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Urban agriculture in Kathmandu as a catalyst for the civic inclusion of migrants and the making of a greener city.

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Abstract:	This research explores the opportunities offered for green city-making on the recently secured Bagmati riverbanks in Kathmandu which is subject to rapid inward migration from landless rural farmers. It asks what the theory and practice of architecture can contribute in this setting to support the fit between emergent bottom-up initiatives and top-down city investment. To do this it deepens and extends loose fit theory, research methods and reflective practices to investigate latent possibilities, assemble a narrative of embedded change and create spatial imaginaries of topographical change on the Bagmati riverbanks. It argues that by making explicit the relationships between setting and occupant, stimulating and representing alternative imaginaries and framing a civic discourse, architectural theory and practice can play a significant role in both integrating migrants into civic institutions and at the same time helping to generate a greener city.

Response to reviewers comments:

The paper has undergone a comprehensive review and major structural revision.

In response to the reviewers numbered comments:

(1) The legend of the maps in figures 1 and 2 has been expanded.

(2) The captions of all figures have been expanded. This includes the caption in figure 6 which has been expanded to explain the reason for the photo on the left of the image.

(3) The figure numbers are in the order that they appear for the first time in the text.

(4), (5) and (6) To make the purpose of the study clear the Research Question (section 1.01) is given at the start of the paper within the Introduction (section 1.00). The aim of the paper is to broaden and deepen the Loose-Fit Theoretical Framework described in section 2.00 by focusing on the critical reflection on a Case Study of Kathmandu's Bagmati riverbanks (section 2.01).

It does so by reviewing the current situation in Kathmandu in section 3.00 and then by reviewing the empirical project work in section 4.00. Then in the following three sections it reflects on these speculations with reference to 3 theoretical ideas (section 5.00: affordance, section 6.00: the place based imaginary, section 7.00: place-based discourse) which relate to the harnessing of both the setting and the imagination in the service of meaningful change.

(7) The major findings of the study are summarised in the concluding section 8.

The River and the City

Urban agriculture on the banks of Kathmandu's river Bagmati as a catalyst for the civic inclusion of *sukumbasi* migrants and the making of a greener city.

AUTHOR DECLARATION

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by both of us.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

We understand that the Corresponding Author is the sole contact for the Editorial process (including Editorial Manager and direct communications with the office). He/she is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs. We confirm that we have provided a current, correct email address (mauricemab@gmail.com) which is accessible by the Corresponding Author and which has been configured to accept email from the Journal Frontiers of Architectural Research.

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The River and the City

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The authors of the particular projects illustrated and referred to in the text are:

Amara Roca Iglesias: Shanti Nagar edible walls
Amara Roca Iglesias: Central Ghats spatial imaginary
Jake Winter: Thapathali Riverside Festival
Jake Tiong: Paurakhi Gaun settlement institutions of permanent temporality

Glossary

Sukumbasi: landless urban migrants
Ghat: steps leading down to a river
Dharamsala: guest house
Baari: field

Illustration credits

Maurice Mitchell: Figs 01, 03.
Amara Roca Iglesias: Figs 02, 04, 05, 06, 07, 08, 09.
Jake Winter: Fig 10.
Jack Tiong: Figs 11, 12, 13.

Declarations of interest

None

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The River and the City

Urban agriculture on the banks of Kathmandu's river Bagmati as a catalyst for the civic inclusion of *sukumbasi* migrants and the making of a greener city.

Abstract

This research explores the opportunities offered for green city-making on the recently secured Bagmati riverbanks in Kathmandu which is subject to rapid inward migration from landless rural farmers. It asks what the theory and practice of architecture can contribute in this setting to support the fit between emergent bottom-up initiatives and top-down city investment. To do this it deepens and extends loose fit theory, research methods and reflective practices to investigate latent possibilities, assemble a narrative of embedded change and create spatial imaginaries of topographical change on the Bagmati riverbanks. It argues that by making explicit the relationships between setting and occupant, stimulating and representing alternative imaginaries and framing a civic discourse, architectural theory and practice can play a significant role in both integrating migrants into civic institutions and at the same time helping to generate a greener city.

1.00 INTRODUCTION

1.01 Research Question

In 2008, the Nepalese government planned a 'green United Nations park' to clean up Kathmandu's rivers and beautify their banks. A year later, the Prime Minister remarked that he dreamt 'of being able to jog along the Bagmati banks early [in the] morning and breathe fresh air'. There was no room in this plan, however, for the migrant settlements established on these same river banks as they were regarded as dirty and 'uncivilised' rather than being both of value to the city as a whole and having the potential to be the source of rich civic relationships (Ninglekhu, 2017, pp.73-77).

Currently, migrant *sukumbasi* farmers with insecure tenure are dwelling on the newly embanked lands, trying to gain access to sustainable livelihoods and life-enhancing city institutions. At the same time the established residents would like to make their city greener and healthier. This research sets out to question the assumption that migrant 'edgeland' settlements have little to offer in achieving these two goals. It asks:

1.02 Research Topic: riverine cities, farming and rapid inward urban migration

Cities first emerged as institutions necessary to tax, administer and use wealth created through surplus food production in early fertile riverine landscapes. These early cities were usually located on elevated ground away from the river so as not to take up valuable fertile ground.

More recently cities were located astride navigable rivers at convenient bridging points. Where waterborne transport crossed with merchant caravans, markets flourished. The location of such cities was centred on the river crossing, giving precedence to the wealth which market trading brings to citizens, rather than avoiding the take-up of arable land close to the river.

Industrialisation and global trade have now resulted in rapid urbanisation. Imports have replaced local food production. The urban landscape has changed from a defined assembly centred within a productive landscape to an unrestricted sprawl with only natural barriers such as the ocean shoreline, mountainous terrain or riverine flood plains to restrict expansion. Agricultural plots have been surrendered and small rivers paved over to make way for gridded city streets whilst the larger rivers have become polluted by industrial effluent.

But there is a new intra-urban turn: a desire by the established citizenry to green the city. Urban farming, domestic gardening, outdoor sports and leisure, horticulture and parkland are all seen, by established urban residents as, at least partial, remedies to the pollution and a pathological lack of connection with nature inherent in contemporary urban life. New Continuously Productive Urban Landscapes (CPULs) are being imagined (Viljoen and Bohn, 2014).

At the same time farmers, impoverished and driven off their land by the industrialisation process, migrate to the city seeking access to city institutions to provide a better life for themselves and their families.

Lacking the benefit of land ownership migrants squat, avoiding investment in permanent long-life structures. This gives rise to temporary informal architecture: an architecture of minimal means in marginal settings. These informal edgeland settlements form 'spaces of exception' (Martin, 2015) from which migrants seek to exercise their 'right to the city' (Lefebvre, 1996; Harvey 2003).

2.00 THEORETICAL FRAMEWORK

2.01 Loose-fit city making: detective, author and craftsperson

Since 2003 the Architecture of Rapid Change and Scarce Resources (ARCSR) research and teaching area at London Metropolitan University has studied informal urban edgeland settlements, from the bottom up, to understand the matters of most concern to their inhabitants, to speculate on ways to support civic emergence within the settlements and to re-assemble these 'space[s] of exception', so that such informal temporary settlements can become part of the city.

This has involved setting hypothetical design projects in a rolling design studio programme located within informal settlements surrounding the rapidly growing cities of Delhi, Agra, Mumbai (2003 to 2013) Kathmandu (2014 to 2017), Freetown (since 2008), Athens and Calabria (since 2016). All these settings concern the situation of recent migrants either intra-nationally from the countryside to the town or internationally fleeing war and poverty to the edge of Europe. They provide a rich, intense and pragmatic learning environment for ARCSR researchers and students of architecture.

Based on this experience, a theoretical framework is emerging around the nature and processes involved in assembling and loosely fitting together elements made by different people at different scales and times, with different intentions, into a civic entity which is greater than the sum of its parts (Pear & Mitchell, 2010), (Tang, 2014), (Mitchell & Tang, 2015, 2016). This theoretical framework is founded on the exploration of the architectural concepts of dimension and fit, scale and horizon, and materials and making. As a result, new knowledge about the city is being produced (Mitchell, 2010; Mitchell and Tang, 2018).

Research methods and practice begin with an investigation of cultural and physical topography as a basis for understanding 'place'. Both the research topic and the research questions are derived from the matters of concern expressed by the occupiers of the places chosen for investigation. This approach requires an ongoing dialogue with the occupiers (or constituents) of the place (or setting) and an engagement (through surveys and small interactive making and drawing projects) with its changing materiality and spatial form.

Such methods and practices draw on anthropology, ethnography and techniques of participatory engagement. They have been characterised in Loose Fit City (Mitchell and Tang, 2018, pp.87-156) as architects and city makers working, in turn, as (1) a detective (investigating place), (2) an author (developing a narrative brief) and (3) a craftsperson (crafting an intervention with an appropriate fit to place).

Some of ARCSR's hypothetical design projects have led to live build projects with a high level of fit between intervention and context. However, most research outputs are speculative civic assemblies: vehicles for discovering resistances, exploring the accommodations necessary and raising a discourse around the opportunities uncovered.

Whilst most research knowledge is gained by looking backwards in time, it is more difficult both to generate a representation of, and then investigate, the efficacy of future intentions, particularly in the realm of city making. For example, masterplans have proved to be highly reductive and over deterministic. It is, however, easier to investigate possible futures when a clear alternative civic assembly is offered for an iterative process of discussion and re-assembly. To address the difficulty of researching the future, the paper attempts to frame speculative research outputs as the offer of a proposal around which a discourse for the production of knowledge about 'the city yet to come' (Simone, 2004) can be initiated.

2.02 A Case Study of Kathmandu's Bagmati riverbanks
This paper aims to deepen the loose fit theoretical framework surrounding the production and interpretation of hypothetical civic assemblies by reflecting on the

particular speculations envisioned in 4 case study projects produced by 3 researchers in the particular situational setting of the Kathmandu Valley.

It does so firstly (section 3.00) by reviewing the current literature surrounding the framing of the changing physical and institutional setting and secondly (section 4.00) by reviewing the project work. Then in the following three sections it reflects on these speculations in Kathmandu with reference to theoretical ideas which relate to the harnessing of both the setting and the imagination in the service of meaningful change. So, in section 5.00, the idea of investigation is extended to include the concept of 'affordance' (Gibson 1975, 1986 [1979]); section 6.00 extends the idea of 'making' to include the assembly, representation and sharing of place based imaginaries (Castoriadis, [1975], 1987; Lefebvre, 1996) and section 7.00 extends the idea of narrative to encompass embedding change in a place-based discourse (Foucault, 1972, 1980).

3.00 EXISTING PHYSICAL AND INSTITUTIONAL TOPOGRAPHY OF THE KATHMANDU VALLEY

The previously marginal but recently embanked and repurposed riverine flood plains alongside the Bagmati river currently form both the edge of the city of Kathmandu and also acts as the border with the neighbouring ancient city of Patan. Both cities have expanded rapidly to meet each other and each now form a part of the same urban conglomeration.

3.01 Existing physical topography

The Kathmandu Valley river basin drains the foothills of the Himalayas in central Nepal and has a history of intensive agricultural use. Up to 30,000 years ago the Kathmandu basin was underwater (Saijo and Kimura, 2007). As the lake receded, fertile mudflats emerged above the water that were later separated by the tributaries of the Bagmati river, which sliced channels through the soft clay, defining what today are different city districts. The Kathmandu valley's landscape and the fertility of its soil have been fundamental in shaping the growth and development of the settlements within it. Now, much of the valley floor and terraced perimeter is intensively cultivated with rice, wheat, maize, potatoes, mustard and other seeds used for oil production, together with a wide variety of vegetables grown throughout the year providing fresh produce to the

local population (Bohle and Adhikari, 2002).

3.011 Rapid urbanisation and the squatted flood plain

Farmland, historically the source of the city´s prosperity, is currently being lost to the urbanisation process (Zurick and Rose, 2009). This rapid urbanisation has been driven by Kathmandu´s growing importance within Nepal's economy as a centre of government, industry and tourism, which has drawn increasing numbers of migrants from rural areas. The trend was exacerbated when rural people, threatened by the Maoist insurgency (1996-2006), migrated, as the revolts escalated, into the valley from the hills, looking for a safe haven. Consequently, over the last four decades, the population of the Kathmandu Valley, spilling out of the cities and into the countryside, has multiplied by a factor of 6, reaching above 3 million inhabitants in 2010 (Bhattarai & Conway, 2010). As a result, the city and the valley have become almost indistinguishable (Zurick & Rose, 2009).

The loss of fertile farmland to the city's expansion has impaired the ability of the farming community, to feed the current valley population (Haack & Rafter, 2006). This problem is compounded by the numerous fired brick factories, which have sprung up on the periphery of Kathmandu to support the building boom by exploiting the fertile topsoil of the valley, constituting a further threat to agricultural production.

Rapid urbanisation has not only reduced food production but has also had a negative impact on the Valley environment, producing atmospheric pollution and a collapse of the fragile ecological equilibrium between the city and its hinterland. Urban areas continue to grow haphazardly, without appropriate infrastructure (Toffin, 2010, 2013). The rate of conversion of areas of fertile farmland into residential, commercial and industrial use has been increasing due to a ready supply of financial capital from transfers of savings from less secure rural areas. This has resulted in huge increases in the price of land (Shrestha, B., 2011).

The informal settlements referred to in this paper were established by rural migrants upon the former flood plains of the Bagmati river and its tributaries. Successive annual floods, illegal mining of sand and municipal 'out-takes' upstream had caused the river to change its course over the riverbed. Subsequently dams and weirs introduced to

conserve water had raised the water level during the monsoons and resulted in increased silting up and the need to lift the banks even higher, providing an attractive opportunity for encroachment (Ninglekhu, 2017 p.74).

By August 2014, the Kathmandu City authorities had begun the process of narrowing and deepening the river channel and strengthening the new riverbanks to regulate flow rates and avoid flooding. This process of embankment created valuable, new, permanently dry, public land sitting astride the city's natural drainage paths enabling the introduction of substantial new mains sewerage infrastructure (ARCSR, 2015, p.43). Being on the edge of existing city grids, this new land also provided an opportunity to extend the road networks without having to cut through existing buildings or to dislocate or displace formal settlements. However, when these new roads cut through informal settlements, houses which were in their direct path were demolished. Fortunately, only a relatively small number of *sukumbasi* were displaced in this way.

3.012 The need to change the role food plays in the valley landscape
Feeding the city in a sustainable fashion, that is economically efficient, socially just and ecologically sound, is one of the quintessential challenges of the 21st century (Morgan, 2014).

In the context of the rapid urbanisation of the Kathmandu Valley, the steady and sufficient supply of food to the city from its surrounding hinterland is no longer sustainable in the medium to long term. Nor can imported food supplies be relied upon. There are only two dependable road links between the Kathmandu Valley and India and one with China. Of the existing roads (surfaced and unsurfaced), up to 60% become unusable during the monsoon. In this situation, alternative models are required to identify secure places to grow food within the topography of the city itself. Instead of locating the city on the edge of its food producing hinterland, the green city imagines a Continuously Productive Urban Landscape (CPUL) (Mougeot, 2005).

3.02 Existing institutional topography

Understanding and making connections between existing bottom up and top down institutions related to cleaning up the river and farming its banks is necessary when proposing a way forward.

3.021 Existing Urban Farming institutions in the Kathmandu Valley

Shristi Shrestha (Shrestha, 2011) studied four urban farms in Kathmandu in 2010: two (Thapathali and Shankhamul), farmed by recently arrived Newar migrants and two connected to institutions on the peri-urban edges of the city (Pulchowk Engineering College and Saligram Bal Griha Orphanage) farmed by more diverse groups. Shrestha found that whilst farmers from all four sites confirmed that farming contributed to the 'well-being' of their communities, the more traditional Newar settlers were more reserved in their approach to neighbours, focusing on their kin relationships whilst the other two peri-urban groups, displayed more openness and inclusivity in their relations with a diverse range of neighbours.

It is noticeable that the two more diverse examples were linked to established institutions capable of providing freedom to (a positive freedom) establish a civic framework for interaction whilst the Newar farmers had had to form a pressure group (The Ganesh Yuba Club) just to provide freedom from (a negative freedom) external incursions and the unintended effects of the top-down requirements of the authorities. In all four examples the urban farm acted as a public, more female than male, place where children learned to farm as a recreation rather than a vocation. These urban farms all encouraged social interaction, engagement and networking, were more democratic and inclusive than family set ups, and provided a setting for people to learn from each other and practice appropriate behaviour and decorum in sharing with others. People chose to live nearby so that they could farm more easily and contribute to the social cohesion of the neighbourhood. Out of these bonds and institutional relationships came the confidence to take on the stewardship of neglected and underused sites in the neighbourhood.

