

KERE ECOSYSTEMS

Learnings from the Past

Anita C Jakkappanavar

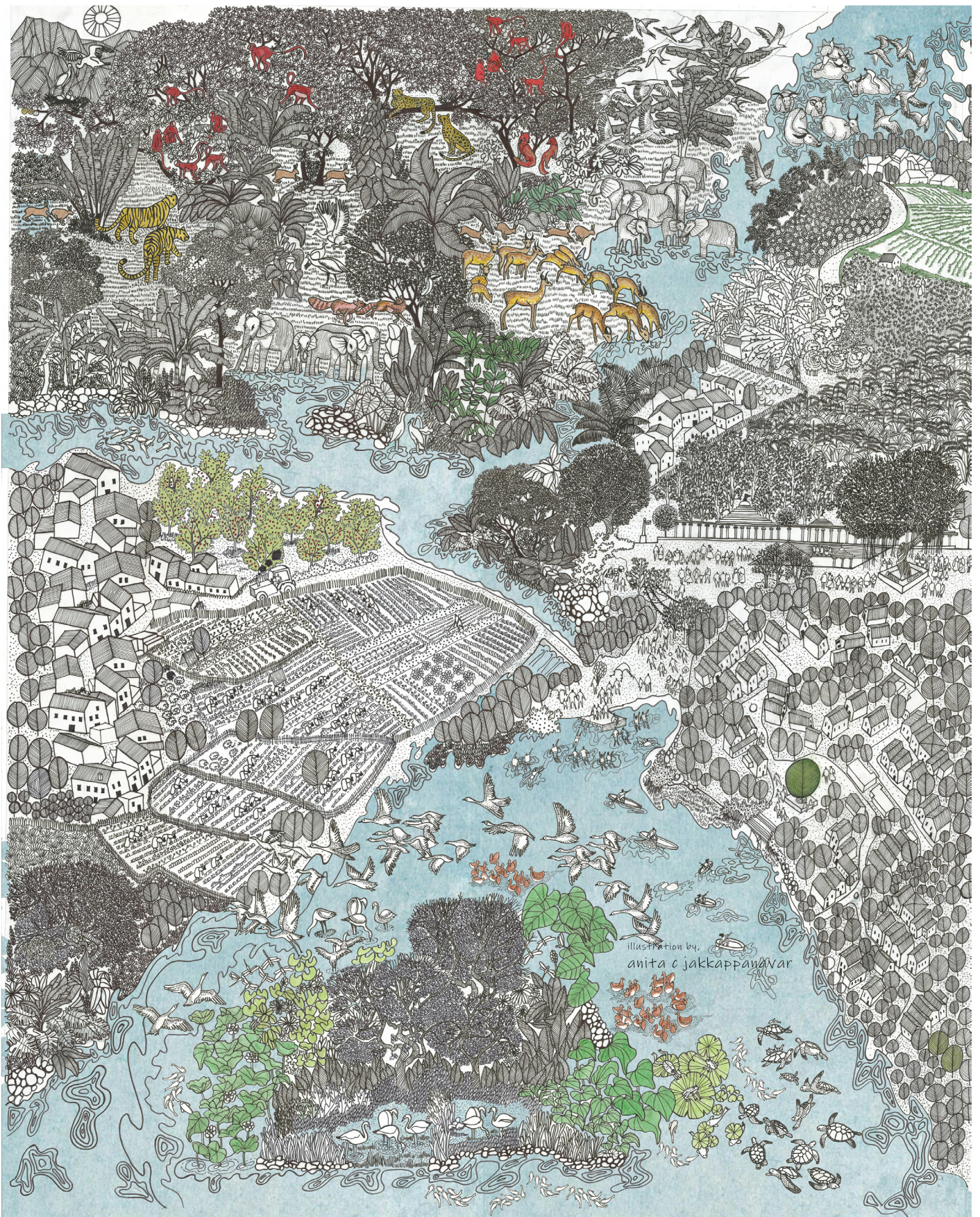
Bengaluru is a multilayered city with many identities that span its origins as a *pete* to a colonial Cantonment and a post-Independence public sector industry hub to today's information technology capital. While the city's name 'Bengaluru' finds its first written mention in 890 CE, it was in 1537 CE that Kempegowda I, a local chieftain, established a mud-walled fort (*kote*) and market town (*pete*) under the Vijayanagara Empire's dominion. Perceived as a 'naked country' with dry fields and open horizons (Mathur, 2006) in the early 1700s, the city underwent significant transformations in economics, form and material landscapes through the 1800s. In the post-independence decades, rapid growth in trade, commerce and industry catalysed urbanisation and unplanned development, leading to the exploitation and degradation of Bengaluru's natural and built systems. The illustrations in this article aim to interpret and represent Bengaluru's transformations and changing landscapes over time, and are based on stories and anecdotes that I heard from local residents, environmentalists and researchers.

The illustration titled 'The Rhythm of Terrain, Water & Community' portrays the interaction between the city and its landscape before and after transformation (Figure 1). The right side of the illustration depicts holistic living of people in their ecosystems. It portrays the form, topography, climatic responses and material explorations in the city. The illustration is a collective memory of Bengaluru from the 1600s to 1700s where communities understood the role of water conservation and developed knowledge systems over generations, to conserve and recharge groundwater. Built with the communities' good will and participation, these systems were cost-effective and utilised the undulating terrain to develop irrigation channels by creating a network of diversion bunds. These harvesting systems were called *keres* (tanks), which supported afforestation, reduced soil erosion, increased groundwater absorption and the rainwater catchment area. These systems were the natural habitat for many birds and animals and also influenced the microclimate.

Planned and executed from the 1500s to the 1800s, Bengaluru's *keres* were based on traditional ponding systems where the waterways are structured in a series of interconnected lakes and canals, including rivulets such as Arkavathi (a minor tributary of Kaveri river) and Vrishabhavathi (a minor tributary of Arkavathi river) which was used for cultivation purposes. Bengaluru has an undulating terrain towards the west with thin soil cover and towards the east, the terrain is flat land with extensive soil cover. The *kere* was constructed by digging the soil and building elevated mud bunds to hold water. These bund walls were made by binding mud and loose stones, and slowed the flow of water and stored water during dry months. During the monsoon season, the runoff water formed streams and rivulets, which collectively formed a system of irrigation channels shaped by a network of diversion bunds.

The surplus water begins its journey from north and west through gentle slopes of the hillocks, small ridges and valleys of Nandi hills, Vidyanarayapura, Doddabettahalli, Makalidurga, Narayangiri, Antargange, Ramanagara, Savandurga, Rangaswamybetta, Kabbaldurga and many more. The running water was then collected by a series of tanks and smaller feeder tanks from which the surplus water overflowed into catchment basins and into main streams. The *keres* hence acted as catchment basins collecting surplus water, silt and clay. These tanks absorbed the monsoon rain to recharge the groundwater, maintaining the moisture in the soil, encouraging irrigation and providing nearby wells with drinking water. The *kere* system also acted as a flood control system preventing soil erosion and wastage of runoff water. The interconnected system enabled water access to nearby agrarian settlements and also balanced the surplus water runoff level during the monsoon season.

The left side of Figure 1 portrays the continuous change in the city with rapid urbanisation - the land dynamics, exploitation, and neglect resulting in an urban mosaic of grey concrete disrupting



144
145

Figure 1. The Rhythm of Terrain, Water & Community

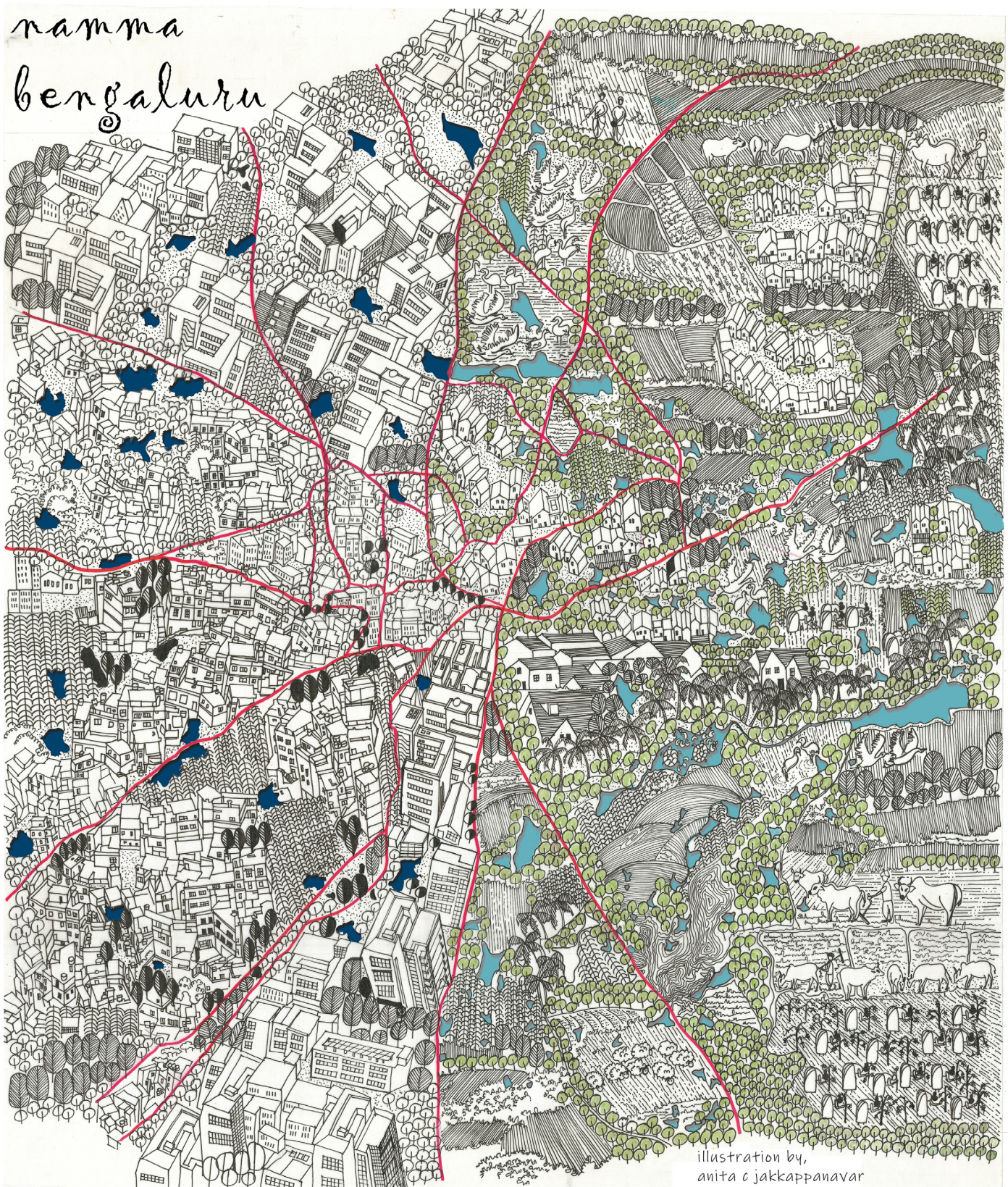


Figure 2. Cultural Scripts of Regional Landscapes in Bengaluru

the human-nature relationship. As the city grew, the encroachment of *keres* resulted in their disappearance while the rivulets were reduced to sewers. The illegal encroachment of lakes, unchecked dumping of effluents and waste, poor maintenance and management, are causing deterioration of lakes. The recent heavy rainfalls in the year 2019 and 2020 have highlighted the consequences of mismanagement of water systems in Bengaluru.

The illustrations are a deliberate attempt to evoke a paradigm shift in our vision and responsibilities towards water and urban ecosystems. Bengaluru is a fast-growing urban centre and is home to more than 13 million people today. According to the 2018 NITI Aayog reports, Bengaluru would have run out of groundwater by 2020 and 1450 million litres per day are being pumped into the city from Kaveri river, amidst growing needs for water. It is necessary to rethink the matrix of lakes and water dynamics and take necessary mitigation measures for groundwater preservation and conservation of indigenous water tank systems. The *kere* system is a reliable investment to build a resilient and sustainable future.

The second illustration titled 'Cultural Scripts of Regional Landscapes in Bengaluru' portrays the importance of water as a source of biodiversity (Figure 2). The illustration is a narrative through memory-mapping of pre-1700s Bengaluru where water held a sacred place in human settlements. Lakes and rivers hence emerged as identity markers for cultural gatherings, social and trading centres, agriculture and other utilitarian purposes. The illustration attempts to capture the holistic idea of settlements with diverse water harvesting systems managed by the communities, ranging from *kalyanis* (temple tanks) to perform rituals, small bathing tanks and larger tanks to support agriculture. The illustration also captures the food systems centred on growth patterns of neighbourhoods and settlements in the 1600s to 1700s. The *akadi* system, which means cultivation of multiple crops simultaneously, was made possible because of the yearlong availability of clean water, leading to increased agricultural yield.

Rainwater-fed streams flowing through cattle yards collected dung and urine of cattle in their journey to the agricultural fields, leading to increased soil fertility. This water also fostered the growth of fish and medicinal plants. Staple crops like paddy, lentils, legumes and millets were grown in the dry fields that were supported by nearby wells and small tanks. Mustard and castor were the cash crops grown to make cooking oil. The houses were supported with small gardens locally known as *thotas*. These *thotas* are distinct examples of productive landscapes across the region which include *tarkari thota* (kitchen garden) and *huvina thota* (flower garden) with *yelley thota* (betel leaf garden) and *teyngina thota* (coconut plantation) at the old city's fringes. