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1 paper

Rejuvination of Blue Land: A pathway to sustainable urban harmony A Case of Janakpur Dham Sub-Metropolitan City, Nepal

Manisha Kumari Sah[1], Ajay C. Lal[2]

[1]Department of Architecture and Urban Planning, Pulchowk Campus
[2]Assoc. Professor, Department of Architecture and Urban Planning
Pulchowk Campus, IOE, TU, Nepal
[1]078msurp008.manisha@pcampus.edu.np , ajay@ioe.edu.np
[2] ajay@ioe.edu.np

1. ABSTRACT

Janakpurdham is known as the ’city of ponds’, yet rapid and haphazard urbanization has disconnected communities from historical ponds that once supported their cultural and environmental needs. Janakpurdham is experiencing pressure on its blue land through encroachment, waste accumulation, greywater discharge, changing lifestyles, and conversion of pond areas to urban uses. This study examines the relationship between urbanization and the sequestration of blue land, focusing on changes in pond conditions, community–pond relationships, and implications for sustainable urban planning.

A qualitative case-study approach was adopted using 20 Key Informant Interviews (KIIs), five Focus Group Discussions (FGDs), and observations. Stakeholders included representatives of governmental water-supply and ward offices, residents living near ponds, tourist guides, and residents of traditional settlements. Information was analysed thematically to identify issues related to pond encroachment, changing pond use, waste disposal, greywater discharge, and the historical and socio-economic significance of blue spaces. Field evidence was also used to assess changes in pond conditions over time.

The study identifies 32 religious and historical ponds within the area enclosed by Parikrama Sadak. Four ponds have completely disappeared, while 28 have experienced encroachment. Overall, the historical assessment indicates a decline in pond area from **11.26% in 2042 to 7.41% in 2067/70**, demonstrating a substantial reduction of blue land within the study area. At the individual pond level, the reduction is particularly evident across different urban zones. In 2042 to 2080 the **core area**, **Angraj Sagar, Telha Pokhari, and Marha Pokhari** recorded reductions of **56.06%, 17.96%, and 35.58%, respectively**. In the **inner-core area**, **Gordhoi Pokhari** experienced a **46.42% reduction**, while **Ratna Sagar**, located in the **fringe area of Janakpurdham**, experienced a **31.90% reduction**. These spatial variations demonstrate the continuing pressure of urbanization and changing land-use patterns on Janakpurdham’s blue spaces. The findings highlight the need for blue-land-inclusive planning that integrates pond conservation, community participation, cultural heritage protection, climate resilience, and disaster risk reduction. Rejuvenating these ponds can strengthen Janakpurdham’s cultural identity while supporting sustainable urban development.

Keywords: *Rejuvination, Blue land, Conflict, Urbanization, Encroachment.*

2. INTRODUCTION

Janakpurdham’s rapid urbanization is placing increasing pressure on its historical and religious ponds ,which are important Blue-Land resources for environmental , cultural,and social functions. This research investigates the decline and transformation of ponds due to urban

growth ,encroachment, pollution , and changing land-use patterns . The study aims to identify the major challenges affecting these blue spaces and highlight the need for sustainable pond-inclusive urban planning in janakpurdham.

3. LITERATURE REVIEW

Urban ponds provide important ecological, social, cultural, and environmental services, including groundwater recharge, rainwater storage, flood management, biodiversity, and recreation. Historical and religious ponds also contribute to cultural identity and community life. Previous studies indicate that uncontrolled urbanization and encroachment are major threats to urban wetlands and pond ecosystems.

4. Study Area

The study focuses on Janakpurdham Sub-Metropolitan City of Dhanusha District, Madhesh Province. Janakpurdham is historically associated with Mithila and is recognized for its religious and cultural heritage. The study particularly examines ponds located within and around the Parikrama area, including Angraj Sagar, Gordhoi Pokhari, and Ratna Sagar.

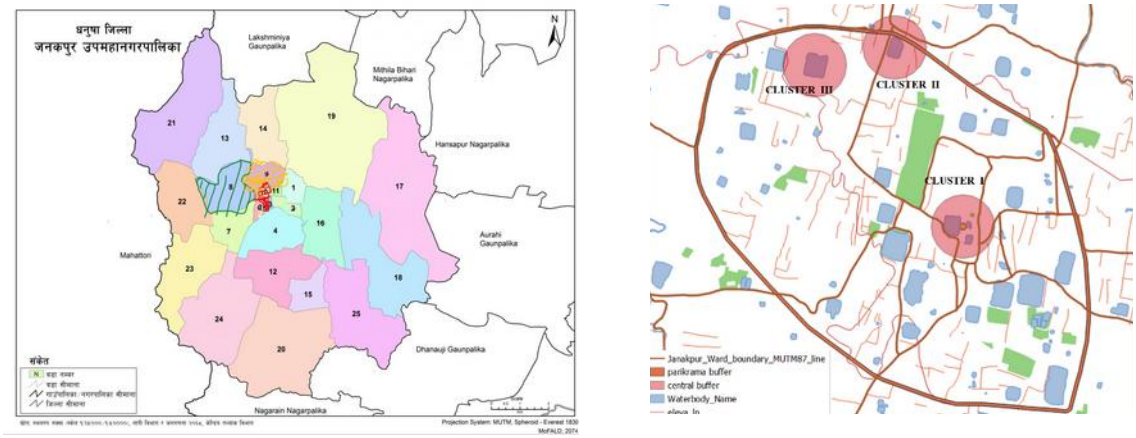


Figure 1: location map study area ponds , janakpurdham, dhanusha, Nepal

5. Research Methodology

Through literature studies, site observations, transect walks, semi-structured questionnaire surveys, KIIs (57), and FGDs (30), the study used a mixed-method research strategy with 87 participants to examine pre- and post-intervention circumstances. Snowball sampling was used to gather data in Hindi, Maithili, Nepali, and English. For comparison analysis, historical documents, maps, satellite images, and published research were consulted.

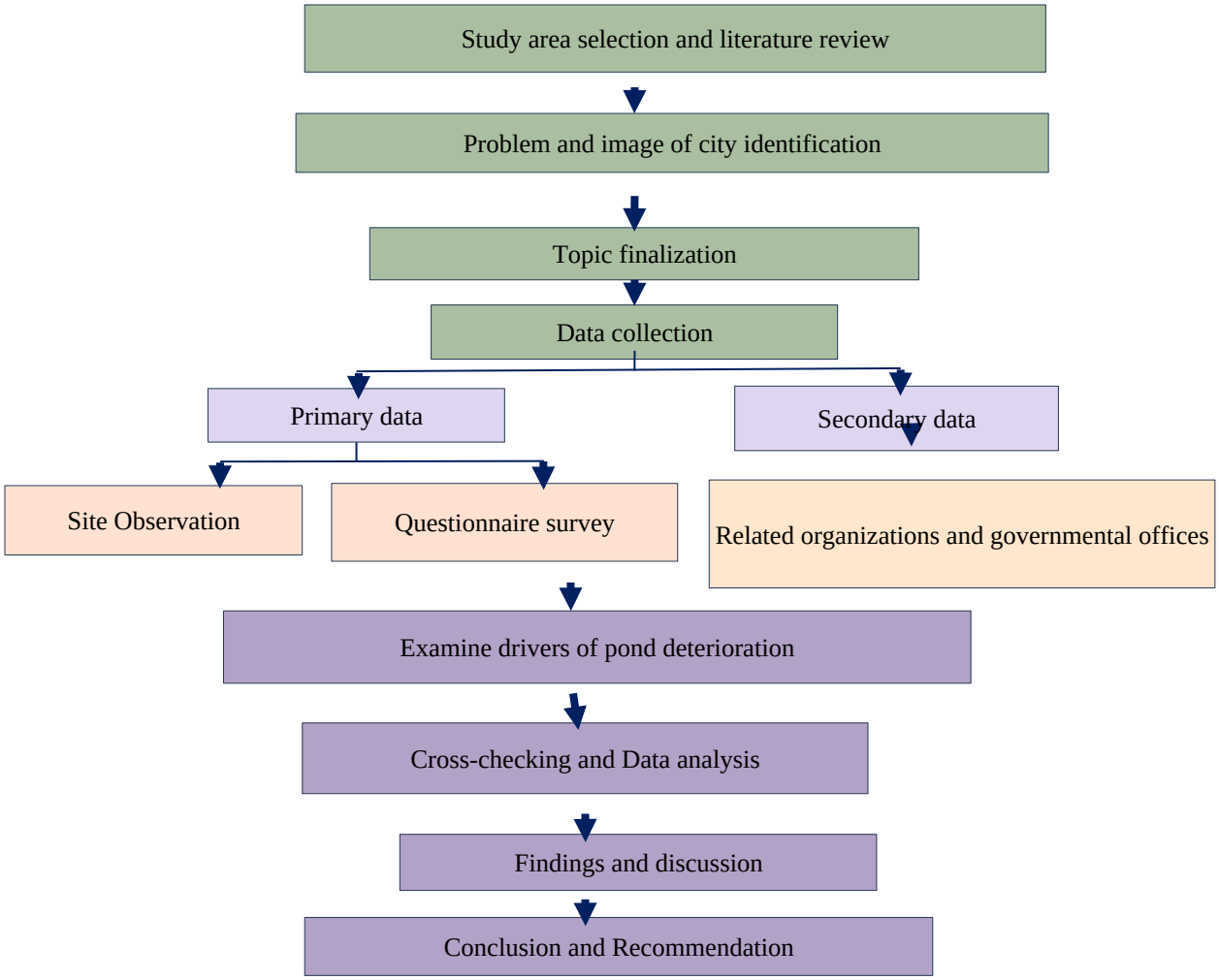


Figure 2: flow chart of methodology

6. Results and discussion

The study found significant decline and encroachment of historical ponds due to rapid urbanization and changing land-use patterns. Among 32 religious and historical ponds within the Parikrama area, 4 have disappeared and 28 have experienced encroachment. Historical assessment also shows a decline in blue-land coverage from 11.26% in 2042 to about 7.41% in 2067/70.

Research Method	Data / Sample	Analysis	Major Findings
Historical Map and GIS Analysis	Historical maps and satellite images	Blue land area comparison	Blue land decreased from 11.26% to 7.41%
Key Informant Interviews (KII)	20 interviews	Thematic analysis	Identified causes of pond encroachment and degradation
Focus Group Discussions (FGD)	5 discussions	Community perception analysis	Identified changes in pond use and cultural significance
Field Observation	32 historical and religious ponds	Physical condition assessment	4 ponds disappeared and 28 were encroached

