

## A Delphi Approach to Building Transformation Pathways for Water-Based Livelihoods in Periurban Pune

Sarah Luft, Carsten Butsch

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In India, the accelerating urban transformation and the growth of metropolitan cities (Prakash 2013) result in an increasing interest in periurban areas, as zones in transition. The periurban is commonly perceived as a patchwork space (Allen 2003) or a mosaic (Simon 2008) with heterogenous, coexisting and interrelated physical, social, economic and institutional structures (Allen 2003, Butsch & Heinkel 2020, Mehta & Karpouzoglou 2015, Simon 2008, Vij & Narain 2016). It can be conceptualized as place, for example, closely linked to the core city, associated with its dynamics (Hui & Wescoat 2019, Iaquina & Drescher 2000, Mehta & Karpouzoglou 2015) or from a process-based understanding of a rural-urban continuum (Iaquina & Drescher 2000, Vij & Narain 2016). What all these different conceptions of the periurban have in common, however, is that they emphasize that these spaces are characterized by dynamic transformation.

These transformations particularly shape the management and governance of natural resources. In the past, scientists primarily used water to analyze these socio-ecological transformations, since water as a substance is essential for life and human activities. At the same time periurbanization results in changing water ecologies within and pressing demands from adjacent urban centers (Butsch & Heinkel 2020, Narain & Singh 2019, Prakash 2013, Vij & Narain 2016). Closely related to these processes are changing land uses and alterations of livelihood strategies. Particularly traditional water-based livelihoods, such as farming and fishing, which are important in periurban areas, are affected by changes of the so-called hydro-social cycle (Butsch et al. 2021). Visible transformations are shifting and adapting livelihoods patterns, techniques and newly emerging strategies, which also target beyond the primary sector (Allen 2003, Mirta & Banerji 2018, Thomas et al. 2017). Noticeable dynamics, which go along with these livelihood changes are shifting mechanisms of domestic and drinking water supply, and associated, partly unresolved, responsibilities from the institutional side.

### Water-based transformation research in urban fringe areas in India

The joint project “H2O – T2S in urban fringe areas” addresses periurban water-based transformations in the urban fringe areas of three Indian metropolitan cities (Pune, Hyderabad, Kolkata) with a focus on three key subjects:

- I. Water-related institutions and governance and changing local water managements
- II. Access to water as a consumption good (for drinking and domestic purposes)
- III. Water-based livelihoods and their effect on periurban settings

The project contributes to understanding site-specific drivers of vulnerabilities and engages periurban capacities to create potential alternative pathways that help promote a more sustainable development of periurban areas in the future. It is part of the joint programme “Transformation to Sustainability” funded by the Belmont Forum and NORFACE and led by an interdisciplinary, international research team from the University of Cologne, TU Delft and SaciWATERS in Hyderabad in collaboration with local partners.

The project follows a multi-staged, mixed-methods approach in six periurban villages over a period of three and a half years. Since its launch in 2018, two empirical field phases have been completed. As on-site field research became impossible for all international and Indian researchers due to the COVID-19 pandemic, the original plan to involve local stakeholders in the gradual development of transformation pathways during a participatory research phase in December 2020 could not be realized. Thus, the methodology was amended to a remote, multi-staged Delphi Study, focusing on three of the six periurban villages. Therein, two strands are pursued: (1) 20 local actors in each of the three periurban settings of Pune, Hyderabad and Kolkata from different livelihood groups, political affiliations, genders and age categories are interviewed to illustrate different future scenarios for their villages (Actor-pathway-study) and (2) 18 Indian and international experts with different regional expertise, affiliations (e.g. academia, institutions, NGOs, governance) and research interests (e.g. water management, periurban development, livelihoods) are consulted to develop best-case future visions of water-related periurban dynamics for the three villages on an abstract level (Expert-panel).

This extended abstract elaborates on the design and process of this Delphi Study and describes the methodological translation of participatory research into a remote, virtual, multi-staged, multi-actor design. Focusing on the first of three rounds, the results of the Actor-pathway-study and the abstract

visions gained from the Expert-panel for the village of Paud in periurban Pune are presented.

