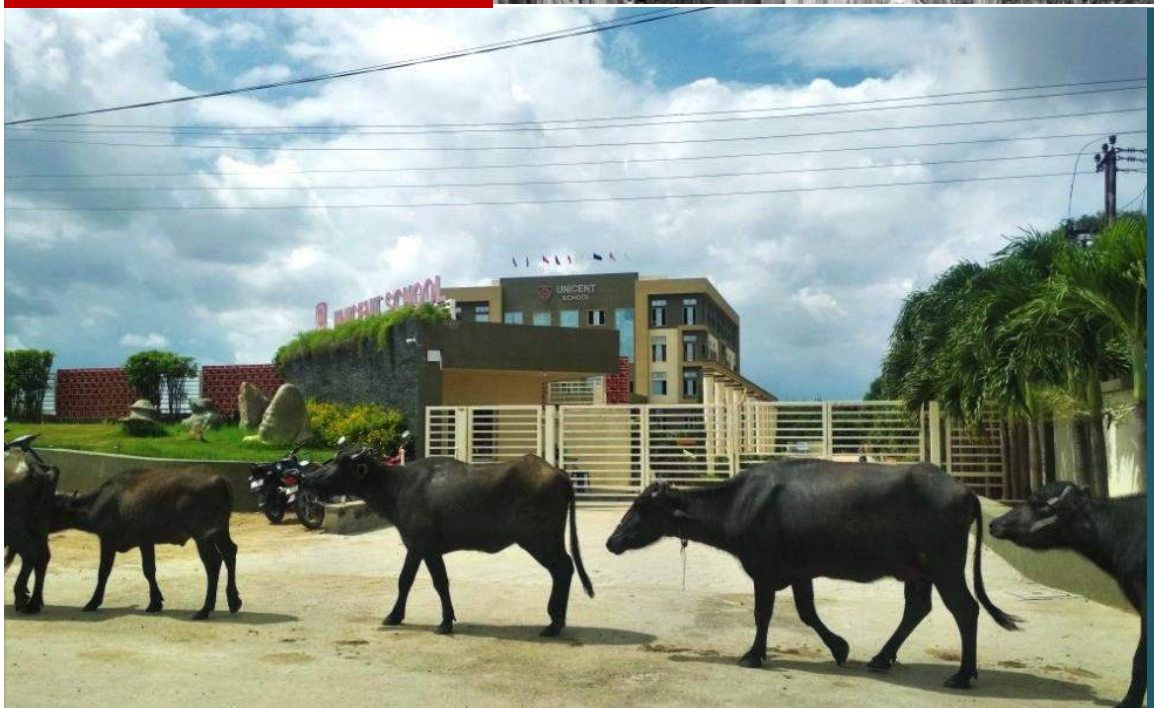
POLICY REPORT

March 2022

Transforming Periurban Futures



This Policy Report combines 4 Thematic Policy Briefs on Periurban Transformations & 3 Case Studies on Periurban Transformation Pathways

T H2O S IN URBAN FRINGE AREAS

SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL

CONTENT

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Conference - This policy brief is based on research, practices and case study experiences discussed in the conference on 'Transforming Periurban Futures' in India, January 18-19, 2022: http://saciwaters.org/t2speriurban/conferences.html. Recordings and summary report of the conference may be accessed on http://saciwaters.org/t2speriurban/events.html.
The conference was organized jointly by the School of Planning and Architecture, Bhopal and the consortium for the project titled "H2O-T2S in Urban Fringe Areas" comprising SaciWATERs, TUDelft, and University of Cologne. We acknowledge the presenters, discussants and participants for their contribution and inputs into this brief.

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2. Sarah Luft & Carsten Butsch. 2022. *Transformation Pathways Case Study - Water Related Transformations in Periurban Pune*. In H2O-T2S & SPA Bhopal. 2022. *Transforming Periurban Futures. Policy Report*. Outcomes of an online science-policy conference, January 18-19, 2022. Prepared under project H2O-T2S in Urban Fringe Areas. University of Cologne. March 2022: pp 19-21

3. Shreya Chakraborty, Sai Kiran, & Prithvi Ram Bommaraboyina. 2022. *Transformation Pathways Case Study - Water Related Transformations in Periurban Hyderabad*. In H2O-T2S & SPA Bhopal. 2022. *Transforming Periurban Futures. Policy Report*. Outcomes of an online science-policy conference, January 18-19, 2022. Prepared under project H2O-T2S in Urban Fringe Areas. SaciWATERs. March 2022: pp 22-24

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THEMATIC POLICY BRIEFS

Periurbanisation in India - Four perspectives

INTRODUCTION

Photo credit: SaciWATERs, Hyderabad

PERIURBAN TRANSFORMATIONS – SHAPING INDIA'S (URBAN) FUTURE

Overarching Policy Recommendations

- Periurban spaces must be developed as spaces in their own right. They should not be treated as "cities to be". Policies should aim at maintaining the ecological values of periurban areas.
- Planning and governance reforms must guide sustainable development in the future as pressures on land availability will continue to cause social and environmental adversities.
- Periurban spaces must be planned proactively: Which roles can they fulfill within the urban agglomeration? Which connections do they need? Which risks are emerging?
- Interlinkages between different institutions should be coordinated cross-sectorally. Planners, the civil society and private players, among others, should participate in periurban planning. The knowledgebase for this needs to be generated through participatory approaches and co-production.
- Adequate monitoring systems to observe transformations and regular updating of plans are essential. Detailed data is needed as a base for planning and for risk assessment. Models based on this information then have to inform planning processes.
- Drivers of land and water encroachment in periurban areas have to be managed. This will allow for active planning.
- Emerging informal networks of civil society and between civil society and local government institutions should be strengthened.
- Flexible policy designs and flexible governance processes have to bear in mind the constant state of flux of the periurban. Flexible strategies should include adaptive and inclusive planning (incorporate intersectionality in all interventions e.g., class, caste, migrant, age, disability, age, tribal identities).
- A new form of learning to live with risk is needed. It can be inspired by traditional systems that have to be adapted to today's needs and governance structures.
- Science and local administrations have to enter into a fruitful dialogue, for which it is necessary to overcome "language barriers".

India is currently being fundamentally transformed by urbanization. The absolute number of urban dwellers has been increasing sharply since the economic reforms of the 1990s and so has the share of population residing in urban areas. But this transformation does not only affect the cities themselves, it affects the areas surrounding them, too. In fact, periurban areas are those spaces that experience the most fundamental transformations. It is in these spaces that India's (urban) future will be decided.

This policy brief discusses, after an introduction, four specific aspects of the periurban transformation – water, infrastructure & governance, gender and disaster risk. These four sections were written based on research, practices and case studies presented at the conference on 'Transforming Periurban Futures in India' that took place on January 18-19, 2022.

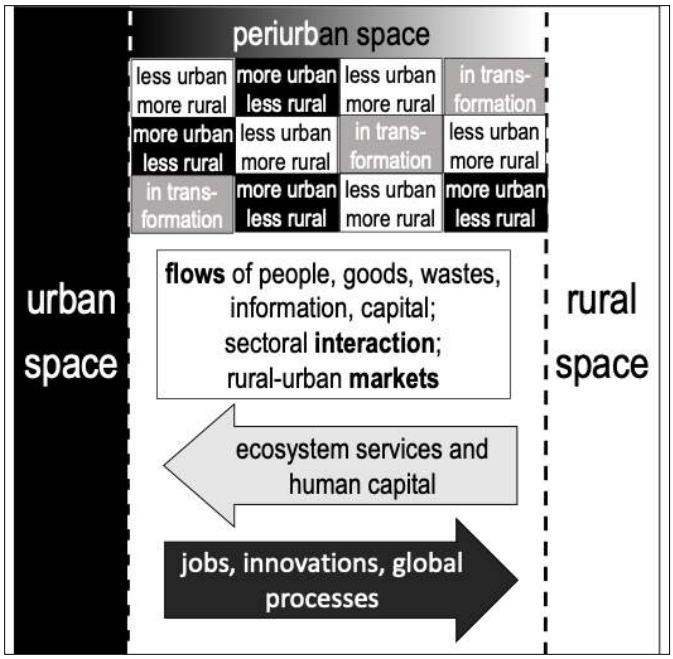
Periurbanization as a transformation process

Periurban spaces are the areas outside the core of growing urban agglomerations. They are the transitional areas shaped by urbanization processes. This transition is visible through changes in land use, economic activities, and population. They represent spaces of flows where the future is not yet determined, characterized by a variety of land use, blend of rural and urban features, multiple stakeholders, diverging interests and weak or overlapping governance arrangements. These features make them challenging to govern.

Periurban spaces are a new spatial category emerging through the current urbanization in the Global South. Yet, the concrete shape periurbanisation takes is unique in each country and also varies within India from one region to another. While the core of most major urban agglomerations in India usually faces slow and steady rejuvenation, peri-urban spaces are changing rapidly. Several drivers are responsible for the dynamic changes in periurban spaces. The drivers of land transformations vary from one place to another and can be related to local infrastructure planning, economic dynamics, influx of foreign capital, the formation of development corridors etc. Different types of settlements emerge in peri-urban areas next to existing villages and hamlets, inter alia informal settlements, census towns, multi-storey housing

complexes, township projects (gated communities), business hubs etc. As a result, they are heterogeneous given the variety of stakeholders, occupational patterns and ecological functions that are intrinsic to these areas.

Another driver of periurban transformation is migration. Migration to periurban spaces stems from unavailability of affordable housing in cities, emerging employment opportunities and is driven by expectations regarding future development. It alters the social composition of periurban areas over time, sometimes very rapidly. There is a heterogeneous mix of different groups that includes the native population, with larger shares engaged traditionally in primary sector activities. In traditional villages, usually very clear social stratification can be observed – often related to traditional occupations. Migrants in contrast are often engaged in the secondary or tertiary sector. The immigration of new population groups thus results in fundamental changes of the social hierarchy. In addition, resource needs and socio-economic backgrounds of different groups vary significantly – as do their visions about periurban futures.



The periurban Mosaic

Source: Butsch, C. and S.-B. Heinkel (2020): Periurban Transformations in the Global South and Their Impact on Water-Based Livelihoods. In: Water 12 (2): 458. DOI: 10.3390/w12020458.