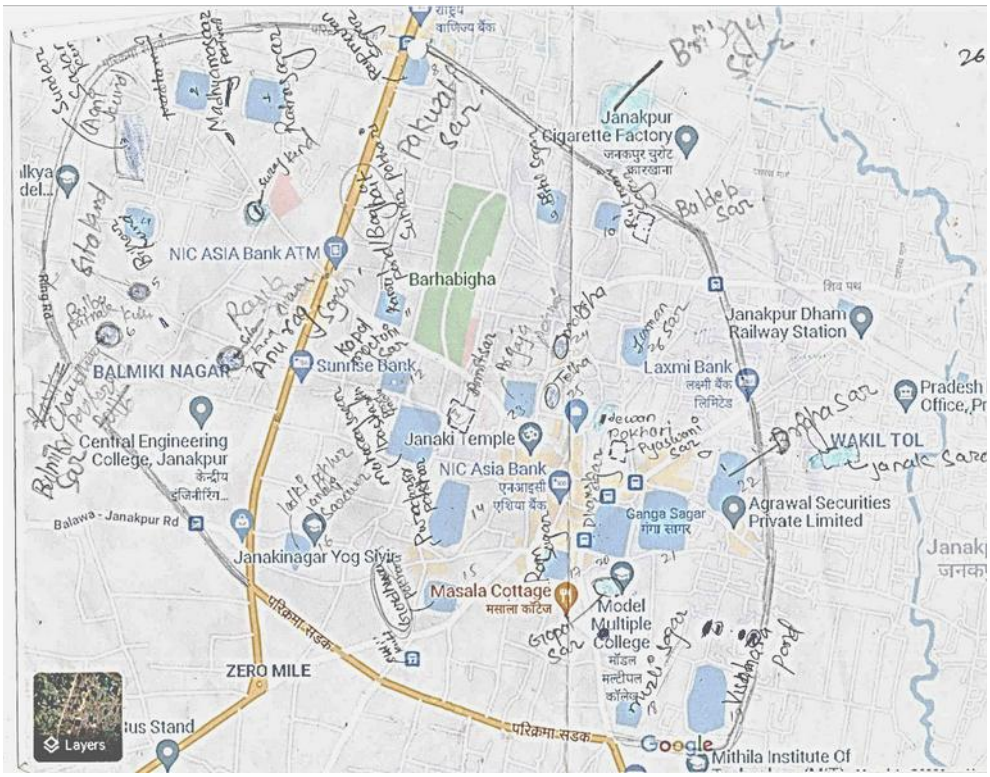
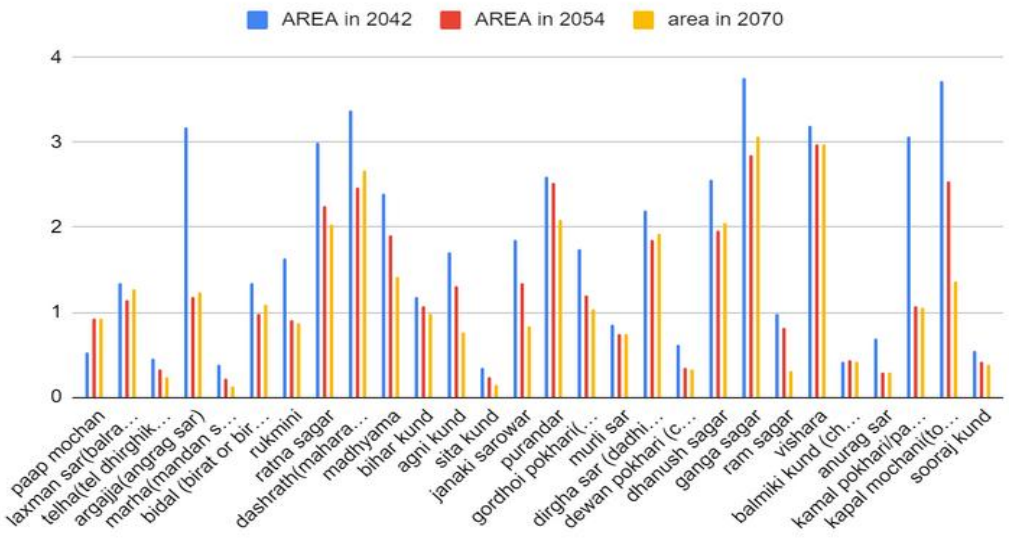
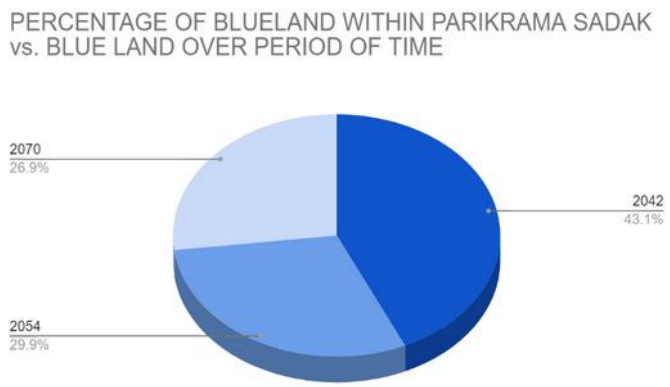


Figure 3: finding the name and numbers of pond with in ring road of janakpur



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)