3.022 The role of city institutions

Kathmandu's soil is very fertile and current city topography affords plentiful opportunities for the incorporation of food production within various aspects of the city´s operations and physical development. However, as any development is likely to

be more financially profitable than agriculture, inner-city production starts making sense only when other issues such as air quality improvement, waste management, pedestrian transport routes, education and civic participation, employment, well-being, and community cohesion are being addressed in parallel. In other words, a holistic, rather than solely market-driven approach to investment in changes to the urban landscape is required.

In 2014, a United Nations Environment Programme report concluded that the multitude of challenges facing Kathmandu's food security could, in part, be addressed by strengthening so-called soft approaches such as promoting institutional reforms, accountable governance, and building social capacity (UNEP, 2014). The transition to civic resilience in the Kathmandu Valley requires that researchers and city makers in a variety of fields, including climate change and agriculture, build partnerships with local authorities and urban planners as well as real estate entrepreneurs. Shristi Shrestha's paper (Shrestha, 2011) demonstrates the importance of linking urban farming to appropriate place-based institutions in order to set the ground rules for shared practice and to engage and fit with outside authorities and other civic institutions particularly regarding non-market based issues such as pollution and the provision of clean water.

3.023 The Bagmati Action Plan and *sukumbasi* settlements

In 2010, the Bagmati Civilization Integrated Development Committee was constituted to implement a 5-year project, the Bagmati Action Plan to 'clean up the Bagmati river by installing waste water treatment plants and restoring the river's aesthetic and cultural values'. A zone extending 20 metres on either side of the river was to be cleared of any kind of activity. Whilst ignoring the existence of *sukumbasi* settlements within the 20-metre exclusion zone, the United Nations and government authorities prepared a plan which includes developing riverside roads, major sewage pipelines and improving understanding of the river environment by establishing a riverside park (UN-HABITAT, 2008). To follow this plan for beautifying the river areas, the Kathmandu authorities planned to evict the squatters.

Ninglekhu argues that an aesthetics of bourgeois environmentalism is embedded within the Bagmati Action Plan. It includes the idea of a 'clean' river and a 'green park'

which would return the river to its rightful place at the centre of Kathmandu 'Civilisation' as represented by old black and white photographs depicting 'the pristine – looking Bagmati of history' where the permanent architecture of temples, *ghats* and *dharamsalas* are sited along the edge of the river's flood plains.

There was no room in the plan, however, for the *sukumbasi* settlements which are regarded as slums: dirty and 'uncivilised'. So the spatial construction of the image of a slum landscape was co-constituted with that of the romanticised 'Civilised' riparian landscape: two sides of the same coin. As a result of these 'politics of transformation' 14 *sukumbasi* settlements are under threat of eviction (Ninglekhu, 2017, p. 74).

Despite the temporary nature of their construction *sukumbasi* settlements have established a permanent presence on the riverbanks. Eviction and demolition has, to date, been a purely cyclic phenomenon; with further 'temporary' re-occupation following-on from removal. The authorities appeared to have adopted a pragmatic approach: not only allowing the construction of 'temporary' dwellings but also feeling free to demolish these with little or no notice to the occupiers when a part of the Bagmati Action Plan was actually being implemented on the ground where the *sukumbasi* dwelt.

4.00 SPECULATIVE ASSEMBLIES IN THE KATHMANDU VALLEY

ARCSR researchers studied the institutional and topographic setting of the Kathmandu Valley between 2013 and 2016. However, this paper draws primarily on the case study provided by the investigatory (detective) work of Amara Roca Iglesias (2013 - 2016); Jake Winter and Jack Tiong (2013/14) and their use of speculative design to assemble and test their discoveries.

[insert Figures 01, 02 & 03 here]

The settings they studied: the Shanti Nagar settlement and the Central Ghats area, are shown in Figure 01. Figure 02 shows Roca Iglesias's detailed survey of the Central Ghats area showing the existing *sukumbasi* settlements and institutions on the edge of the reclaimed flood plain. Figure 03 shows an existing traditional *dharamsala* guest house on the Bagmati River banks where food is grown to feed the inhabitants.

The research projects of Roca Iglesias, Winter and Tuong are introduced and discussed below.

4.01 Domestic scale: Shanti Nagar

As illustrated in Figure 04, the *sukumbasi* settlement of *Shanti Nagar*, was embanked by the residents themselves. Here, Saroj's family house was analysed to assess the opportunities for horticulture at the domestic scale.

[insert Figure 04 here]

The back garden was already intensively cultivated but there wasn´t enough space to produce food for the whole family. Sketch proposals were developed for planters on the roof and against the walls. These sketches for 'edible roofs and walls' caught the eye of a network of *sukumbasi* women, who wanted to create bamboo planters placed against house façades thereby, not only growing more food, but also making the facade more attractive to neighbours.

A prototype planter was fabricated by local teenagers who contributed their skills in working with bamboo. The design evolved throughout the making process and a manual was published illustrating the steps to be followed, facilitating repetition.

[insert Figure 05 here]

Prompted by the confidence generated by the making exercise and with a view to scaling up the proposal, a drawing, illustrated in Figure 05, showing the impact of a vertical wall of planters covering the whole façade of a house in Bhagavati's yard was produced. A row of edible walls running parallel to the Bagmati river was imagined in a place where all of the settlement´s compostable waste might be turned into nutrient to fill the planters. Residents saw the edible wall as an attractive idea, referring to it as *baari* (field in Nepali).

4.02 Urban scale: Central Ghats

Several *sukumbasi* settlements within the embanked 20 metre buffer zone of the Central Ghats were surveyed and analysed. Institutional arrangements which might

support civic engagement through urban farming were identified and an alternative urban strategy that valued and aimed to fit the topography was imagined. By creating a dialogue between researcher and resident through interactive drawing urban farming opportunities already embedded in the everyday were revealed. For example, Figure 06 shows two children pointing out edible plants in the Thapathali area of the Central Ghats which were then recorded on an interactive drawing by both children and researcher.

[insert Figures 06 and 07 here]

Figure 07 shows part of a survey of the Central Ghats landscape compiled from these investigations detailing inhabitation and current farming practices. The survey revealed a substantial and complex environment within which to embed speculative proposals. The use of drawing as a language of exchange allowed the thoughts and stories of local people to inform architectural speculations.

Armed with knowledge revealed by the survey, an alternative to the UN/City Park proposal was imagined which aimed to embed the informal settlements within the urban riverbank park/farm landscape. The activities surrounding the process of urban agriculture were intended to foster civic engagement by the *sukumbasi*, and both transform existing local institutions and foster new ones.

The riverside strip was divided into 5 urban farming rooms based on their current topographical affordances, including their existing use and incumbent local institutions. The particular affordances of each farming room became opportunities to assemble different site specific interventions. Each proposed farming room hosted:

(1) At least one institution.

(2) Allotments and gardens.

(3) Community phulbaris: gardens where flowers are grown for religious festivals

(4) Sports and leisure facilities.

(5) Farmers and custodians who would normally live locally and be organised and supported by the institutions.

[insert Figures 08 and 09 here]

Figures 08 & 09 show drawings of the proposed occupation of farming room 1 (The Edible Playground), room 2 (The Sacred Fields) and room 3 (Thapathali Community Gardens).

Based on existing farming practices in the area, the allotments would be planted with vegetables and fruits rather than rice, grains and pulses which require larger plots and are therefore usually grown on the edge of the city rather than here in the centre. On the basis that a garden of 40sqm could produce vegetables and fruits to feed a family of four people all the year round, the five urban farming rooms could support 15,600 citizens from allotment cultivation alone (Rhoades, 2016; Sapkota, 2003)

4.03 Riverside Festival: Thapathali Bridge site

Emerging from the discourse surrounding the Bagmati Action Plan: the Bagmati River Festival was established to mobilise at a city scale to address shared concerns surrounding clean water, fish stocks and flooding. This triggered a spatial imaginary on the Thapathali bridge festival site shown in Figure 10 which aimed to provide infrastructural and institutional support for the *sukumbasi*, who might become protectors of sand beds filtering river water for drinking, cooking, washing and bathing. The heavy permanent filtration towers contain halls for education, discussion and deliberation and are contrasted with the temporary stick architecture of the surrounding buildings.