Characteristic for periurban areas in the Global South is their dynamic, that they are places of exchange between the urban and the rural and that their diversity is inscribed in the emerging landscape. The direct neighborhood of different land uses is specific for these zones in transition. Periurban Spaces in the Global South can thus be defined as "spaces of flows, where the rural and the urban meet and exchange and that are characterized by a mix of urban and rural features, resulting in a mosaic of land uses, a multiplicity of stakeholders—sometimes with diverging interests —and in many cases weak governance structures".

Challenges and Needs of Periurban areas in India

Transformations of periurban spaces are strongly influenced by development dynamics of the urban centers. Unplanned urban expansion results in the emergence of negative development pathways. Indiscriminate conversion of land use such as green areas, farmlands negatively impacts living conditions and lives of native populations. Illegal developers colonize periurban areas by playing out their financial power to dispossess residents. This unplanned development often may create new hazards and may thus increase the disaster vulnerability of people, infrastructure and values.

In general, periurban spaces are characterized by a multiplicity of governance systems. Different formal, informal and traditional governance structures overlap, which often causes sub-optimal planning results. It is important to understand the specific governance set-ups of periurban spaces in order to steer development into sustainable directions. Although metropolitan cores support urban growth, facilities and amenities do not develop uniformly across metropolitan regions. Periurban areas lag behind in terms of public services and infrastructure compared to the core. The quality of life in some periurban areas is inferior as they are not covered by planned infrastructure (e.g. water supply and sanitation, drainage).

Informal settlements in periurban areas are especially marginalized. Unregistered colonies come up near planned residential areas and are inhabited by communities who cannot afford housing in high priced residential areas. These "slum dwellers" play an important role in providing essential services. Yet informal settlements are often blamed for exacerbating disasters, environmental pollution etc. For example the 2021 floods in Chennai and peri-urban outskirts was due to unprecedented downpour caused by changes in rainfall patterns as well as human-induced landscape alterations due to encroachment, illegal development and loss of local water bodies – mainly by wealthier strata of the society. Yet, official reports on the event blamed marginalized groups.

As periurban spaces grow, several governance challenges in transportation planning emerge. Transportation links the periurban areas to the city and should be central in the planning of these areas. However, the reality is that in some areas

of India, planning follows development rather than the other way around. As a result, periurban areas remain uncovered by transportation facilities resulting in weak mobility and connectivity. Furthermore, focusing solely on land attributes of periurban areas in current planning and development policy effort fails to consider the complex relationships between land and water or the ecological functions that periurban areas provide. As a result, development destroys valuable ecosystem services. This affects local residents and the residents of the larger metropolitan area likewise.

There are first indications that the policy context of periurban areas in India is changing. Niti Ayog 2020 explored different dimensions in planning and capacity building that were previously not considered. National level efforts by MoHUA to develop municipalities in census towns that depict urban characteristics is also underway. Examples of state level initiatives in Uttarakhand and Haryana to develop water supply schemes and agriculture for nearby cities also exist.
Given these general challenges, the next sections explore in depth four fields in which specific challenges emerge in periurban areas. Transformations to sustainability need to address these focus areas: the multiplicity of governance structures and a lack of infrastructure provision is a fundamental problem of unsustainable development in the periurban; being a water-stressed country needs to secure sustainable water management for its growing metrolpolises; gender equality is at the heart of human rights, while especially the pressure through the periurban transformation – which includes also a renegotiation of roles and norms – puts a double burden on women; unplanned developments result in the emergence of new periurban riskscapes.

POLICY BRIEF No. 1

Photo credit: H2O-T2S Project, SaciWATERs, Hyderabad

GOVERNANCE AND INFRASTRUCTURE VOIDS OF PERIURBAN SPACES

Policy Recommendations

- Identify basic economic, ecological, and social needs of periurban communities to assess historically grown, periurban complexities and vulnerabilities to create tailor-made solutions.
- Build up and balance local agency (e.g., representation of different livelihoods, genders, ages) and articulate heterogeneous interests to strengthen long-term capacities.
- Take periurban spaces proactively into account in infrastructural planning on the urban-rural continuum, e.g., through cross-regional infrastructure projects.
- Coordinate interlinkages between different entities and scales on a cross-sectoral basis to enable comprehensive, participatory planning, and create a successful learning environment among district level planners, planning committees, expert groups, the civil society and private players.
- Create continuous and flexible governance structures through adaptive and inclusive planning to respond to the constant state of flux of the periurban and cater for the heterogeneous periurban patchwork.

Challenges for governance and infrastructure

Directing particular attention to the governance and infrastructures of periurban spaces, reveals which interlocking processes pose challenges for their future development. A common feature of periurban spaces in India is their situatedness in a landscape of complex, multiscalar governance structures, with ambiguous actors and complex power hierarchies, yet experiencing an institutional void between the urban and the rural. Periurban spaces are typically managed by rural self administrations, gram panchayats, which are however, often ill-equipped and inadequately capitalised to effectively serve the local communities' needs. This leaves room for new actors to emerge. In contrast to urban areas, periurban spaces thus often lack a consistency of governance and the necessary resources that come with it.

Coordination between rural and urban entities with new institutions emerging and old ones changing or disappearing is often challenging and results in the periurban becoming immersed in an urban-rural vacuum. This in turn forms the basis of many challenges, e.g., it provokes a lack of clarity in responsibilities for planned development, for the management or control over local infrastructural development and for its maintenance.

The understanding of where the infrastructural needs of periurban spaces exist is impeded by the lack of data, e.g., about population dynamics. One reason for these difficulties is the heterogeneous nature of the periurban population (e.g., different livelihood groups, religious groups, migrated groups) and their limited agency. Plans for shaping the future of periurban spaces are often informed not by grassroots voices, but through top-down development that is commonly unilaterally induced from the outside. As a result of this type of development, periurban areas lose their distinctive identities and/or important issues that are worthy of change are not taken up. The latter is evident in Bhubaneshawar, inter alia, where the actual Master Plan addresses infrastructural improvements through growth corridor development, but the importance of developing the marginal land area of the corridor to serve the local needs is little reflected. This type of development leaves room for the evolvement of unplanned and informal infrastructures in peri-urban areas which are further reinforced by complex and dynamic land-use patterns and functional attributions (e.g., in regard to livelihoods, resource provision, ecosystem services, etc.) that prevail there. This in turn drives land conversion and in the long-term predominantly results in water bodies, arable lands or other natural habitats being encroached upon, amongst others.

One of the prevailing infrastructural challenges in the periurban lies in the area of resource supply, e.g., water, as they often only dispose of inadequate supply systems (e.g., water canals or pipes). Available infrastructures are not equipped

according to the local communities' needs or the changing periurban setting (as, for example, seen in Paud, in periurban Pune, where new township development creates new water pressures) and only insufficiently maintained. First, this affects the quality of water, especially for drinking, but also for domestic purposes, for instance, through pollution from adjacent industries' effluents or urban wastes (e.g., in Hadia, periurban Kolkata), or the merging of fresh and waste water pipes. Second, it affects water quantity, e.g., through water leakages due to defective hydraulic systems (e.g., through debris in pipes, malfunctioning pumps, etc.), inadequate water access (e.g., due to different household capitalization and their possibilities to afford water sourcing means), or water overexploitation for the benefit of urban agglomerations. The infrastructural distress evokes long-term health hazards and diseases, and produces tension between the heterogeneous water-user groups in the peri-urban, which often result in the scarce resource being drawn in an unsustainable and overexploiting manner

Policy interventions for governance and infrastructure improvements

In response to these challenges, there are some interventions which aim to streamline the tasks of governance and infrastructure improvements for the future without pressurising periurban areas. Many of these calls for a participatory approach, including stakeholder consultation, gender inclusiveness and targeted capacity development. On the municipal level, for instance, entities, such as the MMRDA (Mumbai Metropolitan Region Development Authority), are responsible for the preparation of a Regional Plan, including stakeholder engagement for infrastructure provision through sufficient financial resources and therefore take charge of improving the technical and social connectivity between the periurban and the municipal area.

On the local level, for instance, interventions focus on inclusive governance, e.g., through organic waste initiatives (e.g., in Tamil Nadu), which links environmental prospects of composting as a sustainable way of closing infrastructural waste-loops with providing peri-urban livelihood opportunities, or on gender inclusive governance, by improving the women' roles and empowering them in leadership positions, e.g., through a solid waste management initiative (e.g., in periurban Sambalpur).
A way to address this kind of inclusive participation has been shown in the case of Hadia in periurban Kolkata, where a transformative pathways approach was applied to identify more sustainable and flexible plans for managing household water and livelihood needs to counteract future governance and infrastructure challenges.

POLICY BRIEF No. 2

Photo credit: H2O-T2S Project, SaciWATERs, Hyderabad

WATER MANAGEMENT IN THE PERIURBAN

Policy Recommendations

- Include the multiplicity of stakeholders in planning for periurban waterscapes. This requires identification and understanding of who these stakeholders are and how they see their roles and the challenges involved periurban water management.
- Integrated management is needed for periurban areas. Different agencies have different mandates, but they need to develop coherent visions and plans for periurban development.
- A pro-active approach is needed for periurban areas and not a reactive one. Indicator-based assessment tools and scenario-based planning approaches offer support for such pro-active guidance.
- Periodic monitoring and updating of plans for periurban areas is essential.
- The Jal Jeevan (Urban Water Security) Mission (MHUA) is an important vehicle to improve periurban water management. It allows for including considerations of ecosystem services in shaping future periurban transformations.

Water-related challenges in periurban spaces

Periurban water management is challenged by the diversity in these very specific zones in transition. Water demands are increasing, for agriculture, domestic needs and industries. Unfortunate trends include an increase of unregulated groundwater withdrawals, degrading quality of water bodies, and threats to water ecosystem services. With changing practices, many community water ponds have lost their traditional function and are no longer maintained. For lowland areas, wetlands are also under pressure, threatening their role as "natural kidneys" for urbanising systems.

Coherent water management is challenged by the lack of congruence of administrative boundaries and watersheds. Periurban spaces are governed by different planning structures and institutions, which often do not function to meet the needs of the periurban. This makes planning, regulation and financing for periurban water management difficult and fragmented.