### **Building transformation pathways**

How to get from a present pathway to a more desired situation? – is the basic guiding question to building transformation pathways towards a more desired future. Particular path-elements, consisting of actions, strategies and values help to understand what this future would look like and gradually lead to objectives that explain what exactly it is that stakeholders aspire (Enserink et al. 2010, Hermans et al. 2017, Marchau et al. 2019). Combining and sequencing these pathway elements depends on drivers and external factors that may render actions and strategies no longer feasible to meet the desired objectives. These occur for different reasons at different times, calling for alternative action (Hasnoot et al. 2013, Hasnoot et al. 2018, Hermans et al. 2017).

Building transformation pathways provides insights into the implementation, sequencing and delay of actions and strategies, potential lock-ins, path dependencies, and decisions towards potential better future options and in doing so contributes to a new planning paradigm (Hasnoot et al. 2013, Hasnoot et al. 2018, Werners et al. 2021): In the long term, building pathways supports exploring alternatives to adapt to changing conditions, developing strategic ambitions and can be utilized as a monitoring and collective learning system to ultimately promote long-term resilience. In shorter-term, building pathways integrates flexibility into policy decision-making, accounts for uncertainties and thereby improves mechanisms to cope with immediate vulnerabilities (Hermans et al. 2017, Hasnoot et al. 2018, Maru et al. 2014, Werners et al. 2021). Designed in a way to integrate multiple perspectives, values, objectives, and knowledge levels, they can help to develop one or more paths to a desired future, which in return enhances the quality and inclusiveness of pathways and facilitates learning on potential needs for change (Werners et al. 2021).

### **Translating on-site research into a remote, virtual approach**

In order to build transformation pathways, the anticipated on-site workshops in dialogue with local stakeholders were translated into a virtual and remote approach, which is conducted as a three-staged, multi-actor process pursued in two strands.

- I. For the Actor-pathway-study the panelists were recruited through local collaborating teams using snowball sampling. To prepare for the 1st round between December 2020 and February 2021 each panelist received a video of the respective village in the local language illustrating the current status quo based on previous research findings, the project's objectives and the questionnaire via WhatsApp. During a structured telephone

interview, participants were then asked to describe their best case, nightmare and business as usual visions for their village in the year 2035, and more precisely identify future livelihoods, the domestic and drinking water situation and their related institutions.

- II. The 1st round of the Expert-panel was conducted in January and February 2021. The panelists received a video with abstract information on the villages, the project's objectives and the questionnaire via email. During a digital semi-structured qualitative interview, they were asked to envision the three villages in the year 2035 and describe sustainable future scenarios in regard to general developments, livelihoods, domestic and drinking water and their related institutions.

In the 2nd round between April and June 2021 the panelists were subsequently asked to prioritize and rank scenarios, values, strategies, and identify limitations and drivers. Based on the panels' answers, the 3rd round, in August and September 2021, focused on drafting possible transformation pathways, reflecting on interim results and filling in the missing elements to finalize the pathways roadmaps. In round 2 and 3, data was obtained during structured telephone interviews in the Actor-pathway-study and collected via structured online surveys in the Expert-panel. All panelists were asked for consensus to commit to all three rounds and ensured anonymity of their participation.

### **Paud's livelihood pathways from two perspectives**

Paud is located 30 km west of Pune on a highway connecting several villages in the Western Ghats with Pune. It is situated on the banks of Mula River, which runs from the Western Ghats towards Pune. The river is dammed at the Mulshi Dam, 10 km west from Paud. As Paud is located upstream from Pune, the water quality is considered good. Nevertheless, compared to the past it has been reported that the water quality has slightly deteriorated.

Paud is surrounded by fields cultivated, especially for growing paddy, which is one of the most important traditional water-based livelihoods. Farming was previously exclusively rain-fed. Nowadays, the water gets more accessible, for example through bore wells or water pumps, which opens new possibilities to change traditional farming patterns (e.g. faster irrigation and more than one yearly harvest). Besides farming, there is an active fishing community, practicing joint fishing in cooperatives and individual fishing for subsistence. Within recent years many fishermen adapted traditional fishing, for example through the usage of more sophisticated nets, to increase their catch. Another important traditional water-based livelihood in Paud is pottery, which is practiced by a small community, the Kumbhars. In recent years, new water-based livelihoods, such as

car wash, animal husbandry or dairy have emerged. As these mainly target urban demand, they exert pressure to modernize traditional occupations or even lead to their disappearance.