[insert Figure 10 here]

4.04 Permanent Temporality: Paurakhi Gaun site

A spatial and temporal imaginary aesthetic of impermanence in the settlement of Paurakhi Gaun immediately East of the Thapathali Bridge festival site was validated by a process of induction, extrapolating from two primary observations.

Firstly, when temporary materials began to be replaced with more permanent materials, demolition by the city authority occurred. However, after representations by the squatters, subsequent resettlement was tolerated by the authorities provided only temporary materials were used. Secondly that the 'temporary' settlement morphology was constantly changing, reflecting more directly the evolving relationships between

people and their material surroundings, than a permanently constructed landscape (Tiong, 2015 p. 107).

To be sustainable, however, this approach would require a communal institutional framework and shared land tenure. So, in addition to the existing Thapathali Church, new bamboo institutional buildings were imagined which included a Futures Hall and workshops built around the UN monument now transformed into a water tower. This scheme is shown in figures 11, 12 & 13.

[insert Figures 11, 12 & 13 here]

The case study research projects described in this section have enabled the following reflective discussion of how architectural theory and practice can (section 5.00) uncover previously hidden opportunities embedded in the relationship between migrants and the settings they occupy; (section 6.00) stimulate the imaginative speculations of residents to encourage dispersed alternative initiatives within the changing topographic setting and (section 7.00) provoke a discourse around these alternative imaginary speculations based on a series of themed juxtapositions aimed at change which will be for the benefit of all Kathmandu's residents.

5.00 UNCOVERING AFFORDANCE

There has been little research focus on what existing riverine landscapes offer to their occupants. Geddes made an attempt in 1915 with his classic section cut across the valley landscape (Geddes, 2018 [1915]). Where topographical surveys have been undertaken, they are usually framed in terms of how the raw materials present in the landscape might be held as a standing reserve for the benefit of the land owners. More recently there has been an interest in how residents should be considered part of the topography rather than occupiers, who will need to share the attributes of place by reaching an accommodation with each other and with other living creatures and plant life in order to sustain meaningful occupation in the long term (Kohn, 2013).

'…what matters for successful coordination with the activities of others is that one can reliably act [not only] in ways that fit in with a sociocultural practice…but also with the specific details of the particular situation in which the activity is taking place.' (Rietveld & Kiverstain, 2014, p.333)

Squatted marginal land is usually too difficult or expensive for mainstream development to take place. However, the existence of viable squatter settlements on marginal urban land, nestling within the landscape alongside well-worn pathways, demonstrates the ability of migrants to make homes and reclaim community space from the physical and environmental degradation present in peri-urban edgelands. To achieve this fit with the setting residents have had to negotiate mutually beneficial relationships with their neighbours and accommodate the reality of city authority.

Gibson's Affordance Theory (Gibson, 1986 [1979]) offers a lens through which the potential of existing topographies can be understood and matched to the abilities of the occupiers. The attraction of Affordance Theory is that it is a theory of agency: not just a theory about the world but one of how to first imagine change and then interact with the world in order to understand it through a process of speculation.

Sukumbasi settlements on the banks of the river Bagmati have already been researched (Kiran & Pahari, 2011) employing both remote satellite technology and digital mapping on the one hand and through close-up interviews on the other. Interviews consisted mostly of closed questions relating to land ownership and access to infrastructure such as clean water and sanitation. At no stage, however, were the dwelling opportunities afforded by the riparian landscape investigated. Quite the contrary: the results of these surveys were instrumental in dividing the *sukumbasi* into two groups: 'authentic' and 'inauthentic', diluting the impact of political solidarity amongst the riverside inhabitants during attempts by the authorities to evict the *sukumbasi* from the riverside (Ninglekhu, 2017).

So, methodologically, what tools and techniques could be employed, effectively, to make Gibson's topographical affordances discoverable and ensure that the relationships between material objects and institutions in the landscape are 'well communicated and intelligible'? Norman (2013, p.72 + 73) offers an answer by identifying careful mapping of 'spatial layout and temporal contiguity' within the physical and cultural topography as the key to both understanding existing patterns and forms, and proposing a way forwards. This mapping should identify the 'physical, logical, semantic and cultural constraints [which] guide … actions and ease …

interpretation.' Such investigative mapping methods are familiar in the fields of architecture, geography, anthropology and archaeology. In this research, new knowledge was produced through such a process of mapping and analysing resistances and accommodations to a process of drawing and making.

Affordances are not just resources to be exploited but are, more importantly perhaps, relational. They depend on capabilities and resources being available at the time and place they are required. However, the presence of both resources and capabilities in a particular setting is not, in itself, adequate to form effective relations between them. For these relationships to be effective the human actor needs to attend to the resources available and make choices, so as to construct a viable civic assembly.

'In the process of education of attention the novice learns to selectively pick up some aspects of the environment while ignoring others' (Rietveld & Kiverstain, 2014, p.335).

When a network of capabilities and resources are sustained in place they form an 'ecological niche' (p. 326). Such niches have been carved out within the setting by both the urban farms reviewed and the resilient *sukumbasi* settlements studied in this paper. The process of fitting resources and capabilities together was already apparent in the migrants' experimentation with vegetables and fruits rather than rice and grains as potentially more appropriate crops for urban gardens than rural cash crops. This process of trial and error is also implicit in the history of settlement, demolition and resettlement in Paurakhi Gaun (see section 4.04 above). Furthermore, existing relationships between *sukumbasi* gardens and urban farms on the one hand and riverbank institutions which already support these activities such as the *dharamsalas*, schools, temples and police college on the other hand, are relational in-situ resources assembled within the hypothetical proposal illustrated in Figures 08 and 09 (see section 4.02 above).

The affordance of the Bagmati landscape for urban agriculture was offered as a setting within which to imagine and represent a topography of civic inclusion.

6.00 IMAGINATION AND REPRESENTATION

One of the greatest poverties is being unable to imagine a different future. Graeber (2016) calls depoliticised urban environments 'dead zones of the imagination'. Cornelius Castoriadis describes the 'imaginary' as a formal representation which stands for a whole society made up of an institutional assembly sharing the same world of meaning with values and social roles encoded within it (Castoriadis, 1997 [1975]).

Here the idea of the imaginary is extended to include the spatial and temporal, together with an extension of the institutional form to include that of the place and materiality within which the institution interacts and is embedded: that is the topographical. In order to imagine the results of such an extension it is first necessary to define the shifts in institutional priorities and boundaries from those held currently. These would include a move away from the maximisation of utility and the minimisation of costs towards privileging the autonomy of the individual to freely engage with the affairs of the city, to enjoy a citizen's rights to shelter and livelihood and to shoulder a fair share of a citizen's responsibilities for the education and welfare of others.

In addition, the proponents of ecological thinking claim that the prevailing processes of commodification that are the basis of market-based exchange rely on the free and abundant supply of those things that have not yet been monetised. So, it would seem necessary for urban agriculture to work within an institutional order where real value is placed on clean air and clean water, and on the quality of the soil, for example, but that these resources should not necessarily be measured in terms of short term market value (Awan, 2014).

In tackling the research question and emergent theoretical framework explored in this paper, master planning has been rejected as a tool of design because in masterplanning:

…[c]reativity is sacrificed for predictability, and in the process, human agency becomes subordinated to the rationalized processes and techniques of the rationalized workplace. (Smith, 2014, p.19).

Instead of masterplanning by the few, the creative imagination of all those involved has been privileged. Interactive making such as the making of the bamboo wall and

planters (see section 4.01) and drawing exercises such as the representation of edible plants (see section 4.02) were used to articulate alternative spatial imaginaries, as a prelude to exhibition, discussion and deliberation. Subsequent interventions can become a loose assembly of dispersed initiatives by a range of creative actors.

Embedding change within a particular topographical setting in this way requires the research to examine how the creative imagination can be used to first explore change through representation of alternative futures and then assemble a civic narrative that will suggest a way to move resolutely forwards. Lefebvre (1996, p. 102) proposes that the following 'intellectual operations and reflective practices' are necessary in the first step of this process; that is, exploring change through the representation of alternative futures:

(1) Deduction: a top-down reductive process used to solve specifically defined problems.

(2) Induction: a bottom-up inclusive process where recognisable existing patterns, within the setting, are projected forwards in space and time.

(3) Translation: the deconstruction of the existing order into component parts and its re-assembly, within the setting, to create a new narrative usually at a particular scale.

(4) Transduction: an intellectual construction or utopian vision, inserted within the setting, intended to provoke and challenge existing forms and procedures.

(5) Transposition: by which precedent is captured from elsewhere in time and place, then framed and harnessed to the new location.

All five intellectual 'operations and reflective practices' were employed by researchers in developing the hypothetical assemblies discussed in this paper. Section 7.00 below suggests how the second step, a civic narrative to deliberate on future moves, might be assembled through discourse.

7.00 EMBEDDING A DISCOURSE FOR CHANGE

Michel Foucault formulates language as discourse (Hall et al, 1992 p. 291). The purpose of which is to produce knowledge.

'Foucault …saw discourse as a group of statements which provide a language for talking about – a way of representing the knowledge about – a particular topic at a particular historical moment … Discourse

is about the production of knowledge through language. But … since all social practices entail meaning, and meanings shape and influence what we do – our conduct – all practices have a discursive element.'

In addition to written and spoken language, drawn hypothetical imaginaries are also ways to 'represent knowledge about' a particular topic and can therefore also generate a 'discursive element'. The drawn hypothetical imaginaries represented in this paper represent a new framing of reality, a framing made possible through discourse, a new 'regime of truth' (Foucault, 1980, p.131). They are needed to counteract the framing of the current official discourse as a juxtaposition between the 'dirty and uncivilised slums' and the 'clean river and green UN park' (see section 3.023); together with that between 'authentic' and 'inauthentic' *sukumbasi* (see section 5.00).

The reflective discussion around the hypothetical assemblies represented in this paper is framed below as a focus for discourse about the city's future by offering five examples of themes/juxtapositions which would require further discussion and resolution as part of this discourse. Some of the juxtapositions posed below may be regarded as inferring a clash of opposing forces, as in an athletics contest, rather than an exchange of views in good faith: more akin to the ancient Greek concept of 'agon' than Foucault's concept of discourse. However, the classical concept of 'agon' assumes that such clashes, especially if the exchanges happen without serious risk of violence, nearly always result in creative growth sparked and fine-tuned by leaps of the imagination aimed at solving pressing problems. Here, where a multiplicity of themes and juxtapositions with a plethora of intersectional implications are present and a more fine grained, pragmatically bounded, process of deliberation about how to move resolutely forward is required, the concept of civic discourse has been used.

7.01 Theme 1: Food Security
Time spent producing food versus time spent engaging with city institutions

Whilst a diversity of food sources is required to build resilience, it is not at all clear that poor households in poor countries could or should be, self-sufficient (Corinna Hawkes, 2016). To be, or not to be, self-sufficient is, indeed, one of the core questions of food policy. The ambition of this research project, however, was to investigate opportunities to foster the resilience and flourishing of individuals and families through sharing and

engagement with the city, rather than engage with the question of self-sufficiency at the scale of the family. Time spent producing food will need to be balanced with time spent engaging with civic institutions.

7.02 Theme 2: Institutions for sharing
Individual versus communal land ownership

In the Central Ghats area of Kathmandu where individual ownership of land is unacceptable to government despite the pressure from incoming migrants for access to the city, institutional arrangements are critical. Figures 05, 08, 09, 10 & 13 illustrate what riverbanks might look like in a greener Kathmandu city. These proposals could inform a process of sharing the riparian topography which is common to all, where political authorities, local institutions and citizens decide together how to improve and curate this newly central area of the city. The innovative institutional arrangements which would be necessary could catalyse the transformation of individual identities through shared involvement with urban agriculture. This would imply not only sustaining existing institutions (*dharamsalas*, temples and schools) which support urban agriculture but also the creation of new institutions privileging shared over individualised land ownership (e.g. Community Land Trusts) as well as extending existing arrangements (e.g. Garden Centres).

7.03 Theme 3: The city maker's role
Masterplanner versus embedded practitioner

Increasingly students and newly qualified architects choose to work with transient urban populations, contributing to urban place making; often for a small, locally embedded, client group. In such situations, these urban practitioners often find that substantial capital inflows have been dedicated, by city authorities, to the provision of preconceived and often globally idealised versions of only partially appropriate urban infrastructure.

The imagined Riverside Festival (see section 4.03) is a speculation on the impact of fitting a citywide event aimed at cleaning up the river with a migrant settlement initiative to provide clean water for drinking and bathing. If city makers are to make a

difference where such city scale initiatives are trying to fit with concrete realities on the ground, they need tools to understand and assess the physical and cultural potential of the setting so as to make informed choices about what outside resources can most effectively unlock and maximise the effectiveness of those found locally. Here, embedded within the interstices of urban practice, city makers working with scarce, externally sourced resources might put greater reliance on the urban dwelling opportunities offered both within the pre-existing physical landscape and within the collective decorum and potential for urban governance offered by the pre-existing topography of cultural, social and political institutions. These would include the existing urban farms (see section 3.021), women's groups and individual householders (see section 4.01) discussed above.

Using techniques developed from the theoretical framework discussed in this paper architects can uncover, enable and support such emergent 'ecological niches' (see section 5.00) as a contribution to healthy city making.

7.04 Theme 4:

Temporary versus permanent construction

It is clear that temporary structures and lightweight, nimble (easily changed) shelter arrangements can continue to facilitate both agriculture and homemaking even though ownership does not rest with the individual but with the state, park authority or charitable trust. More permanent structures are still likely to play an important role as infrastructure (e.g. mains drainage, water treatment and bridges) together with some permanent institutional provision (the temples and schools remaining after the recent earthquake). It should be noted, however, that some institutions last longer than the buildings which house them: for example, the extensive range of educational and advice sessions provided to local residents within the temporary bamboo and blue canvas church in Paurakhi Gaun (see 4.04).

It is perhaps ironic that the earthquake and aftershocks which hit Kathmandu in April and May 2015, damaged or demolished so called 'permanent' buildings studied in the Central Ghats (at least two riverbank temples and a secondary school), but inflicted little or no damage on the lightweight 'temporary' dwellings of the *sukumbasi*.

More generally across the city as a whole, it may be that the nature of urban farming is such that it should acquire the techniques of the *sukumbasi* by squatting in places which are currently unused such as empty plots, blank walls and unoccupied roofs. To function effectively this implies a 'pop-up', nomadic architecture, an architecture of permanent temporality, of both the garden centre and grow bags; a form of loose fit DIY learning by doing. It also challenges city makers, whether residents or professionals, to conceive of a way of fabricating using 'temporary' materials to construct family homes of individual quality: the architecture being more a process of assembling a changing green civic topography than the manufacture of a consumer product.

7.05 Reflective practice
Top down versus bottom up

In constructing the imagined spatial assemblies shown in figures 08 and 09, elements of all five of Lefebvre's intellectual operations and reflective practices for embedded change (section 6.00) were attempted. Rather than a mono-cultural allocation as a globally signified 'UN' park, top-down processes providing infrastructure (land title, river embankment, new roads and sewage network) in the setting were balanced with existing institutions (temples, schools and police buildings). In addition, the setting's emergent 'ecological niches' (*sukumbasi* settlements, allotments and gardens, pathways and newly embanked wasteland) were re-assembled to fit with a physical and institutional infrastructure tailored to meet a new utopian vision: the shared green city as represented in the inclusive Riverside Festival scheme.

As a provocative representation of how migrant farmers could be integrated into a greener city, these schemes could provide a city-wide platform for discussion, deliberation and considered action.

8.00 CONCLUSION
When the Prime Minister of Nepal imagined jogging along the banks of the Bagmati river early in the morning to breathe fresh air he made no mention of the farming landscapes which could make this happen. This is because the relationship between

migrant farmers and the setting which they occupy, and its potential to benefit all the residents of the city, has hitherto been either hidden, ignored, neglected, or rejected. The aim of this research has been to highlight the potential benefits of this relationship to all residents who wish to make their city greener and healthier. It has done so by extending and deepening the loose-fit theoretical framework whereby previously hidden relational opportunities for engagement can be uncovered and by revealing and supporting the capacity of migrants to imagine, represent and deliberate future changes to the settings which they occupy.