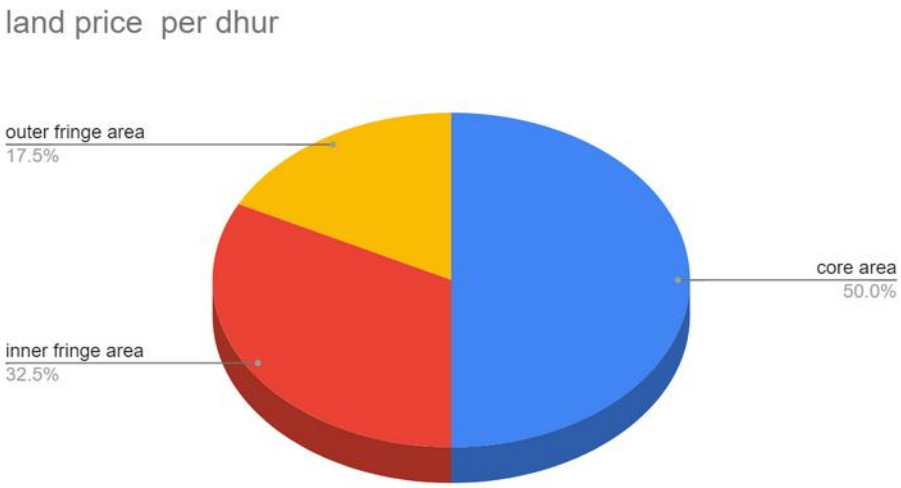
In 2070

Blue land area = 32.78 hectare

Blue land in percentage = 32.68 / 441.28 = 7.41%

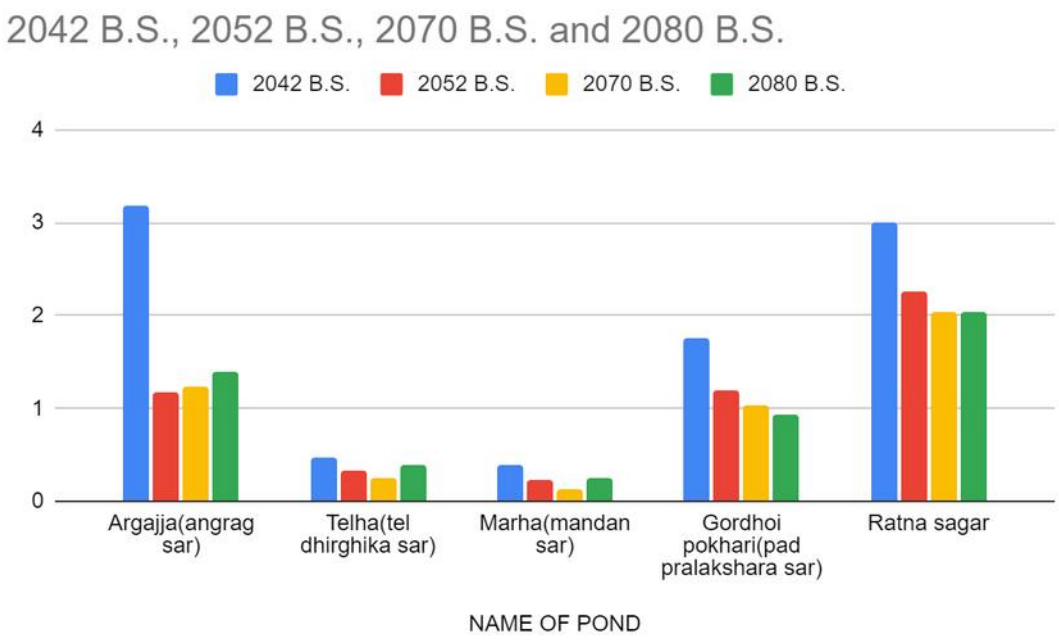
S.N	PARAMETERS	IN JANAKPUR CASE	FROM INTERNATIONAL AND NATIONAL ASE	ANALYSIS
1	Population growth and Encroachment	Crowding, enchroachment	Overcrowding, informal settlement, enchroachment due to rural to urban migration.	Developing countries are facing same challenges.
2	Population density	Around 7,000 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.

Population growth, increasing land value, urban expansion, encroachment, and inadequate institutional coordination are major drivers of pond degradation. Social and cultural changes have also reduced traditional uses and community attachment to ponds. Environmental pressures, waste accumulation, flooding, and climate-related impacts further affect pond conditions.



Indicator of Urbanisation

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



The findings demonstrate that pond degradation is not only an environmental issue but also a social, cultural, and urban-planning challenge. Loss of ponds reduces ecological functions and threatens Janakpurdham's historical identity as the "City of Ponds." Therefore, conservation should be integrated with urban development, heritage protection, tourism, and community participation.

7. conclusion and Recommendations

Pond-inclusive urban planning and stronger coordination among local, provincial, federal, and community institutions are needed. Guthi Sanstha and local communities should be actively involved in pond conservation and management. Development of connected pond corridors, public spaces, recreational facilities, cultural activities, and tourism infrastructure can help restore the social and economic value of the ponds

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.

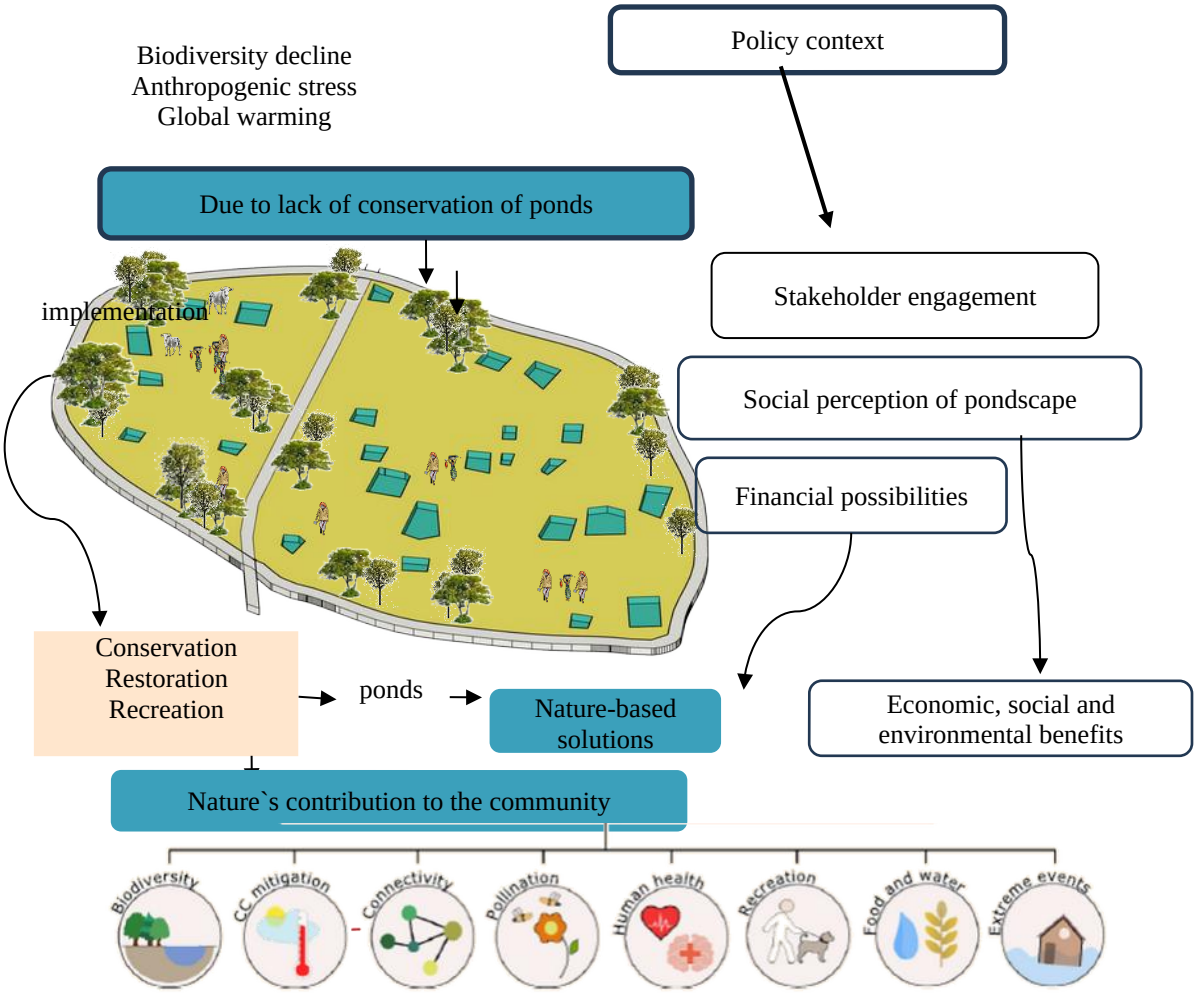
- **Reconfigured Drainage System for disaster risk reduction and climate resilience**

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.

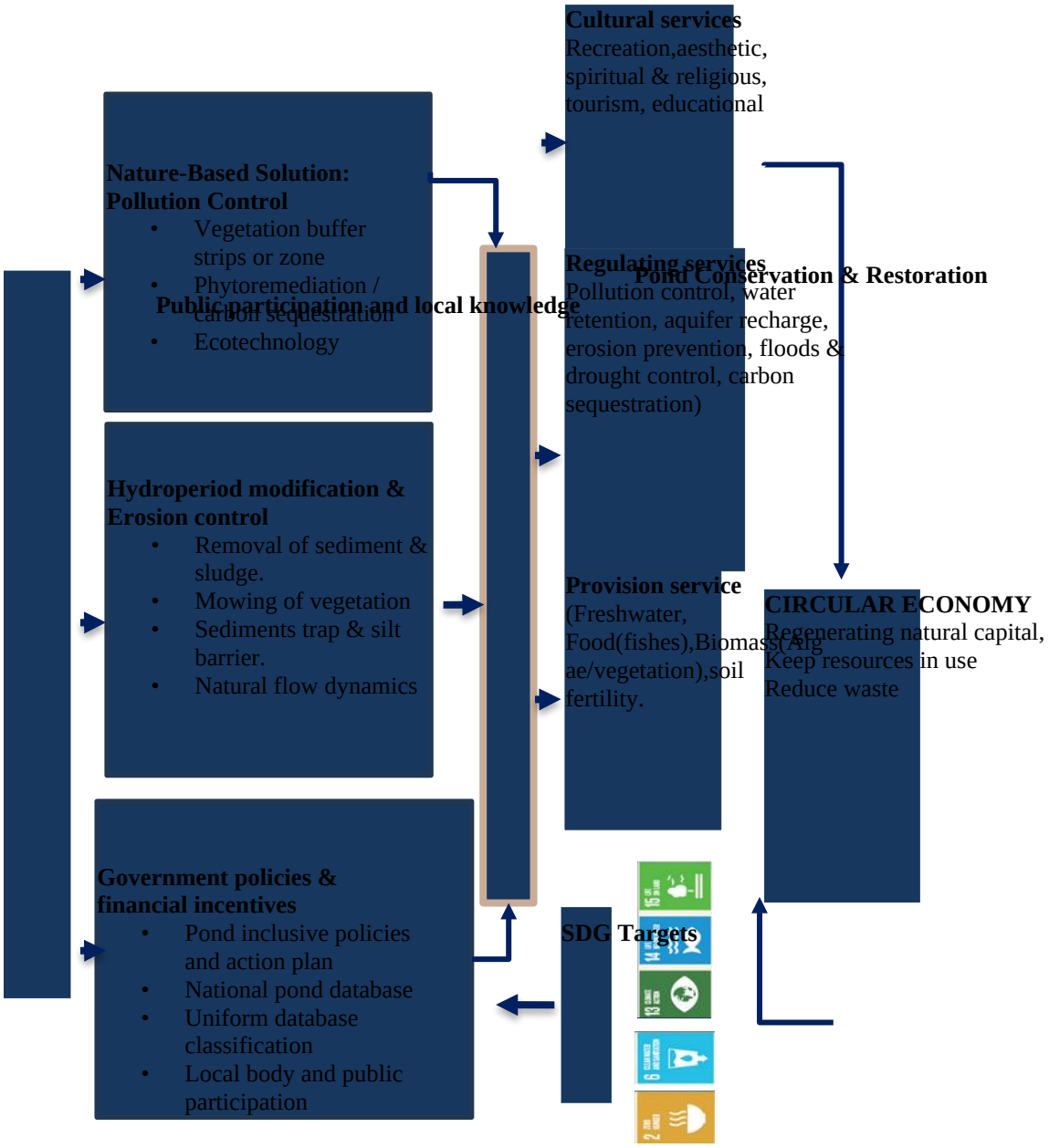
- **Technological Solutions:**
- **Incentivize Conservation Practices:**

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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8. REFERENCES

Adhikari, S. (2018). IMPACTS OF RELIGIOUS TOURISM IN JANAKPUR. *Research Nepal Journal of Development Studies (RNJDS)*.

adhikari, s. c. (n.d.). impact of religious tourism in janakpur. *Research Nepal Journal of Development Studies (Year 1st Issue 2nd, 2018 November)*.

ARCHAEOLOGY, D. O. (2046). *AN ACT MADE TO PRESERVE THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL, HISTORICAL OR ARTISTIC OBJECTS.*

Babu Ram ACHARYA, N. (2008). *Land Tenure and Land Registration in Nepal* . Stockholm, Sweden .

Beura, D. (July 2018). DEPLETION OF WATER BODIES DUE TO URBANISATION AND ITS. *International Education and Research Journal*.

bhitta, s. k. (2013, 05 31). *mithila and history*. Retrieved from skbhittha.wordpress.com: https://skbhittha.wordpress.com/2013/05/31/mithila-history/

Burghart, R. (n.d.). The disappearence and reappearence of janakpur. *Himalaya*, 2.

conservation, v. d. (2017). *Encroachment.*

council, G. j. (2073/74). *Constituted to make recommendations for the protection and management of ponds, ponds, Ram Janki and other major temples and Guthi lands within the Janakpur municipality within the greater Janakpur area. High-level task force.* janakpur: Greater janakpur area development council.

Cuenca-Cambronero, M. B. (2023). Challenges and opportunities in the use of ponds and pondscapes as Nature-based Solutions. *Hydrobiologia*.

Deka, J. R. (2021). Historical ponds of Darrang district: Identification and mapping. *their ecological relevance for management planning. International Journal of Geoheritage and Parks*.

Deka, J. R. (2021). Historical ponds of Darrang district: Identification and mapping, their ecological relevance for management planning. . *International Journal of Geoheritage and Parks*.

ebay. (2013, , Mar.). *dhobi*.

Energy & Wetlands Research Group, C. I. (2015). *REJUVENATION & SUSTAINABLE MANAGEMENT OF GOKARNA TEMPLE POND - KOTITEERTHA.*

ISUNJU, J. B. (2016). *SPATIOTEMPORAL ANALYSIS OF ENCROACHMENT ON WETLANDS: HAZARDS, VULNERABILITY AND ADAPTATIONS IN KAMPALA CITY, UGANDA* .

ISUNJU, J. B. (March 2016). *SPATIOTEMPORAL ANALYSIS OF ENCROACHMENT ON WETLANDS: HAZARDS, VULNERABILITY AND ADAPTATIONS IN KAMPALA CITY, UGANDA.*

Kapari, R. B. (December 2004). *Cultural Heritage of Janakpur* . janakpur : Vaidehi offset printers, janakpur.

Karki, B. R. (2020). *Ranipokhari Reconstruction and Conflict Settlement.* kathmandu.

Lal, A. C. (2016). Augmenting Blue Land Uses: An adaptation approach for Climate Change in Urban Areas. A case study of Janakpur Municipalities, Nepal. *Journal of Natural Resources and Development*.

Manoj, K. &. (2015). Environmental perspectives of pond ecosystems: global issues, services and Indian scenarios. . *Current World Environment*.

NATION, U. (29 January 2016). *framework convention on climate change.* parris.

NEPAL, T. R. (2023, JUNE 10). *Adequate Budget Demanded To Renovate Janakpur Ponds*. Retrieved from https://old.risingnepaldaily.com/nation/adequate-budget-demanded-to-renovate-janakpur-ponds

NURP, S. . (2079). *RILSUP.*

Office, N. S. (n.d.). *National Population and Housing Census 2021*.

Padhy, M. K. (2015). *Environmental Perspectives of Pond Ecosystems: Global Issues, Services and Indian Scenarios.* 3: 10.

PICARDO, E. (2022, july 29). *gentrification*. Retrieved from investopedia: https://www.investopedia.com/terms/g/gentrification.asp

Praval Devkota, S. D. (2023). Land use land cover changes in the major cities of Nepal from 1990 to 2020,. *Environmental and Sustainability Indicators,*.

revive, n. (2019, July 29). *Mithila Kingdom: Origin, History, and Fall*. Retrieved from nepalrevives.com: https://nepalrevives.com/mithila/

Secretariat, W. a. (2002). *Water Resources Strategy.* January.

Singh, S. A. (2023, August 11). On Jur Sital, the Maithili New Year, the chulha maharani gets a break. *Gaon conncetion*.

singh, s. k. (2002). *revitalization of ponds for sustainability of town (a case study of janakpur municipality).*

Thehimalayantimes. (2002, May 02). Janakpur ponds need to be conserved. Nepal.

traveller, N. (2020, Oct 28). *Jhijiya- A Pride Traditional Dance Of Mithila*. Retrieved from https://nepaltraveller.com/sidetrack/jhijiya-a-pride-traditional-dance-of-mithila

UN-Habitat. (2020a). *THE STRATEGIC PLAN* .

Zimmer, A., & Véron, R. a. (2020). *Urban Ponds, Environmental Imaginaries and (Un)commoning: An Urban Political Ecology of the Pondscape in a Small City in Gujarat, India.*

ZURICH. (2023, April 20). Three common types of floods explained. *Flood and water damage*.

Allchin, F. Raymond (2023, May 15). **Indus civilization. Encyclopedia Britannica.** ***https://www.britannica.com/topic/Indus-civilization***

Gleick, P. H. (1993). Water and Conflict: Fresh Water Resources and International Security. International Security, 18(1), 79–112. https://doi.org/10.2307/2539033