches:

Figure 9 sketches of different phase of forced eviction and resettlement.

The sketches depict the cycle of urban transformation in Janakpur. Initially, traditional settlements are displaced, making way for the development of commercial and mixed-use areas, as well as residential blocks, often on land owned by the guthi. However, these areas might later be demolished or repurposed due to changing awareness and policies. This transition alters the social fabric of the settlement, shifting it from a traditional community-oriented environment to a more commercially driven and economically focused one. Notably, the process also impacts the pond basins, as these spaces are affected by the changing urban landscape. Presently, there is a resurgence in efforts to revive the ponds, indicating a renewed emphasis on environmental considerations and sustainability.

Present condition of the pond and surrounding
are illustrated in below:





In core area, with in a 200m radius, there are:

Percentage of buildings	Types of buildings
70%	Commercial buildings i.e, hotels, resturants
20%	public buildings i.e Janaki mandir, bibah madap, Nepal telecome office and water supply tank
10%	Resident cum commercial

- Fully paved road i.e impervious material.
- Fully commercialized surroundings

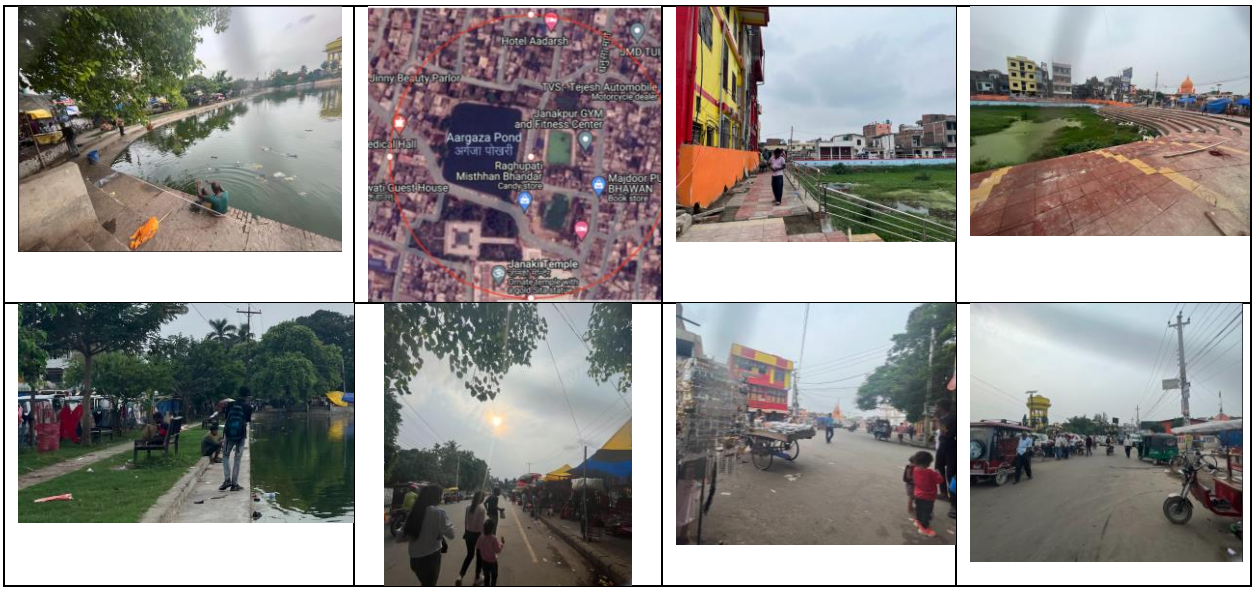


Figure 10 surrounding urbanization in present condition

The dynamics of the other two ponds in the fringe area take on an entirely different character, despite being interconnected within a 300-meter radius buffer and linearly aligned with railway lines. This scenario is depicted as follows:

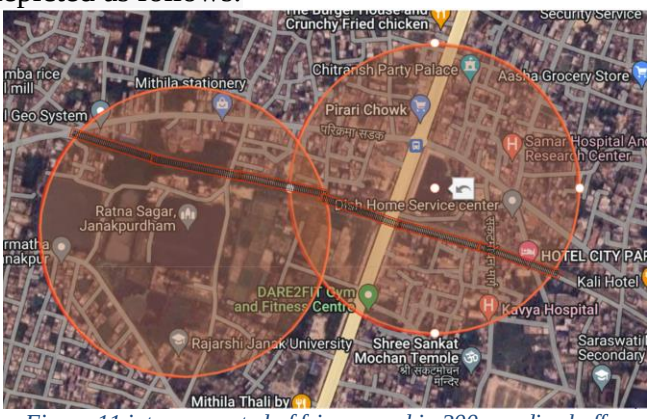


Figure 11 interconnected of fringe pond in 300m radius buffer

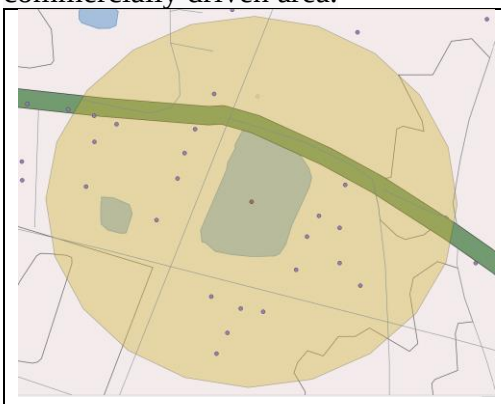
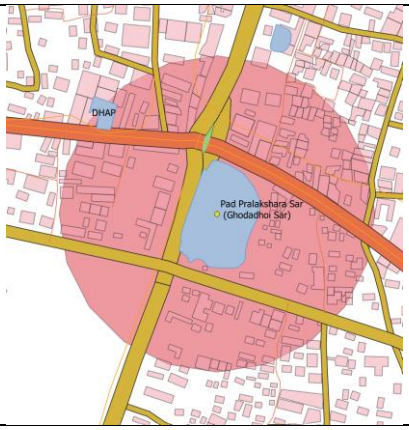
Inner fringe area

Based on local community insights and discussions, it's revealed that the area surrounding the pond was primarily agricultural land with no settlements about 50 to 60 years ago. The pond, situated at a distance from the core area, used to serve as a place where the washermen ("dhobi") would wash clothes, particularly for affluent families, earning it the local name "Dhobhiyahi." This historical usage underscores the multifaceted roles that such ponds have played in the past.

Figure 12 sketch of gordhoi in 1960s as per local discussion

Figure 13 temporarily used to wash clothes as per illustrated by locals (ebay, 2013)

The pond known as "Paadprachaalan Pond" (Gordhoi) located in the inner fringe area, separated by the Sindhuli Highway in presents is in a distinct situation. Currently, only one third of the pond remains due to the expansion of the highway, which has been widened over three times its original size. The presence of the highway has attracted commercial development and new constructions, illustrating a shift in dynamics from its previous agricultural and cattle feeding use to a commercially driven area.

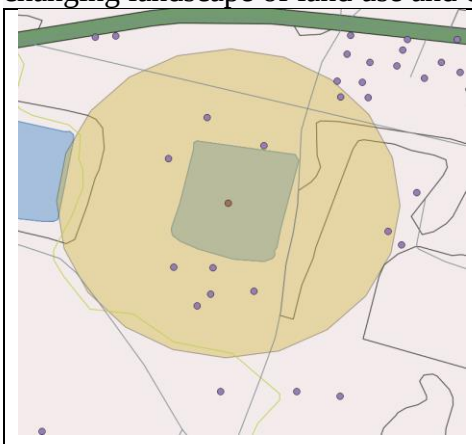
	
Map of 2042	Map of 2080

Although there is very less houses, the pond is used for cattel feeding, rice cultivation and for agricultural purposes. After that the highway proposal concentrated to commercial buildings as shown below:

In outer fringe area (Ratna Sagar)-

This pond holds a unique position as it is located within a sacred space and is connected by tertiary road and surrounded by temple. This connection to local roads signifies its importance and accessibility, which has contributed to its relatively secure status compared to other ponds. The cultural significance of this pond has played a role in safeguarding its existence within the changing landscape of land use and development.



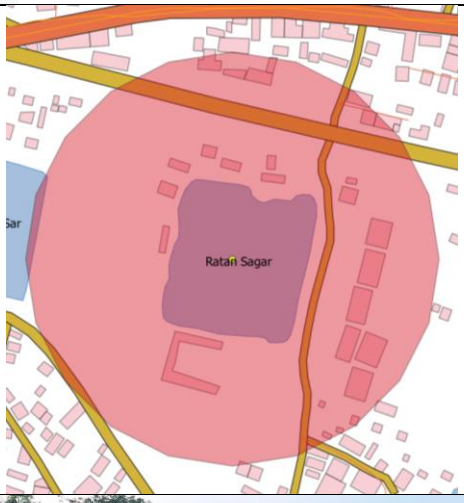


Figure 14EXISTING CONDITION

Figure 15 SPIRITUAL DRINKING TO PURIFY FROM SIN

As migrated people in janakpur are from business background that's why they give more proximity economics rather than religious and environment. Similary, Land tenure in Kampala is a consequence of its traditional and colonial history and nature of land-use is closely linked to its ownership so the migrated peoples are from agricultural background so they give importance to agriculture so the wetland are use for agriculture.

4.1.3. Draining of Wetlands for Mosquito Control

Initially, the ponds of Janakpur Dham were intricately linked with natural water sources, such as the jalad Nadi and Dudhmati River. These water bodies were not only connected to the ponds but also served as drainage outlets for the older settlements. This interconnection facilitated effective water management and drainage for the community.
However, as the population expanded and urbanization took hold, the open canals that were once vital lifelines became subject to neglect and misuse. Gradually, these canals started accumulating waste and debris, transforming into neglected patches of land resembling abandoned spaces. Unfortunately, these once-crucial channels were eventually filled and repurposed for the construction of infrastructures like roads and private buildings.

The presence of street vendors around the ponds contributes to the accumulation of waste within the pond vicinity. Unfortunately, the regular collection of waste by the authorities is often lacking. This provide a conducive environment for mosquito breedin and creates a problematic cycle in which waste accumulates, drains clog, mosquito breeding increases, and public health concerns grow.

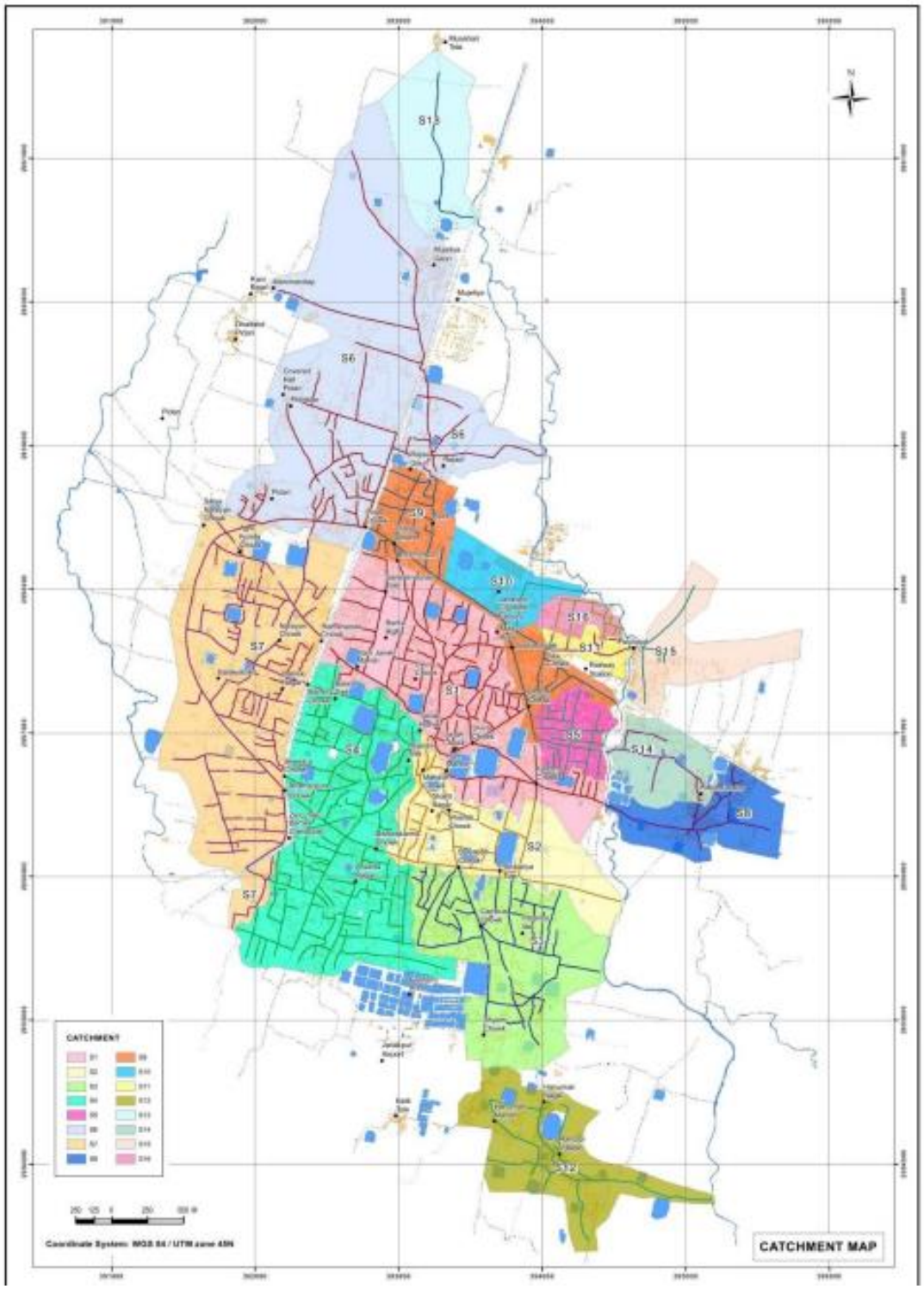
In essence, the evolving urban landscape and insufficient awareness of the importance of these water channels led to the loss of an integrated water management system, resulting in stagnant ponds that posed environmental and health challenges.

Figure 16 inner fringe pond (gordhoi)

Figure 17 core area pond angraj sagar

Similarly, Draining stagnant water from wetlands to eliminate mosquito breeding sites was recommended in 1914 by public health scholar Simpson for malaria prevention. This approach was incorporated into planning schemes and legislation. Over time, drained wetlands became

inhabited, initially by migrants excluded from colonial land allocation. Colonial settlers avoided proximity to natives due to health concerns. Urban immigrants later settled near natives in low-lying areas, continuing wetland reclamation. This led to informal settlements in wetlands, reflecting ongoing challenges in wetland preservation.

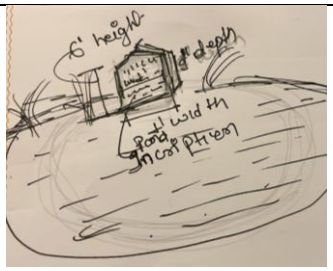


4.2. SEQUESTRATION OF BLUELAND ON THE OF SOCIAL FACTORS AND FACTORS AFFECTING IT

4.2.1. Socio-Ecological Transformation of a Pond into a Water Reservoir

4.2.1.1. Angaraj sagar

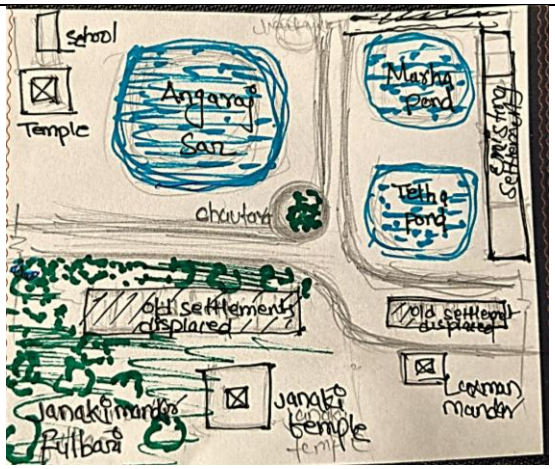
Based on Key Informant Interviews (KII) and Focus Group Discussions (FGD) with local elder groups, there are stone inscription in every pond with its significance which about 6 feet x 1 feet x 9 inch depth as shown in this sketch but during renovation these inscriptions are lost.

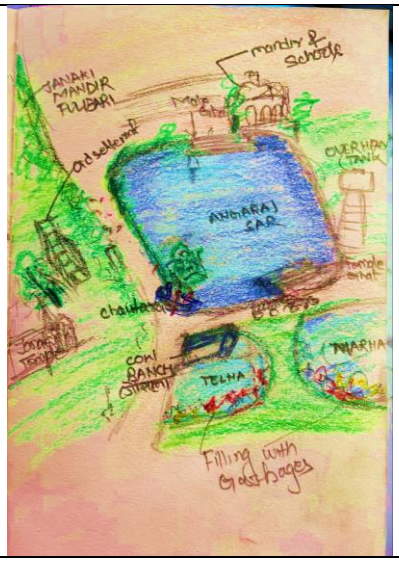


The pond known as "Angraj" holds significant religious importance. It has historical connections as a bathing site for Goddess Sita, enhancing its sanctity. Currently, the primary uses of this pond are centered around the temple premises and its religious practices.
Local settlements predominantly use the Angraj pond for bathing, and cultural activities are often organized within the pond's precincts. The temple premises draw gatherings of both locals and tourists, especially during various seasonal events such as Janaki Navami (Goddess Sita's birthday), Jhula Chath (a 15-day swinging festival), Purnima holy baths, and Ekaadasi (celebrated 24 times a year).

Moreover, there's a claim that the surrounding infrastructure, such as Nepal Telecom and an overhead tank located to the north of the pond, encroach upon the area originally designated for the Angraj pond. Additionally, roads have been constructed around this pond.

The adjacent ponds, namely Telha and Marha, have different functions. Telha pond is utilized for cattle feeding, especially due to the presence of a gaushala (cow shelter) located in the western corner of the Telha area. Additionally, both Telha and Marha ponds are used for various purposes including washing and other activities.





In this time, to whole year there are numerous cultural activities interlinked with pond are celebrated as 24 ekadashi in a year (in this day people take holybath in pond and jursital and Janaki nawmi (birthday of goddess sita) in baisakh, ganga dashara in jestha, 15 days jhula twice a year in shrawan, rishi Panchami (female bath in pond to purify from mensuration) in bhadra, Navratri, ghatasthapana, pitri pakch (water giving to their ansester) in ashwin, chath twice a year in kartik and and chaitravivah panchami (ram sita marriage) in mangsir, falgun purnima(holi),ramnawmi (birthday of god ram) ,navratra in chaitra.

- **In Jur sital**

Jur Sital is also called Nirayana Mesh Sankranti and Tirhuta New Year (Mithila new year) and villagers sprinkle 'old water' from water bodies on each other. Thal-Kado, the silt that is a byproduct of the extraction process, comes in handy when playing Holi. People believe it lends them ample strength to tackle the heat of the summer and end in magh in makar sakranti bringing end of winter. (Singh, 2023).

- **Chhath**

Chhath Puja is a folk festival that lasts four days. It starts with Kartik Shukla Chaturthi and ends with Kartik Shukla Saptami. Chhath is celebrated twice in a year. Chaiti Chhath - It is observed in the Chaitra month of Vikram Samvat. Kartik Chhath - It is celebrated at a very large scale in the Kartika month.

Thousands of devotees from across the country gather to pray at rivers, ponds, ghats, and other sources of water. According to the Hindu custom, worshippers thank Sun God and seek blessings for their progress and well being. People make offerings to both the Sun God and his wife, Chhath

Maiya During chhath ghats are decorated and water of ponds and rivers is cleaned as people worship, pray and offer fruits to Sun God and his wife by standing in the water

- **Pitra pakcha**

Pitra Paksha is a 16-lunar day period in Hindu calendar when Hindus pay homage to their ancestors (Pitrs), especially through food offerings. The period is also known as Sorah Shraddha / Pitri Pokkho. It begins on the Pratipada (first day of the fortnight) ending with the no moon day known as Sarvapitri Amavasya. Pitra pakcha or shraddha is celebrated in the bank of pond

- **Dashain**

During dashain various activity held near pond. Like during ghatasthapana the public use clay pot to hold pond water for religious purpose after that there is staphna of clay pot near every Durga temple to cultivate jumra, which is celebrated as last day called tika . While in evening time jhijhiya dance is organised to remove the negative energy and provide a recreational space to people in night time.

Figure 18 jhijhiya dance celebrated nearby pond (traveller, 2020)

Figure 19immersion of durga idol on last day of dashain

- **Kojagra purnima**

The devotee used to take a bath in pond in the morning and start the puja. Pan and makhan are cultivated from pond and offered to Lord Vishnu and goddess Laxmi.

- **Jitiya**

A three-day-long Hindu festival which is celebrated in Ashwin month. Bartalu started the fast by listening to the story of Jitmahan by bathing in the holy water bodies Gangasagar, Argajasar, Dhanush Sagar, Gordhoi Pokhari and other ponds and rivers of Janakpurdham. there is a tradition that it is customary to eat pond cultivated foods like millet bread, salty greens and fish after worship on the first day of the fast.

Figure 20 worshipping pond for the welfare son

After, infrastructure development like bibhah mandap construction, road etc then there is less activities are shown due to people detachment from pond from various activities and development of infrastructures increases the land price while decreases the land parcel so the people started to enchroach surrounding of pond for their greed as shown in below sketches.

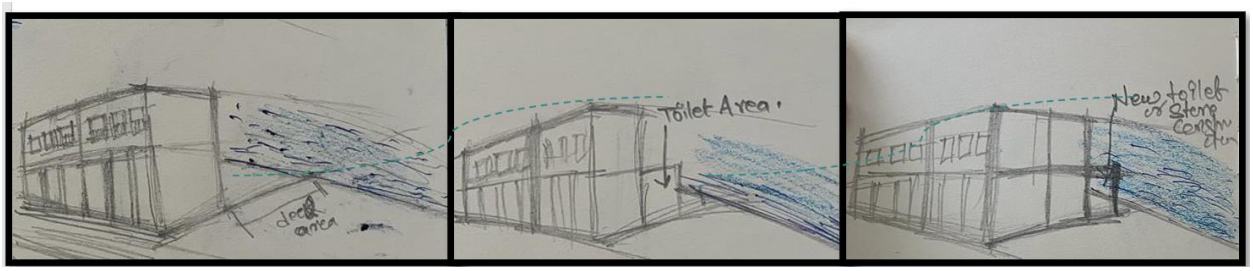


Figure 21 dynamics of reducing their glory

Then the Even most of pond surrounding area and water area are enchroached to construct the houses of pilgrimage or relative of mahanta as these land are under the temple guthi so these land are offered to their relatives with landownership. There constructional are held around 2060 B.S and dimantedaround 2072B.S.

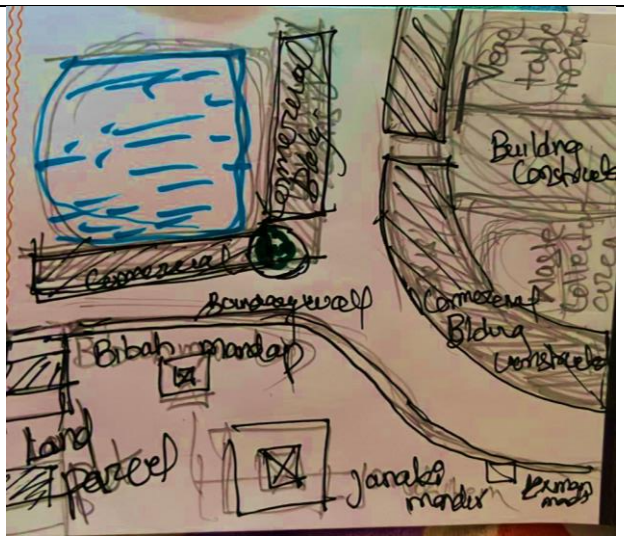


Figure 22 enchroachment when urbanisation starts

Figure 23 RCC BUILDING IN ANGRAJ POND BASIN

4.2.1.2. Gordhoi Pokhari-

This particular pond holds religious significance and is situated in ward nine. Historically, it has been utilized for agricultural purposes and as a feeding spot for cattle. Being in an area devoid of settlements, the pond is surrounded by agricultural fields. Its sacredness is emphasized by the practice of washing one's feet in its waters during holy occasions like Falgun Purnima.

However, in the present day, the landscape around this pond has undergone significant changes. The once-undisturbed surroundings, including the water area, have been affected by the encroachment of a highway. The expansion of the highway has encroached upon the pond's natural domain, altering its original condition and challenging its traditional uses. This situation underscores the complex interplay between urban development, infrastructure expansion, and the preservation of religious and cultural spaces.

4.2.1.3. Ratna Sagar –

Originally, this pond held a deeply sacred status and was primarily utilized by the neighboring temple. Its significance was particularly emphasized during religious observances such as Ram Navami (Lord Ram's birthday), Chaitra Navami, and Chaitra Dashain. Currently, this pond remains relatively well-preserved compared to other ponds in the vicinity.

In case of Navsari, Dudhiya Talav, once a seasonal water body, served various functions like fish catching, swimming, and religious rituals in the mid-20th century. However, urban development led to its division and pollution. In response to drinking water challenges, Navsari Municipality undertook a revitalization project in 1999/2000. The pond was dredged, lined with plastic, and connected to canal water from Ukai Dam. The area around the pond was fenced and trees planted. Displacement of nearby slums and effective management contributed to the successful project, making Dudhiya Talav a central visual feature of Navsari, even though it's an engineered water body disconnected from its natural hydrological cycle.

4.2.2. Disbelief, Mistrust, and Mythology

Urbanization has led to the sequestration of these ponds, distancing them from the cultural and religious activities that once defined them. The encroachment, waste accumulation, and decline in water quality have eroded people's faith in the ponds' significance.

The transformation of once-lively ponds like Blueland into wastelands reflects the disbelief that has taken root among the community. The construction of boundary walls, paved roads, and modern structures has physically disconnected people from their interactions with the ponds. These changes have created a sense of mistrust as commercialization has taken precedence over the cultural and religious aspects.

Furthermore, the mythological importance that these ponds held has been dismantled. The ponds' historical and cultural value, once deeply embedded in the community's beliefs, has been overshadowed by the negative consequences of urbanization. Accumulated waste, foul smells, and mosquito breeding have transformed these ponds into places that are no longer conducive to daily and cultural activities.

The transition from vibrant cultural hubs to neglected wastelands illustrates the interplay between disbelief, mistrust, and mythology. Urbanization and commercialization have led to the sequestration of these ponds, diminishing their significance in the eyes of the community and challenging the deep-rooted beliefs that once bound them to these sacred spaces.

NAME	LOCATION	SIGNIFICANCE	EXISTING CONDITION
PAAP MOCHAN SAGAR	NEAR RASTRA BANIJYA BANK	SINS ARE WASHED AWAY BY BATHING	WEST AND NORTH DILL SAFE, POLLUTED WATER
LAXMAN SAR(BALRAM SAR)	SOUTHEAST TO LAXMAN AAKHADA	NAMED AFTER STEPBROTHER OF GOD RAMA	ENCROACHED FROM ALL SIDES, POLLUTED WATER
TEL DHIRGHIKA SAR(TELHA)	NORTH TO LAXMAN MANDIR	A MARRIAGE RITUAL-DENAHI WAS PERFORMED IN SITA MARRIAGE	ENCROCHED FROM ALL SIDE, POLLUTED WATER
ANGRAJ SAR (ARGAJJA)	NORTH TO VIVAH MANDAP	SITA USED TO TAKE BATH HERE	ENCROACHED FROM ALL SIDES, LESS POLLUTED WATER
MANDAN SAR(MARHA)	NORTH TO TELHA	NAMED AFTER A MAN OF ANCIENT MITHILA	ENCROCHED FROM ALL SIDE, POLLUTED WATER
BIDAL SAR(BIRAT OR BARAHI SAR)	EAST TO SARASWATI MODEL SCHOOL	NAMED AFTER DEMON OF SAME NAME	ENCROACHMENT INCREASING IN EAST AND NORTH , POLLUTED WATER

RUKMINI SAR	WEST TO KANYA SCHOOL	NAMED AFTER WIFE OF LORD KRISHNA	WEST SOUTH DILL ENCROACHED, LESS POLLUTED WATER
RATNA SAGAR	NORTH TO BHOLA SINGH LIONS SCHOOL	KING JANAK USE TO KEEP TREASURE HERE	COMPARATIBELY LESS POLLUTED WATER9
DASHRATH SAR(MAHARAJ SAR)	SOUTH TO YATRI NIWAS	NAMED AFTER DASRATHA SAGAR	NOT ENCROACHED, POLLUTED WATER
MADHYAMA SAR	WEST TO RATNA SAGAR		
BIHAR KUND	EAST TO GYAN KUP	A PLACE TO ROAM AROUND	POLLUTED WATER, ENCROCHED FROM EAST SIDE
AGNI KUND	WEST TO RATNA SAGAR	PLACE FAMOUS FOR YAGNA DURING SIRDHWAJ JANAK	CLEAN WATER, NOT ENCROACHED
SITA KUND	SOUTH TO GYAN KUP	NAMED AFTER GODDESS JANAKI	CLEAN WATER, NOT ENCROACHED
JANAKI SAROWAR	BACK OF JANAKI NAGAR YOG SIYIR	NAMED AFTER GODDESS JANAKI	
PURANDAR SAR	SOUTH TO PETHIA BAZAR	NAMED AFTER GOD PURANDAR	ENCROACHED FROM ALL SIDES, POLLUTED WATER
GORDHOI POKHARI (PAAD PARCHALAN)	WEST TO PIDARI CHOWK	NAMED AFTER ONE OF THE MARRIAGE RITES	ENCROACHED, POLLUTED WATER
MURLI SAR	NORTHEAST TO VIDHYAPATI CHOWK	NAMED AFTER SACRED FLUTE OF LORD KRISHNA	ENCROACHED FROM SOUTH,WEST AND EAST ,POLLUTED WATER
DIRGHIKA SAR (DADHI SAR)	EAST TO MUNICIPALITY OFFICE	CURD WAS MADE HERE DURING SITA MARRIAGE	ENCROACHED FROM SOUTH AND EAST , POLLUTED WATER, WATER INLET AND OUTLET ARE PROVIDED BY MUNICIPALITY
DEWAN POKHARI (CHANDRA KUP)	NORTHEAST TO JANAKI MANDIR		ENCROACHED FROM ALL SIDES
DHANUSH SAGAR	EAST TOP RAM MANDIR	KING OF JANAK DYNASTY USED TO KEEP SACRED BOW AT THIS PLACE	POLLUTED WATER, DILL ARE SAFE

GANGA SAGAR	EAST TO SHIV MANDIR	HERE BODY OF KING NIMI WAS AGITATED BY THE MUNIS	EAST DILL ENCROACHED, POLLUTED WATER
RAM SAGAR	SOUTH TO RAM MANDIR	NAMED AFTER GOD RAMA	ENCROCHED, POLLUTED WATER
VISHARA POKHARI	EAST TO TIRHITYA GACHI	NAMED AS PER RELIEF FROM SNAKE POISON.	POLLUTED WATER, ROAD IN WEST NORTH, SOUTH SIDE
BALMIKI KUND(CHAUDHARY)	WEST TO BALWA TOL	BALMIKI USED THIS POND	ENCROACHMENT INCREASING IN SOUTH AND SOUTH, POLLUTED
ANURAG SAR	EAST TO RASIK NIWAS		POLLUTED, ENCROACHED FROM EAST, NORTH AND SOUTH
KAMAL POKHARI/ PAKWATI SAR	WEST TO JANAKI SCHOOL	LOTUS FLOWER CULTIVATED HERE	DILL ARE SAFE, WATER POLLUTED
KAPAL MOCHANI/ TODANOCHNI	SOUTH TO TULSI SMARAK	SKIN ALLERGY GET RELIEF AFTER TAKING BATH HERE	ENCROACHED FROM NORTH AND EAST, POLLUTED
GOPAL SAGAR	SOUTH TO GANGA SAGAR		DISAPPEAR
SOORAJ KUND	SOUTH TO JANAKI EYE HOSPITAL	GOD SUN ARISES FROM HERE DURING RAM SITA BIBAH	POLLUTED, ENCROACHED FROM ALL SIDES

Table 3 Significance of different pond

4.2.3. Socio-Economic Factors

Earlier, these religious and historical ponds played a pivotal role in defining the land use and settlement patterns of their surrounding areas. The livelihood dependency on these central ponds gave rise to a multitude of economic activities, including innovative practices like aquaponic agriculture, which utilized the pond's resources for sustainable food production. These nature-based economic endeavors not only contributed to income generation but also offered stress relief and opportunities for physical activities, thus promoting community fitness and potentially reducing healthcare expenses.

The intricate connection between these ponds and the local economy underscored their significance beyond just cultural and religious contexts. They served as centers of economic vitality, fostering a range of activities that not only sustained livelihoods but also integrated traditional practices with modern sustainability efforts. However, the transformation of these

ponds due to urbanization, encroachment, and shifting land use patterns has disrupted this delicate balance, impacting both the economic and cultural dimensions associated with these water bodies.

Figure 24 Makhan extraction by womens

Figure 25 Makhan cultivation in pond

Figure 26 fruit from pond cultivation

Figure 27 fishing pond

4.2.4. Environmental Factors

4.2.4.1. Degradation of Water Bodies

In the past, the absence of plastic usage meant that only compostable waste like straw and dry leaves were carried away by stormwater and eventually deposited in the pond. These ponds were traditionally cleaned twice a year during significant occasions such as Jursital (the Mithila new year) and Kartik Chhath. The resulting mud from these cleanings was repurposed for plastering mud houses, showcasing the sustainable practices associated with the ponds.

However, in the present scenario, the rapid commercialization and unregulated urban development have given rise to a range of problems concerning these water bodies. The accumulation of waste, improper waste disposal practices, and open incineration have led to the sequestration of these once-lively blue lands from their natural vibrancy and ecological balance. This deterioration not only impacts the ponds' ecological health but also disrupts their cultural and economic roles in the community.

Figure 28 waste accumulation near pond

Figure 29 open incineration near pond

4.2.1.4. Climate Change and Disasters

The traditional practice of using mud for plastering houses has a climate-friendly aspect, as it provides effective thermal insulation in hot climates. Additionally, using a mixture of cow dung, straw, and hash for cooking fuel exemplifies sustainable practices rooted in the local environment.

However, in contrast to these practices, the contemporary issues of waste accumulation, encroachment, and improper land use contribute to the sequestration of these blue lands. Such activities disrupt the natural balance of these
areas, leading to their detachment from the vibrant cultural and ecological roles they once held.
Moreover, the blockage of drainage systems due to these factors has given rise to various disasters. Janakpur has experienced both alluvial and pluvial floods, as depicted in the figures below, showcasing the tangible consequences of these disruptions on the local environment and communities.

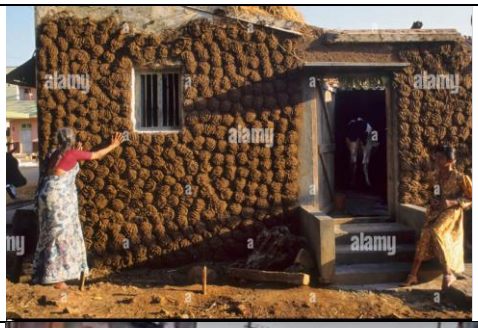


Figure 30pluvial flooding in janakpur source- Himalayan times

4.3. ENVIRONMENTAL IMAGINARIES AND CONFLICTS

4.3.1. Diverse Stakeholder Environmental Imaginaries.

4.3.1.1. Residents' Perspectives on Urbanization and Environment.

During focus group discussions with locals of the community, it became clear that the local residents had a limited grasp of the religious and cultural significance attributed to these ponds. Instead, they suggested repurposing the ponds as swimming pools, reflecting a preference for modern conveniences and contemporary activities. This shift towards modernization indicates a change in values and priorities among community members, likely influenced by changing lifestyles and external factors. This presents a potential conflict between the traditional religious importance of the ponds and the growing attraction to modern leisure activities, posing a challenge in reconciling cultural preservation with evolving societal preferences.
In Janakpur, the rising land prices have resulted in a change in how locals perceive the situation. The development of commercial complexes is often associated with progress, while ponds are increasingly viewed as wastelands due to the influence of tap water availability or the transition from ponds to wells, hand pumps, and eventually taps. As a result, the significance of ponds in Janakpur has dwindled, leading to a disconnect between their importance and the local population's livelihood.

Similarly, residents' environmental imaginaries reflect a lack of awareness about the cultural significance of ponds, leaning towards modern amenities like swimming pools. This shift may stem from evolving lifestyles and external influences. In Janakpur, rising land prices contribute to devaluing ponds, seen as waste lands. While Thana Talav residents view it with fear due to risks like snakes and drowning, requesting protective measures as fence was erected to protect the pond. A disconnect exists between people and ponds, influenced by tap water access and pollution. This can be seen in frustrated residents' remarks about ponds filled with garbage or waste disposal practices on the opposite side, revealing a concealed class dimension.

4.3.1.2. Policymakers' and institutional Visions and Development Goals-

Their visions and objectives guide resource allocation, regulation implementation, and project execution. Understanding their viewpoints offers insights into decision-making and policy formulation to tackle challenges posed by the evolving urban landscape and its impact on ponds and natural resources.

According to the Historical Monument Preservation Act and the Department of Archaeology (DOA), properties falling under the jurisdiction of the guthi are expected to take up their own preservation efforts. However, if this responsibility isn't fulfilled, the DOA steps in for preservation. But the present scenario reveals a lack of accountability for the deteriorating state of Janakpur's historic religious ponds. This situation highlights the isolation of these ponds from any responsible authority, as their degradation continues without effective oversight or intervention.

In Janakpur, there's a noticeable gap between different stakeholders, each asserting their authority.

As per the Local Government Operation Act 2017, a sub-metropolitan city should have parks and recreational spaces suitable for various age groups, including those with special needs. However, in Janakpur, there is a noticeable absence of such parks and recreational areas.

Nevertheless, positive changes are becoming evident due to DUDBC and janakpur sub-metropolitan city and policy implementations. Ponds like Telha and Marha, which were engulfed by private developments around two decades ago, are now being revitalized due to increased awareness and policy enforcement although in a modern way. Unfortunately, the designs sometimes overlook the ponds' significance, with concrete perimeters causing issues like poor water percolation and unpleasing aesthetics.

Similary, The Ranipokhari Restoration Project faced a significant lack of attention and care from responsible authorities from the outset, leading to widespread social concern. Restoration work holds historical importance and neglecting it disregards history. Regrettably, the reconstruction by the OKMC did not meet ethical or historical standards, seemingly prioritizing commercial motives over societal value. It's crucial to recognize that conservation, restoration, or reconstruction should not be driven by profit.

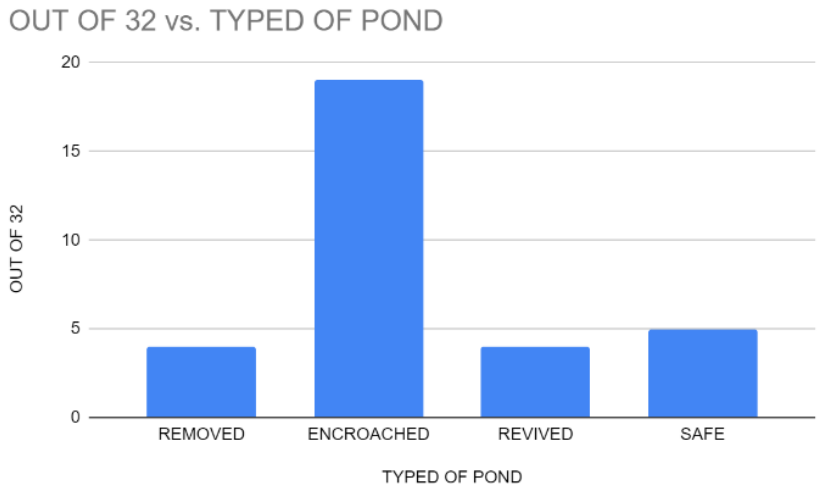
Although societal norms can evolve, a monument's historical value and integrity must be preserved without compromising its significance. The reconstruction of Ranipokhari deviated from its historical essence. The restoration plan included commercial additions like a coffee shop, restaurant, and bar for revenue generation. Yet, this approach faced criticism and violated the Ancient Monument Preservation Act, 2013, which carries legal consequences for such actions. (Karki, 2020)

5. FINDINGS

5.1. SEQUESTRATION OF BLUELAND ON THE BASIS OF PHYSICAL FACTORS -URBANIZATION AND ENCHROACHMENT

5.1.1. Population Growth And Encroachment.

Based on insights from a key informant interview with an elder from Ward Three and the Greater Janakpur Development Council, along with discussions within the core area, it was revealed that the older ponds, which fell victim to encroachment prior to Nepal's first survey in 2042, hold a historical significance not easily captured on any map further information about this are attached with annex. Notably, this older municipal region of Janakpur, encompassing the Parikrama Road, experiences higher population density due to its historical importance. Among the 32 historical and religious ponds in this area, 4 have vanished over time, while the remaining 28 exhibit varying degrees of urbanization indicators and encroachment, as depicted below:



S.N	Disappeared Ponds name	Ward	location
1	Amrit kund	6	South to aanchal hospital
2	Pyaswini sar	3	West to manaki hotel
2	Baldev sar	11	East to kanya school
4	Gopal sar	4	East to Gopal dharam shala

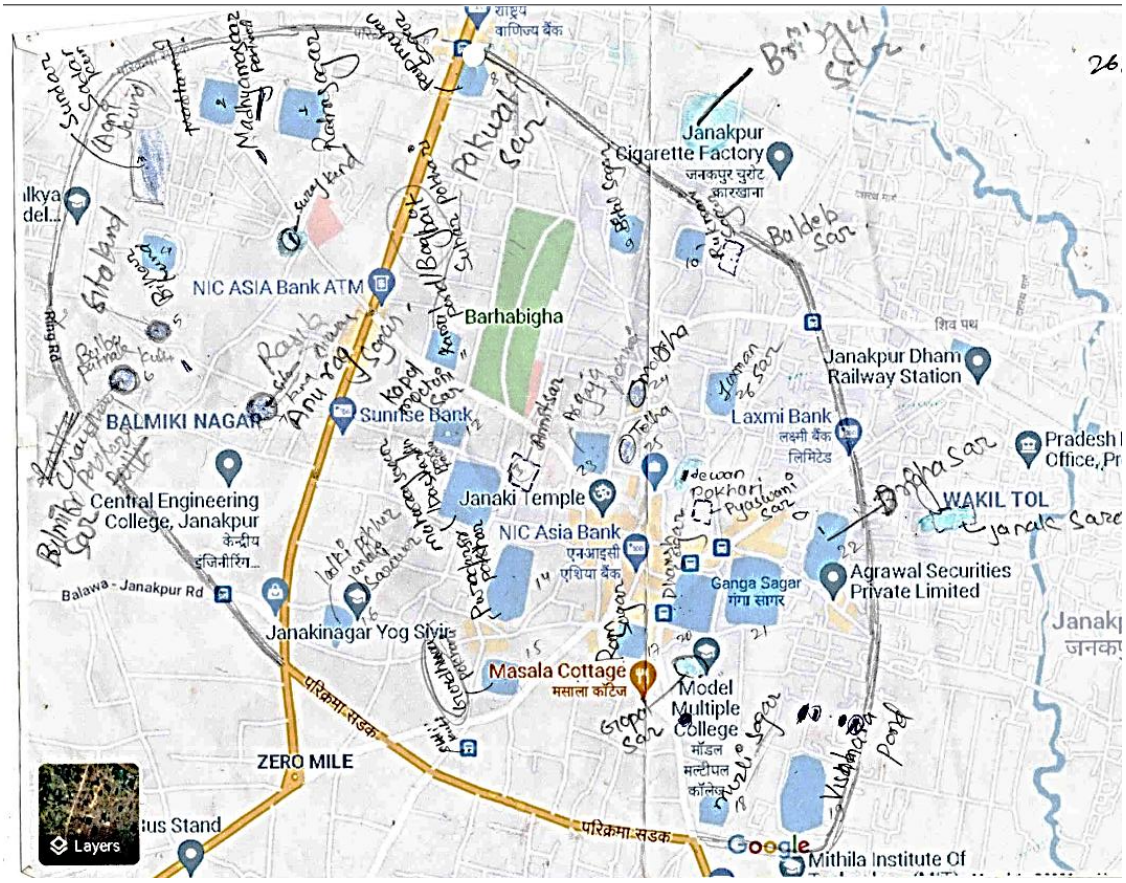
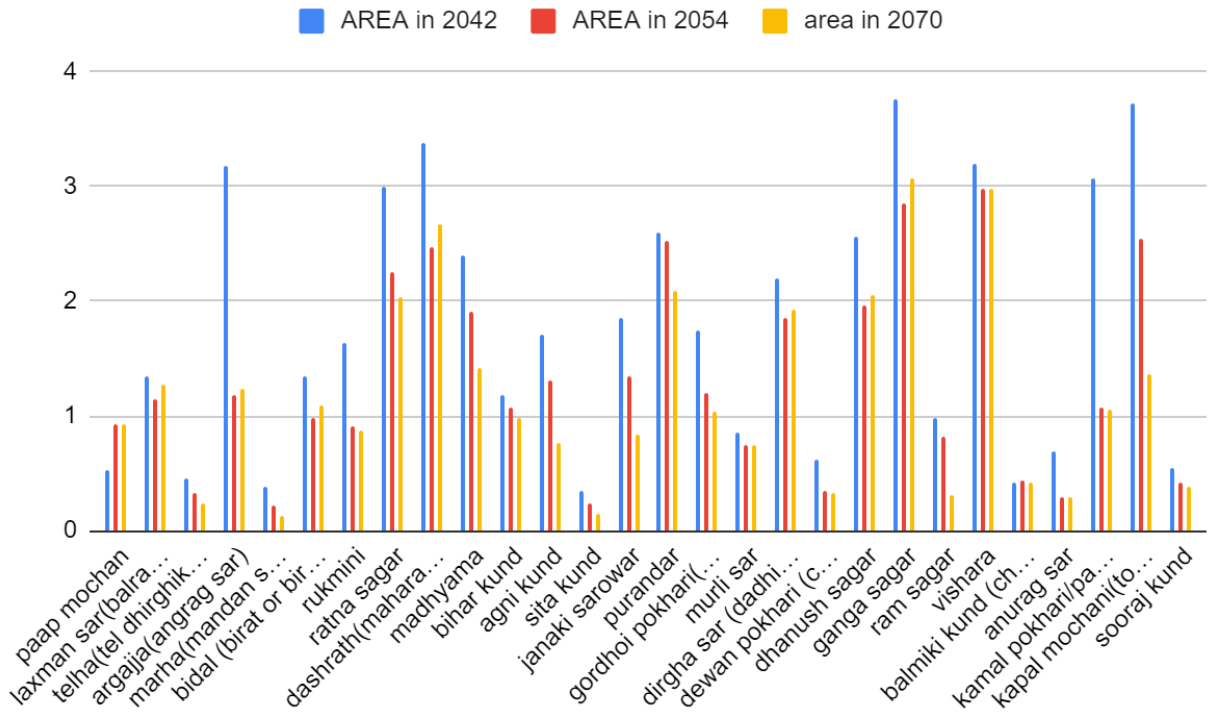


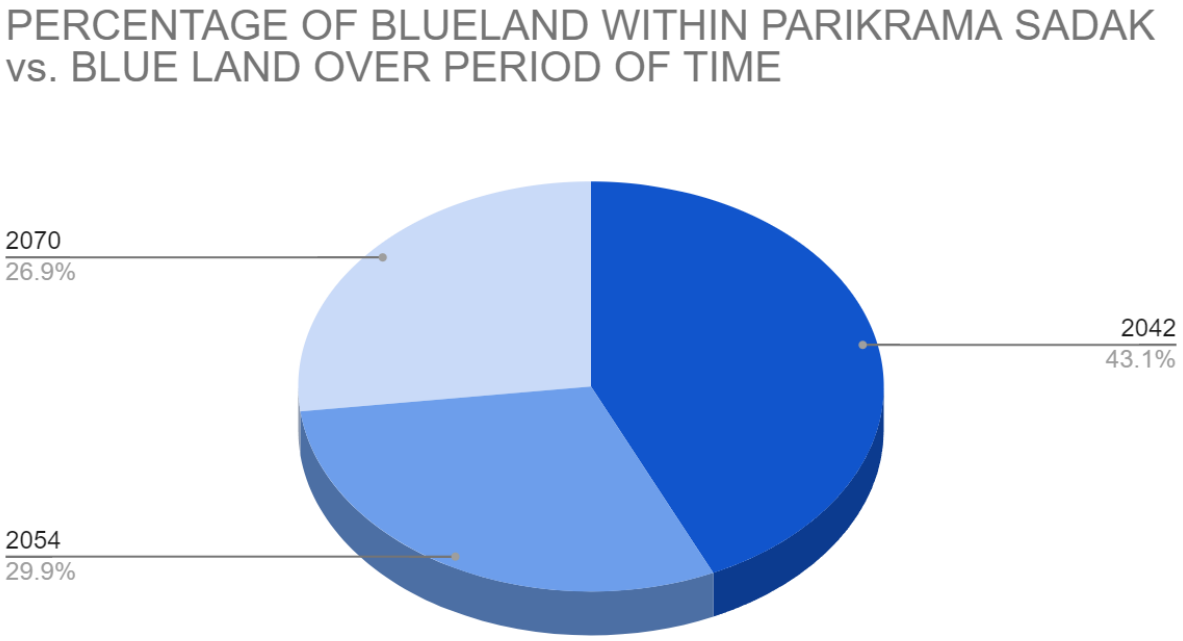
Figure 31finding the name and numbers of pond with in ring road of janakpur



In 2042
Blue land area = 49.71 hectare
Blue land in percentage =49.71 / 441.28 = 11.26%

In 2054
{ (26.29 blue and +10.05 circulation area)/441.28 total}
blue land = 8.23 % (Singh, 2002)

In 2070
Blue land area = 32.78 hectare
Blue land in percentage = 32.68 / 441.28 = 7.41%



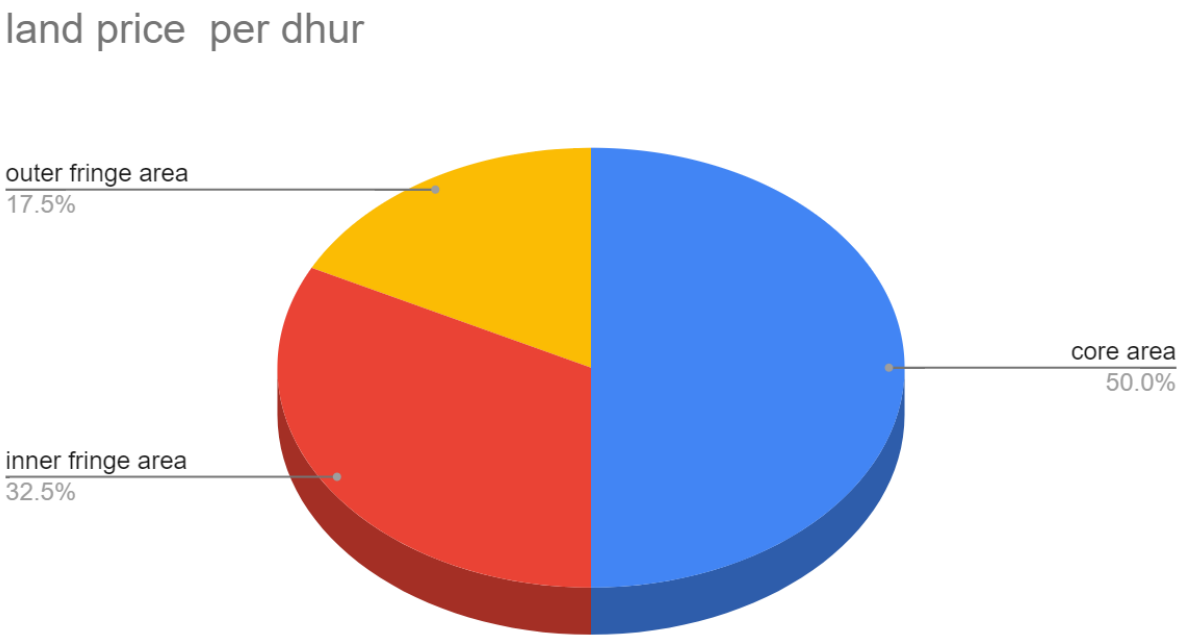
4.3.1.3. Existing Condition of Blueland

 **Bidal Sagar**	 **Rukmini Sagar**	 **Kapal Mochan Sar**	 **Kamal Pokhari**

 **Purandar Sar**	 **Maharaj Sagar**	 **Murli Sagar**	 **Vishara**
 **Dirghika Sar**	 **Ganga Sagar**	 **Dhanush Sagar**	 **Telha**
 **Marha**	 **Argajja**	 **Laxman Sagar**	 **Madhyama Sar**
 **Agni Kund**	 **Sooraj Kund**	 **Anurag Sar**	 **Sita Kund**
 **Balmiki Sar**	 **Paap mochani**	 **Ram Sagar**	 **Bihar kund**
 **Ratna Sagar**	 **Gordhoi pokhari**	 **Dewan Pokhari**	 **Janaki Sarowar**

5.1.2. Land Tenure Dynamics-

This mechanism serves to illuminate the evolution of encroachment in both core and fringe areas as per bid rent theory even in a religious city because of migration from business background. The escalating land prices and the process of gentrification within settlements stand as indicators of the encroachment progression over a span of time. The varying rental costs further delineate this trend: within the core area, exemplified by Angaraj Sagar, the figure exceeds Rs 50,000, while the inner fringe hovers around Rs 20,000, and the outer fringe records an approximate value of Rs 5000. These rental disparities underscore the influence of economic forces on the degree of encroachment on these blue land spaces.

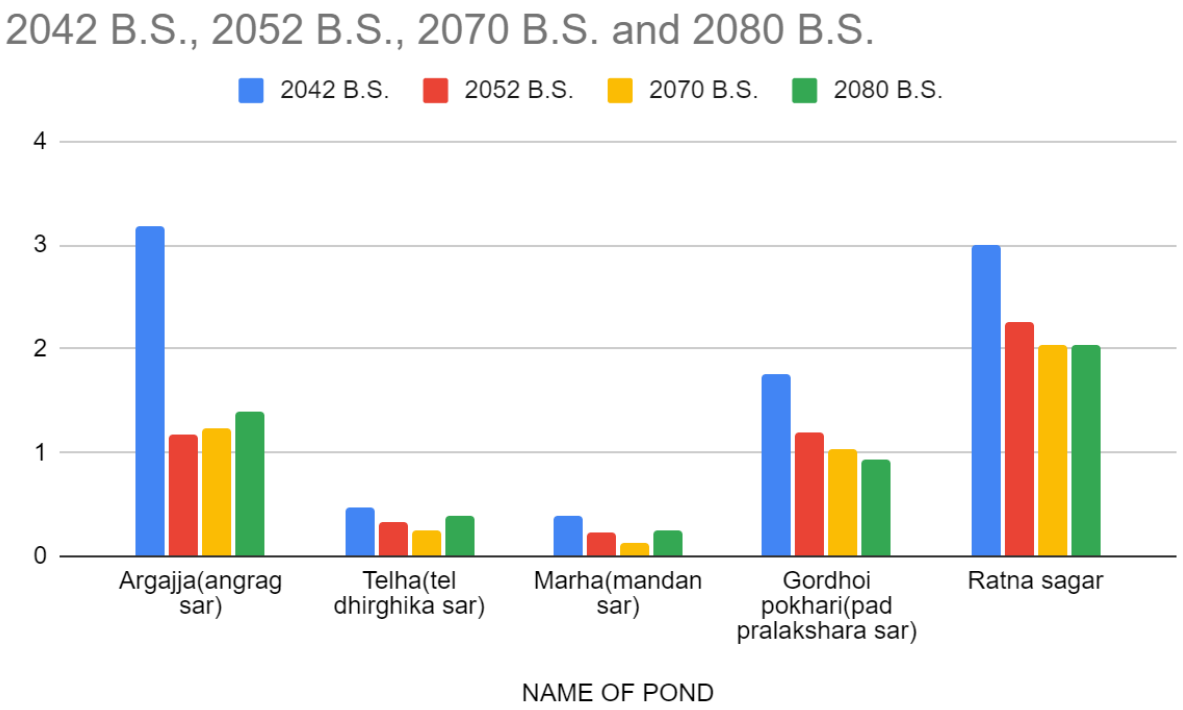


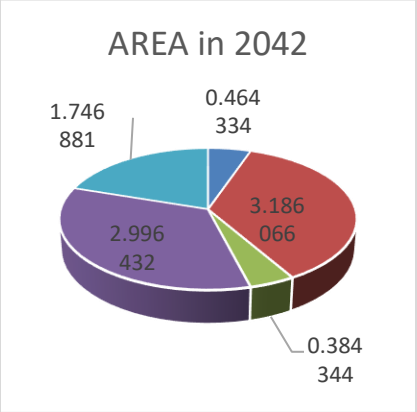
The selected criteria of these pond are differentiatited to generalize the whole dynamics of the land and blueland. In these pond, different stages are analysed as
Angraj already rennovated
telha pokhari in final stage of renovation
Marha is in intial phase of construction
Gordhoi is in middle phase of construction
Ratna Sagar is going to construct from this year.

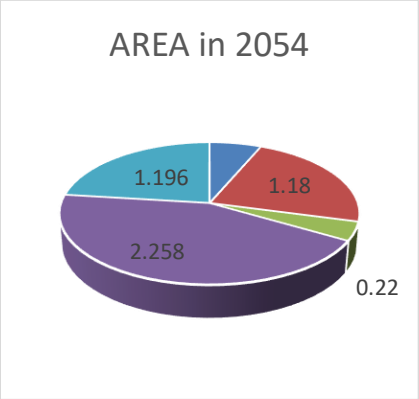
4.3.1.4. Indicator of Urbanisation

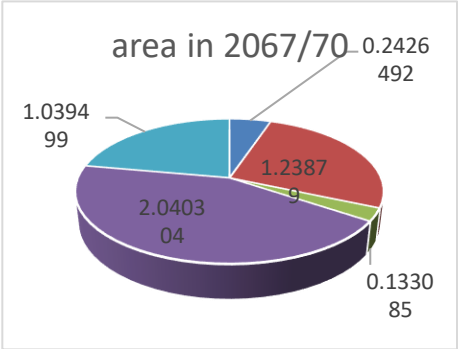
Type of urbanization	Measures	Spatial scale of measures	Core Area	Inner fringe area	Outer fringe area

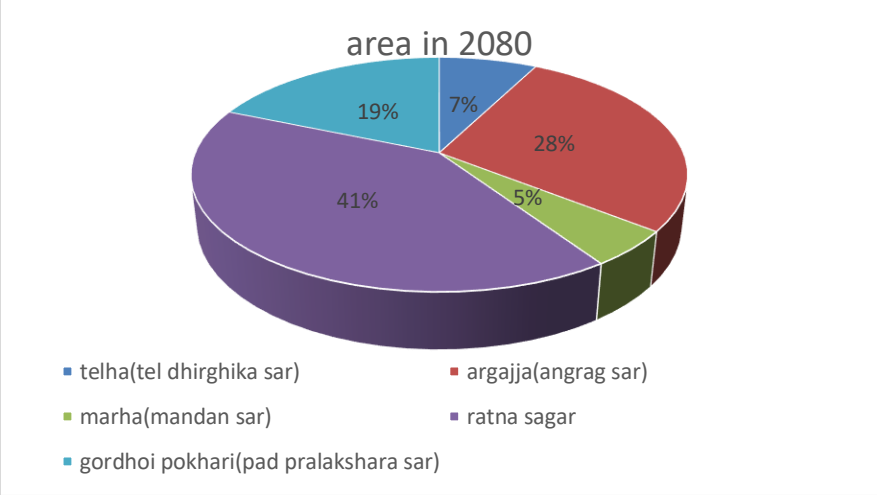
metric					
Presence of building	Area with building (low and high rise buildings)	With in 200m	Medium rise due to byelaw constrant	High rise	Low rise
Presence of roads	Raod with in buffer area	100m	Presence of metallic road	Presence of metallic road	Gravelled road
Impervious surface	Impervious surface	50m	RCC Ghats in whole perimeter	RCC Ghats from road side or half of the perimeter	Brick Ghat are in some part
Urban land use	Proportion of urban land use	200m	Commercial use	Mixed use	Residential
Distance to city center	Distance to city center	No limit	With in a city	1km far	1.2 km far
Human population	Number of residents living around pond.	200m	0	15	7









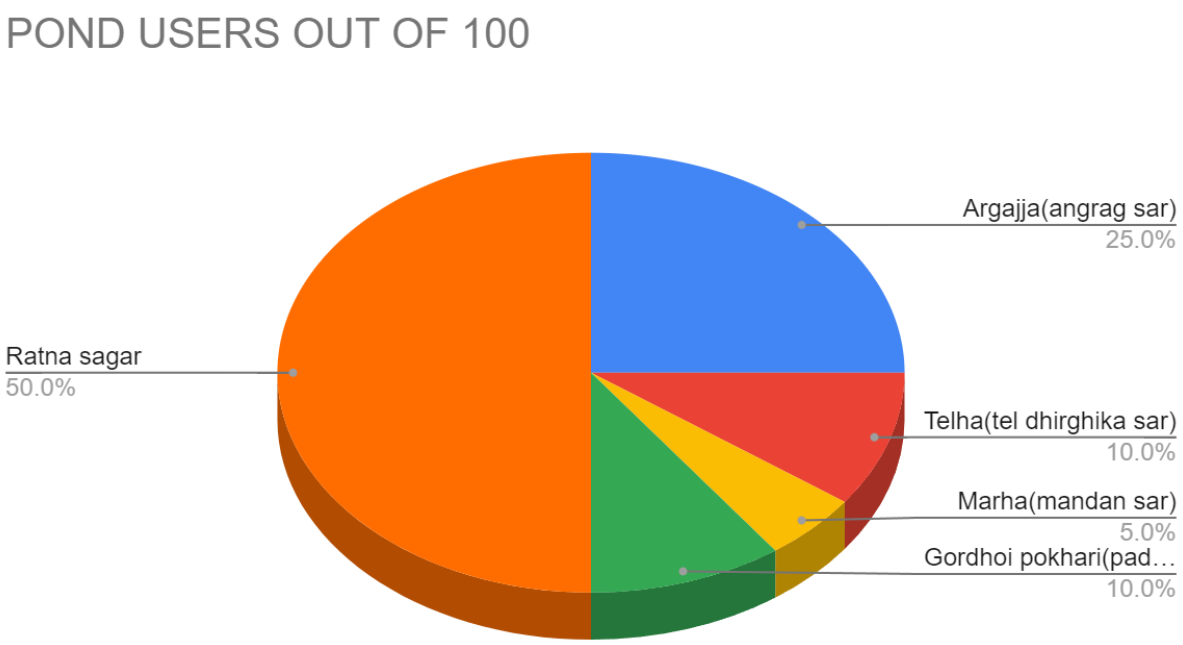


5.2. SEQUESTRATION OF BLUELAND ON THE BASIS OF PHYSICAL FACTORS -URBANIZATION AND ENCHROACHMENT

5.2.1. Socio-Ecological Transformation Of A Pond Into A Water Reservoir.

The ponds of Janakpur served not only as spaces for daily household and commercial activities but also held immense religious significance throughout the year, associated with various festivals. The vibrancy and vitality of these ponds have become disconnected from their religious and daily functions, creating a sense of separation akin to a baby being detached from its mother or a bone from skin. Given this, the revival of these ponds to their previous state becomes crucial.

The below pie chart shows the numbers of users out of 100 people on daily basis but it differe as per seasonal festivals.



5.2.2. Socio-Economic Factors

Several ponds have deteriorated to the extent that they are filled with waste, making their revival challenging and costly. The expenses involved in restoring a single pond, such as Telha, which requires 3 crore rupees for renovation along with an additional 30 lakh rupees for waste collection, could potentially be used to construct more than three new ponds excluding land costs. This situation underscores the economic burden and complexities of restoring severely degraded ponds.

The socio-economic significance of the ponds has deteriorated due to various concerns. However, as aquaphonic agriculture industries are emerging near Janakpur, there is potential to engage in economic activities that align with the existing importance of the ponds. This could involve developing different initiatives aimed at generating income while preserving the cultural and ecological value of the ponds.

The lack of awareness about the conservation of our religious identity, combined with a strong emphasis on modern economic development, has led to conflicts between institutions and the local community. The gentrification of local communities is reshaping traditional values and structures into an economically-focused landscape. This shift has resulted in land scarcity for many individuals, and even those who own land are facing challenges in meeting basic needs.

5.3. ENVIRONMENTAL IMAGINARIES AND CONFLICTS

The local community perceives ponds as undervalued, a sentiment stemming from the growing disconnection between people and these water bodies. This disconnection has been shaped by the evolution of lifestyle, transitioning from reliance on ponds to wells, hand pumps, and now tap water, alongside concerns about pollution. The absence of responsible authorities overseeing pond management exacerbates this issue. Renovation efforts often align with modern ideals, reflecting a lack of understanding or limited significance attributed by governmental bodies. This disparity leads to conflicts between traditional community perceptions and modern approaches to pond conservation and development.

Public dissatisfaction with the renovation efforts is notable, while the government justifies the dissatisfaction by attributing it to potential disruptions caused by the renovation process. However, in reality, the renovations themselves might not be up to par, which is contributing to the overall dissatisfaction expressed by the public. Nevertheless, positive changes are becoming evident in some context.

6. CONCLUSION AND RECOMMENDATION

6.1. STRATEGIC RECOMMENDATIONS

- **Community Engagement and Awareness Programs:**

- Utilize a participatory approach in the planning and development of policies, fostering collaboration among local communities, government agencies, and related organizations.
- Restore the importance of ponds through awareness initiatives within the local community, highlighting their socio-economic significance.
- Generate awareness among locals about the socio-economic and religious value of ponds, encouraging community care and sustainable development through government policies and incentives.
- Establish community organizations focused on the continuous care, maintenance, and coordination of festivals and religious events, aligning with their significance and operated by government institutions.
- Enact educational initiatives to enlighten local communities on the historical, cultural, and ecological importance of ponds.
- Organize workshops, seminars, and community events to instigate a sense of pride and responsibility among residents toward their local ponds.
- Conduct awareness programs in collaboration with the Department of Archeology, incorporating local knowledge passed down from ancestors.

- **Policy Advocacy and Implementation:**

- JSMC should revise its policy, increasing the setback from buildings to ponds from 5 meters to a range of 10 to 50 meters. This adjustment aims to promote the development of ponds, allowing for the implementation of recreational infrastructure within the expanded setback area.
- JSMC should formulate policies for pond restoration and conservation to ensure the well-being and sustainable development of ponds
- Conservation efforts should align with established guidelines, engaging local communities and government authorities to precisely define the size, shape, and area of ponds.
- At the outset, encircle the current pond area with traditional transparent materials, like an iron grill boundary, to showcase all activities within the pond premises.
- Over the long term, investigate encroached pond lands and reintegrate them within the pond boundary.
- Advocate for the incorporation of pond preservation within urban planning policies and regulations.
- Ensure the rigorous enforcement of existing regulations pertaining to pond conservation, preventing encroachments and unauthorized alterations.

- **Spiritual and cultural connectivity**

- Visual Connectivity: Establishing visual connections between ponds and temple complexes to enhance the overall aesthetic and cultural experience.
- Cultural Integration: Infusing cultural and spiritual elements into climate change

adaptation strategies, creating a visually harmonious link between the environment and religious practices.
- Enhanced Aesthetics: Emphasizing the importance of visual harmony for a more integrated and meaningful relationship between the natural environment, religious activities, and disaster resilience

- **Sustainable Development Initiatives:**

- Integrate ponds into sustainable development initiatives, considering them as valuable assets for water resource management, biodiversity conservation, and climate resilience.
- Pavement should be green which has the dual benefit of encouraging environmentally friendly pavement and replenishing groundwater. Because they are permeable, rainwater may more easily be absorbed by green pavements, seeping into the ground and replenishing subterranean water reserves. Concurrently, the incorporation of solar lights guarantees an environmentally responsible and sustainable lighting solution while also improving safety and visibility in the pond area at night. This joint strategy addresses issues with energy efficiency and water conservation in a way that is consistent with eco-friendly practices.

- **Eco-Tourism and Community-Based Initiatives:**

- Explore income-generating opportunities through eco-tourism and community-based initiatives that simultaneously preserve ponds and contribute to local development.
- Emphasize the crucial use of pond guidelines to ensure the sustainable development and preservation of these blue landscapes, maintaining the city of ponds' identity.

- **Reconfigured Drainage System for disaster risk reduction and climate resilience:**

- Reconfigure the drainage system to serve multiple purposes, such as stormwater drainage, groundwater recharge, disaster resilience, and sustainable water
- Implement short-term measures like introducing dynamic features, such as fountains, to the static pond water, enhancing aesthetics without disrupting nearby temples.
- In long-term connectivity of ponds, either restoring historical connections or establishing new linkages like connecting with Jaladi Nadi in the east and Dudhmati in the west of Parikrama Sadak.
- Emphasize the ecological balance provided by ponds, contributing to disaster risk reduction by preventing water-related disasters and enhancing overall local resilience.
- Highlight the role of ponds in climate change mitigation by emphasizing their green infrastructure, aiding in water absorption, reducing surface runoff, preventing soil erosion, and contributing to groundwater recharge.
- Highlight the role of ponds in climate change mitigation by emphasizing their green infrastructure, aiding in water absorption, reducing surface runoff, preventing soil erosion, and contributing to groundwater recharge.

- **Technological Solutions:**

- Utilize technology such as Geographic Information System (GIS) mapping to monitor and manage pond ecosystems.
- Implement water quality monitoring systems to ensure the health of pond ecosystems and the safety of water usage.

- **Incentivize Conservation Practices:**

- Incentives like (financial incentives, recognition and rewards, tourism and economic opportunities, capacity building, cultural and social events organizer) to the local community to encourage them.
- Provide incentives for communities or individuals engaged in pond conservation efforts, such as tax benefits or recognition.
- Establish reward systems to encourage responsible usage and maintenance of ponds.

- **Collaborative Research and Documentation:**

- Encourage collaborative research initiatives involving local universities, pond-oriented organizations, and community members to document the historical and cultural significance of ponds.
- Create a repository of knowledge, including oral histories and traditional practices related to ponds.

- **Infrastructure Development with Conservation in Mind:**

conservation should adhere to established guidelines, involving local communities and government authorities to accurately determine the size, shape, and area of ponds

- Integrate pond conservation into infrastructure development plans, incorporating features that enhance the ecological and cultural value of ponds.
- Implement measures to prevent runoff and pollution, ensuring the long-term sustainability of pond ecosystems.

- **Capacity Building:**

- Conduct training programs for local communities on sustainable pond develpoment, water conservation, and pollution control.
- Build the capacity of local governing bodies to effectively manage and protect ponds within their jurisdictions.

Recommendations for Collaborative Governance in Pond Preservation and Development:

During the Panchayat era, 90% of the land in Janakpur fell under the jurisdiction of indigenous independent trusts. Later, this control was transferred to Guthi Sanstha. Therefore, it is imperative for Guthi Sanstha to enhance its policies, allowing local people to become members. The heads of various branches of Guthi Sanstha should be elected or chosen from the local community, ensuring that they can effectively address the emotions and concerns of the residents. Multi-dimensional authorities are necessary to formulate policies and regulations for the development and conservation of ponds.

- **Federal Government:**

- **Pond Inclusive Planning and Policy:** Create thorough guidelines for how ponds fit into urban development and planning plans.

- **Regulation of Biodiversity, Sustainable Management, and Water Quality:** Create and implement policies that prioritize biodiversity preservation, sustainable pond management, and the preservation of water quality.

- **Allocation of Funds:** Provide substantial sums of money for pond development and conservation initiatives, with a focus on communities that are home to a sizable number of ponds.

- **Provincial Government:**

  As Janakpurdham is the capital of Madhesh Pradesh, it is imperative for the provincial government to focus on the holistic development of Janakpur, emphasizing its religious, cultural, and historical significance to make it a globally renowned and meticulously planned city. This development endeavor aims not only to showcase the strength of the government but also to serve as an exemplary model for other provinces, specifically within the broader context of Madhesh Pradesh. The strategic vision involves multifaceted initiatives encompassing infrastructure enhancement, heritage preservation, tourism promotion, technological integration, and community engagement.

- **Integrated Development Approach:**Formulate and implement an integrated development approach for every city involves strategically combining various elements to achieve balanced and sustainable urban growth. while in case of janakpur, religious, cultural, and historical elements combine harmoniously in urban planning, reflecting a holistic vision for Janakpurdham growth.

- **Tourism Promotion and Marketing:**Launch targeted tourism promotion campaigns to position Janakpurdham as a premier global destination for religious and cultural tourism, attracting visitors from diverse corners of the world.

- **Cultural Festivals and Events:**Organize and promote cultural festivals, events, and

exhibitions that showcase the unique traditions, art, and history of Janakpurdham, attracting both national and international attention.

- **Education and Research Centers:** Establish educational and research centers dedicated to religious and cultural studies, fostering academic exploration and inviting scholars to delve into Janakpurdham's distinctive heritage.

- **International Collaboration and Partnerships:** Actively seek collaborations with international organizations, cultural institutions, and academic bodies to facilitate knowledge exchange and expertise-sharing in the preservation and promotion of cultural heritage.

- **Sustainable Development Practices:** Implement sustainable development practices that harmonize economic growth with environmental conservation, ensuring the long-term viability and resilience.

- **Local Government (JSMC - Janakpur Sub-Metropolitan City):**

Community Involvement and Empowerment:

- Engage local communities in the preservation and promotion of their cultural heritage, cultivating a sense of pride and ownership among residents and fostering sustainable development.
- Awareness program should be organized to aware local for their socio-economical, and religious significance.
- To find out encroached area of the pond and boundary with transparency as iron fench.

Waste management:

- Implement restrictions on waste dumping, imposing fines, and monitor these areas using CCTV cameras and lighting for security.
- Facilitate community involvement in pond preservation efforts, ensuring local participation and representation.

Safety and security:

- Install adequate lighting and CCTV cameras to manage waste, enhance safety for people, and safeguard the pond.

Infrastructure Development with Conservation in Mind:

- Ensure that roads or infrastructure do not pass through religious complexes or disrupt them.
- Develop infrastructure projects with a primary focus on pond conservation and integration into local ecosystems.

Monitoring and Enforcement:

- Establish mechanisms for monitoring pond health, enforcing regulations, and addressing issues promptly to ensure sustained preservation efforts.
- Introduce a water bank system to monitor and maintain pond water quality.
- Execute exhibitions and programs for economic generation related to pond management.

Heritage Conservation and Restoration:

- Enforce stringent measures for the conservation and restoration of religious and historical sites in Janakpur, ensuring the preservation of their authenticity and showcasing the rich cultural legacy. Simultaneously, focus on restoring the social fabric and sense of community, allowing them to develop organically according to their own dynamics.

Technology-Driven Narratives:

- Integrate digital platforms and technology to offer virtual tours, informative apps, and online resources, thereby enhancing the overall experience for visitors and creating a global outreach.

Crisis Preparedness and Heritage Protection:

- Develop comprehensive contingency plans and crisis management strategies to safeguard cultural heritage sites, ensuring prompt and effective responses to unforeseen challenges.

Inclusive Tourism Strategies:

- Develop inclusive tourism strategies that prioritize the economic and cultural well-being of local communities, fostering a symbiotic relationship between residents and visitors while maintaining the authenticity of cultural sites like homestay development, development of kuti with well maintained services for income generation and their maintenance.

Public Spaces and Amenities:

- Design and establish well-planned public spaces and amenities that enhance the overall living experience for residents and visitors, encouraging a sense of community and cultural appreciation.

Public-Private Partnerships:

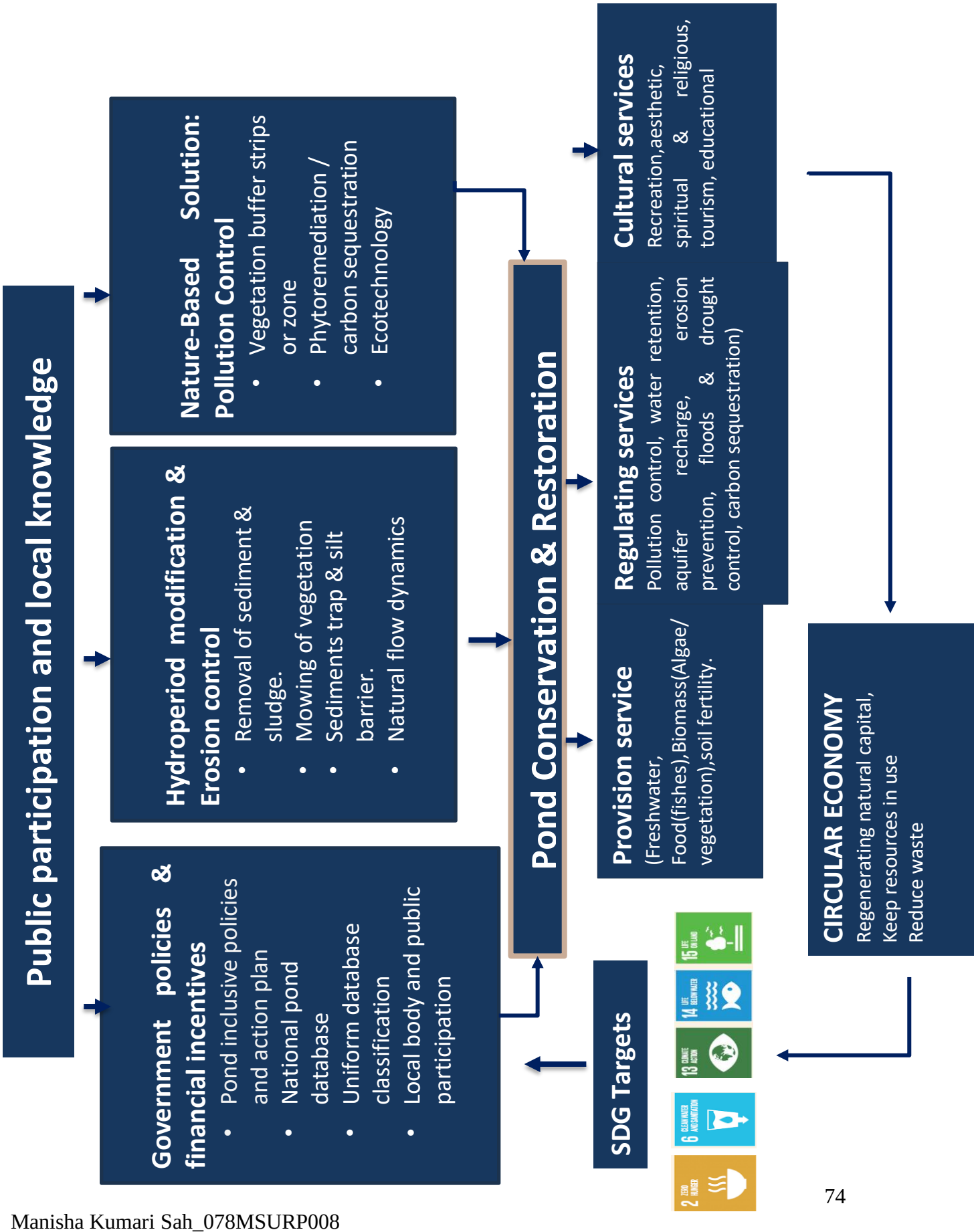
- Encourage private sector participation through collaborative ventures, fostering innovation, investment, and sustainable development in Janakpurdham like recreational developments in pondscape, fishing, aquaphonic agriculture development.

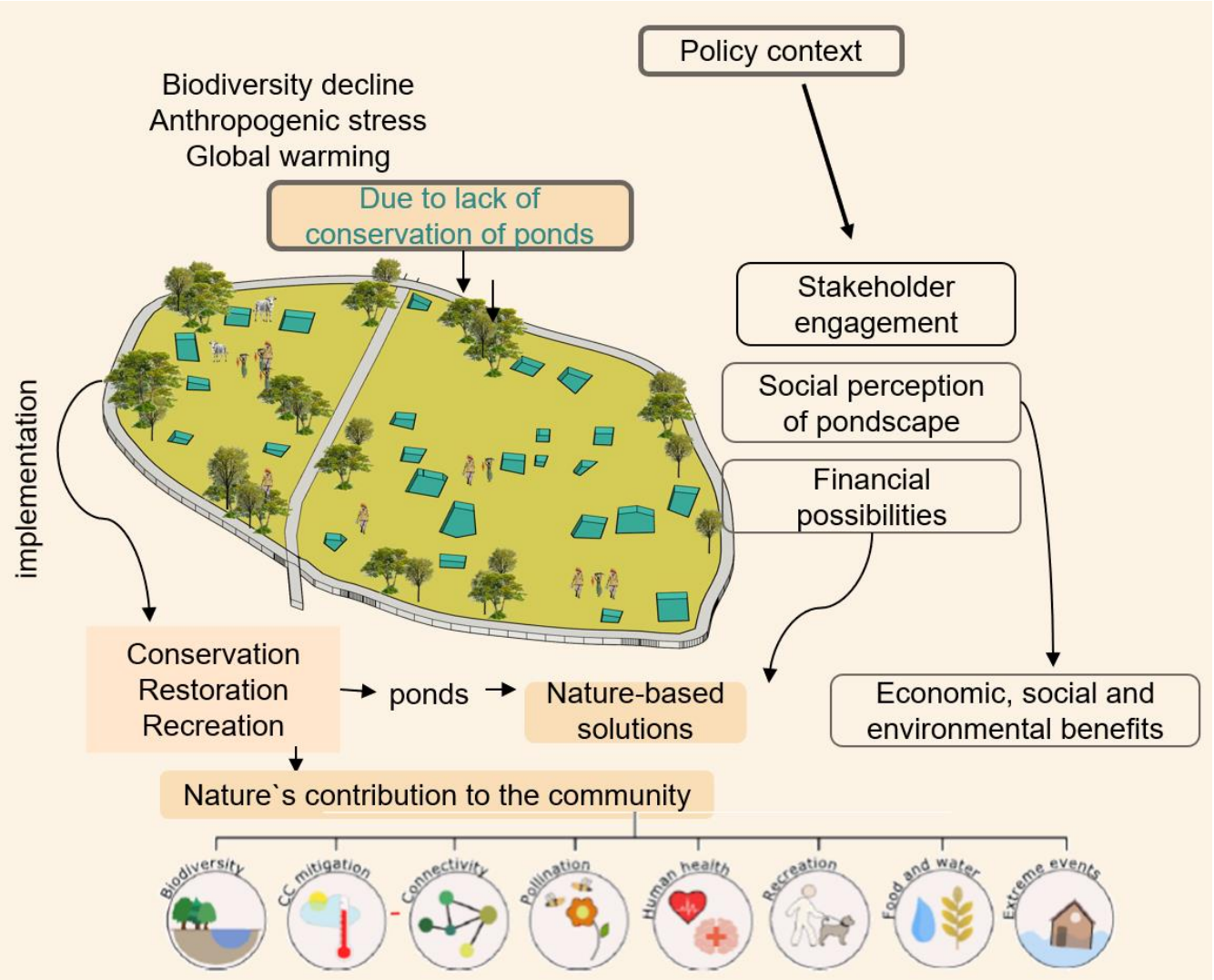
Cultural and Artistic Prominence:

- Promote and support local artists like Mithila paintings, craftsmen, and cultural practitioners like jhigiya dance, water recharging day to all pond, tree and human during jursital integrating their creations into the cultural fabric of Janakpurdham and elevating their recognition on a broader stage.

Enhanced Infrastructure and Accessibility:

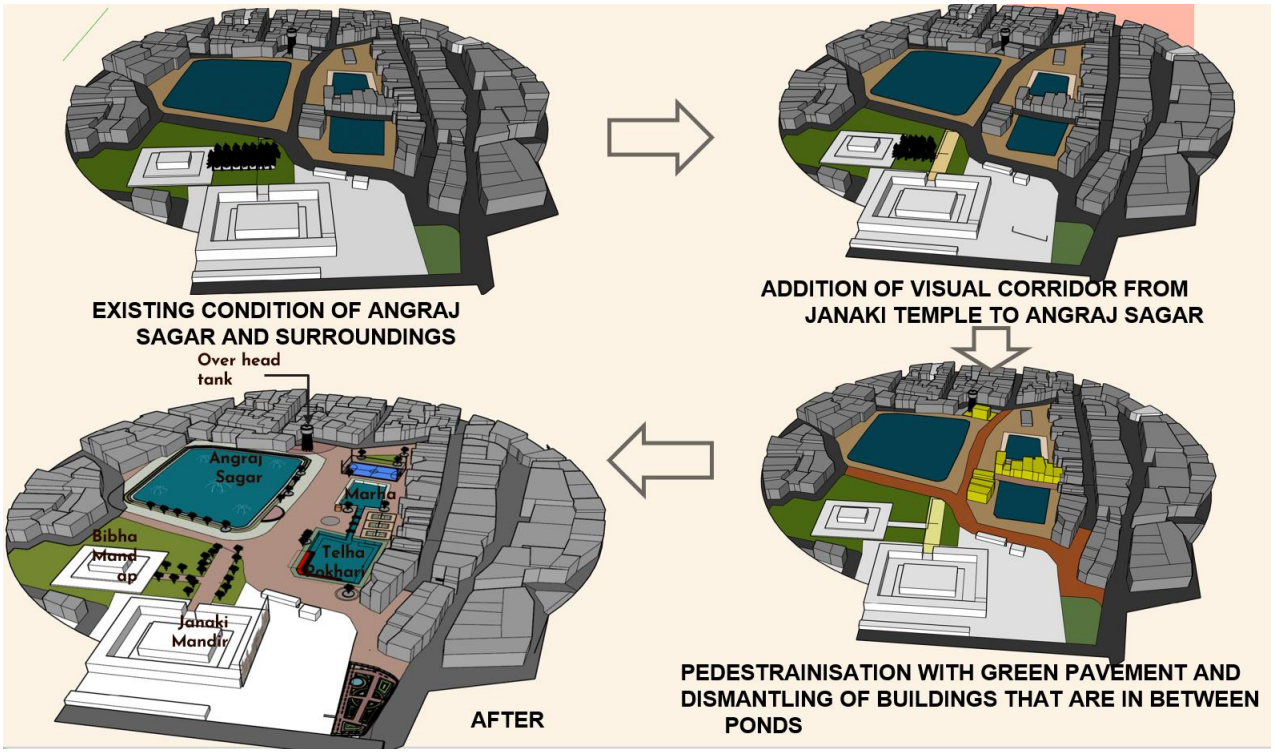
- Investments are needed in the development of infrastructure, Ramayan Circuit, and transportation facilities in Janakpurdham. This will elevate the city's accessibility, leveraging its historical role as a trade route for religious tourists and pilgrims, and positioning it as a convenient pilgrimage and tourism hub.


Public participation and local knowledge
Government policies & financial incentives
• Pond inclusive policies and action plan
• National pond database
• Uniform database classification
• Local body and public participation
Hydroperiod modification & Erosion control
• Removal of sediment & sludge.
• Mowing of vegetation
• Sediments trap & silt barrier.
• Natural flow dynamics
Nature-Based Solution: Pollution Control
• Vegetation buffer strips or zone
• Phytoremediation / carbon sequestration
• Ecotechnology
Pond Conservation & Restoration
Provision service
(Freshwater, Food(fishes),Biomass(Algae/ vegetation),soil fertility.
Regulating services
Pollution control, water retention, aquifer recharge, erosion prevention, floods & drought control, carbon sequestration)
Cultural services
Recreation,aesthetic, spiritual & religious, tourism, educational
CIRCULAR ECONOMY
Regenerating natural capital,
Keep resources in use
Reduce waste
SDG Targets


Policy context
Biodiversity decline
Anthropogenic stress
Global warming
Due to lack of conservation of ponds
Stakeholder engagement
Social perception of pondscape
Financial possibilities
implementation
Conservation
Restoration
Recreation
ponds
Nature-based solutions
Economic, social and environmental benefits
Nature`s contribution to the community
Biodiversity
CC mitigation
Connectivity
Pollination
Human health
Recreation
Food and water
Extreme events

6.2. SPECIFIC RECOMMENDATIONS

In case of Angraj Sagar



- The Hospital Road and Devi chowk Road, which were originally rerouted from Janaki Mandir's perimeter and are only meant for pedestrian traffic, highlight the need to give priority to pedestrian-friendly areas and making sure that people on foot are safe and comfortable. Furthermore, looking into more alternate routes and growing the current

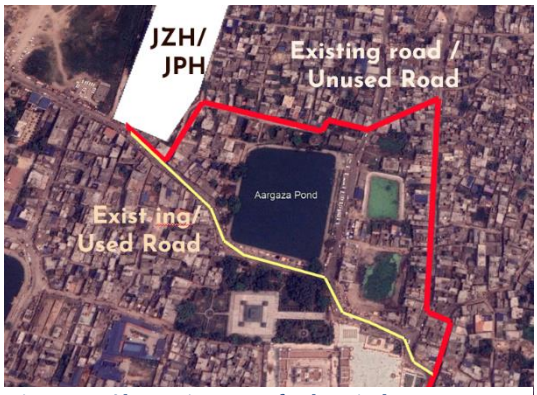


Figure 32 Alternative route for hospital

network can improve the area's accessibility and connectedness even further. This planning techniques support pedestrian-friendly settings, encourage inclusive and sustainable mobility, and attend to the many demands of the neighborhood.

- The construction of corridors to establish a connection between Janaki Mandir and Angraj Sagar is a deliberate measure to improve the area's connectivity. As of right now, Bibah Mandap's . To create a visual link with Angraj Sagar, remodeling is acknowledged to be necessary. With this renovation, the surroundings should be more harmonic and interwoven, and the significance of Angraj Sagar should be artistically and visually merged into the larger landscape of Janaki Mandir.

Figure 33 corridor development for visual and spiritual connectivity from temple to angraj sagar

- The bank areas are designed with utility spaces such as changing rooms and a religious audio-visual room for cultural and religious performances and announcements during festivals.

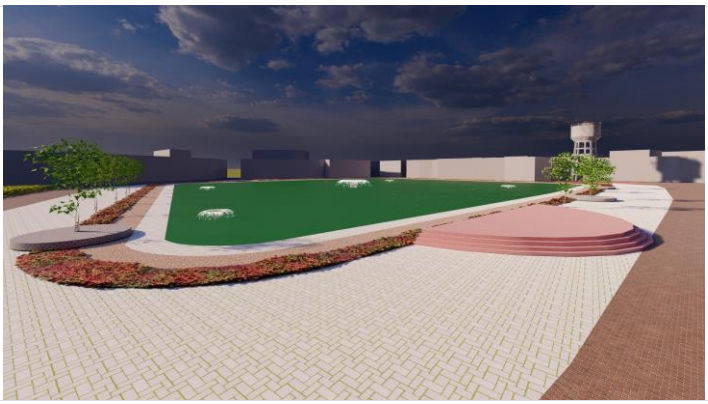
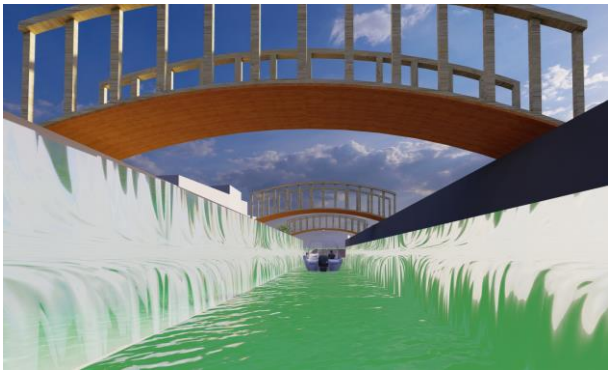


Figure 34 addition of stages for religious performances

- The vegetable market in east of Angraj Sagar should be resettle in other place and the unorganized food court alongside the road, and informal markets in the west of Angraj Sagar should be repurpose to surrounding existing building for vibrancy with pleasing ambiance.The **public building** in the north of angraj sagar is **Nepal telecome building** which should be incorporated with the pond premisses.

Figure 35 Addition of park and sport court

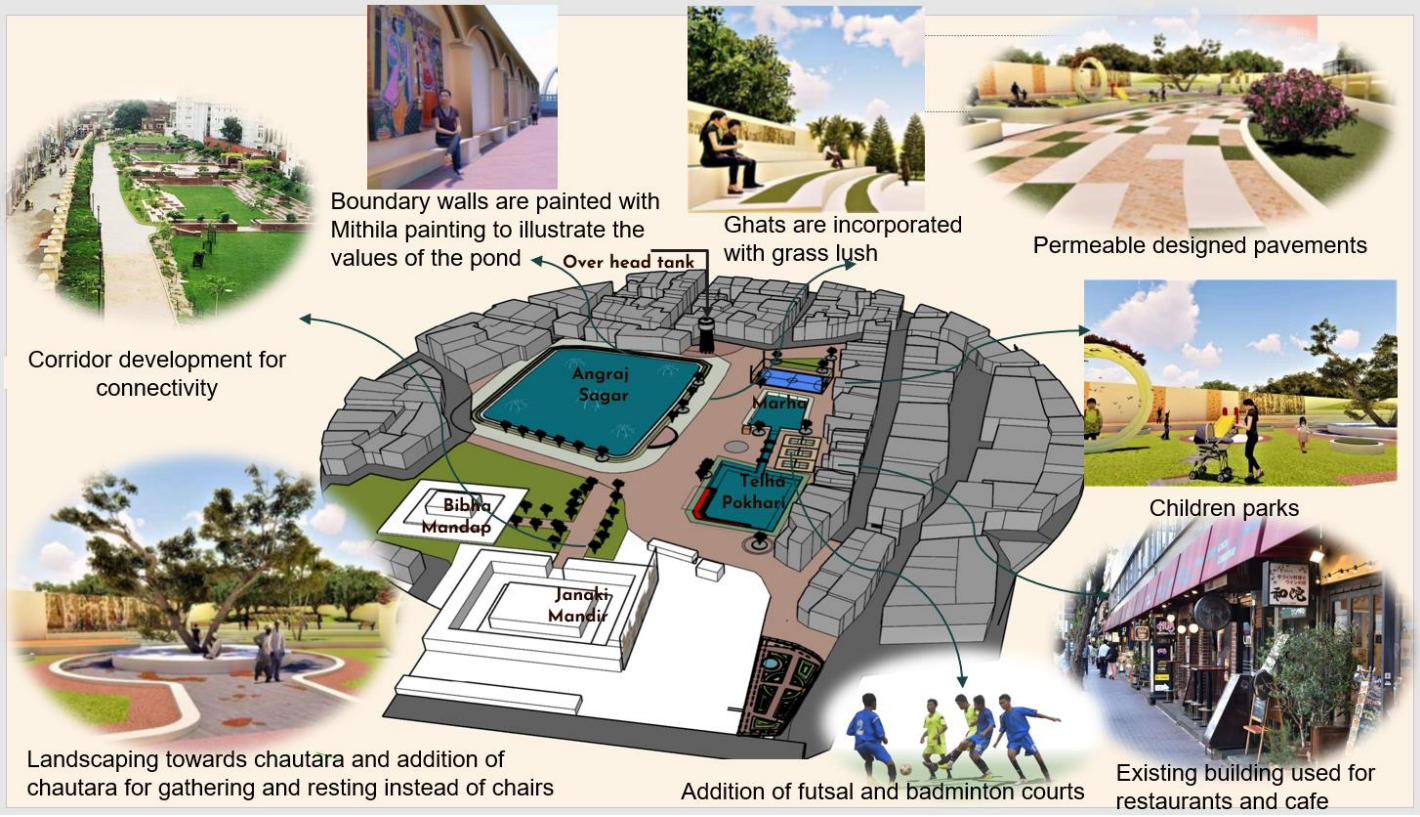


- The government should acquire the private buildings on the 6-plotted land in the east of Angraj Sagar and between Telha and Marha ponds. Subsequently, these buildings should be dismantled and redesigned for recreational purposes, showcasing the linkage between Angraj, Telha, and Marha, creating a spacious and aesthetically pleasing area within the core area.

- Telha and Marha, characterized as non-religious ponds, have been interconnected and repurposed for recreational activities. The addition of sports courts contributes to the vibrancy of the area, providing an enhanced value to Angraj Sagar.

Figure 36 telha marha pond connection and surrounding plannings

Figure 37 view of ponds from janaki mandir premesses



- To study the diminishing glory of Blue Lands over periods of time and its settlement pattern.

This research concludes that during the Panchayat era, ponds were clean, well-maintained, contributed to a better economy, had no market centers, and were vibrant with pilgrimage and religious tourists. However, in the contemporary context, ponds experience dumping around their vicinity, a decline in recreational use such as bathing, and a shift in economic activities towards centralized market centers.