The theory and practice of architecture can help unlock and nurture the relationship between the material setting and its occupants by making this processes of discovery and representation explicit. Architectural practitioners can help to provoke a discourse to find a suitable fit around a series of themed and grounded juxtapositions which can frame a creative discourse surrounding the concerns of both new and established residents as a way to move resolutely forwards.

By making explicit the relationships between setting and occupant, stimulating and representing alternative imaginaries and framing a civic discourse, architectural theory and practice can play a significant role in both integrating migrants into civic institutions and at the same time helping to generate a greener city.

Rather than characterising parts of the setting as either 'clean' or 'dirty' and its occupants as either 'authentic' or 'inauthentic', architectural discourse can provide a set of more positive juxtapositions which address real concrete issues needing to be played out through discursive practice for the benefit of all.

It remains to be seen what impact the hypothetical assemblies represented here will have on the discourse surrounding the move to an inclusive green and continuously productive Kathmandu and the effect, in turn, the opportunities and institutions associated with urban farming might have on social inclusion and the expansion of active citizenship.

However it is clear that by harnessing their ability to investigate (detective), collate a shared narrative (narrator) and then effectively represent alternative spatial and

temporal imaginaries (making facilitator) architects can contribute significantly to loose fit city making wherever marginal urban land is rapidly settled, by enhancing the power of the creative imagination for the dispossessed within an emergent civic discourse.

The lessons learned from this study of Kathmandu's Bagmati riverbanks have wider implications for architects working in a variety of transitional edgeland conditions. In many cities neglected riparian flood plains, squatted by urban migrants, can provide an opportunity to kick start the move to a greener, healthier city whilst at the same time widening civic participation and celebrating diversity. This is especially true where such flood plains are located within the heart of the dense urban fabric. Here, instead of being covered up, built upon and then abandoned as a wasteland of out of date polluted industrial debris, using the extended loose-fit theoretical framework discussed in this paper, they can be recognised for what they might become. They could be sensitively explored, emergent 'ecological niches' supported and the civic setting re-imagined as unpolluted common ground supporting a dynamic assembly of fresh aired pedestrian arteries and civic places on which urban farming, temporary dwelling, sports, leisure and cultural expression can be continuously explored and celebrated.

The City and the River

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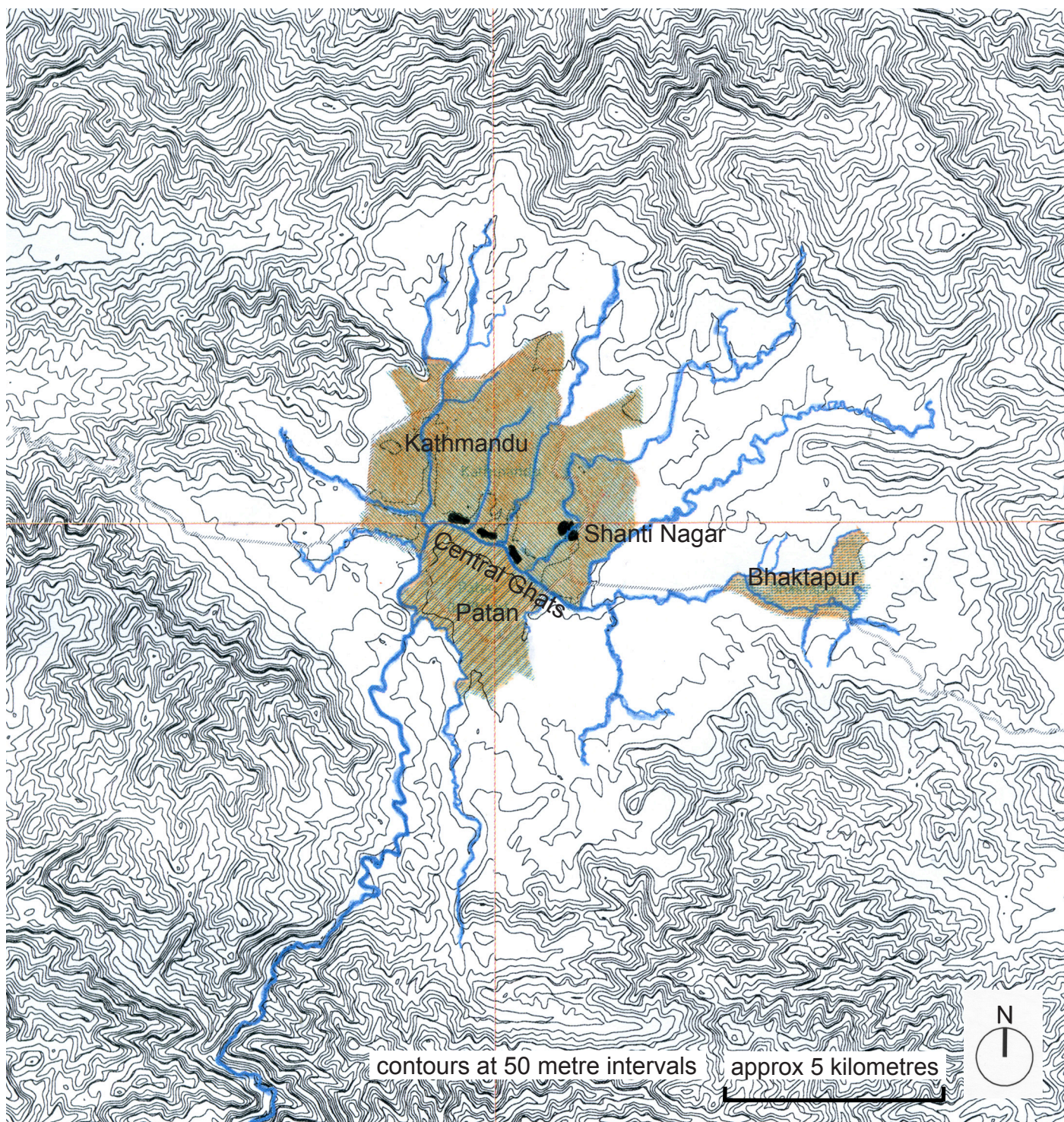
Figure 01

Fig.01 Location of settlements studied
Location of the *sukumbasi* settlements of Shanti Nagar and the Central Ghats in the Bagmati river valley basin in the centre of the Metropolitan Area between Patan and Kathmandu

Figure 02

D

7

C

6
B

5
4
1

1

3

1
2

A

Sukumbasi settlements

A Bansighat
B Thapathali
C Paurakh Gaun
D Shankhamul

Existing institutions

1 *Temples*
2 *Dharamsala*
3 Police Barracks
4 Local Authority Offices
5 Secondary School
6 Maternity Hospital
7 UN Park

approx 500 metres

Fig. 02 Survey of the Central Ghats area of Kathmandu
Plan of the Central Ghats showing the existing *sukumbasi* settlements and institutions on the edges of the reclaimed flood plain
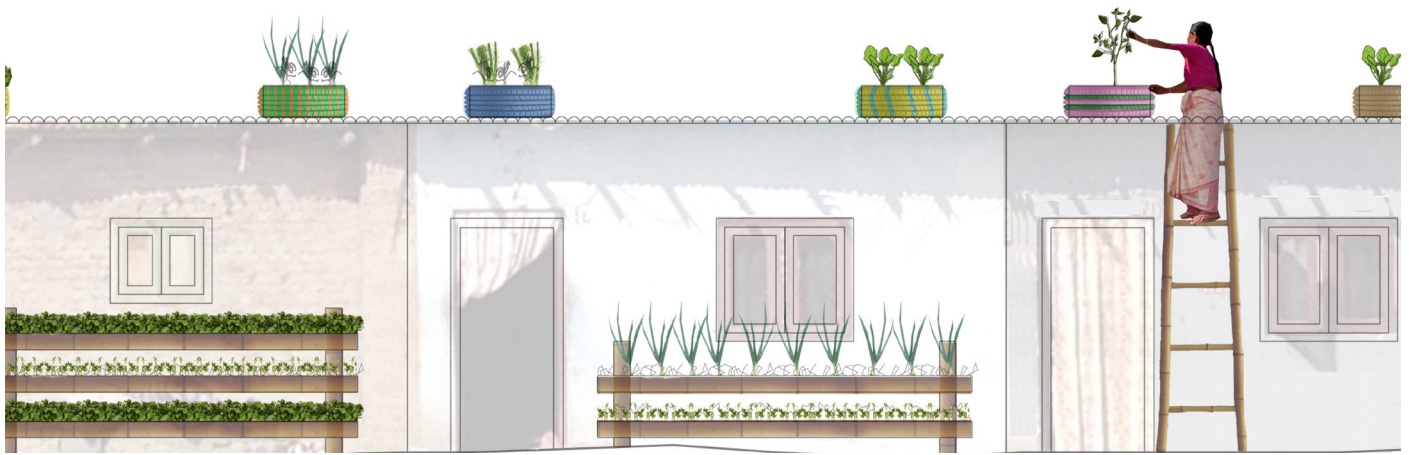
Figure 03

Fig. 03 Traditional urban farming
Dharamsala guesthouse on the banks of the Bagmati river where food is grown to feed the guests

Figure 04

Fig. 04 *Sukumbasi* farming initiatives

A Shanti Nagar, a *sukumbasi* settlement recently
   embanked by the residents themselves
B Using grow bags to increase food production in
   Shanti Nagar

Figure 05

A

B

C

Fig. 05 Domestic farming walls

A   Proposal for bamboo planters in
    Saroj's house
B   Bamboo planters being
    constructed in Saroj's house
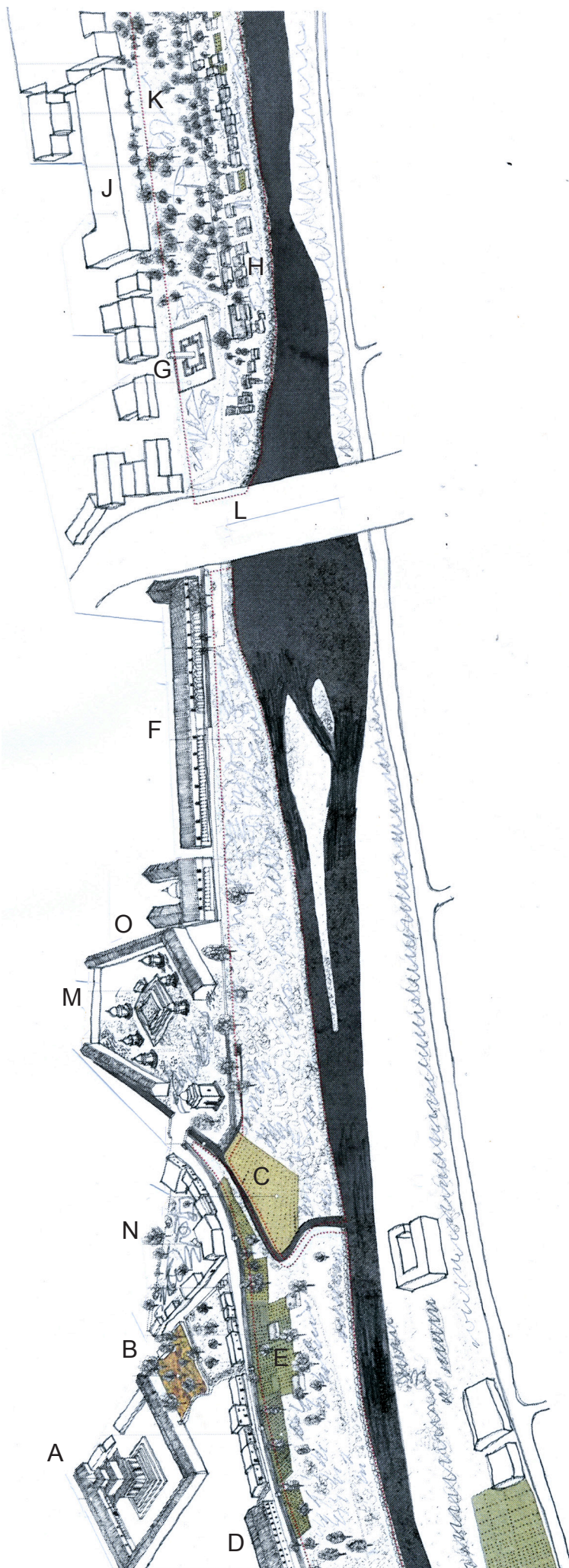C   Proposal for an edible wall in
    Bhagavati's yard

Figure 06

Fig. 06 Example of interactive drawing

A   Two children pointing out edible plants in the Thapatali area of the Central Ghats
B   Interactive drawing by both children and researcher recording location and type of edible plant

Figure 07

approx 100 metres

Fig. 07 Existing topography of part of the Central Ghats showing local landmarks and institutions

A   Tripureshwar Temple complex
      damaged by 2015 earthquake
B   Phulbari flower garden
C   Rice field
D   Police barracks
E   Police farming fields
F   Dharamsala with fields behind
G   UN monument uncompleted
H   Thapthali Valley church made of
      bamboo
J   Maternity hospital
K   Thapathali *sukumbasi* settlement
L   Teku Bagmati bridge
M   Jang Hiranya Ham Narayan Temple
      destroyed in 2015 earthquake and
      replaced by temporary temple
N   Communal place with small temple
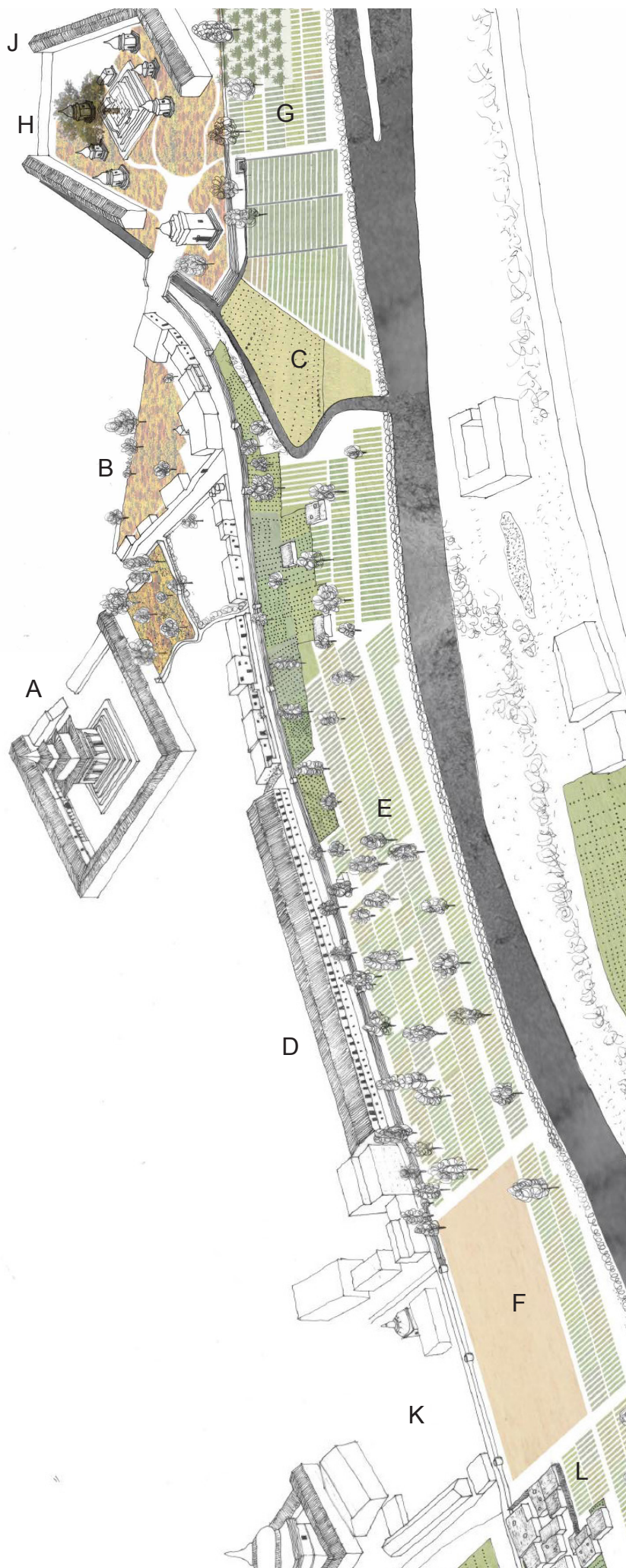   and youth club
O   Local Authority offices

Figure 08

Fig. 08 Spatial imaginary of Farming Rooms 1 & 2: the Edible Playground and the Sacred Fields