Fig. 1: Paud (Photo: C. Butsch 2019)

From the actors' perspectives, three different livelihood strategies are important for Paud in the future (with 2035 as reference year): (i) Traditional water-based livelihoods including fishing and farming, (ii) non-water-based livelihoods, in tourism, industries or service jobs, and (iii) alternate water-based livelihoods in car wash, laundries or new forms of agriculture. These strategies will eventually create income-security, livelihood diversification and employment opportunities for the village residents, contribute to prosperity and ultimately lead to a well-balanced progress of the village. In order to achieve this future, each strategy is supported by institutions that among other things, support traditional livelihoods, aim to regulate participation, or control land development.

The experts created a more differentiated picture of future livelihood actions leading to a multiplicity of strategies envisioned for the village in 2035 (Fig. 2). These strategies will eventually lead to (i) the modernization of livelihoods, (ii) the evolvement of traditional livelihoods, (iii) the preservation of traditional livelihoods and their intangible heritage, or (iv) the diversification of livelihoods. The village will then ideally be characterized by livelihood security through income stability and equality and develop in a more sustainable way in the future. The most important rules and regulations and the institutional actors implementing those rules and regulations to support reaching this future are closely connected to the underlying strategies. They include financial support and subsidies by government entities, skills development programmes carried out by NGOs, incentives for better marketing of products from the private sector or the support for women's self-organization through associations or cooperatives.

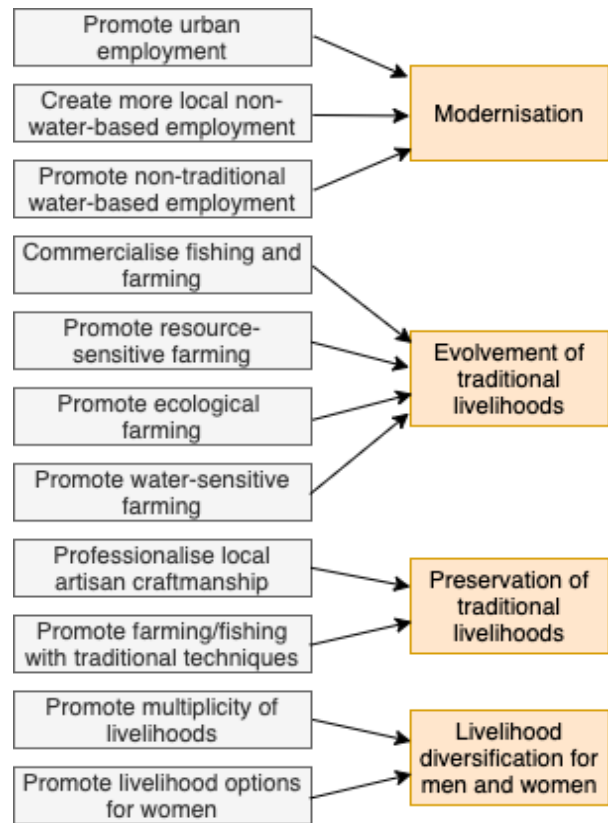


Fig. 2: Experts' visions on future livelihood strategies and values in Paud (draft by Luft 2021)

### Concluding remarks

This study demonstrates how on-site research is transformed into a digital, multi-stage process to construct transformation pathways for periurban Paud. The first rounds of the Actor-pathway-study and the Expert-panel have provided a broad profile of possible village futures, detailed from the actors' perspectives and more abstract from the experts' point of view. On the one hand, a considerable overlap between the two strands is visible. On the other hand, significant differences were identified, especially with regard to the diversification of livelihood strategies and actions and the degree of abstraction. Altogether, however, they demonstrate that periurban futures are shaped by a multiplicity of actors, site-specific vulnerabilities and potentials. Transformation is inevitable and leads to a co-creatable, constantly reshaping future in which both positive and negative externalities are generated. Thereby, this study aims at contributing to enabling local communities to think about possible futures towards sustainable development, with a particular focus on water and water-based livelihoods. Gradually determining which actions and strategies, values and objectives the actors and experts actually prefer for Paud in 2035 and which sequence of development they envision is a matter of continuing research involving consideration of all three rounds.

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## Contact

Sarah Luft (MA)  
Geographisches Institut, Universität zu Köln  
Otto-Fischer-Str.4, 50674 Köln  
s.luft@uni-koeln.de

Carsten Butsch (Dr. PD)  
Geographisches Institut, Universität Bonn  
Meckenheimer Allee 166, 53115 Bonn  
butschc@uni-bonn.de