A large range of actors is involved in periurban water management. Within larger agglomerations multiple government agencies shape the access to water. They tend to limit their interventions to their official mandates. In addition, in more rural areas of the periurban, traditional water management systems are still in place. These governance structures result in a fragmented water governance.

Periurban areas contain different types of water bodies with different functions. Information and data on their status, relevant trends and developments is difficult to obtain. The few existing monitoring programmes create a time-challenge for managing bodies: Once water bodies show decreasing trends, the time for management interventions may be limited, or it may even be too late. Longer-term planning for appropriate water management is complicated by the fact that different drivers affect future scenarios for periurban spaces, resulting in uncertain futures against which to plan. Hydrosocial features constantly change, with evolving water user hierarchies, power structures and social structures around water use.

Possible policy interventions for improved water governance

A more integrated water systems management in periurban spaces - Perspectives on water management will need to shift to an integrated systems perspective. This implies a circular and holistic approach: consider all water resources and all water requirements, with their temporal, spatial, quantity and quality dimensions, including options for treatment and reuse. For instance, many periurban spaces offer opportunities for wastewater reuse in agriculture, which enables

integrating wastewater as part of the water cycle, if it is properly managed and treated adequately (e.g., not containing harmful substances, but delivering nutrients and thus closing regional nutrient-cycles).

Changes in perspectives need to be accompanied by suitable tools and technologies. This does not necessarily mean the most innovative or technologically advanced tools. Rather, it means tools and technologies that are fit for communities. For instance, for wastewater reuse in agriculture this includes monitoring tools at farm levels, to ensure that wastewater is suitable for the crops grown by irrigating farmers.

As a governance model, a model of "integrated management", as opposed to models for "integrated governance" seems useful. Integrated management means that multiple government agencies continue to have a role in periurban water management, but with frequent and open channels for communication. This would seem more fitting than a model with a single overarching government entity, which would be expected to integrate all aspects in one agency.

Tools for policy, planning and management - Dedicated categories for land use and water bodies are helpful, even with constant changes and under different institutional and administrative systems. When dedicated land use categories are assigned, these can be used to develop corresponding management standards and monitoring tools for local water bodies. In planning, management and policy making or the communities of users, identification of the key stakeholders and players is a basic but essential step. A dialogue between these different groups needs to be initiated: Farmers, other water users, government agencies, NGOs and further actors. Each one of them has a role to play.

For longer-term planning, scenario-based approaches can help local water users to adapt to hydrosocial uncertainties. Experts and local water users tend to have different expectations regarding periurban futures. Integration of these different scenarios and the types of knowledge they are based on can help shape hydrosocial futures. Current planning tools can be used to support more proactive interventions, for instance by restricting certain types of development or certain zones, depending on water availability.

POLICY BRIEF No. 3

Photo credit: SaciWATERs, Hyderabad

GENDER IN THE PERIURBAN

Policy Recommendations

- Promote and support more co-production of knowledge through participatory action research that incorporates voices from a wide range of stakeholders recognizing differential values, priorities, agencies and actions of different communities, social and gender groups, governance levels, and sectors of knowledge
- Identify, document, and scale scattered innovative civil society and local administrative initiatives emerging for such informal and complex periurban spaces
- Building flexibility in policy designs, convergence between existing policies from different departments, and incorporating gender concepts in policy language can strengthen policy based periurban gender interventions
- Incorporate gender intersectionality in all interventions (class, caste, migrant, age, disability, age, tribal identities)
- Incorporating men in understanding and responding to gendered issues
- Build networks and solidarities among multiple stakeholders to push for more integrated and holistic transformations of issues around unequal gendered work burdens, labour exploitation, and violence. These key stakeholders can vary for different urban contexts and therefore intervention points and nodal stakeholders for impact need to be context specific.
- Use of digital platforms to map, integrate, disseminate, and improve access to basic services to reduce women's domestic work burdens spent on accessing these services

Gender challenges in the periurban

Several characteristics and processes of periurban spaces contribute to creating gendered outcomes. The Census 2011 data shows that for many gender indicators periurban areas are distinct outliers from the expected urban-rural transition. These indicators include population growth rate, ratio of family member dependency ratio on adult women in household, and womens' work participation rates. The periurban therefore clearly provides a unique gender space. This gendered space manifests through access to basic material needs such as water and food security, work burdens, access to choices. There are varied sources of gendered vulnerabilities in the periurban spaces.

Deteriorating Periurban water ecology – Periurban water ecologies are rapidly deteriorating due to polluting industries, urban waste flows, and water extraction for urban supply in periurban areas. The burdens of the consequent water scarcity is felt most by women, especially those from the poor households, as they face traditional water collection and management burdens. Women spend more time collecting water in periurban areas particularly in lean seasons and perceive having lesser time consequently for self care, domestic responsibilities, and paid labour.

Inadequate access to public services –These spaces are often excluded from adequate public services such as health and WASH as they do not cleanly fit into rural/urban governance and policy frames. As a result access to basic services like health and WASH here is met through private and/or informal service coverage at high costs which create access barriers for women. The work burdens associated with poor access to basic services exclude women from the labor market or place them under exploitative contractor driven systems of employment. This affects their access to schemes and public support on nutritional/reproductive health aspects/immunization/family education.

High migrant population inflows and loss of social networks – High migration into the region with nuclear families cause people, especially women, to be uprooted from their social and familial networks of their origin areas. Coupled with lack of access to quality urban services and declining work opportunities for women, there is high incidence of violence on women both in domestic and public spaces in these regions. There is a lack of safe public spaces in precarious peripheries, as spaces of migration and minimal service provision and governance, poor social and economic viability of these spaces particularly for women. Poverty, lack of transportation, poor community infrastructure such as toilets

especially for women from socially excluded and stigmatized groups (indigenous, migrants, disabled, trans communities), further reduces ability of women to participate in social life and services.

Gender related interventions in periurban spaces

Participatory research methods: A Transformation Pathways method used by the H2O-T2S project had significant inputs and potential interventions for a more gendered understanding of periurban areas and their future planning pathways. These include - coproducing with stakeholders, enabling them to envision their futures away from the status quo, and stretching their ability to look beyond their lack of agency to affect their future. It also enables recognition of differential values, priorities, agencies and actions between communities, stakeholder groups, and gender categories.

Innovative grassroot interventions: In informal settlements at the peripheries interventions such as on-site schools, mobile health vans, e-mamta tracking systems for maternal health, clustered anganwadis, incentives for frontline workers to go to these remote locations, were scattered efforts from civil society and local administrative initiatives that were found to be effective initiatives requiring more upscaling (Centre for Policy Research, New Delhi).

Flexible policy designs: Designing government schemes for urban/rural services with a flexible fit for purpose approach with flexible funding structures to enable local governments to customize service provision, was found to be important for periurban areas that often break clean urban/rural/formal/informal boundaries. Policies such as the RURBAN Mission, focused entirely on infrastructural development of small peripheral towns and clusters of villages around main cities through convergence of existing government schemes in these growing peripheries. In most policies however, while benefitting women largely through more general and basic infrastructure development, 'gender' is not specifically incorporated in the policy, the language of gender hardly exists.

Women-led networks and solidarities: Along with the top-down policy framework, bottom-up emergent initiatives like women-led mobilizations and larger solidarities brought focus to gendered burdens of this context. Building and supporting such solidarities and networks was found to be an important direction not only in interventions seeking to improve basic services but also to create safe spaces for women. The Safer Cities Flagship Program initiative of UNWomen built solidarities at grassroot levels with civil society and frontline actors. It approached multiple stakeholders ranging from police to transport corporations, mapped dark spaces through digital apps, and brought together essential services through digital mapping and outreach. It focused on the co-design of locally relevant solutions with affected groups to create safe spaces for women.

Womens' entrepreneurship: Finally, another positive intervention looked at the potential for building womens' entrepreneurship in urbanizing rural areas connecting business models to improved access to hygiene (in this case, menstrual health products). This initiative from NAARI involved making and selling biodegradable cloth pads and creating menstrual health awareness as a business model for women entrepreneurs through womens' collectives. Market linkages with urban centres leverage these businesses and as rural areas urbanise these initiatives get strengthened through improving market linkages. Also women are better prepared and less vulnerable to urbanizing trends than when they are displaced from agriculture labour. This initiative also capitalizes on the trend that among the youth there is greater interest in such entrepreneurship rather than agriculture labour and this can be supported through better skilling and education. The initiative also incorporated men in understanding and responding to gendered issues.

POLICY BRIEF No. 4

Photo credit: H2O-T2S Project, Dr. Sharlene Gomes, TUDelft

PERIURBAN SPACES AS RISKSCAPES

Policy Recommendations

- Risk management and disaster preparedness need to become a priority in periurban governance. This requires capacity building on the local and regional level.
- A coherent, multi-sectoral, data driven disaster risk management needs to be established on the district level.
- Planning needs to secure protected areas that have specific functions for disaster risk reduction (e.g., retention areas) and keep disaster prone areas (slopes, floodplains) free from human use.
- A new form of learning to live with risk is needed. It can be inspired by traditional systems that have to be adapted to today's needs and governance structures.
- Detailed data for risk assessment is needed. This includes elevation models, hydrological data, meteorological data, information on soils. Models based on this information then have to inform planning processes.
- Science and local administrations have to enter into a fruitful dialogue, for which it is necessary to overcome "language barriers".

Periurban riskscapes

Currently the nature of the periurban transformation in India results in an increasing vulnerability towards disasters. Periurban spaces are prone to multiple risks and have limited coping capacities. Prominent examples are flooding events that devastated several Indian metropolitan regions in the last decades e.g., the Hyderabad floods in October 2020. Yet, periurban spaces are also the cradle of other man-made disaster or society-environment disasters, such as droughts, industrial accidents, fires, landslides etc. which affect the larger metropolitan areas in which they occur. These emerging vulnerabilities concern the built environment, the socio-economic fabric and ecological aspects.

Root causes for risk in periurban areas

The first root cause of the increasing vulnerability is unplanned development – the dominant mode of periurbanisation. It increases the disaster vulnerability through:

- The intensification of land use and landscaping through new infrastructures and housing. This logically results in more people and more assets being exposed to potentially hazardous events. In addition, intensification can actively produce new risks, too e.g., not considering disaster risk exposure when new housing or infrastructure are built in risk prone areas.
- Necessary infrastructures are built often after development takes place. Thus, local authorities have to provide infrastructure not in a forward-looking but mainly in a reactive way. Known hazards can then not be adequately included in the planning process and the chance to smartly design housing and infrastructure to increase resilience is lost.
- A lack of finances causes an aggravation of infrastructural deficits. Often, local authorities lack the means to provide very cost effective measures. Small interventions – like underground drainages – have the potential to significantly decrease the exposure to events or increase coping capacities.
- Spaces that could provide valuable functions for disaster risk reduction cannot be preserved. For an effective flood management, retention areas are needed that can absorb flood peaks. Often these areas are transformed into more intensive land use, which increases the exposure to flooding and the severeness of flooding events. Encroachments of first and second-order drains amplify the flood height after extreme rain fall events.

The second root cause is the weak periurban governance. It is characterized by an overlapping of several governance systems at different scales. Traditional governance structures erode, while new ones are not yet in place e.g., existing traditional water management systems are discarded without new ones being put in place instead. Also, collective work

on maintaining traditional protective measures, such as terraces that provide protection from landslides, is likely to erode in the process of periurbanisation without new institutions effectively taking on these tasks. Governance shortfalls are inter alia caused by and cause at the same time deficits in the availability of data. Data gaps concern ecological aspects, built structures, infrastructures and social systems. Informed decision making is often not possible under these circumstances and increases the disaster risk.

The third root cause is social restructuring. An influx of relatively poor populations from the core of the respective agglomerations and from other cities can be observed. Both streams of movement result in an accumulation of a vulnerable population, which lacks the capacity to cope with hazards.

How these three root causes exactly manifest in periurban areas is highly diverse and space specific. This makes it a challenging task for decision makers on the ground, yet ignoring them is not an option. Research needs to develop consistent frameworks on the drivers of change in the periurban and how they shape the periurban riskscape.

Policy interventions

Policy interventions need to address two perspectives: (1) Periurban areas need to be developed in a way that reduces risk while at the same time (2) disaster management skills need to be developed.

Risk management

Risk management is a cross-sectoral activity. It has to be based on a robust assessment of risk. For this adequate data is needed. This includes information about the physical geography, including elevation models, soil models, climate data etc., the built infrastructure and social structures. Data needs to cover the serviced area holistically, including informal settlements. A rigorous assessment of risks needs to inform the planning process for future developments. Even more important is the risk reduction in built up areas, where ex-post interventions need to be established in socially acceptable manners.

An important part of risk management is the dialogue with local populations. They often have in-depth knowledge about risks. Further traditional risk management systems, which have been developed locally can provide cost-effective and ecological means of managing risks.

Disaster management

Disaster management structures need to be put in place on a regional level. Most important in this regard are clear responsibilities and communication rules. It further includes rapid response forces that can be activated for intervention in case of a disaster. In case of a disaster, the most vulnerable infrastructure needs to be protected. Thus, for different scenarios, intervention plans need to be designed in advance. Most important is in the case of a disaster the prevention of risk cascades – the emergence of secondary or tertiary risks. These can be for example health risks emerging in the aftermaths of a flooding event because access to the sanitary infrastructure is limited.

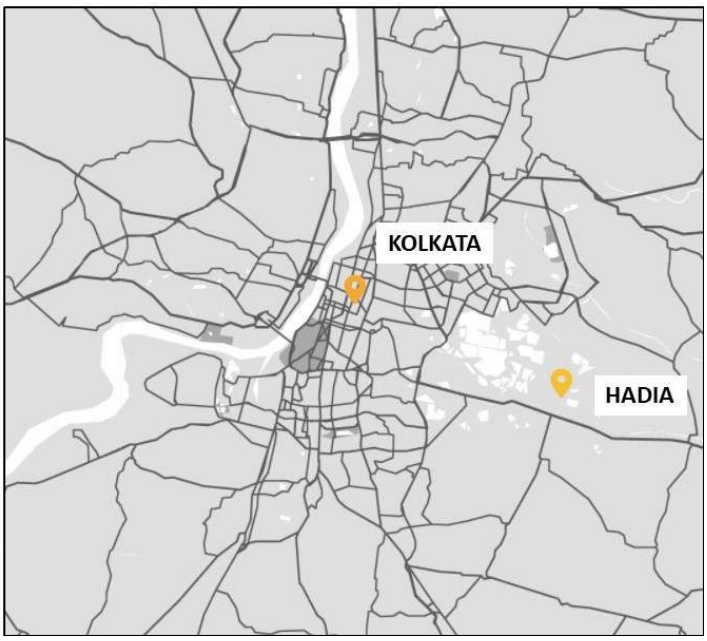
CONCLUSION: Pathways for Periurban Transformations

The challenges induced by periurban transformations are fundamental and not easy to solve. They are situated in various domains – society, government, economy – and on different scales – local, regional, national, global. Yet, this very unique spatial category offers a lot of opportunities. The high dynamics must not only be seen negatively – they will result in adverse development if they take place in an unregulated manner, with financial potent investors shaping spaces for their short term profit. But the dynamics also allow steering development quickly in a direction that allows for a transformation to sustainability. Essential in this regard is a solid database for planning, participatory planning processes, a robust institutional and financial framework and, most importantly, joint visions for sustainable development pathways.

TRANSFORMATION PATHWAYS: CASE STUDIES

WATER RELATED TRANSFORMATIONS IN PERIURBAN KOLKATA

Photo credit: H2O-T2S Project, Dr. Sharlene Gomes, TUDelft



Hadia: Periurban Kolkata

Hadia mouza is situated to the east of Kolkata city in West Bengal in the jurisdiction of Bamanghata gram panchayat. It consists of several villages including Bamanghata North and South, Dhalipara, Bogdoba, Noskorpara. In the 2011 Indian census, Hadia had 7921 inhabitants. It is situated in the East Kolkata wetland, which since 2002 has been a protected RAMSAR site. Because of this RAMSAR status, development in Hadia and its surrounding areas is restricted. A large wastewater canal runs through Hadia, bringing Kolkata's sewerage through the wetlands. The wetlands naturally treat Kolkata's sewerage.

Hadia is situated 7 km away from New Town, 10km from Science city and 7km from the Kolkata leather complex. The emergence of New Town and the leather complex led to the construction of roads in the area (eg. Basanti highway). Good connections to Kolkata led to an increase in population as people from other areas migrated and settled down in Hadia. Local residents are neutral on the topic of migration and consider village ties to be important. Tribal communities like the Munda and Maheli people also reside in parts of Hadia.

Household water needs in Hadia

Traditionally, groundwater and local ponds were the main source of household water supply. As incomes improved, households invested in private hand pumps leading to less reliance on ponds for domestic purposes causing deterioration of ponds over time due to lack of maintenance. In general, groundwater is accessible at 150 ft although quality is affected by Arsenic and Iron contamination causing diarrheal and other health issues. Therefore, most households purchase packaged water for drinking purposes if they can afford it from local Reverse Osmosis (RO) distributors. More recently, the panchayat installed deep tube wells (1000ft) to access groundwater and are also installing pipelines to supply treated surface water.

Water - related livelihoods in Hadia

The main source of livelihoods in Hadia is aquaculture and farming. Hadia has several large to medium sized bheris used for commercial aquaculture by private fish farmers or the local fishing cooperative. To the south, there is more wastewater farming or work as laborers outside the village. Here, only subsistence fishing is practiced in small rainfed ponds. New fishing practices are found, however, the majority of fishermen still use traditional methods. The construction of the wastewater canal and sluice gate allows nutrient rich wastewater to be used for aquaculture. Wastewater is distributed among the villages on a rotational basis through smaller channels. Hadia's aquaculture industry is affected by competing wastewater access, decline in wastewater nutrients and siltation issues in bheris and wastewater channels. Government support is furthermore, not available to everyone. While cooperatives receive some government support for dredging activities and developing tourism on the surrounding land, private bheri owners rely on their own funds. Besides fishing, some residents practice agriculture. Alternate cultivation of paddy and vegetables is done using groundwater. Jaggery farming is also seen in parts of Hadia. In some areas, agricultural lands are becoming barren due to

sandy soil or are converted into bheris. Newly emerging livelihoods include water vending (RO), employment in New Town or the Kolkata leather complex.

Pathways for future water-related transformations in Hadia

Three kinds of development pathways can be expected in Hadia over the next 15 years (2020 - 2035). Below is a brief description of local development preferences for livelihood and household water sector.

Future livelihoods

With regards to livelihoods, the business as usual pathway (in red) shows that aquaculture continues as is by private fishermen while fishing cooperatives continue developing tourism as a secondary source of income using government schemes. Long-term, however, it is not sustainable due to increasing expenses, declining fish productivity and uncertainty about whether the next generation will take over the business.

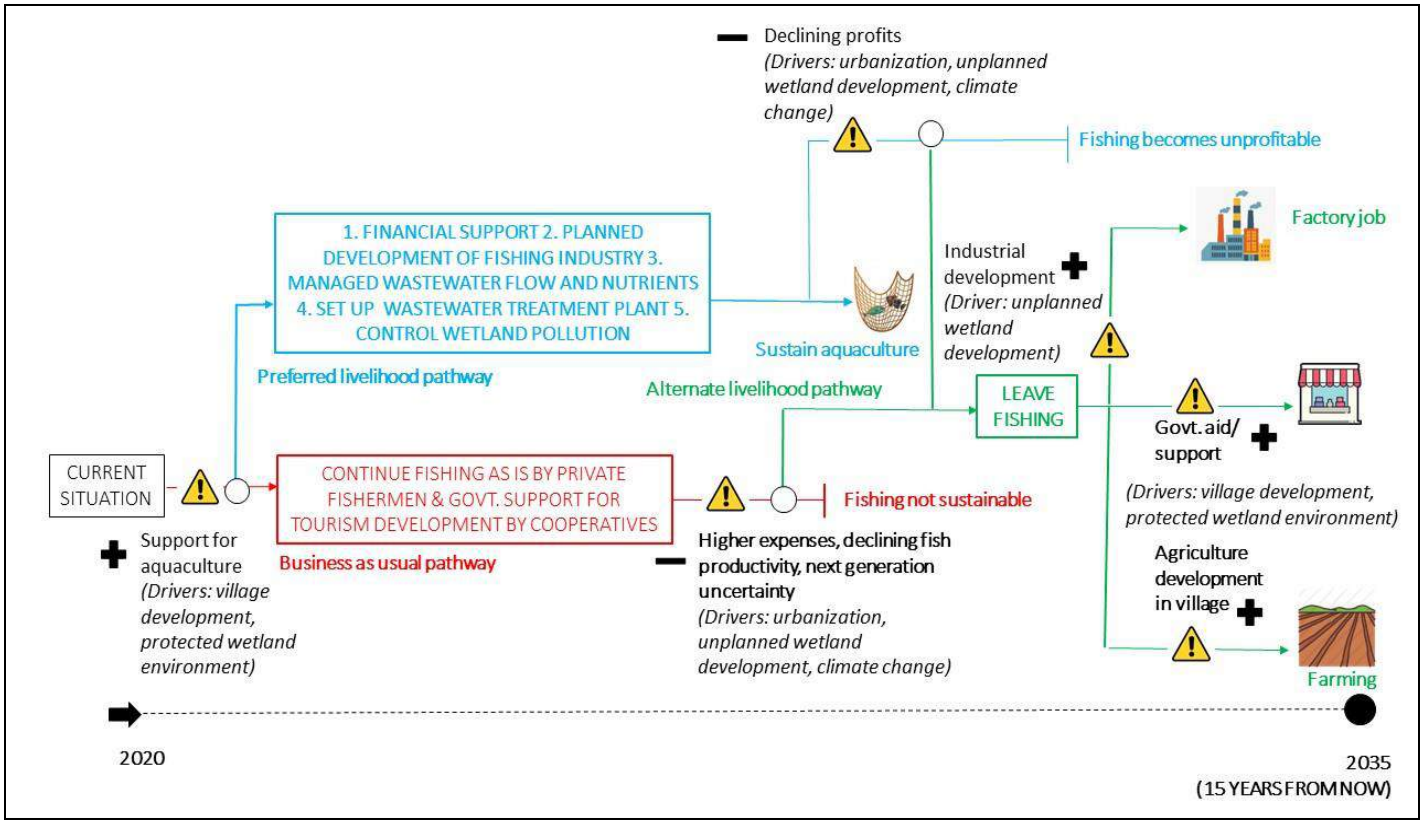


Fig 1.1: Business-as-usual and Alternative Pathways for Periurban livelihood futures

However, with improved support for Hadia's aquaculture sector, people can shift to their preferred livelihood pathway (in blue). This is achievable if development leads to more investments in village development and protection of the wetland environment. In this pathway, (1) different kinds of financial support for fishermen, (2) planned development of the fishing industry, (3) improved management of wastewater flow and nutrients, (4) establishments of a wastewater treatment plan and (5) control of wetland pollution are the actions needed in this order.

In the future, there is also a risk that urbanization, unplanned wetland development or climate change will drive development in a negative way in Hadia. This is signaled by the continuous declining profits and the next generation leaving aquaculture. With the collapse of the aquaculture sector people will be forced to move to their alternate livelihood pathway (in green) to pursue other kinds of jobs. The top 3 preferred alternative livelihood options depend on how Hadia develops in the future. With unplanned wetland development, people will pursue factory jobs in industries that develop. If there are investments in village development and a protected wetland environment then: with government support people can set up a small business in the village or with support for agricultural development work in farming related jobs.

Household water in the future

Three kinds of development pathways for household water in Hadia are identified for the next 15 years. In the business as usual pathway (in red), people continue to rely on existing water sources i.e. handpumps for domestic purposes and RO water for drinking purposes until piped supply begins.

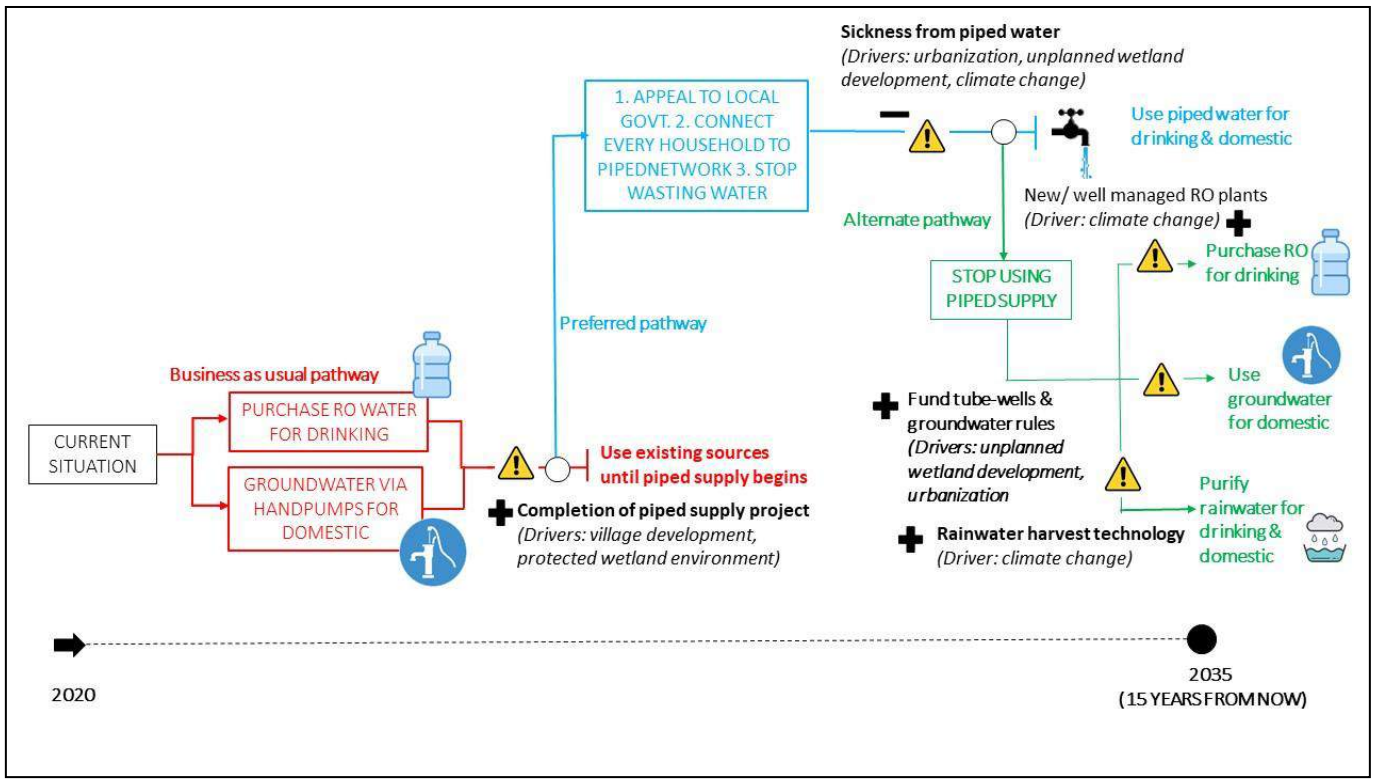


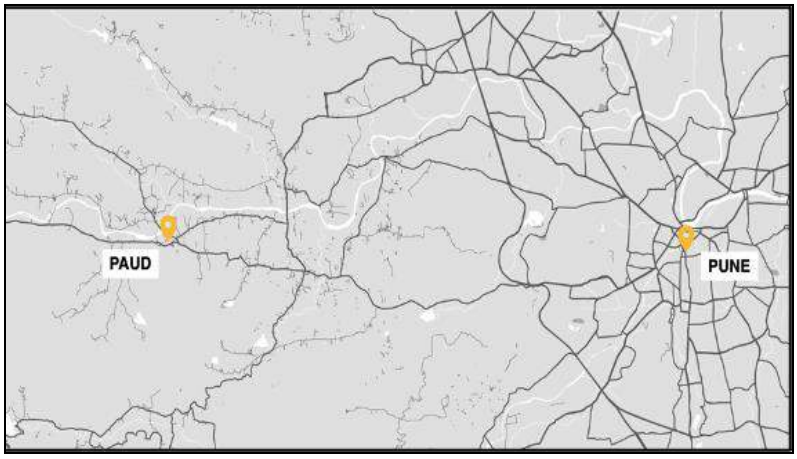
Fig 1.2: Business-as-usual and Alternative Pathways for Periurban household water access futures

Once the piped supply project is completed, people will move to their preferred pathway where they use piped water supply for both drinking and domestic purposes (in blue). For this pathway, several actions are necessary: (1) Hadia appeals to the local government for project completion, (2) all households are connected to the piped network, (3) efforts to prevent water wastage in this order. This pathway is supported by the drivers village development and protected wetland environment. On the other hand, urbanization, unplanned wetland development and climate change can negatively affect this pathway. If people get sick from drinking piped water, it is a signal for the household to stop using piped water before there is a serious health crisis or disease outbreak.

This leads to the alternate pathway (in green) for household water supply. The top 3 preferred alternative options depend on the use (drinking/domestic): With additional RO plants and good maintenance of existing RO plants, households will purchase RO water for drinking purposes. Securing funds to install handpumps and rules for regulating groundwater, facilitates groundwater use for domestic purposes. If rainwater harvesting technologies are piloted by the public health engineers, households will purify and use rainwater for drinking and domestic purposes. Each alternative is suited for different drivers. For example, households prefer to use handpumps if the 'unplanned wetland development' or 'urban expansion' driver occurs and RO water or rainwater if 'climate change' occurs.

WATER RELATED TRANSFORMATIONS IN PERIURBAN PUNE

Photo credit: H2O-T2S Project, SaciWATERs, Hyderabad



Paud: Periurban Pune

Paud is located 30 km West of Pune on a road connecting several villages in the Western Ghats with Pune, and South of the river Mula which runs towards Pune. To the West, Mulshi Dam can be reached after 10 km. In 2011, the village counted roughly 4,000 inhabitants.

The establishment of social (education, childcare), technical (transportation, electrification), and service (shopping, tourism) infrastructure, and the proximity to Pune, make Paud attractive as a base for employment in the vicinity or commuting to the city and thus being massively characterized by in-migration.

The village structure is very clear: The old village core with neighborhoods clustered by social status is located North of the highway. This part is under gram panchayat jurisdiction, whereas the surroundings of the village are administered by the Pune Metropolitan Region Development Authority. South of the highway are mixed residential areas, the government buildings, and Playtor, a township under construction. When completed, Playtor is expected to have 900 flats and thus almost as many inhabitants as Paud itself. As a registered township, it must guarantee its own regulatory systems (water, electricity, waste). It will belong to Paud administratively, but will represent a separate living environment.

Household water needs in Paud

Household water supply in Paud is diverse: Traditionally, water was drawn from wells and the river Mula. Now, with the provision of a centralized pipeline supply by the gram panchayat, households receive good quality water from the Mulshi Dam for two hours per day which they store in public and private storage systems. As in some parts of the village the water pressure is low, few households have private water connections as well. Despite Paud's upstream location, the water quality is deteriorating compared to the past. Therefore, some residents purchase packaged water. The gram panchayat additionally plans to install water ATMs for drinking purposes.

Water - related livelihoods in Paud

Major traditional water-based livelihoods in Paud are fishing, farming and pottery. The fishing community consists of roughly 25 households practicing joint cooperative, and subsistence fishing. Traditional fishing methods are very common, particularly within the indigenous group, called Bhoi. However, nowadays, the rights to fish in the dams are more regulated and fishing permits are expensive. Recently, supported by the "Blue Revolution Scheme" by the State Fisheries Department (2016) many fishermen adapted their techniques to increase their catch, e.g., through sophisticated nets. In 2011, 18% of Paud's residents engaged in farming, mainly paddy cultivation. Previously, farming was exclusively rain-fed. However, recently it became too risky to solely rely on precipitation due to climate variability, changing varieties of crops and their water requirements. Well-off farmers invest in hydraulic systems for irrigation and adapt their techniques, whereas farmers with limited budged are challenged to respond to these changes. Pottery in Paud is also undergoing change as potters are orienting toward urban markets and diversify their products by moving into brickmaking.

These traditional water-based livelihoods are supported by social networks used for sharing equipment and labor, and the intergenerational knowledge transfer among close kin. However, with new water-based livelihoods (e.g., car-wash centers, tourism, dairy, poultry), and employment outside the village emerging, they are under pressure to modernize.

Pathways for future water-related transformations in Paud

Three kinds of development pathways can be expected in Paud over the next 15 years (2020 - 2035). They are briefly described below.

Future livelihoods

The business as usual pathway (in red) shows that farming and fishing initially continues unchanged, through structured support and consistent demand from Pune. After time, access to local resources is getting more restricted, more households sell their land and farming and fishing are no longer sustainable. With financial support some farmers and fishermen diversify, or move towards small-scale economic activities. Therefore, farming and fishing are reduced and coexist with other livelihoods in the future.

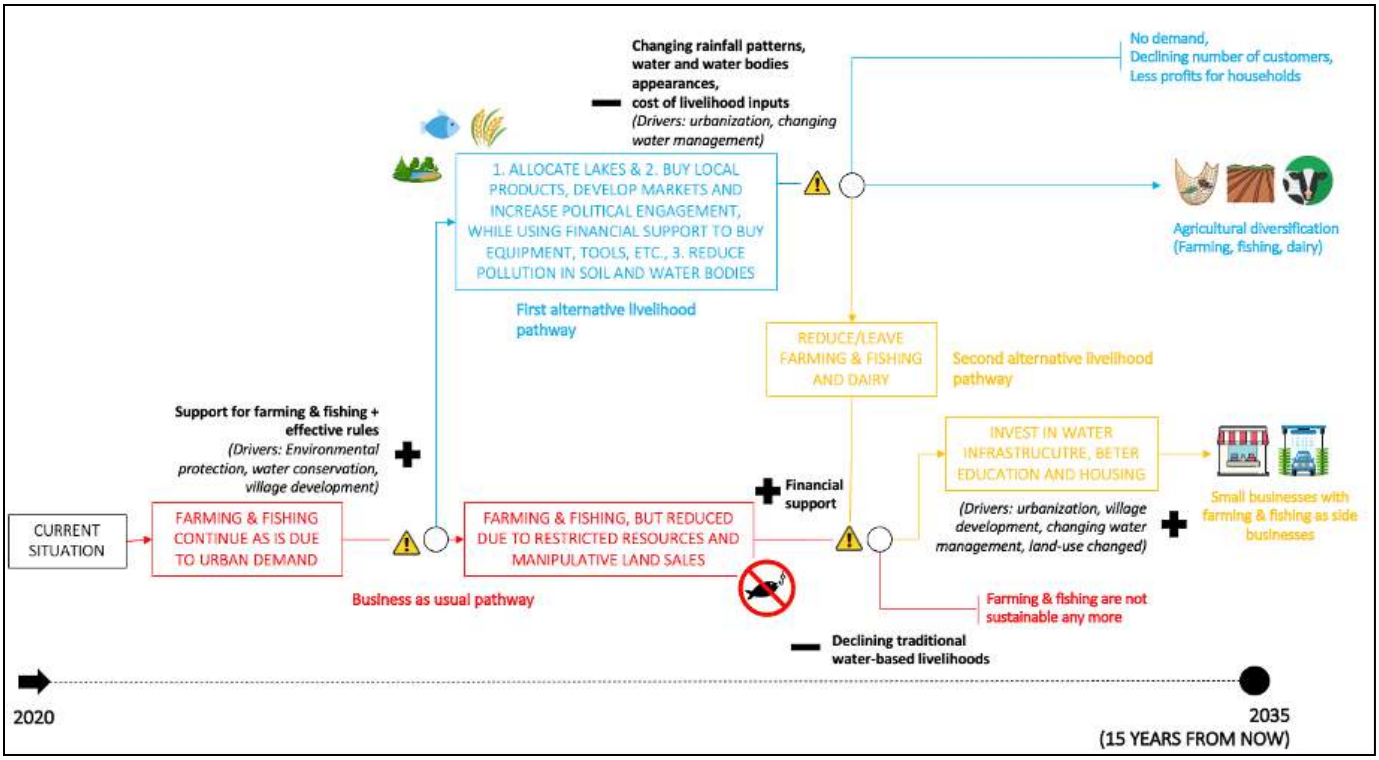


Fig 2.1: Business-as-usual and Alternative Pathways for Periurban livelihood futures

However, with substantive support and effective rules to increase local consumption (e.g., by the District or State) a shift to the first alternative livelihood pathway (in blue) is possible. This is supported by the introduction of environmental protection and water conservation initiatives, and village development. In this pathway, three steps of actions are necessary: (1) allocating resources, (2) buying local products to remove outside competitors from local markets, developing local markets, and increasing political engagement to strengthen the community, while receiving financial support to buy equipment, and (3) reducing pollution in soil and water bodies. On the other hand, urbanization and changing water management may negatively impact this pathway. This is signaled by declining rainfall, the appearance of dirty water and water bodies, and unaffordable cost of livelihood inputs and cause farmers and fishermen to leave this pathway, before their products are no longer in demand, the number of customers decreases and households have less profits.

They might shift to the second alternative livelihood pathway (in yellow). This pathway depends on the availability of financial support to help them invest in hydraulic infrastructure, or afford better education and housing. Farming and fishing is than reduced and pursued as a side business. Urbanization, village development, changing water management, and land-use changes support this pathway.

Household water in the future

In the business as usual pathway (in red) households draw water from diverse sources. They rely on tap water from the Mulshi Dam. As this supply is sometimes interrupted, e.g., through power outages, they combine it with other sources, e.g., filtered river water or pumped groundwater that they pipe to where needed and store in tanks. However, if tap water supply gets more insecure and pollution increases, they face water scarcity in the future.

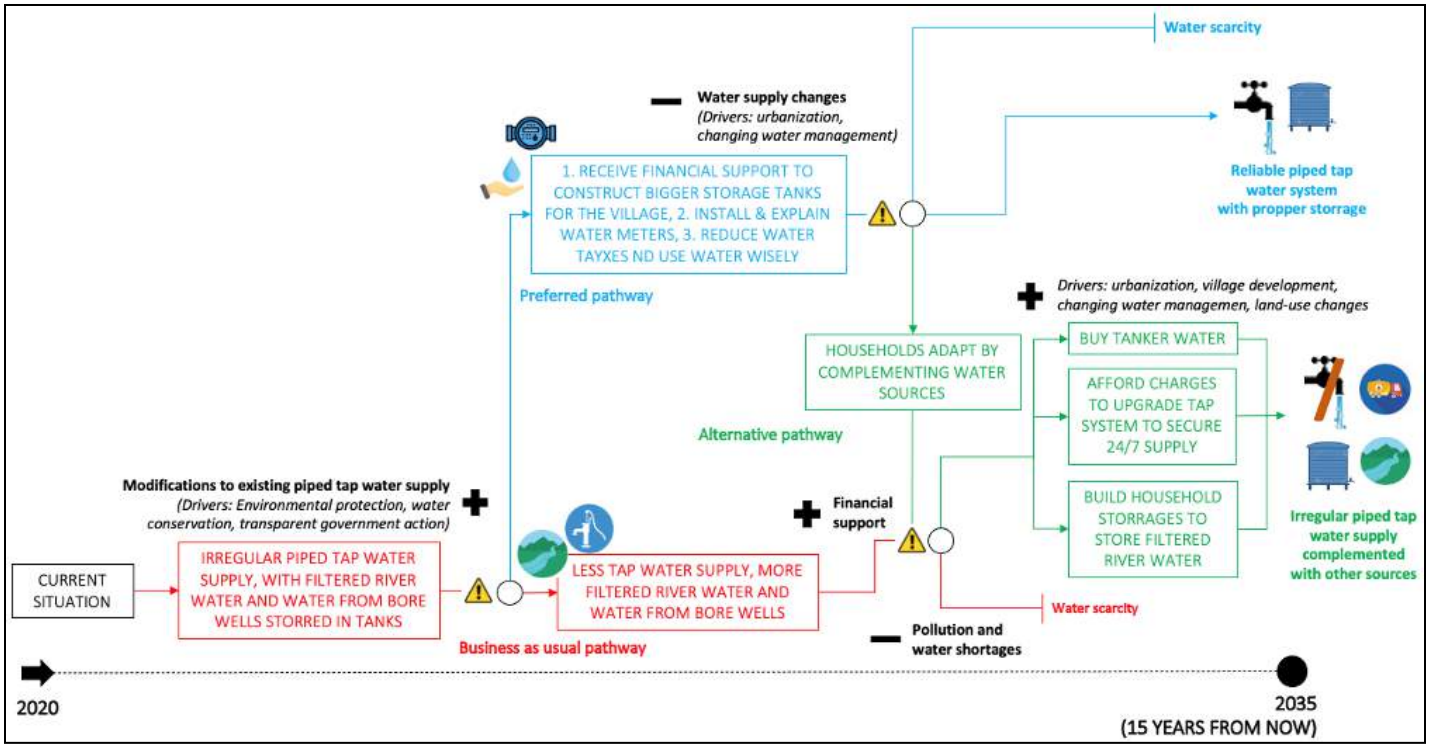


Fig 2.2: Business-as-usual and Alternative Pathways for Periurban household water access futures

With more regular tap supply (e.g., through TATA, gram panchayat), the preferred pathway (in blue) becomes possible. This is supported by the introduction of environmental protection and water conservation initiatives, and more transparency in government action. In this pathway necessary actions are (1) constructing water tanks with financial support, (2) installing water meters, reading and useing them, and (3) using water sustainably and anticipating water taxes to be reduced in the future. With this, water supply is reliable in the long term.