- To outline the drivers leading to the degeneration of the pond and its surrounding areas.

The drivers leading to degeneration of pond are

- Alienation of pond to individual people
- Governmental intervention, institutional and individual encroachment.
- Improper Urbanization

- To reestablish the significance and values of pond following recommendations should be incorporated by pond-oriented organizations, government entities, and local communities to revive the significance and values of ponds in the contemporary context.

- **The processes of removal and separation have both occurred in the case of Janakpur** due to various influencing factors. Therefore, the optimal strategy for disaster mitigation, carbon sequestration and climate change is the conservation of ponds based on traditional knowledge while adapting their use to current needs offers a nature-based solution **to reestablish the significance and values of ponds.**

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ANNEX-I SUMMARY AND NOTES KEY INFORMANT INTERVIEWS

KII with Saroj Kumar Yadav, chief minister of province number 2 and people in his office.
Time : 14 july, 2:00 pm

- From his points of view ponds are used for economy generation by fish farming.
- Ghats are less constructed than needed.
- There is no integration between publics and community due to the cast system which is also the major reason to deteriorate these ponds. (example : different use in surrounding of ponds like egg shop is used by Muslims for the economical purpose while the same pond used to be worship by Hindu, which is conflict between mixed society

Fig: KII with Saroj Kumar Yadav, chief minister of province number 2 and peoples in his office.

KII with Manoj Sah, current mayor of Janakpur sub-metro municipality, from 2078 and peoples in his office.
Time : 21 july, 2023, 03:15 pm

Keynotes:

- According to him every water bodies were interconnected with inlet and outlet but during ADB project these connection are blocked 15 years ago, due to this blockage the property of buttom soil of pond changed its character similar to black cotton soil or terracotta , which is the negative impact on ground water discharge through ponds.
- As per him, ward 13 ,8 and 14 are flooded wards due to this reason , so in these wards soakpeats are mandatory to construct
- According to him , numbers of ponds are deteriorated vanished due to urbanization , who is responsible the municipality themselves and department of urban development and building construction.
- As per him, these water bodies should be designed as an example of Nocha pokhari ,
- As per him, to revive these water bodies , water based cultivation, water ATMS , recreational design like boating should be used.
- As per him, ghats are not necessary to construct to the edge of the water body while some technological techniques should be applied.
- As per him water bodies should be renovated as soon as possible to revive or maintain water ecology
- As per him, in ancient period ponds were clean and lime stone were used to care the water.

Fig: KII with Manoj Sah, current mayor of Janakpur sub-metro municipality and peoples in his office

Bishwanath Kumar Yadav , adhikrit from water supply, irrigation and energy ministry.
Date and time : July 18, 2023, 4:00 pm
Key notes

- About 25 years ago the boring depth near Janaki mandir area was about 100 feet, where as these days 500 feet boring gets dry during summer times.
- Currently boring depth near Janaki mandir is 480 feet, Ratna sagar and Pidari chowk area is 250 feet.
- The core reason for water scarcity in Janakpur is urbanization, RCC road, deforestation and lack of public awareness
- People do not use water bodies these days for any particular purpose and is isolated as a deck.
- People do not want to use water body's water these days as it is open source of water and polluted.
- Wells are useless these days as it is full of garbage and plastic.
- Water bodies are only used to recharge ground water, not for household work.
- About 30 years ago people were dependent on water bodies as were using it for bathing, drinking, washing and cleaning purposes.
- Water supply ministry have vision to revive the wells in coming years to fulfil the demand of growing population.
- Shallow tube wells are misused as it run 24/7, although there is no need of extra water.
- Some post artesian are inside and near the city, which signifies that we will not face any major water scarcity in the coming years.
- Over head water tank are built for public.
- There is not any core plan to tackle the water scarcity that people will face in the coming years due to rapidly growing population.
- 

Fig: KII with Bishwanath Kumar Yadav an adhikrit from irrigation, water supply and energy ministry.

KII with Jay Kumar Raut, adhikrit of industry, commerce and tourism ministry
Date and time : 19 july, 2023, 12:00 pm

Key notes.

- As per him, indu cremation rites call for families to spread ashes in a holy body of water within a day or two of the death to symbolise the soul's complete separation from the body.
- As per him people use water bodies for religious purposes during festivals such as Chhath, Makar Sankranti.
- As per him, water bodies should be well managed and clean to attract more tourists.
- As per him water bodies of our city is dirty which is home to thousands of mosquitoes.
- As per him, Some emit unpleasant smell due to lack of care.
- As per him, We should have plan to protect water bodies from soil erosion.
- As per him, maintenance of water body is lacking so that people are highly dependent on rain water.
- As per him, number of hand pumps are increasing day by day , so people prefer hand pumps over water bodies.
- As per him, Due to climate change desert face heavy rainfall where as green field face scarcity of rainfall.
- As per him, Pollution is increasing in water bodies well, forests.
- As per him, the proper management and awareness of water is lacking.

Fig: KII with Jay Kumar Raut, an adhikrit from industry, commerce and tourism ministry.

KII with Bajrang Sah, former mayor, from 2054-2059 BS
Date and time : 20 july, 2023, 04:00 pm
Key notes

- According to him the maximum water bodies are in good condition which can be renovated now to so local people are also take bath or its perception on blue land is more religious than other because of its location neatness and holy programs
- During the ADB project the connected drainage of blue lands are get disconnected
- According to him the water flows from northern side and get drain out through all the water bodies.
- As per him during the time of 2072 . The president of India Pranab Mukherjee and Chief minister of UP(yogi Aaditya Nath) and chief minister of India(Narendra Modi) had arrived during this time which caters one of the world wide marketing which interconnect world wide tourist for our religious and historical place.
- As per him Janakpur and Aayodha connection and railway line link with India make easy transaction to the holistic pilgrimage due to which the ponds contain more significance and able to attract more fund for revitalization of water bodies.

Fig: KII with Bajrang Sah, Former Mayor , from 2054 to 2059 BS.

KII with Lal Kishor Sah, former mayor, from 2072 to 2078 BS
Time : 20 july, 2023, 01:00 pm

Keynotes:

- As per him the quality of water deteriorated from previous as in present day but before 30 years the water of water bodies used for domestic purpose after that well , handpump, are used.
- As per him the transformation of water bodies in area to well in chowk then to hand pump in every household, which shift the human behaviors social inclusion to exclusion
- As per him, due to the gap in political instability of about 30 years , the encroachment around the natural water body gets started , which is the in see to phase of water resources deterioration or encroachment
- As per him, in earlier days , public are self responsible for the cleanliness and management of their surrounding and heritage but urbanization tends to dismantle the way of living and demand urban services and infrastructure which makes isolated living and segregated water bodies from human
- As per him, there are very religious water bodies out of Janakpur also which are also need to preserve as per policies and planning due to the cultural and historical value of Janakpur it gets elected as the capital of province 2, Madhesh Pradesh
- As per him, image of Janakpur city is changed as per new public buildings in Nepal like Janakpur cigarette factory gets its image
- As per him, Keshariya color used in his time as a image of city due to its religious importance in Hindu culture , he was influenced by London city , pink city
- As per him, Only 50 percentage of Telha, Marha and Gordhoi area are in present condition
- As per him, there is a by law to step back 15 feet from the water body's edge
- As per him, there is no encroachment in Ratna Sagar he claimed

KII with Dr Vijay Rajput, doctor and social worker

Time **:** 21 july, 2023, 8:00 am

- As per him, Janakpur is a water bodies city and the soil having capacity to hold water, due to which our cultivation are water based cultivation. Example: pan, makhan, fish etc.
- As per him, Mithila is fully depends on nature and it is bounded by Koshi, Gandaki rivers.

- As per him, Makhan is more proteinous than any other dry fruit, which didn't contain fat
- As per him, Darbhanga is in Mithila , whose maharaja`s flag symbol was of a fish
- As per him, Ghats are cleaned thrice a year, mainly in the time of kartik Chhath, and jursital
- As per him, Linkage of ponds is the scientific way of cleaning ponds and clearing water
- As per him, there is the lack of policy for the design of surroundings and pwater bodies.
- As per him, due to the static water of water bodies there is no process of aeration
- As per him, no any law for historical religious monuments and water resources
- As per him, Increase in plastic waste , degenerate the water bodies ecology.
- As per him, this is the present condition of the water bodies is critical condition or initial sign of water scarcity for the future generation.
- As per him, there is the lack of maintenance of water bodies ,which degraded water quality
- As per him, there is no major encroachment in Aangraj sar
- As per him, there is different ghats for males and females which are in opposites side of water bodies.
- As per him, From Bihatar Janakpur includes cleaning maintaining our religious monuments
- As per him, migrated people from other area makes the Janakpur economical growth without knowing their religious and cultural significance
- As per him, due to urbanization, change in lifestyle, the cultural, emotions, aastha etc changed
- As per him, Janakpur cigarette factory should give compensation to Janakpur for using their water resources and polluting them.
- As per him, ecological diversity are deteriorated while Ganga aarti attract most of the tourist and able to maintain their surrounding and quality
- As per him, dynamic flow of water should be maintained or focus by the government while social awareness programs should be conducted.
- As per him, public, Guthi, governments all are aware about water bodies design and management but it cannot be in practice because of monopoly or self beneficial environment
- As per him, Guthi have collected the fund from these water bodies but not working for the maintenance of these ponds

Fig: KII with Dr Vijay Rajput, Doctor and social worker,

KII with Mithilesh Kumar Karn, chair person of ward 10, Janakpur sub-metro municipality
Time: 20 july, 2023, 4:00 pm

Keynotes:

- As per him, Telgrithya is used for bathing but not for cooking purposes but Marha is used for feeding cattles.
- As per him, Nagarpalika provided thirty lakh budget on Telha, Marha for the waste management. Argajja is one of the most religious than these two which is used for holy activities like bath of goddess Sita, and to get rid from skin diseases and sins.
- As per him, the significance of Aangraj sar is that Goddess Sita used to bath in this pond in here young age
- As per him, there is not any time limit for any one for use of pond , as in ancient time people were free to use these ponds

Fig: *KII with Mithilesh Kumar Karn, chair person of ward 10, Janakpur sub-metro municipality*

KII with Prameshwor Sah, chair person of ward 9, Janakpur sub-metro municipality
Time: 19 july, 2023, 11;30 AM

- As per him, there is 4 ponds in his ward
- As per him, earlier these water bodies were used for bathing, cleaning, cooking but now these are unused
- As per him, the present condition of Gordhoi pokhari is not fully constructed ghats , lightings, degradation of water quality from which he is unsatisfied
- As per him, these water bodies are used for fishing
- As per him, the significance of Gordhoi pokhari is used for cleaning their legs during ekadashi Falgun purnima, parikarma

Fig: KII with Prameshwor Sah, chair person of ward 9, Janakpur sub-metro municipality

KII with chief secretary of ministry of infrastructure development, province number 2
Time: 17 july, 2023, 11 AM

- different types of awareness programs related to banned on plastic wastage and create greenery around ponds are done

Fig: KII with chief secretary of ministry of infrastructure development, province number 2

KII with Jagarnath Prashad Jayswal, adhikrit from ministry of forest and environment, province number 2
Time: 15 july, 2023, 3:00 AM

Key notes:

- As per him, during Mukhya Mantri Swacha Abhiyan project different types of awareness programs related to banned on plastic wastage and greenery around ponds are done
- As per him, In this project pond rejuvenation programs are done in rular areas

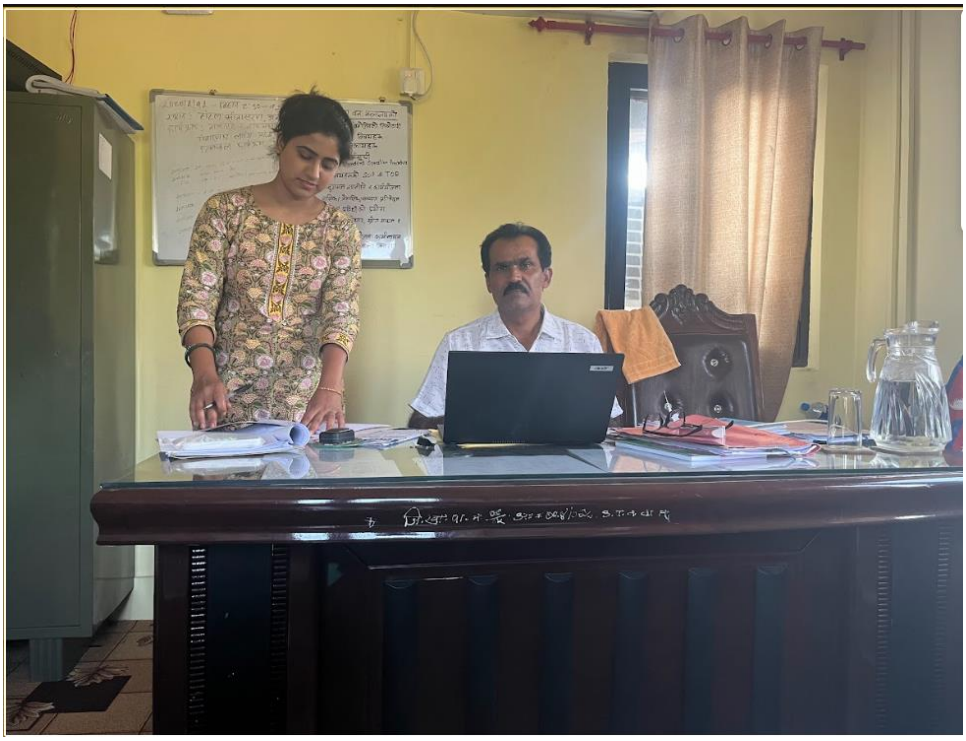

Fig: KII with Jagarnath Prashad Jayswal, adhikrit ministry of forest and environment, province number 2

KII with Sharawan Yadav, Sahari vikas
Time: 14 july, 2023, 11:00 AM

Key notes:

- As per him The DPR which are designed are Nocha , Dashrath talau park, Ram sagar, Agnikund, Gordhoi pokhari and Visahara pokhari
- According to him, by constructing ghat around the edge of water bodies reduces water level, because of blockage of water and RCC material.
- As per him, public water bodies are dugged for the wellfare of others (pani khuwaunu bhane ko mukta hunu ho)
- As per him, lakes are manmade while Janakpur include religious water bodies which is designed according to its religious purpose not as recreational area or boating purpose as per
- As per him, no any NGOS OR INGOs works on these historical religious pond, which shadow from public eye
- As per him, Ganga aarti of Ganga sagar is one of the best example for religious purpose in present condition
- As per him, Parshuram talau which is in mithilabihari muncipality which is also designed as per its religious purpose
- As per him, ground water depletion is caused due to deterioration of water bodies.
- As per him, ponds helps to maintain the temperature
- As per him, ponds are designed with natural elements not by maximum use of artificial construction
- As per him, drainage systems from the ponds are blocked and connected in manhole for disconnection of sewage treatment

Fig: KII with Sharawan Yadav, Sahari vikas

KII with Anil Das, wup mahant, Ratna Sagar
Time: 15 july, 2023, 05:00 pm
Key notes:

- According to him, there is no safety measures for people drowning in waterbody.
- As per him, people used to drink water of Ratna sagar about 20 years ago but currently used for only washing and cleaning purposes
- As per him, 2-3 person gets drowned every year.
- As per him, tourists come from different places of Nepal and India to see Ratna sagar
- As per him, It is also called Hathharani or Paap mochani sagar
- As per him King Janak bank was located in this area, from where all the accessories are gifted to God Dasharath and that is called as Mani parvat in India.

Fig: KII with Anil Das, wup mahant, Ratna Sagar

KII with Ram BHaros Kapar
Time: 15july, 2023, 12 PM

Key notes:

- As per him, the factor of deterioration of water body is caused due to encroachment on water area surrounding area and whole area
- As per him, to revive these water bodies a strong politician or mayor are required as Balen
- As per him, Mithila mahatma incorporates 72 religious and historical ponds were before 13-14 BCE Janakpur was fully covered with forest so water bodies can not be identified in topography map
- As per him, duiring 19th king of Simrangadh, Harshingh dev mentioned various ponds were in Janakpur
- As per him, three ways of encroachment of Guthi sansthan is land buy and sell, urbanization, people are not able to get

KII with mahant Tapeshwor Das, mahant of Janaki temple
Time: 15 july, 2023, 09;00 am

Key notes:

- Thousands of people comes to bath in Ganga Sagar, Dashrath talau and Ratna Sagar every year from more than 50 kilometers.
- Handpumps having boring depth of more than 400+ feet gets dry during summer
- Argajja, Telha and Marha were bigger than current area
- The dill area of most water bodies are encroached where as ponds area are still preserved and is not encroached.
- Most of the previous well have been disappeared or in worst condition .

KII with a local tourist guide

Keynotes:

- As per him, every year thousands of tourists come to visit ponds of Janakpur.
- As per him, every five years a procession (Barat) from Ayodhya comes to Janakpur.
- As per him, guests from the bridegroom's(Ram's) side took bath in Purandar Sar, not in Gordhoi.
- As per him, Dhanush sagar is the place where a part of sacred bow had fallen when Ram broke it.
- As per him, most tourist came to visit Ganga Sagar, Dhanush Sagar and Ratna Sagar.
- As per him, some ancient ponds are not in existence now.

Fig: Kii with a tourist guide

KII with local resident near Purandar Sar
Time: 12 july, 2023, 5:00 PM
Keynotes:

- As per her, all the drainage of residence near water body area is connected to the water body.
- As per her, ghat was on the one side of the water body, which is missing these days
- As per her, recently fish farming was done but currently its not done due to lack of maintenance.
- As per her, previously people used to use water body for household work such as cleaning , washing and bathing but its not done now.

Fig: Discussion with resident near Purandar Sar

KII with resident near Gordhoi
Time: 10 july, 5:00 pm
Keynotes:

- As per him, people during Holi parikrama washes their legs in this water body thus, its called Gordhoi Pokhari.
- As per him, washermen used to wash clothes here.
- As per him, the waterbody is of no use in current situation.
- As per him, the waterbody area is encroached by the construction of road and buildings.
- As per him, this waterbody is unmanaged and is totally ignored
- As per him, drainage are connected to the water body.
- As per him, the water body should be clean and could be use for different household purposes.

Fig: Discussion with resident near Gordhoi

Discussion with resident near Telha and Marha
Time: 11 july, 2:00 pm

Keynotes:

- As per him, the waterbodies were totally encroached, but is in better condition today.
- As per him, people used to throw waste in the water bodies
- As per him, the renovation of water bodie will bring more tourists to the city.
- As per him, both water bodies are in existence from Ramayana era.
- As per him Marha was encroached by the peoples whereas, Telha is encroached by the road and the peoples.
- As per him, washermen use to wash clothes in these water bodies 20 years ago.

Fig: Discussion with resident near Telha and Marha

KII with resident near Argajja
Time: 12 july, 3:00 pm

Keynotes:

- As per him, there is the lack of maintenance of water bodies ,which degraded water quality
- As per him, Increase in plastic waste , degenerate the water bodies ecology.
- As per him, due to urbanization, change in lifestyle, the cultural, emotions, aastha etc
- As per him, people still use Angraj Sagar to wash clothes and bath.
- As per them, people used this water to clean, wash, bath and feed their cattles, which is rare these days.
- As per them, no major encroachment is done in Angraj Sagar.

ANNEX-II FOCUS GROUP DISCUSSION AND LOCAL RESIDENCE SURVEY

Focus Group Discussion in Ram Mandir Guthi
Time: 13 july, 1:00 pm

Keynotes

- As per them, some water bodies of city are encroached, while some are still preserved.
- As per them, number of ponds are deteriorated vanished.
- As per them, people should be aware of use and necessity of the waterbodies.
- As per them, people prefer handpumps instead of waterbodies.
- As per them, all ponds and wells must be revived.
- As per them, water bodies could be good source for economical growth as it could attract more tourists every year.

Fig: Focus Group Discussion in Ram Mandir Guthi

Focus Group discussion with old persons near Gordhoi
Time: 14 july, 4:00 pm

Key notes:

- As per them, the pond's water was never clean.
- Washermans used to wash cloth in this pond, so it also known as Dhobyahi Pokhari.
- As per them, kids used to get drowned where as adults never used to bath in this pond due to its dirty water.
- As per them, the enhancement of road encroached the pond.
- As per them, the pond was used for irrigation purposes.
- As per them, trees were in the deck of pond, and was surrounded by forest.
- As per them, water of this pond was used to feed cattle
- As per them, the drainage were connected to the pond.

Focus Group Discussion with peoples near Angraj Sagar.
Time: 13 july, 3:30 pm

keynotes :

- As per them, there is the lack of maintenance of water bodies ,which degraded water quality
- As per them, Increase in plastic waste , degenerate the water bodies ecology.
- As per them, due to urbanization, change in lifestyle, the cultural, emotions, aastha etc changed
- As per them, the water body is in better condition than 5 years before.
- As per them, Ganga Aarti should be conducted in order to increase the significance of Angraj Sagar.
- As per them, people still use Angraj Sagar to wash clothes, which should be stopped.
- As per them, Angraj Sagar is one of the most sacred pond to bath in to.
- As per them, people used this water to clean, wash, bath and feed their cattles, which is rare these days.
- As per them, no major encroachment is done in Angraj Sagar.
- As per him, Ghats are cleaned thrice a year, mainly in the time of kartik Chhath, and jursital
- As per him, this is the present condition of the water bodies is critical condition or initial sign of water scarcity for the future generation.

Fig: Focus Group Discussion with peoples near Angraj Sagar.

Focus Group Discussion with Dinesh Kumar Singh, chair person of ward 8, Janakpur sub-metro municipality and people of ward 8.

Time: 19 july, 2023, 10:00 am

- As per him, during Shrawan jhula , Ratna sagar water is used for the cleaning purpose of temple and bathing of god and goddess
- As per him, In present day too peoples use these ponds to take bath but not use for drinking purpose
- As per him, Railway drainage is drain out in Ratna sagar
- As per him, policy requires to include for these management
- As per him, suicide case are also seen in these water bodies because of fringe location and lack of security (example: guards lightings CCTV camera) Ratna sagar DPR is designed but not designed as per their own significance

Fig :Focus Group Discussion with Dinesh Kumar Singh, chair person of ward 8, Janakpur sub-metro municipality and people of ward 8.

Focus Group Discussion with persons near Gordhoi

Time: 17 july, 2023, 4:30 pm

- As per him, he is about 80+ years old and seen stone inscription of size 1feet width 9 feet thick and 6 feet long
- As per him, Gordhoi pokhari is also called as Paad prachalan/ Dobhiyahi pokhari as washerman used to clean clothes in the pond
- As per him, major crowdness in this water body is seen in Falgun purnima.
- As per him, peoples used for bathing in this water body earlier 10 to 15 years but not used for drinking.
- As per him, Chhath festival is also celebrated in this water body.
- As per him, Purnima or ekadashi , which comes 24 times in a year , during this time this water body is used
- As per him, In northeast corner of this water body , cremation is also used.
- As per him, this water body is surronded by trees like taar gachi, khajur gachi, baith gachi
- This water body is also located in the entrance of janakpurdham from south west highway
- As per him, public are not satisfied with the design or encroachment of Gordhoi pokhari , which is caused due to political parties
- As per him, due to its location and its significance economy generation from tourist is more easy from entrance ticket
- As per him, saftey designs are not accumulated in the design , thats why people use this water body as toilet
- As per him, there is settlement called Belhi gau of about 8 to 10 houses which is in vernacular architecture (kafda roof , wooden houses are still in this area.)
- As per him, the clearance of water was so transparent the bottom points were also visible.
- As per him, In ancient time the size of this water body was about 4/5 lagga from today condition
- Chautara nearby this water body are used as gathering spaces in every timing due to its cool effect

Fig: Focus Group Discussion with persons near Gordhoi

Semi-structured Questionnaire

Gender: female { } , male { } , other { }
Age ( ) 15-35
( ) 25-35
( ) 55 and above.

LOCAL COMMUNITY

.What the use of pond were previously (above 50 years age group and current)

TIME	MALE (abv 50)	FEMALE (abv 50)	ADULTS (20-50)	others
5AM – 10AM				
10AM – 12PM				
12PM – 2PM				
2PM – 5PM				
6PM-8PM				
8PM – 10PM				

1. Which types of festivals were celebrate different months and timings ?
2. What are the socio - economical use of pond?
3. What are the safety measures used to protect from drowning.
4. What was the use of ponds during disasters. (fire)
5. What are the reasons or causes of the deterioration of pond?
6. What are the Satisfaction level of locals from the pond ?
7. why these pond are unused for bathing and other purposes but used for chath and death?
8. Road condition, material, number of houses, uses in every month (like vivahpanchami , jhula, ramnawmi , holy parikrama, death time)

For water related ministry and institutions

1. What are plannings for the ponds of Janakpur?
2. What was/is the boring depth before 50 and now?
3. Why depth of GWT increasing and why water quality degraded?
4. What is the budget plan for pond and why?

5. Why the boring depth increases mainly in Janaki chowk rather than ratna sagar, pidari chowk)
6. What are the plans growing population. (up to 50 years.)
7. How you think these ponds' liveliness can be revived?
8. What are the visions from your side for the revival of glory of ponds?

For policy makes and cross check with locals -

1. what is the historical importance of pond.

1. Angrag Sar:- Sita used to take her bath here.

2. Taildrighika Sar :- A marriage ritual-denahi performace was performed here on the occasion of Sita's marriage.

3. Mandan Sar :- A pond of middle size Named after a man of ancient Mithila.

4. Ratna Sagar :- Noun masculine, a gem, a jewel: adj most excellent

5. Gordhoi-

2. From how long you are living here?
3. why these pond are unused for bathing and other purposes but used for chath and death?
4. What are the uses of the pond early 50 years and what are the factors affecting Pond liveliness these days?
4. what are your visions to revive Janakpur ponds in todays context (52 kutti,72 kund).
5. Is there any mandatory law for contractors for fish farming or not?
6. is there any institution/organization which manage pond and provide them instruction for various uses?
7. Janakpuri ponds are interlinked with each other and its purpose?
8. how we can revive its history, use, adhesiveness i.e glory?
9. how the image of city changes.
As – janakpur cigrettee factory - Ramanand chowk gate-Geruwa city \ orange city-Madhesh Pradesh
10. Road condition, material, number of houses, uses in every month (like vivahpanchami, jhula, ramnawmi , holy parikrama, death time).

ANNEX-III CONFERENCE PAPER

त्रिभुवन विश्वविद्यालय
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गोश्वारा पो ब. न- १९१५, पुल्चोक, ललितपुर
फोन- ५५२१५३१, फ्याक्स- ५५२५८३०

Date: November 26, 2023

To Whom It May Concern:

This is to certify that the paper titled "***Sequestration of Blue Land: An Urbanization Conflict in Case of Janakpur Dham Sub-Metropolitan City, Nepal***" (Submission# **477**) submitted by **Manisha Kumari Sah** as the first author has been accepted after the peer-review process for presentation in the 14th IOE Graduate Conference being held during Nov 29 to Dec 1, 2023. Kindly note that the publication of the conference proceedings is still underway and hence inclusion of the accepted manuscript in the conference proceedings is contingent upon the author's presence for presentation during the conference and timely response to further edits during the publication process.

Bhim Kumar Dahal, PhD
Convener,
14th IOE Graduate Conference

"... ... ..."
[Placeholder for Publication Information]

Sequestration of Blue Land: An Urbanization Conflict in Case of Janakpur Dham Sub-Metropolitan City, Nepal

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Abstract

Janakpurdham is a "city of ponds" but its glory is reducing due to haphazard urbanization. The sequestration of blue land transforms this vibrant city into a lethargic one. The religious, cultural, and socio-economical hubs now face obstacles due to waste dumping, greywater drainage, and encroachment of ponds.KII and FGDs with local communities and related organizations are conducted to intervene both before and after assesssing the condition and functions of the pond. This paper aims to shed light on the tangible and intangible conflict caused due to urbanization and the sequestration of blue land from its users. There are 32 religious and historical ponds within the Parikrama Sadak (ring road) out of which four of them entirely vanished while 28 ponds succumbed to encroachments. The encroachment of ponds within 30 years is 3.85% of the area encircled in Parikrama Sadak. This highlights an urgent need for local community to unite and reawaken their efforts for the revitalization of the city. Plans and Policies should harmonize blue land with Urbanization for a positive perception and vibrant city.

Keywords
Sequestration, Blue land, urbanization, conflict, encroachment

1. Introduction

At present, more than 50% of the world's population resides in urban areas, and by 2050 it is expected to grow up to 68%The trend of urbanization of Nepal is increasing as a rocket line with a 2.9 percent urbanization growth rate from 1990 to 2018 [1]. Furthermore, it is expected to maintain its status as one of the fastest urbanizing countries through 2050, with a projected urban growth rate of 2 percent [2]. As per the census 2021, the population density of Nepal is 198 people per sq km, in Madhesh province is 633 people per sq km, in Janakpur sub-metropolitan city is 2115 people per sq km [3] and within a Parikrama sadak is about 6741 people per sq Km which show. Janakpurdham is one of the most densely populated cities, making it crucial to preserve its water bodies. Wetlands, which include ponds, lakes, and tanks, offer diverse advantages, functioning as crucial ecosystems supporting various life forms, including migratory birds, while also playing a pivotal role in environmental functions such as bioremediation, flood control, and clean water provision. Their rich biodiversity and multifaceted benefits make them valuable wildlife sanctuaries and educational hubs, often referred to as the "kidneys of the landscape." [4]. Like the city's lungs, the pond provides the majority of the oxygen needed by the inhabitants. It would be like separating skin from bone to separate it from its users. Janakpur Dham is the "City of Pond," as the pond is the evolution of settlements which finds itself at the epicenter of a profound urbanization conflict: the sequestration of its valuable Blue Land resources with its users. These historical, religious, and cultural Pond significance are under imminent threat due to the rapid pace of urbanization. The condition of ponds is often worse in underdeveloped and developing countries, as is the case in Lucknow, where the new building of the Lucknow High Court is accused of encroaching on ponds [5]. Regarding Nepal, the 'Rani Pokhari Reconstruction and Conflict Settlement' takes into account the state of the ponds as well as the conflict[6]. The physical changes in ponds are linked to societal shifts, reflecting power dynamics and cultural influences. These shifts encompass the values and vision of an improved pond landscape, captured by the concept of environmental imaginaries. This term includes both the values attached to existing ponds and visions of a 'better' pond landscape[7].

At the global level, we have committed to international agreements such as the Paris Agreement, Sustainable Development Goals (SDGs), and the Sendai Framework for disaster risk reduction. However, at the national and local levels, religious and cultural ponds are being separated from their users, leading to a decline in their splendor and causing various issues, including flooding, waterlogging, water scarcity, groundwater depletion, deteriorating drinking water quality, rising temperatures, and climate change impacts. Research conducted in Janakpur has revealed a significant 2°C reduction in summer temperatures for these water bodies when compared to those located farther away[8].

2. Research Objectives

The main objective of this research is to rejuvenate Janakpur Dham as a "city of the pond". The sub-objectives are:

- To study the diminishing glory of Blue Lands over periods of time and its surrounding settlement pattern.
- To outline the drivers leading to the degeneration of the pond and its surrounding areas.
- To reestablish the significance and values of the pond in today's

context.

3. Scope and Limitation

The research is focused on physical and social concerns of sequestration of the pond while the pond's ecological is not considered.

4. Literature Review

Sequestration is removal or separation; banishment or exile [9].The term "pond" comes from "pound," meaning a confined water body. Various definitions of ponds exist based on factors like wave action, rooted macrophytes, or light penetration. However, a universally accepted definition is lacking due to measurement complexities. In essence, ponds are still, relatively small bodies of surface water, whether natural or artificial, smaller than lakes[10]. Historical ponds worldwide hold significant cultural, ecological, and socio-economic value, yet they remain understudied. Neglect from communities and authorities has led to their disappearance, with some on the verge of vanishing. Urgent conservation measures are needed [11]. Urbanization is considered as one of the indicators of development in the modern world. The process of spreading of urban bodies in space and time is called as urbanization. As cities expand, they often encroach upon natural habitats, including ponds and other bodies of water. Depletion of ponds has put a lot of adverse impacts on the water supply, groundwater development and local climate. Having said that the present trend of urbanization cannot be abruptly stopped, it is highly required to structure and implement effective management principles to protect and promote the water bodies in urban localities [12]. Criteria used for characterizing the level of urbanization around a pond. [13].

Table 1. Examples of criteria used for characterizing the level of urbanization around a pond in a selection of recent publications, showing the diversity of approaches.

Type of urbanization metric	Measure	Spatial scale of the measure	Example of studies
Presence of buildings	Percentage of built-up area, that is, percentage of area covered by buildings	50 m-3.2 km radii	Gianuca et al. (2018)
	Percentage built-up area, that is, surface area occupied by buildings, houses, and industrial infrastructure, with roads and parking lots excluded	3.2 km radius	Beans et al. (2017)
	Percentage built-up area, that is, surface area occupied by buildings	200, 500, 800 m radii	Blicharska et al. (2017)
	Built-up area	500 m radius	Holtmann et al. (2017)
	Areas with buildings (low + high rise buildings)	200 m radius	Heino et al. (2017)
	Percentage of buildings: commercial, residential, and parking lots	1 and 2 km radii	Zhang et al. (2016)
	Areas of low, medium, and high urban residential density (six per class), based on city classification	Surrounding landscape	Mimouni et al. (2015)
Presence of roads	Road length within buffer area	10, 100 m, and 1 km	Villasenor et al. (2017)
	Road density in a buffer area	300 m to 10 km	Marsh (2017)
	Road density and urban infrastructure	500 m radius	Roe et al. (2011)
Impervious surfaces	Impervious surfaces	50, 100, 250, 500 m, 1 km, and 2.5 km	Thornhill et al. (2017)
	Impervious surface cover in a buffer area	300 m to 10 km	Marsh (2017)
	% covered in impervious surfaces	catchment	Mackintosh et al. (2017)
	Percentage of impervious surfaces: pavement, driveways, footpaths, and other human-building sites.	1 km and 2 km radii	Zhang et al. (2016)
	Cover of impervious surfaces (buildings and roads)	500 m, 2 km, 5 km radii	Straka et al. (2016)
	Impervious cover (Ontario Geospatial Data)	0.2 km to 2.6 km radii, at 0.2-km intervals	Paterusade et al. (2015)
	Percentage of surface covered by artificial surfaces (FAO GLC-SHARE)	watershed	Castilla et al. (2015)
	Percentage of impervious surface	sub-watershed	Vincent and Kirkwood (2014)
Urban land use	Proportion of urban land use in a buffer	100 m, 200 m, 400 m, 800 m, 1.6 km radii	Le Gall et al. (2018)
	Proportion of urban land use in a buffer	1 km buffer	Hill et al. (2017)
	Type "Urban," from merged types from the Land cover Florida Natural Areas Inventory	2 km buffer	Faller and McCleery (2017)
	Proportion of urban land (Land Cover Circa 2000 dataset) in a buffer	1 km buffer	Hassall and Anderson (2015)
	Land cover (urban industrial, urban residential (including gardens)) from the South African National Land Cover dataset (NLCD)	100 m, 400 m, 1 km radii	Calder et al. (2015)
Distance to city center	Distance to city center	no limit	Pawlikiewicz and Jurasz (2017)
Human population	Number of residents living around ponds	200, 500, 800 m radii	Blicharska et al. (2017)
	Human population density in a buffer area	1 km radius	Hamer and Parris (2011)
Development	Development in a buffer area	300 m to 10 km	Marsh (2017)

Figure 1: criteria for level of urbanization around pond

The term "conflict" is a widely used concept that signifies contradictions and clashes of opinions, whether involving violence or not. The emergence of conflicts in a specific context and timeframe hinges on actions undertaken by authorities that are contentious or contrary to public viewpoints[6]. Ponds play a vital role in human civilization, serving as essential water sources for domestic, agricultural, and industrial needs, and providing sustenance through food resources. Unfortunately, these freshwater ecosystems are under threat due to numerous human-induced disturbances. these challenges are crucial to preserve the ecological integrity and essential services provided by ponds in the landscape. Human-induced developmental activities can deteriorate pond water quality due to the accumulation of toxic chemicals (for example, pesticides from agricultural runoff) and sedimentation, rendering the use of ponds ineffective and risky. Ponds are suffering loss from two accounts, namely, a decrease in number and an increase in pollution load [10]. Encroachment is the term for when man-made development encroaches on natural areas, such as ponds, floodplains, and wetlands, negatively impacting the ecological functions and values of these areas through actions like filling, clearing vegetation, and changing the landscape. The habitats, natural processes, and water quality are all impacted by this intrusion. In addition to activities like land filling, vegetation removal, and landscape modifications that contribute to ecological harm like hampered processes, habitat loss, and deteriorating water quality, it also includes the extension of human-built infrastructure into areas like floodplains, wetlands, and ponds.[14]

5. Methodology

The pragmatism paradigm, which is a combination of post-positivism and interpretive approaches, is used to guide this research because the research topic deals with quantitative data from institutions and qualitative or socially constructed realities from individual users. The ontological position of this research is that urbanization diminishes the glory of the pond in the core area rather than the fringe area. Epistemologically speaking, the valid source of knowledge to find out the area of blue land earlier and now from satellite, Ariel map, and GIS mapping.

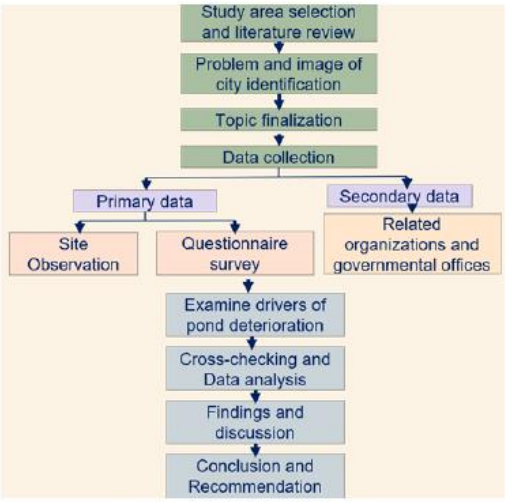

Figure 2: conceptual framework

6. Study Area

Janakpur is the headquarters of the Dhanusha district of Nepal and is about 84 miles (235) km) from Kathmandu. Janakpur is also known as Janakpur Dham (Dham in Nepali means a sacred region) [15].Janakpur the pond city is one of the oldest municipalities in Nepal established in 1962 A. D. Janakpur is an ancient, historic, and religious town overseeing 72 ponds (excluding fish ponds) managed by the Ram Mandir (temple) and the Janaki Mandir Guthi. Guthi serves as an institution responsible for overseeing socio-cultural activities and manages properties and functions associated with temples. Despite the ongoing challenges of ponds disappearing or shrinking due to rising population density, Janakpur continues to maintain 3.8 percent of its total jurisdiction area designated for blue land use. This unique context positions Janakpur as an excellent case study to explore the implications of blue land use within an urban setting. .[8]. Janakpurdham is also called as "babaan kutti bihattar kund" which means 52 ancient temples and 72 religious and historical ponds. Maximum number of historical and religious pond are within the parikrama sadak so over all encroachment level is analyzed within a ringroad and detailed study is carried out in 3 ponds and surroundings.

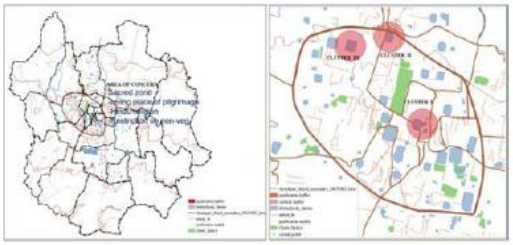

Figure 3: site area

o generalize the dynamics and the state of the ponds, we select ponds in varying stages to broadly represent their condition over time.

Case area	ward	area
Angaraj sar and near by ponds (telha and marha pond)	10	Core area
paadprakchaalaan gordhoi)	9	Inner fringe area
Ratna sagar	8	Outer fringe area

Figure 4: case area selection

In case of Angraj Sagar The Janaki Mandir is situated to the north of it. Key Informant Interviews (KII) and Focus Group Discussions (FGD) with elders in the area revealed that Goddess Sita bathed in this pond using 'uptaan,' which is thought to heal skin-related ailments with a single sacred dip. The Nepal Telecom office and road construction are the main causes of this pond's encroachment. By way of the Mahanta and Guthi Sanstha, however, private ownership has encroached upon the Telha Marha pond.

Figure 5: Angraj sagar

In case of gordhoi pokhari Based on local community insights and discussions, it's revealed that this pond is used to wash the

feet of lord Ram so it is called as Paadprakchaalaan in Sanskrit and Gordhoi in Maithali language. Before 50 to 60 years the bank area is used for agriculture and also used by washerman("dhobi") to wash clothes, particularly for affluent families, so it is also called locally "Dhobhiyahi."

Figure 6: paadprachalaan

In case of Ratna Sagar This pond, which is in better condition than the other two ponds, served as King Janak's royal bank because of its unusual location—it is connected to a tertiary road in an outer fringe area.

Figure 7: Ratna Sagar

7. Data collection

During the site observation, Google map is used for reference then 87 FGD, KII is done out of which 26% of government offices, 17% with Elected officers and former mayors, local community offices, and tourist guides and 57% with Local residents (mainly elderly residents). A qualitative and quantitative method is used to determine the sequestration of the blue land. A semi-structured questionnaire in (Maithili, Hindi, Nepal, and English) language is followed to analyze before and after intervention situations with elderly groups of a community that have been familiar with this pond for more than 50 years. A snowballing method is used to find out the elder local group. Transit walt is used to observe the existing conditions and pond users is determine by visiting pond at different timings (in the early morning and morning and in the evening) in today's context. For a detailed study of ponds a 200m radius is made to analyze the before and existing conditions of urbanization. GIS map from the survey department of 2042 and Google Earth map from 2080 is used to examine urbanization in 40 years. The missing pond identified is again cross-checked with the KII and FGD with local elders interviews, local NGOs, tourist guides, governmental offices, and elected members (politicians and former mayors and existing and ward chairpersons).

8. Finding and analysis

The level of urbanization in the case as illustrated in literature with different urbanization indications is identified and tabulated as mentioned below.

Type of urbanization metric	Measures	Spatial scale of measures	Angrajsagar	Gordhoipokhari	Ratna sagar
Presence of building	Area with building (low and high rise buildings)	With in 200m	Medium rise due to byelaw constrant	High rise	Low rise
Presence of roads	Raod with in buffer area	100m	Presence of metallic road	Presence of metallic road	Gravelled road
Impervious surface	Impervious surface	50m	RCC Ghats in whole perimeter	RCC Ghats from road side or half of the perimeter	Brick Ghat are in some part
Distance to city center	Distance to city center	No limit	With in a city	1km far	1.2 km far
Human population	Number of residents living around pond.	200m	0	15	7
Urban land use	Proportion of urban land use	200m	Commercial use	Mixed use	Residential

Figure 8: criteria used for characterizing the level of urbanisation around a pond

8.1 Examining the physical factors

8.1.1 Urbanization and Encroachment

Since Google Maps of Janakpur is only available from 2010, older ponds are not displayed, and some pond names are missing. Some ponds appear as land, while others are not shown on the map. However, through Key Informant Interviews (KII) and Focus Group Discussions (FGD) with the local community and local organizations, we have identified the number of ponds, their positions, and their significance, as illustrated in the map below.

Figure 9: finding the numbers and significance of pond

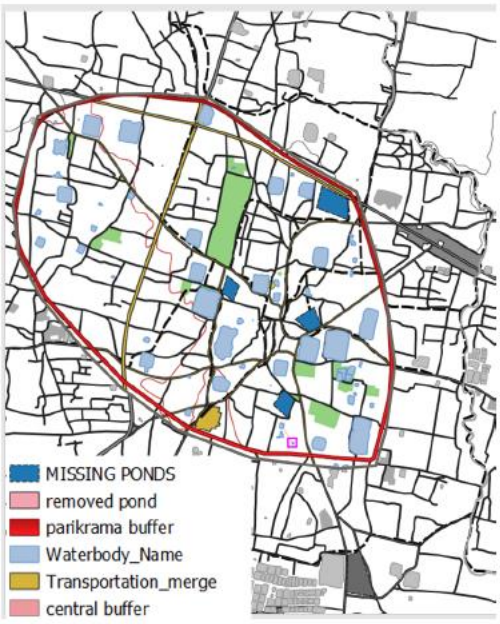

Figure 11: Removed ponds map

There are 32 religious and historical within the Parikrama Sadak out of which 4 ponds are removed while 28 ponds are in the following conditions as shown in below chart and map.

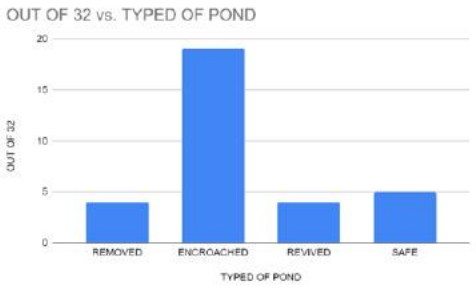

Figure 10: chart of pond condition

The percentage of enchroachment after excluding the four missing pond is 3.85% of the area encircled in Parikrama Sadak in a 30 years. The data of different period of time is shown in below pie chart

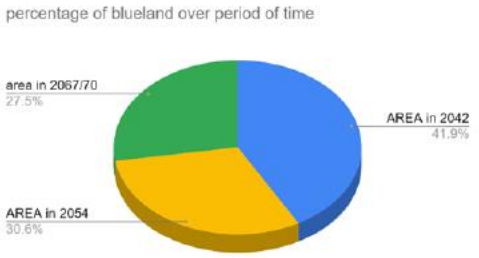

Figure 12: Blue land area over period of time

The encroachment in Angraj Sagar and surrounding ponds, Gordhoi pokhari and in Ratna Sagar from 2042 to 2080 is shown below chart.

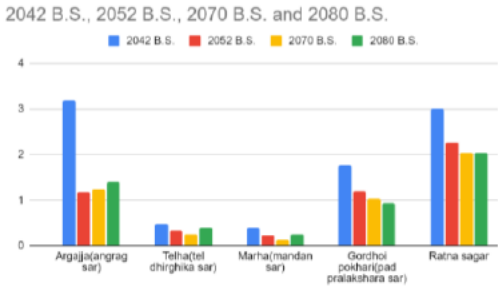

Figure 13: Condition of pond in 2080

8.1.2 Land tenure dynamics

This mechanism serves to illuminate the evolution of encroachment in both core and fringe areas as per bid rent theory even in a religious city because of migration from a business background. The escalating land prices and the process of gentrification within settlements stand as indicators of the encroachment progression over a span of time. The varying rental costs further delineate this trend: within the core area, exemplified by Angaraj Sagar, the figure exceeds Rs 50,000, while the inner fringe hovers around Rs 20,000, and the outer fringe records an approximate value of Rs 5000. These rental disparities underscore the influence of economic forces on the degree of encroachment on these blue land spaces.

8.2 Examining the social factors

8.2.1 Socio-ecological transformation

Ponds that once served religious purposes, such as for holy baths, have now been displaced by household chores among low-income groups, leading to waste dumping and detaching these sacred blue lands from their traditional users. These activities have resulted in the isolation of these ponds, distancing them from their original religious and cultural functions. As a consequence of these activities, the number of pond users has significantly dwindled, with only ten percent of the population now utilizing Angraj and Ratna Sagar, while the other three ponds have been abandoned.

8.2.2 Socio-Economic Factors

Numerous ponds have reached a state of degradation where they are now filled with waste, posing significant challenges and costs for their revitalization. The financial outlay for the restoration of a single pond, like Telha, which necessitates 3 crore rupees for renovation and an additional 30 lakh rupees for waste removal, could potentially fund the construction of more than three entirely new ponds, excluding land costs. This situation highlights the substantial economic burden and intricacies associated with the restoration of severely deteriorated ponds.

8.3 Environmental imaginaries

The concept of 'Shifting Perceptions: Modernization, Land Prices, and Environmental Imaginaries' is elaborated upon in the following points:

8.3.1 Residence perspective on the pond

During the local residence survey, it was found that 63% of respondents viewed encroachment as beneficial, as it often leads to public service improvements like infrastructure development and public buildings. In contrast, 36.4% of locals expressed concern, seeing encroachment as detrimental to their religious and cultural gathering spaces. From the residents' standpoint, a significant 84.2% expressed dissatisfaction, noting that during the pond's revival process, waste removal is inadequate, designs are unpleasing, and water quality remains subpar. However, 15.8% expressed some level of contentment, noting that even an initial effort to revive the area is preferable to no action at all. Regarding responsibility for pond deterioration, 50% of respondents held Guthi Sansthan accountable, while 29.9% attributed it to the Janakpur Sub-Metropolitan City, 13.2% to governmental offices, and the remaining 7.9% to local entities.