A   Tripureshwar Temple complex damaged by 2015 earthquake
B   Phulbari flower garden extended with youth club guardians
C   Rice field extended
D   Police barracks
E   Police farming fields extended; rest areas around existing mature trees
F   Playing fields
G   Community orchards and allotments to feed 470 people
H   Jang Hiranya Ham Narayan Temple destroyed in 2015, replaced by sacred tree
J   Local Authority offices (Urban Farming Department)
K   Farming secondary school
L   Bansighat *sukumbasi* settlement

approx 100 metres

Figure 09

A

B

C

D

E

F

TEKU BAGMATI BRIDGE

G

H

J

approx 100 metres

Fig. 09 Spatial imaginary of Farming Rooms 2 & 3: the Sacred Fields and Thapathali community gardens

A   Thapathali community farm and informal settlement
B   UN park elevated walkway
C   Thapathali and Bansighat informal settlement and community farm amongst the trees
D   Maternity hospital
E   Thapathali Valley church
F   UN tower becomes the focus of a food market
G   Small reservoir to irrigate allotments
H   Community Pulbhari: flowers for temple festivals
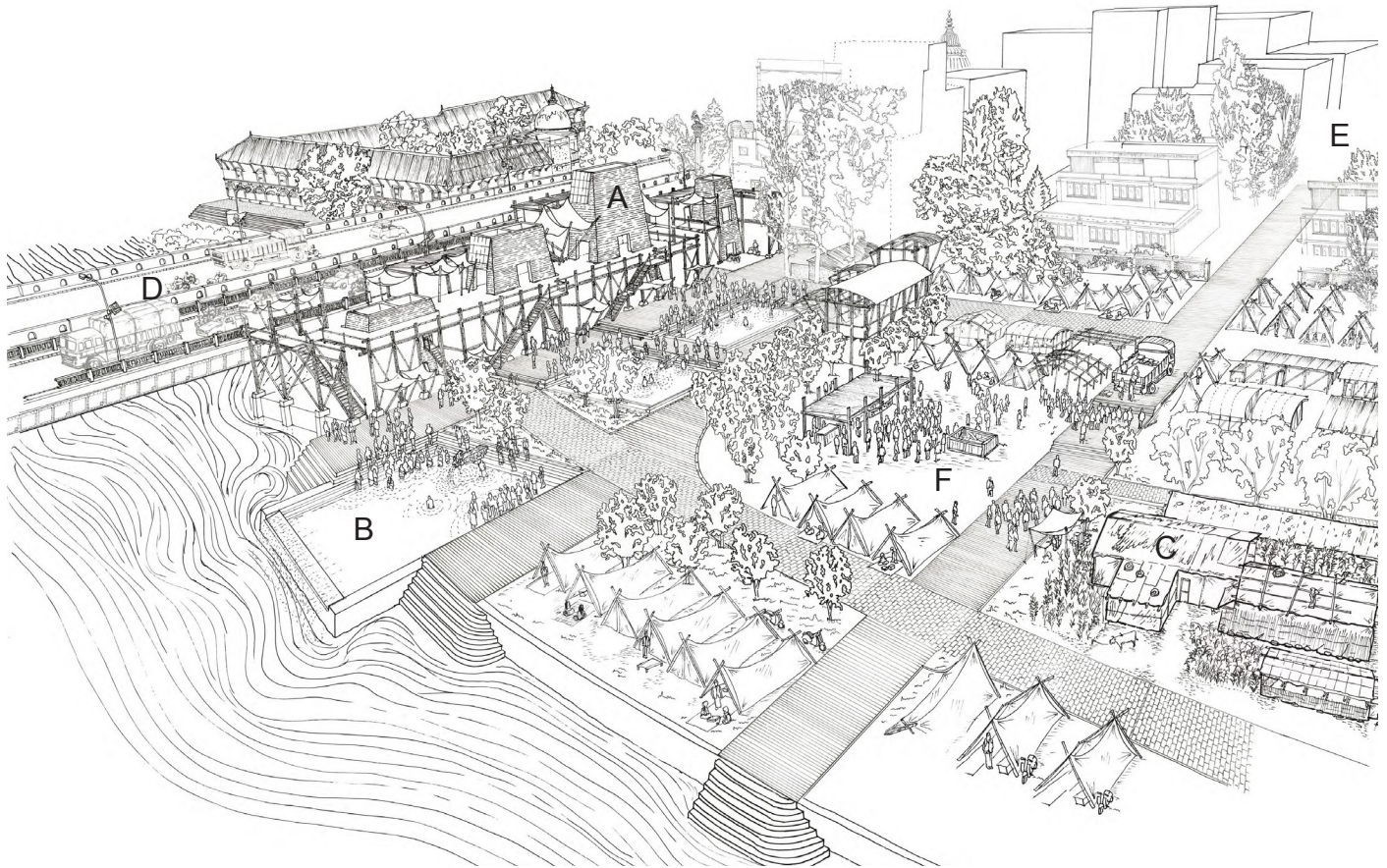J   The Sacred Fields: ground to feed 470 people

Figure 10

Fig. 10 Spatial imaginary of Riverside Festival at Thapathali (drawing by Jake Winter)

A   4no proposed water filtering tower halls providing the solid cores to a bamboo framed People's Palace
B   Proposed clean bathing *ghat*
C   Refurbished Paurakhi Gaun Valley church
D   Existing Thapathali bridge
E   Existing maternity hospital
F   Proposed extension of Paurakhi Gaun *sukumbasi* settlement

Figure 11

Women spend most of
their time outside the
house doing chores

live chickens
running around

children playing in-
front of the church

approx 4 metres

Fig. 11 Paurakhi Gaun *sukumbasi* settlement as existing (images by Jack Tiong)

A View looking east from the Thapathali bridge with the Paurakhi Gaun Valley church in the
    middle back-ground
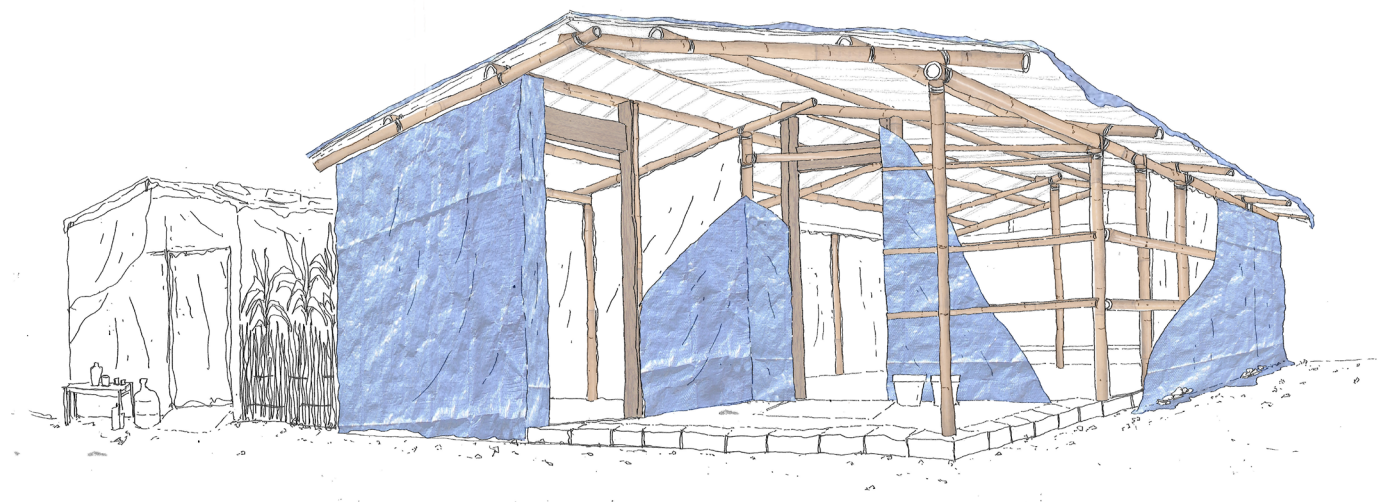B Section looking east with the church on the right

Figure 12

Fig. 12 The bamboo framed and blue plastic clad Paurakhi Gaun Valley church (photo and sketch by Jack Tiong)

Figure 13

Bamboo Craft Workshop   Water Tower   Quilt Workshop

Fig. 13 A space to congregate
Proposed community hall and workshops looking west towards Thapathali bridge (section and perspective sketch by Jack Tiong)

Conflict of interest

This piece of the submission is being sent via mail.