On the other hand, urbanization, and changing water management may negatively affect the development of a tap system. This is signaled by occurring supply changes and results in people shifting to the alternative pathway (in green). In this pathway, households adapt by complementing water sources. With financial support in place, they can (1) upgrade the tap system (e.g. by paying higher electricity prices to retain water) and secure a 24/7 supply, (2) buy water from tankers, and (3) build own storages for river water to overcome supply interruptions. These supply options already exist in Paud today. Urbanization, village development, changing water management, and land-use changes support this pathway.

WATER RELATED TRANSFORMATIONS IN PERIURBAN HYDERABAD

Photo credit: H2O-T2S Project, SaciWATERs, Hyderabad

Anajpur: Periurban Hyderabad

Anajpur village is at the peripheries of Hyderabad city at a distance of about 6 kms from the Outer Ring Road, which provides an express highway for the city and 9 kms from National Highway 95, which allows for frequent commuting to the city. Anajpur is characterised as periurban with presence of the Sanghi industrial complex and the 2000 acres Ramoji Film City complex in its vicinity directly affecting livelihoods, agriculture, and water resources of the village. Compared to the past, land value and land prices are rising. The tourism complex led to significant selling of land by landowning households in the village. Immigration of population and new urban residential developments has come up to benefit from the employment opportunities of the city and the Film city nearby. Increased social security, electrification, expansion of technical infrastructure and telecommunication network have been reported as positive village developments over the past decade. However, the industrial cluster caused immense land, surface water, and groundwater pollution in the village which led to unproductive agricultural lands and unusable quality of household water access.

Household water needs in Anajpur

The groundwater pollution from the industrial cluster and impact of the film city on quality and water levels in the village water body, affected the distribution and quality of traditional village water household water supply provided by the village governance (panchayat). A recent state policy Mission Bhagiratha, for universal treated tap water supply to all households by the state government, has been implemented in the village. Yet it is seen that because of perceived uncertainty of pipeline water quality and infrequent water supply provided by the government many households purchase RO water bottles at high cost delivered by RO plants. Immigrating population is increasing the local water demand of the village. Richer households have built large household water pumping and storage systems to draw more water from the village water supply which has increased the demands on the limited village water supply capacity and increased inequality in water availability between rich and poor households. The shift in responsibility and power for water supply from the village panchayat to the state department has led to reduced access to governance, grievance redressal, and regular maintenance for the local community.

Water - related livelihoods in Anajpur

Agriculture and fishing are major traditional livelihoods in the village. There is also a significant amount of dairy, animal husbandry, poultry, and laundry businesses which are newly emerging and have a strong affiliation and focus towards urban markets and consumers. The pollution of groundwater from the industrial cluster in the village affected the traditional agriculture and poultry farms in the village downstream of the industries. Further the setting up of the film city in the village led to large tracts of agriculture land being sold at low prices. With many households thus leaving agriculture, the film city and the industrial complex developed into large employers and main source of income in the region. However, over the past 3 years, particularly since the major pandemic related lockdowns, the industry and film city drastically reduced hiring of labour from the village.

Pathways for future water-related transformations in Anajpur

Based on these external periurban drivers and path dependency of the past transitions and developments, the local stakeholders considered 3 major future scenarios and pathways over 15 years for Anajpur. Below is a brief description of local development preferences for livelihood and household water sector.

Future livelihoods

With regard to livelihoods, among many potential scenarios and pathways, the most preferred future livelihood scenario considered was to retain traditional livelihoods in the village but improving their productivity and profitability. This direction can be supported by positive drivers such as supportive state policies and retaining the village as a panchayat even under the urbanising influence. Under these contexts low interest loans for inputs, for adopting upgraded technologies, building better market access through cooperatives, and improving water storage systems are key actions from communities that can lead to better livelihood outcomes.

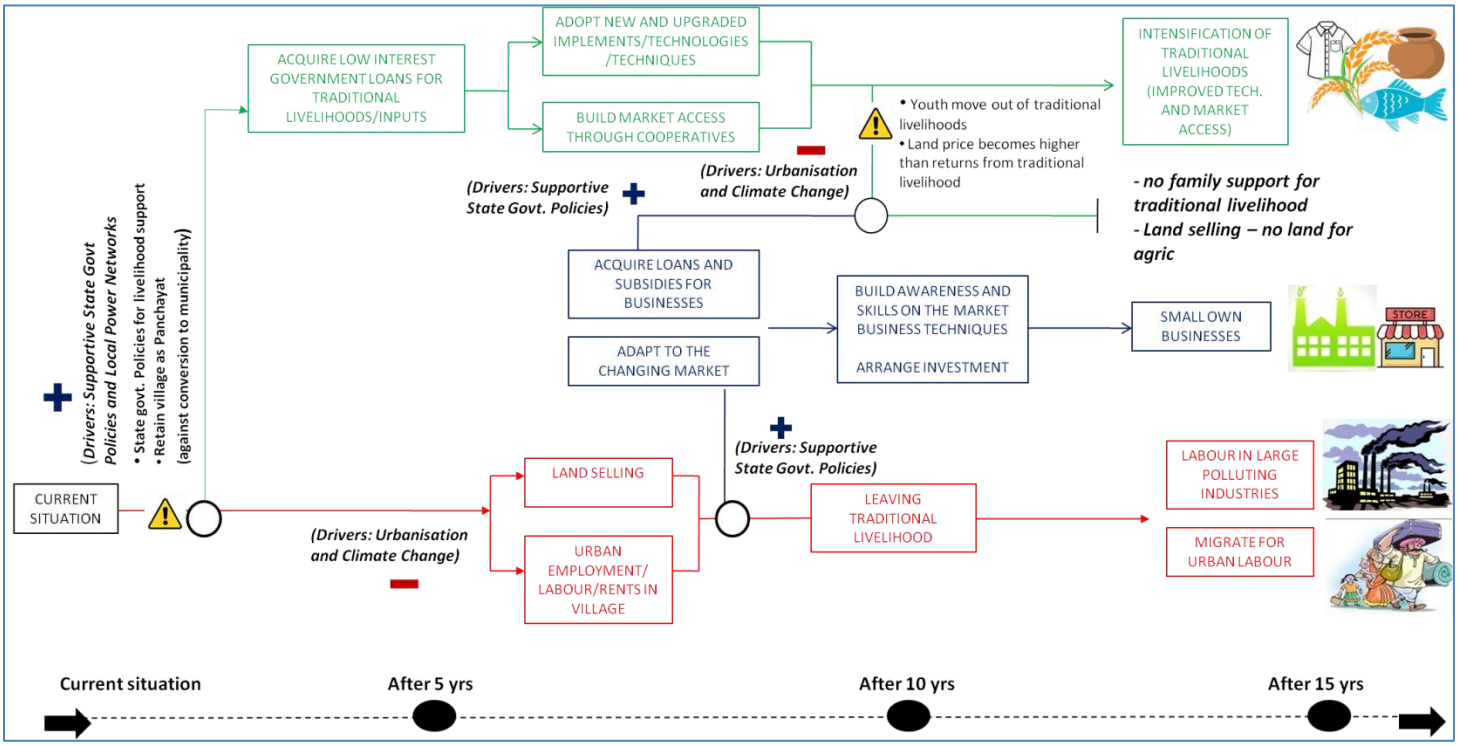


Fig 3.1: Business-as-usual and Alternative Pathways for Periurban livelihood futures

However, if urbanising influences and climate change outcomes predominate, water resources will be compromised affecting returns from traditional livelihoods and simultaneously land prices will increase. These drivers and signals would drive the village away from this pathway. Under such potential future development, an alternative pathway is considered as the community shifting to small-scale own businesses by adapting to the changing market, and developing skills and awareness on the market and business techniques.

These pathways are considered alternatives to the current unsustainable business-as-usual pathways that lead to water pollution, reducing returns from traditional livelihoods, land selling, and compulsion to shift to urban wage labour and housing rental as future livelihoods.

Household water in the future

Currently the village depends on multiple sources of household water. Under potential influences of climate change, population pressure from high in-migration, and infrastructure deterioration, this would lead to an unsustainable business-as-usual pathway towards insecure water access from tap water sources and increased dependence on high cost RO water.

Instead, a preferred pathway considered by the communities was to improve Mission Bhagiratha water supply through improving governance accountability for quality infrastructure, maintenance, and more assured and frequent water supply. Building awareness and initiatives towards demand management and water saving by households is also considered an important action alongside improving supply and distribution of Mission Bhagiratha water. Active and responsive state policy environment and local governance strengthening through participatory village decision-making would drive this pathway.

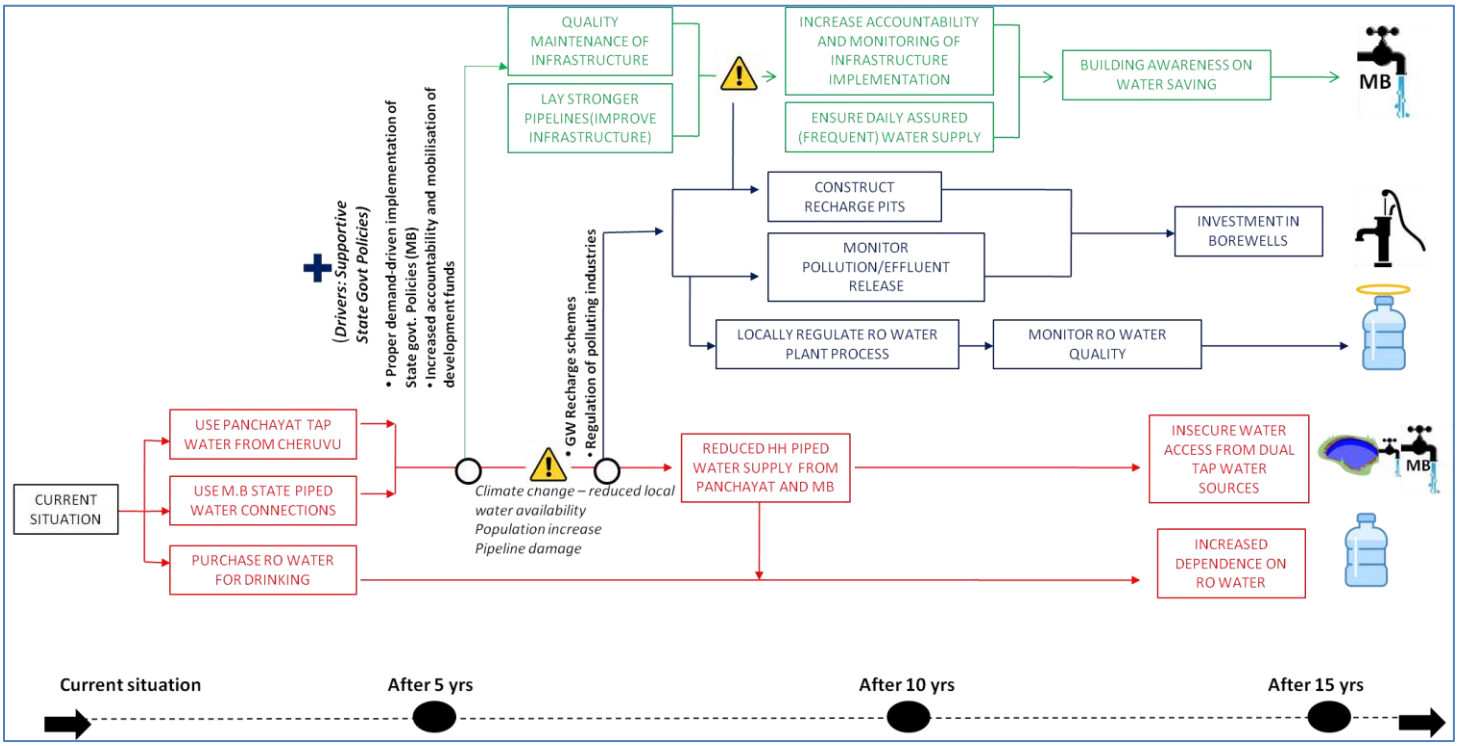


Fig 3.3: Business-as-usual and Alternative Pathways for Periurban household water access futures

An alternate pathway would lead to improved groundwater access under an environment of stronger regulation of polluting industries and supportive policies for groundwater recharge. Communities and local panchayats would play a major role in locally monitoring effluent release from industries in the village, regulating treatment processes of local informal RO water plants, and constructing groundwater recharge pits in the village.

ANNEXURES

ANNEXURE 1: Contributors

Photo credit: Conference slide, SPA Bhopal

SPEAKERS AND DISCUSSANTS

Opening Plenary: PERIURBAN TRANSFORMATIONS

- **Dr. Surendra Bagde**
  Additional Secretary, Ministry of Housing and Urban Affairs, Govt. of India
- **Dr. Rumi Aijaz**
  Senior Fellow, Observer Research Foundation, New Delhi
- **Dr. Bhuvaneswari Raman**
  Professor, OP Jindal Global University
- **Dr. Shiraz Wajih**
  President, Gorakhpur Environmental Action Group
- **Dr. Carsten Butsch**
  University of Cologne
- **Dr. Leon Hermans**
  TUDelft

Thematic Session: PERIURBAN WATER RESOURCES

- **Shri G. Mathi Vathanan**
  Principal Secretary, Department of Housing and Urban Development, Govt. of Orissa
- **Dr. Victor Shinde**
  Lead, Water and Environment, National Institute of Urban Affairs
- **Dr. Priyanie Amerasinghe**
  Emeritus Scientist, International Water Management Institute, Colombo Sri Lanka
- **Sarah Luft**
  University of Cologne
- **Dr. Shamita Kumar**
  Professor, Bharati Vidyapeeth University
- **Dr. Alexander Follman**
  University of Cologne

Thematic Session: GENDER IN THE PERIURBAN

- **Dr. Sucharita Sen**
  Professor, Jawaharlal Nehru University, New Delhi
- **Shreya Chakraborty**
  Senior Fellow, SaciWATERs, Hyderabad
- **Nupur Rashi Panna**
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- **Krati Sharma**
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- **Mukta Naik**
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- **Chirantana Kar**
  Project Director, NAARI
- **Dr. Vishal Narain**
  Professor, MDI, Gurgaon
- **Dr. Poulomi Banerjee**
  Senior Consultant, SaciWATERs

Thematic Session: GOVERNANCE & INFRASTRUCTURE

- **Dr. Sudhir Krishna**
  Ex. Secretary, Ministry of Housing and Urban Affairs, Govt. of India
- **Dr. Tathagata Chatterji**
  XIM University, Bhubaneswar
- **Dr. Sharlene L. Gomes**
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- **Mayur Kulkarni**
  Planner, Mumbai Metropolitan Region Development Authority
- **Aparna Soni**
  School of Planning and Architecture, Bhopal
- **Partha Banerjee**
  The Researcher, Kolkata

Thematic Session: DISASTER RISK AND RESILIENCE

- **Shri G. Padmanabhan**
  Ex-head, Disaster Management Unit, UNDP India
- **Dr. Rohit Jigyasu**
  Project Manager, Urban Heritage, Climate Change and Disaster Risk Management, ICCROM, Rome Italy
- **Dr. Anant Maringanti**
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- **Dr. Anil K Gupta**
  Professor, National Institute of Disaster Management
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- **Dr. Animesh Kumar**
  Head, UNDRR, Bonn

SCHEDULE AND CONCEPT

Time	Session Details
DAY 1: 18th January 2021	
02:00 -03:30 pm (IST) **9:30 – 11:00 am (CET)**	**Opening Plenary: PERIURBAN TRANSFORMATIONS**
04:00-05:30 pm (IST) **11:30-01:00 pm (CET)**	**Thematic Parallel Session 1: PERIURBAN WATER RESOURCES** **Concept**: Periurbanisation in most cases results in changing and increasing pressures on water as a resource. First, in situ more water is needed, because water related activities increase. These are often conflicting and result in struggles over the scarce resource for different purposes – irrigation water, input for industrial processes and drinking water. Additionally, the growing urban centres demand more water and release grey or waste water into the periurban. Thus, specific periurban waterscapes emerge. New and old rules, new and existing infrastructures and external and internal actors create a landscape waterscape in which changing flows and qualities of water reflect the different demands, rules and regulations, and power structures. This session seeks to explore, how periurban waterscapes can be transformed in a sustainable manner.
	Thematic Parallel Session 2: GENDER IN THE PERIURBAN **Concept**: Gender relations are determined not only through social structures, but also through physical and spatial resource relations. Urban growth processes manifest on the periurban through rapid superimposition of new urban landscapes on the old rural ones, with an accompanying export of resources to the city core and increasing urban and industrial pollution of the decreasing stock of resources. Hegemonic geographical and resource spaces that are produced from these economic processes reflect and reproduce persistent social and gender relations. The unique social and political pressures and milieu of the periurban space mediate this co-production of space, resource, and gender. This session intends to understand the changing processes of production and reproduction of gender relations in the periurban context, emerging gendered vulnerabilities and opportunities, and pathways for transformations in gender relations in periurban spaces.

Time	Session Details
DAY 2: 19th January 2022	
02:00 -03:30 pm (IST) **9:30 – 11:00 am (CET)**	**Thematic Parallel Session 3: GOVERNANCE AND INFRASTRUCTURE** **Concept**: Periurban areas are highly dynamic in nature and are not well-served in the traditional governance classification of urban and rural institutions. This is closely linked to the governance of infrastructures, as infrastructures typically represent collective goods and services. The dynamic context-specific and spatially distinct trajectories of the different periurban areas mean that simply creating a new third category for governance and planning is not necessarily a panacea. This session on "Periurban Governance and Infrastructure" will discuss and compare how different periurban areas, for different domains and challenges, develop new and promising governance arrangements, with a particular focus on infrastructure provision and management. The underlying question is how to develop and nurture new governance arrangements that can support a periurban transformation towards a sustainable future.
	Thematic Parallel Session 4: DISASTER AND RESILIENCE **Concept**: Rising water stress and the increasing occurrence of urban flooding in last one decade calls for understanding the resilience of different systems to cope up or recover from these. The periurban areas being rich in natural resources plays an important role in minimizing the urban flooding risks and addressing the water stress related concerns. The dynamics of growing pressures on scarce resources such as land and water in periurban areas is adversely affecting the inherent resilience provided not only to local dwellers but also to the densely populated urban areas. This session on 'Disaster and Resilience to water' will focus on ecosystem services of periurban areas and their role in enhancing community resilience to water stress and urban flooding. The deliberations will contribute to understanding the community resilience from the perspective of 'static resources' that acts as a buffer to reduce vulnerabilities and the qualities of 'local dwellers' that adapt and thrive in response to growing environmental challenges in the periurban areas.
04:00-05:30 pm (IST) **11:30-01:00 pm (CET)**	**Closing Plenary: PATHWAYS FOR TRANSFORMING PERIURBAN FUTURES**

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