8.3.2 Policymaker perspective on pond

From a policy maker's perspective, 75% of them express satisfaction with the ongoing reconstruction of ponds, while the remaining 25% are dissatisfied. Additionally, 60% of policymakers reject the acceptance of encroachments, perceiving it as indicative of policy shortcomings, as illustrated in the graph below.

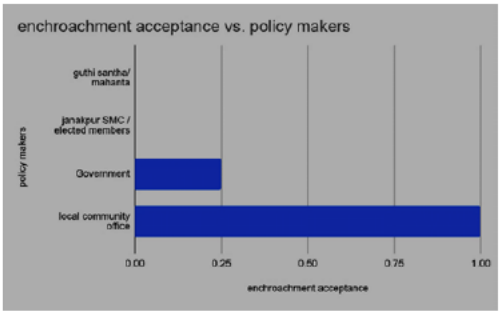

Figure 14: Encroachment acceptance

9. Conclusion and Recommendation

A participatory approach is employed for planning and policy development, involving collaborative efforts among local communities, government agencies, and related organizations, with the provision of incentives to the local community. These incentives include financial support, recognition and rewards, tourism and economic opportunities, capacity building, and the organization of cultural and social events aimed at rejuvenating their local water bodies with religious concerns.

- conservation should adhere to established guidelines, involving local communities and government authorities to accurately determine the size, shape, and area of ponds.
- Reviving the significance of ponds can be achieved through awareness programs within the local community, emphasizing the socio-economic significance of these blue landscapes.

- Enhancing connectivity between ponds and temple complexes can integrate cultural and spiritual elements into climate change adaptation strategies, fostering a harmonious link between the environment and religious recreation, disaster resilience, and sustainability.

- Reconfigure the drainage system to serve multiple purposes, including stormwater drainage, groundwater recharge, disaster resilience, and sustainable water management, thereby addressing challenges related to disaster resilience and climate change adaptation.

- The mandatory use of pond guidelines is crucial for ensuring the sustainable development of these blue landscapes and the preservation of the city of ponds.

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ANNEX-IV PLAGIRISM CHECK REPORT

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ORIGINALITY REPORT

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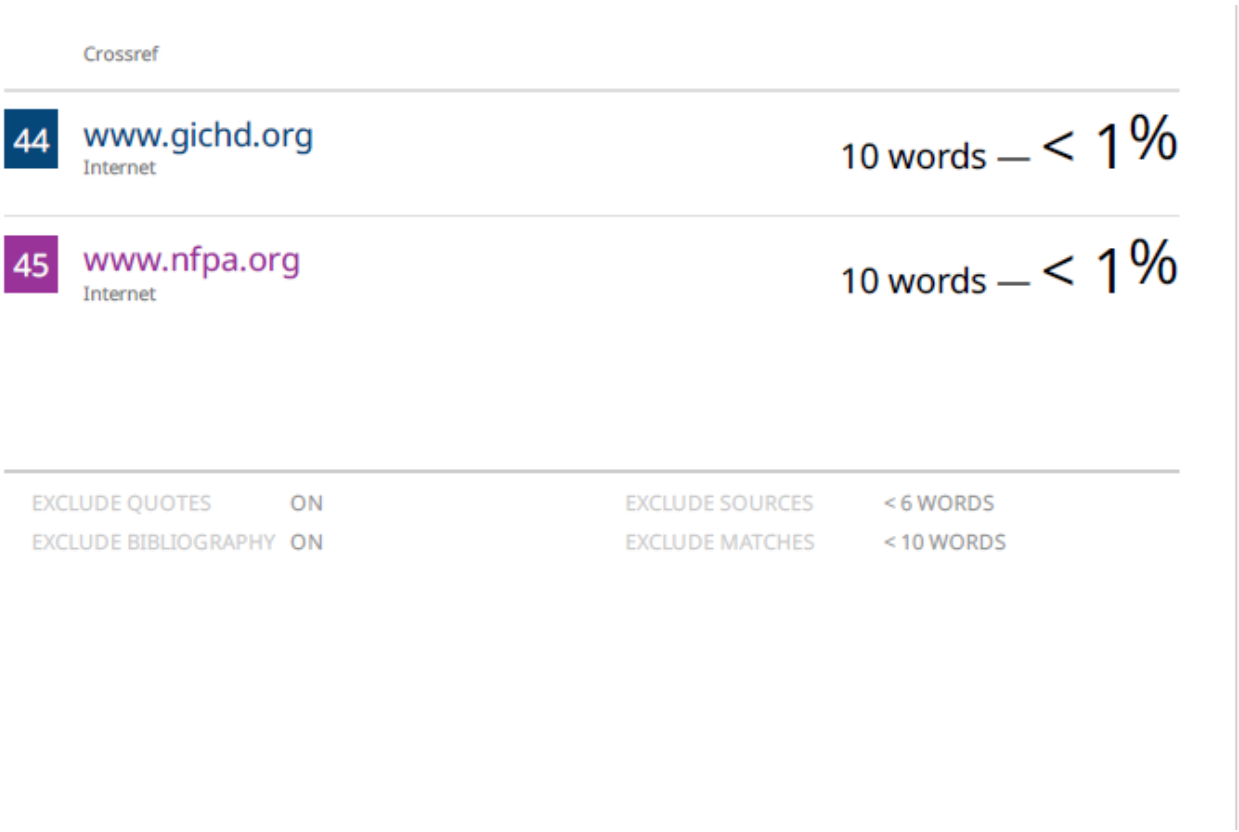
11	www.spotlightnepal.com Internet	46 words — < 1%
12	Shweta Yadav, V. C. Goyal. "Current Status of Ponds in India: A Framework for Restoration, Policies and Circular Economy", Wetlands, 2022 Crossref	39 words — < 1%
13	wgbis.ces.iisc.ernet.in Internet	34 words — < 1%
14	ouci.dntb.gov.ua Internet	30 words — < 1%
15	policy.asiapacificenergy.org Internet	30 words — < 1%
16	ccsi.columbia.edu Internet	27 words — < 1%
17	repository.smuc.edu.et Internet	26 words — < 1%
18	www.coursehero.com Internet	22 words — < 1%
19	www.pdc.org Internet	22 words — < 1%
20	extwprlegs1.fao.org Internet	21 words — < 1%
21	libstore.ugent.be Internet	17 words — < 1%

22	Sandra Edmonds Crewe. "Aging and Gentrification: The Urban Experience", Urban Social Work, 2017 Crossref	16 words — < 1%
23	www.adaptationcommunity.net Internet	16 words — < 1%
24	www.cwejournal.org Internet	15 words — < 1%
25	13angle.com Internet	14 words — < 1%
26	edepot.wur.nl Internet	14 words — < 1%
27	John A. Downing. "Emerging global role of small lakes and ponds: little things mean a lot", Limnetica, 2010 Crossref	13 words — < 1%
28	Jyotish Ranjan Deka, Moni Kangkan Bordoloi, Pranjit Kumar Sarma. "Historical ponds of Darrang district: Identification and mapping, their ecological relevance for management planning", International Journal of Geoheritage and Parks, 2021 Crossref	13 words — < 1%
29	digitalcommons.coastal.edu Internet	13 words — < 1%
30	pure.eur.nl Internet	13 words — < 1%
31	www.cmdrcoe.org Internet	13 words — < 1%

32	www.proshareng.com Internet	13 words — < 1%
33	Tim R. New. "Chapter 2 Major Habitats", Springer Science and Business Media LLC, 2020 Crossref	12 words — < 1%
34	muimun.org Internet	12 words — < 1%
35	www.aib.edu.au Internet	12 words — < 1%
36	www.intermap.com Internet	12 words — < 1%
37	childresearchpolicy.org Internet	11 words — < 1%
38	core.ac.uk Internet	11 words — < 1%
39	gltn.net Internet	11 words — < 1%
40	www.investopedia.com Internet	11 words — < 1%
41	www.sluse.dk Internet	11 words — < 1%
42	www.zurich.com Internet	11 words — < 1%
43	Beat Oertli, Kirsten M. Parris. "Review: Toward management of urban ponds for freshwater biodiversity", Ecosphere, 2019	10 words — < 1%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44
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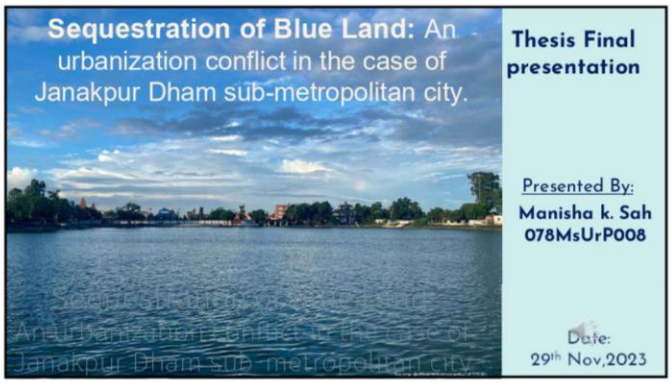
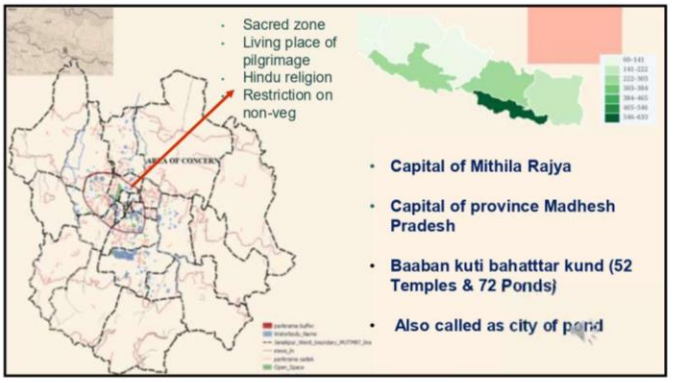
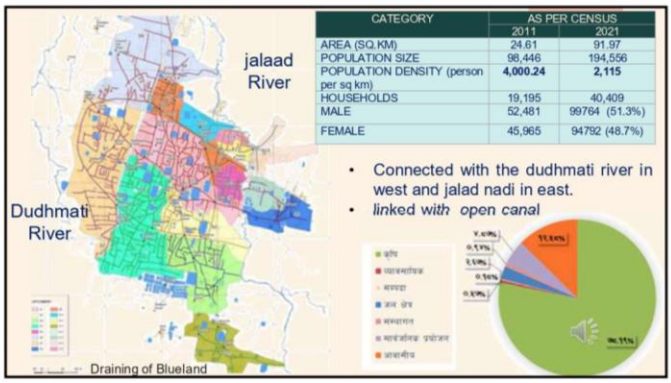
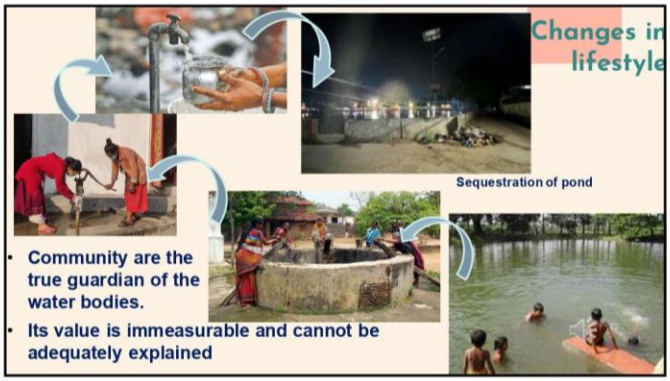
EXCLUDE SOURCES < 6 WORDS
EXCLUDE MATCHES < 10 WORDS

ANNEX-V FINAL PRESENTATION SLIDES





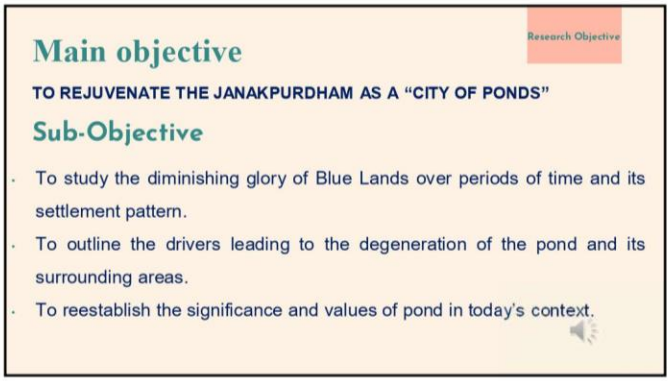


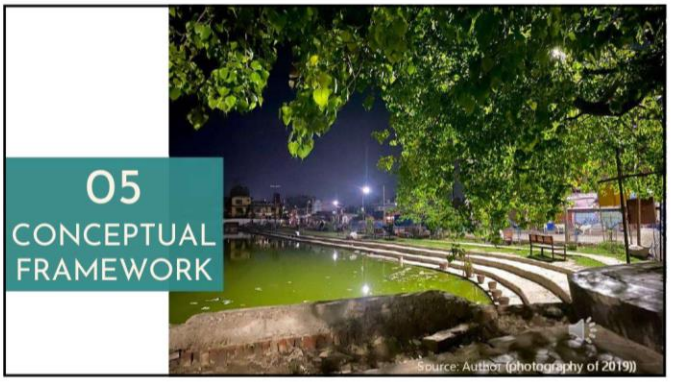

Changes in lifestyle
Sequestration of pond
Community are the true guardian of the water bodies.
Its value is immeasurable and cannot be adequately explained


03
PROBLEM STATEMENT
Source: Author (photography of 2019)


Disappearing and segregation of the pond
Diminishing pond glory.
Flooding and Water logging.
Depletion of the groundwater table cause Increase in the depth of boring from 100ft to 500 ft within 10 year causes water scarcity in core area.
Absence of recreational areas like parks, and playgrounds for the different age groups and socio-economic infrastructures
lack of awareness and research.
Increase in temperature.


04
RESEARCH OBJECTIVE
Source: Author (photography of 2019)


Research Objective
Main objective
TO REJUVENATE THE JANAKPURDHAM AS A "CITY OF PONDS"
Sub-Objective
To study the diminishing glory of Blue Lands over periods of time and its settlement pattern.
To outline the drivers leading to the degeneration of the pond and its surrounding areas.
To reestablish the significance and values of pond in today's context.


05
CONCEPTUAL FRAMEWORK
Source: Author (photography of 2019)

Conceptual Framework

Paradigm: pragmatism

Ontological claim : urbanization tends to reduce the **glory of the pond in the core area rather than the fringe area.**

Epistemology: valid source of knowledge to **find out the area of blue land earlier and now** from satellite, Ariel map, and gis mapping while documents from secondary sources and find out the **change in blue land use and requirement of recreational spaces** can be achieved from direct interaction with the blue land users and households, FGD, KII with Guthi, ward chair person, & janakpurdham sub-metropolitan city,

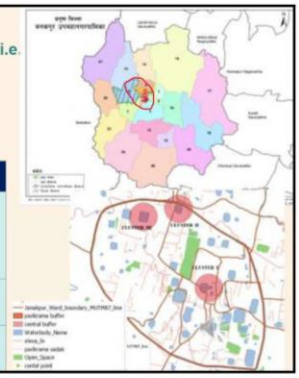
Research Methodology:
Qualitative and Quantitative Research.

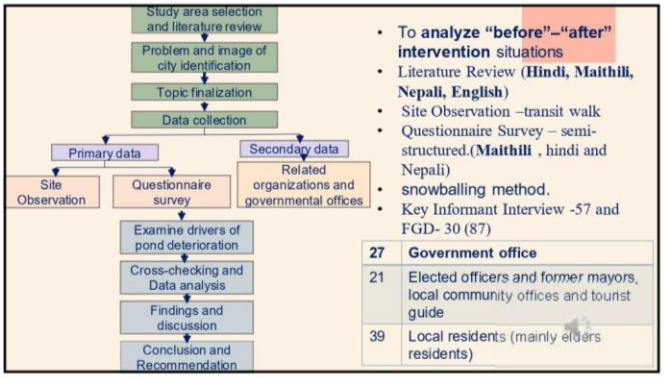
Approach: Interpretive + post–positivism = pragmatism

To Generalize the Pond Dynamics and Condition Pond which is in different phases i.e.

- Already developed and surrounding development phase
- In development Phase
- Going to be develop.

Case area	ward	area
Angaraj sar and near by ponds (telha and marha pond)	10	Core area
paadprakchaalaan gordhoi)	9	Inner fringe area
Ratna sagar	8	Outer fringe area

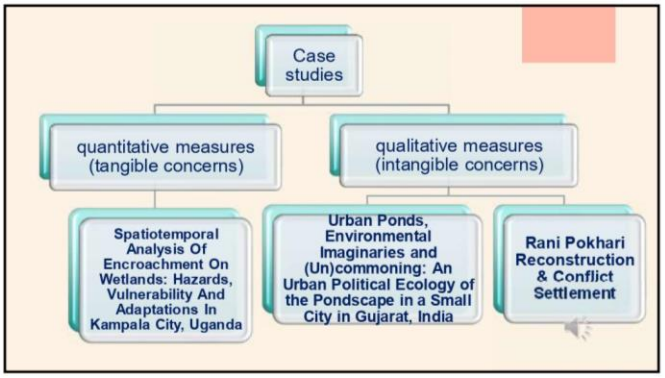




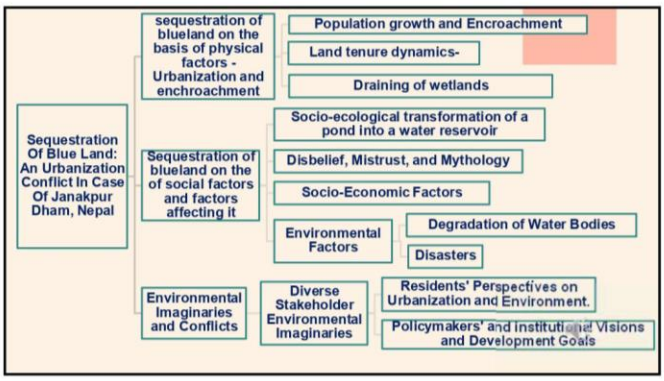
- To **analyze "before"–"after" intervention** situations
- Literature Review (**Hindi, Maithili, Nepali, English**)
- Site Observation –transit walk
- Questionnaire Survey – semi-structured.(**Maithili** , hindi and Nepali)
- snowballing method.
- Key Informant Interview -57 and FGD- 30 (87)

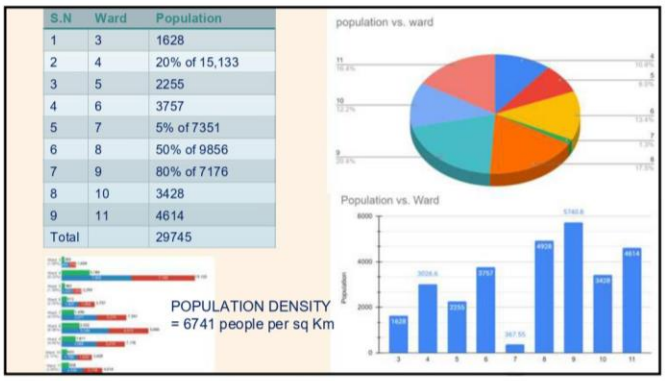
27	**Government office**
21	Elected officers and former mayors, local community offices and tourist guide
39	Local residents (mainly elders residents)

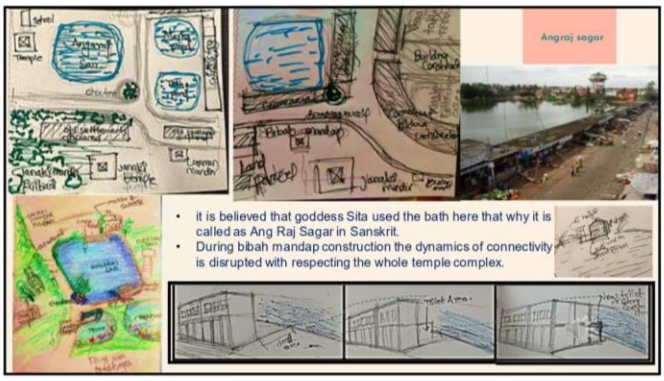
Literature & Case studies

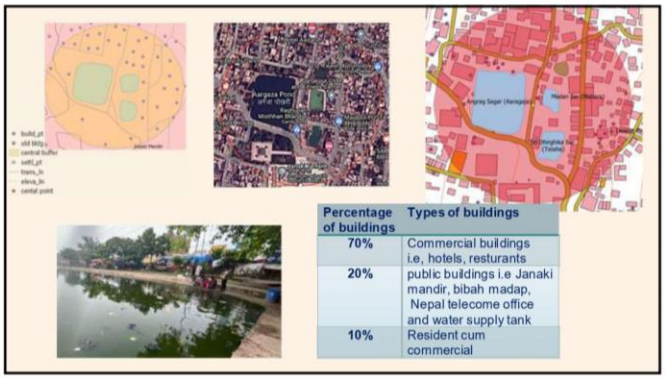


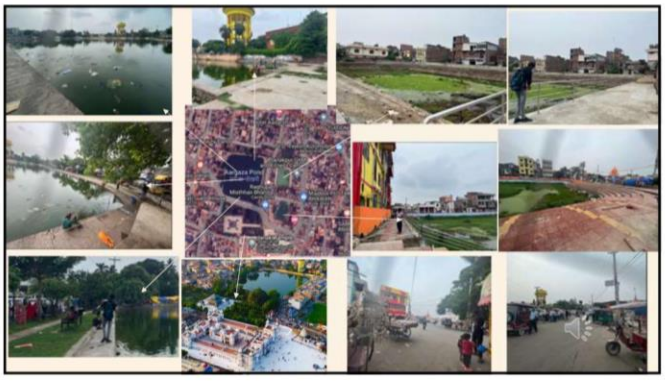

Findings and discussion

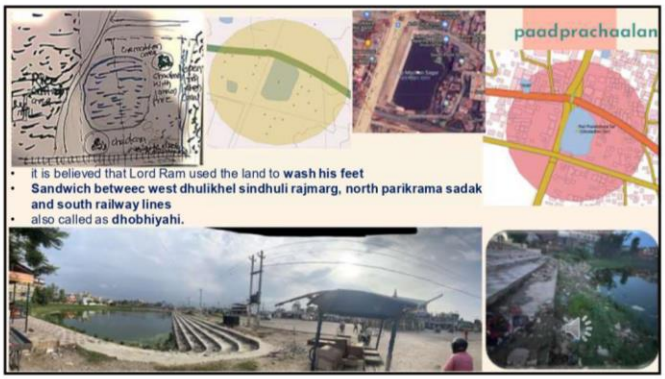

Sequestration Of Blue Land: An Urbanization Conflict In Case Of Janakpur Dham, Nepal
sequestration of blueland on the basis of physical factors - Urbanization and enchroachment
Population growth and Encroachment
Land tenure dynamics-
Draining of wetlands
Sequestration of blueland on the of social factors and factors affecting it
Socio-ecological transformation of a pond into a water reservoir
Disbelief, Mistrust, and Mythology
Socio-Economic Factors
Environmental Factors
Degradation of Water Bodies
Disasters
Environmental Imaginaries and Conflicts
Diverse Stakeholder Environmental Imaginaries
Residents' Perspectives on Urbanization and Environment.
Policymakers' and Institutional Visions and Development Goals


S.N Ward Population
1 3 1628
2 4 20% of 15,133
3 5 2255
4 6 3757
5 7 5% of 7351
6 8 50% of 9856
7 9 80% of 7176
8 10 3428
9 11 4614
Total 29745
population vs. ward
Population vs. Ward
POPULATION DENSITY
= 6741 people per sq Km


Angraj sagar
it is believed that goddess Sita used the bath here that why it is called as Ang Raj Sagar in Sanskrit.
During bibah mandap construction the dynamics of connectivity is disrupted with respecting the whole temple complex.

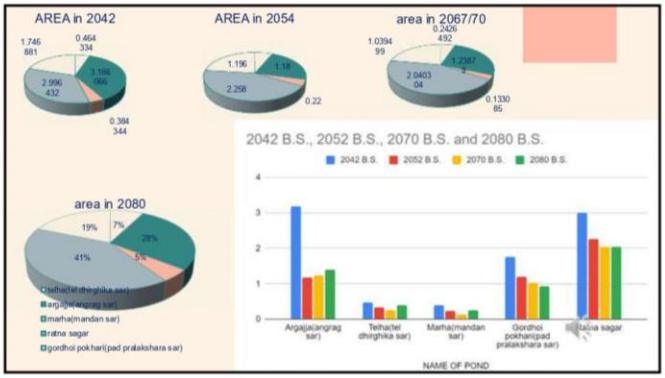

Percentage of buildings
Types of buildings
70%
Commercial buildings i.e, hotels, resturants
20%
public buildings i.e Janaki mandir, bibah madap, Nepal telecome office and water supply tank
10%
Resident cum commercial

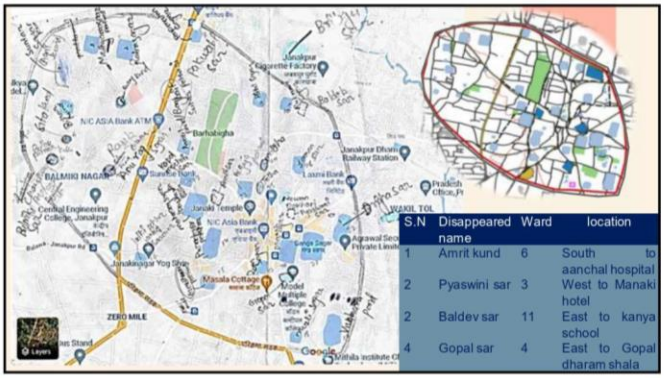


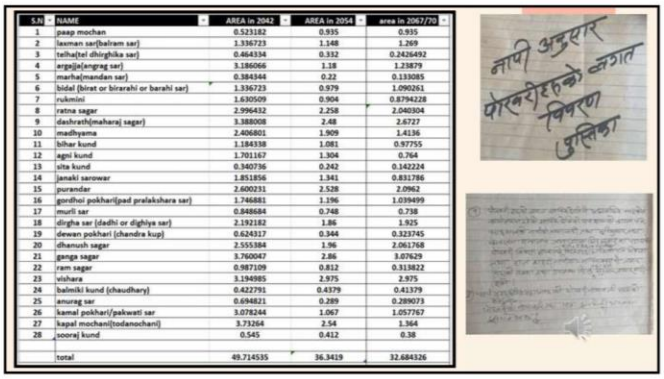


Type of urbanizatio n metric	Measures	Spatial scale of measures	Angraj sagar	Gordhoi pokhari	Ratna sagar
Presence of building	Area with building (low and high rise buildings)	With in 200m	Medium rise due to byelaw constrant	High rise	Low rise
Presence of roads	Raod with in buffer area	100m	Presence of metallic road	Presence of metallicroad	Gravelled
Impervious surface	Impervious surface	50m	RCC Ghats in whole perimeter	RCC Ghats from roadin some side or a-t half of the perimeter	Brick Ghat are

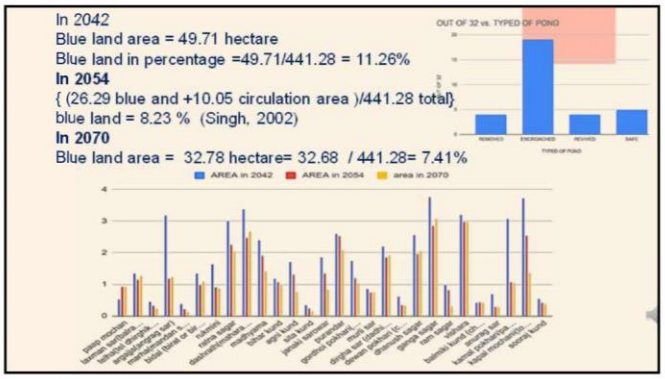
Distance to city center	Distance to city center	No limit	With in a city	1km far	1.2 km far
Human population	Number of residents living around pond.	200m	0	15	7
Urban land use	Proportion of urban land use	200m	Commercial use	Mixed use	Residenti al

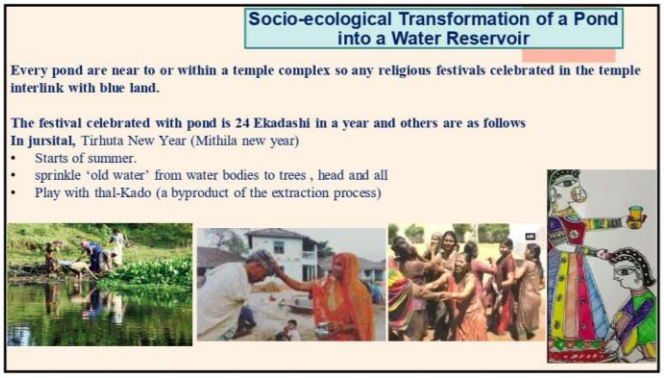






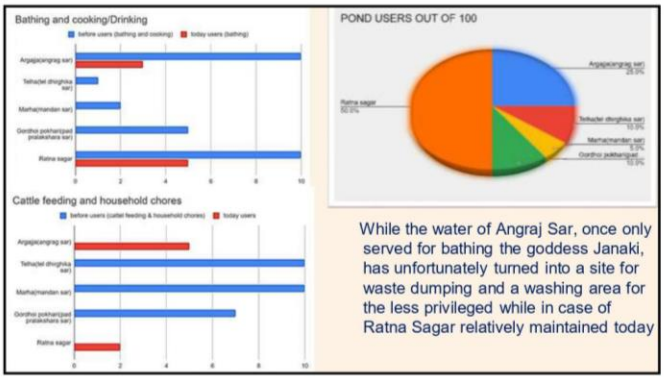
S.N	NAME	AREA in 2042	AREA in 2054	area in 2067/70
1	paap mochan	0.523182	0.935	0.935
2	laxman sar(balram sar)	1.336723	1.148	1.269
3	telha(tel dhirghika sar)	0.464334	0.332	0.2426492
4	argaja(angrag sar)	3.186066	1.18	1.23879
5	marha(mandan sar)	0.384344	0.22	0.133085
6	bidal (birat or birarahi or barahi sar)	1.336723	0.979	1.090261
7	rukmini	1.630509	0.904	0.8794228
8	ratna sagar	2.996432	2.258	2.040304
9	dashrath(maharaj sagar)	3.388008	2.48	2.6727
10	madhyama	2.406801	1.909	1.4136
11	bihar kund	1.184338	1.081	0.97755
12	agni kund	1.701167	1.304	0.764
13	sita kund	0.340736	0.242	0.142224
14	janaki sarowar	1.851856	1.341	0.831786
15	purandar	2.600231	2.528	2.0962
16	gordhoi pokhari(pad pralakshara sar)	1.746881	1.196	1.039499
17	murli sar	0.848684	0.748	0.738
18	dirgha sar (dadhi or dighiya sar)	2.192182	1.86	1.925
19	dewan pokhari (chandra kup)	0.624317	0.344	0.323745
20	dhanush sagar	2.555384	1.96	2.061768
21	ganga sagar	3.760047	2.86	3.07629
22	ram sagar	0.987109	0.812	0.313822
23	vishara	3.194985	2.975	2.975
24	balmiki kund (chaudhary)	0.422791	0.4379	0.41379
25	anurag sar	0.694821	0.289	0.289073
26	kamal pokhari/pakwati sar	3.078244	1.067	1.057767
27	kapal mochani(todanochani)	3.73264	2.54	1.364
28	sooraj kund	0.545	0.412	0.38
	total	49.714535	36.3419	32.684326



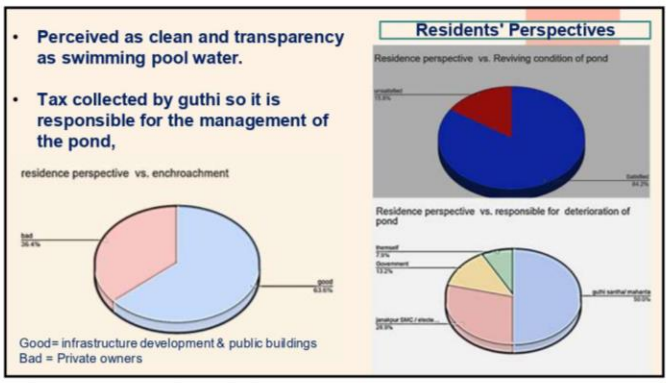


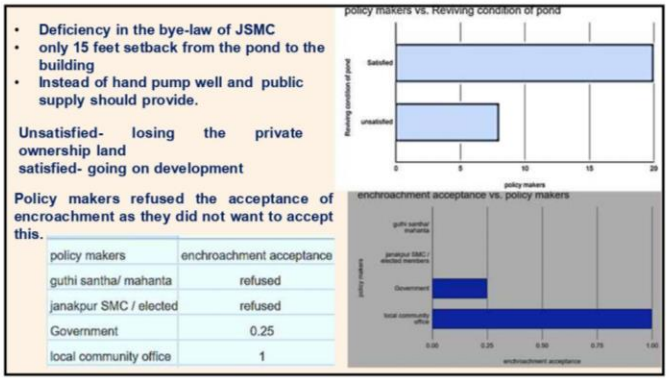
Festivals	Month	Activities
Jursital and Janaki nawmi	Baisakh	To recharge water table by cleaning pond and watering trees.
Ganga dashara	Jestha/ ashar	Holy bath and ripening of mango
Ganesh Chaturthi, churchaan, Teej , Rishi panchami	Sharwan/bhadra	Submersion of lord Ganesh, and Female take holy bath
Jitiya, Dashain, Kojagra Purnima, pitri pakcha	Ashwin	Worshipping pond, collecting water in earthen pot in Ghatasthapana and celebrating 9 day with jhigiya dance and maintaining or constructing ghats for chaat celebration and worshipping ancestor.

Chaath and kartik snaan	kartik	Celebrating for 4 days in pond and holy bath in early morning in these pond by taking fasting.
vivahpanchami	Mangsir	Marriage ceremony of goddess sita and ram celebrated in pond and the tourist rest there.
makarsakranti	magh	Many religious pilgrimage come to take bath in this pond.
Falgun Purnima / holi	falgun	15 days parikrama is started from janakpur and ends in janakpur and one day earlier people walk in parikrama road by talking holy bath in these pond.
Ram Naomi and chaath	chaitra	Celebrating God Ram birthday in these pond.



NAME	LOCATION	SIGNIFICANCE	EXISTING CONDITION
PAAP MOCHANI SAGAR	NEAR RASTRA BANIJYA BANK	SINS ARE WASHED AWAY BY BATHING	WEST AND NORTH DILL SAFE, POLLUTED WATER
LAXMAN SAR(BALRAM SAR)	SOUTHEAST TO LAXMAN AANHADA	NAMED AFTER STEPBROTHER OF GOD RAMA	ENCROACHED FROM ALL SIDES, POLLUTED WATER
TEL DHRGHIKA SAR(TELHA)	NORTH TO LAXMAN MANDIR	A MARRIAGE RITUAL-JEWAH WAS PERFORMED IN SITA MARRIAGE	IN FINAL PHASE OF CONSTRUCTION,ENCROCHED FROM ALL SIDE, POLLUTED WATER
RANGRAJ SAR (ARGAJA)	NORTH TO VIHAR MANDAP	SITA USED TO TAKE BATH HERE	ENCROACHED FROM ALL SIDES, POLLUTED WATER
RAMDAN SAR(MARHA)	NORTH TO TELHA	NAMED AFTER A MAN OF ANCIENT MITHILA	IN INITIAL PHASE OF CONSTRUCTION,ENCROCHED FROM ALL SIDE, POLLUTED WATER
BIDAL SAR(BIDAT OR BAWAN SAR)	EAST TO SARASWATI MODEL SCHOOL	NAMED AFTER DEMON OF SAME NAME	ENCROACHMENT INCREASING IN EAST AND NORTH , POLLUTED WATER
RUKMANI SAR	WEST TO KANYA SCHOOL	NAMED AFTER WIFE OF LORD KRISHNA	WEST SOUTH DILL ENCROACHED, LESS POLLUTED WATER
RATNA SAGAR	NORTH TO BHOLA SINGH LIONS SCHOOL	KING JANAK USE TO KEEP TREASURE HERE	COMPARATIVELY LESS POLLUTED WATER
SADHNATH SAR(MAHARAJ SAR)	SOUTH TO YATRI NIWAS	NAMED AFTER DASRATHA SAGAR	NOT ENCROACHED, POLLUTED WATER
MADHYAMA SAR	WEST TO RATNA SAGAR	MIDDLE SIZED POND	
BIHAR KUND	EAST TO GYAN KUP	A PLACE TO ROAM AROUND	POLLUTED WATER, ENCROCHED FROM EAST SIDE
AGNI KUND	WEST TO RATNA SAGAR	PLACE FAMOUS FOR YAGNA DURING SIRDHWAJ JANAK	CLEAN WATER, NOT ENCROACHED
SITA KUND	SOUTH TO GYAN KUP	NAMED AFTER GODDESS JANAKI	CLEAN WATER, NOT ENCROACHED
JANAKI SAROWAR	BACK OF JANAKI NAGAR YOG SIYIR	NAMED AFTER GODDESS JANAKI	
PURANDAR SAR	SOUTH TO PETHIA BAZAR	NAMED AFTER GOD PURANDAR	ENCROACHED FROM ALL SIDES, POLLUTED WATER
GORDHOI POKHARI(PAAP PARCHALAN)	WEST TO PIDARI CHOWK	NAMED AFTER ONE OF THE MARRIAGE RITES	ENCROACHED, POLLUTED WATER
MURLI SAR	NORTHEAST TO VIDHYAPATI CHOWK	NAMED AFTER SACRED FLUTE OF LORD KRISHNA	ENCROACHED FROM SOUTH-WEST AND EAST ,POLLUTED WATER
DIRGHIKA SAR(SADHI SAR)	EAST TO MUNICIPALITY OFFICE	CURD WAS MADE HERE DURING SITA MARRIAGE	ENCROACHED FROM SOUTH AND EAST , POLLUTED WATER, WATER INLET AND OUTLET ARE PROVIDED BY MUNICIPALITY
DEWAN POKHARI(CHANDRA KUP)	NORTHEAST TO JANAKI MANDIR	BATH IN KARTIK SUKLA TO GET PURE AND INITIALLY SALAD NADI WATER ENTERS HERE	ENCROACHED FROM ALL SIDES
DHANUSH SAGAR	EAST TOP RAM MANDIR	KING OF JANAK DYNASTY USED TO KEEP SACRED BOW AT THIS PLACE	POLLUTED WATER, DILL ARE SAFE
GANGA SAGAR	EAST TO SHIV MANDIR	HERE BODY OF KING NIMI WAS AGITATED BY THE MUNIS	EAST DILL ENCROACHED, POLLUTED WATER
RAM SAGAR	SOUTH TO RAM MANDIR	NAMED AFTER GOD RAMA	ENCROCHED, POLLUTED WATER
BISHARA POKHARI	EAST TO TIRHUTIA GACHI	REMEDY FROM POISON	POLLUTED WATER, ROAD IN WEST NORTH, SOUTH SIDE
BALMIKI KUND(CHHAUDHARY)	WEST TO BALMIA TOL	USED BY BALMIKI GURU (WRITTER OF RAMAYANA)	ENCROACHMENT INCREASING IN SOUTH AND SOUTH, POLLUTED
KHURAS SAR	EAST TO RAJAK NIWAS	BATH TO GET ERUCTION	POLLUTED, ENCROACHED FROM EAST, NORTH AND SOUTH
KAMAL POKHAR(PAKWATI SAR	WEST TO JANAKI SCHOOL	LOTUS POND AS GET SOFT AS LOTUS	ENCROACHED FROM ALL SIDE,INITIAL STATE OF CONSTRUCTION, WATER POLLUTED
BAPAL MOCHANI(DHORICCHHI	SOUTH TO TULSI DHAMAK	GET REMEDY FROM SKIN ALLERGY	ENCROACHED FROM NORTH AND EAST, POLLUTED
SOORAJ KUND	SOUTH TO JANAKI EYE HOSPITAL	SOORAJ	POLLUTED, ENCROACHED FROM ALL SIDES

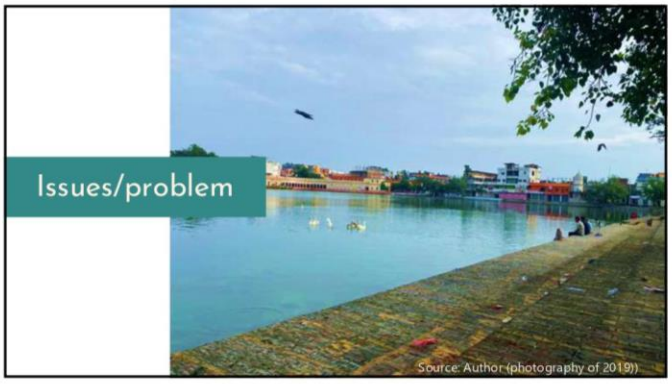




policy makers	enchroachment acceptance
guthi santha/ mahanta	refused
janakpur SMC / elected	refused
Government	0.25
local community office	1

S.N	PARAMETERS	IN JANAKPUR CASE	FROM INTERNATIONAL AND NATIONAL ASE	ANALYSIS
1	Population growth and Encroachment	Crowding, enchroachment	Overcrowding, informal settlement, enchroachment due to rural to urban migration.	Developing countries are facing same challenges.
2	Population density	Around 7,000 people per square kilometer. (with in a parikrama sadak)	Around 9,000 people per square kilometer.	Challenges for disasters and informal settelments.

3	LAND TENURE DYNAMICS	Migrated from business background	Migration from agricultural background	Prioritize economy rather then heritages and environment
4	Residence perspective	Fenced to reduce enchroachment but faced garbage accumulation area	fenced from risk but faced garbage or waste disposal practices	frustrated residents due to garbage accumulation.
5	Policy maker perspective	lack of attention from authorities	lack of attention from authorities and again revived	same country same problem with different mode.



From above data, Linkage of pond with human ecosystem get degenerated due to Living human treasure and causes degradation of water bodies and welcome disasters.

- Absence of specific organization for the proper conservation and development of pond.
- Absence of policy and planning for pond development in JSMC.
- Unawareness of significance of tangible and intangible values of pond
- Disruption of linkage of pond with monuments or temples
- lack of linkage of pond with settlement's or surrounding community
- Absence of lightings and religious recreational spaces
- Absence of drainage.
- Upended social fabric and sense of community.
- Lack of research
- Policy gap in urban development and conservation.
- Dumping around the pond
- Lack of safety and security.
- Water and Air pollution.

To reestablish the significance and values of ponds following recommendations should be incorporated by pond-oriented organizations, government entities, and local communities to revive the significance and values of ponds in the contemporary context.

- **Community Engagement and Awareness Programs**
- **Policy Advocacy and Implementation**
- **Spiritual and cultural connectivity-**
- **Sustainable Development Initiatives:**
- **Eco-tourism and Community-Based Initiatives.**

Janakpur is interlinked with the **Ramayan circuit** so it is more attractive on international and national budgets.

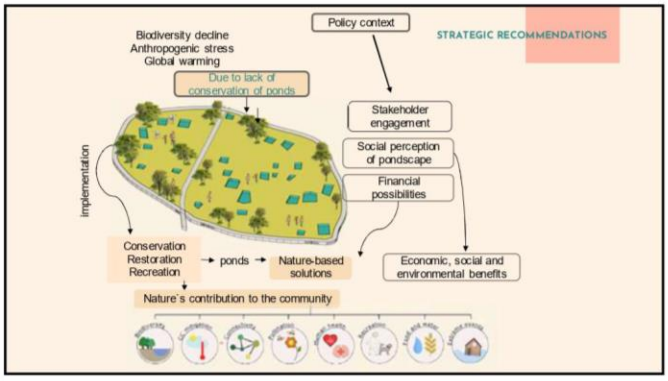
- **Reconfigured Drainage System for disaster risk reduction and climate resilience**

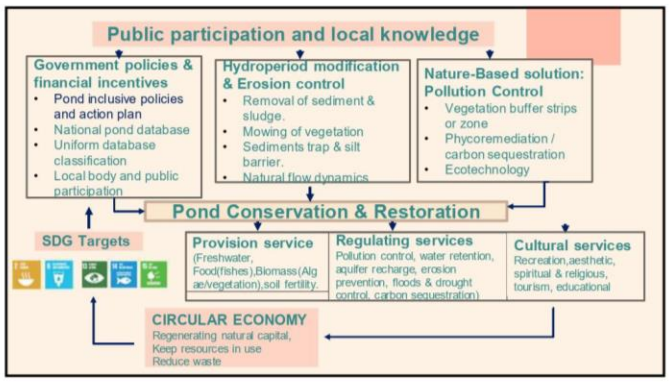
In short-term, fountains used for oxidation and In long-term drainage of ponds, either restoring historical connections or establishing new linkages like connecting with Jaladi Nadi in the east and Dudhmati in the west of Parikrama Sadak.

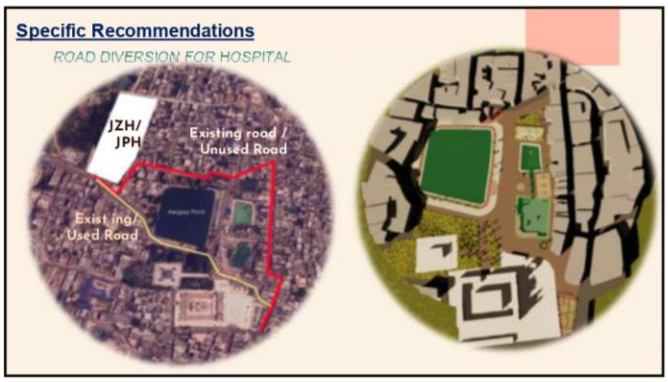
- **Technological Solutions:**
- **Incentivize Conservation Practices:**

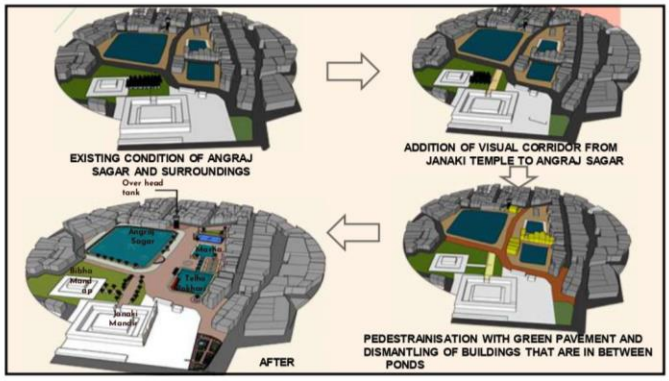
Incentives like (**financial incentives, recognition and rewards, tourism and economic opportunities, capacity building, cultural and social events organizer**) to the local community to encourage them.

- **Collaborative Research and Documentation:**
- **Infrastructure Development with Conservation in Mind:**









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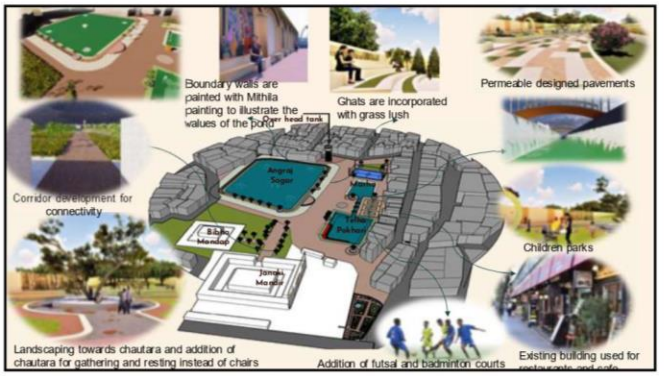

conclusion

To study the diminishing glory of Blue Lands over periods of time and its settlement pattern.

- From the above study, it reveals that ponds during panchayat era
- Clean and maintained
- Better economy
- No market centers
- Vibrant with pilgrimage and religious tourists.
- But in today's concept
- Dumping around the pond,
- nobody takes bath
- economy center market

To outline the drivers leading to the degeneration of the pond and its surrounding areas.

- Alienation of pond to individual people
- Governmental intervention, institutional and individual encroachment.
- Improper Urbanization

The processes of removal and separation have both occurred in the case of Janakpur due to various influencing factors. Therefore, the optimal strategy for disaster mitigation and climate change is the conservation of ponds **to reestablish the significance and values of ponds.**

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Thank you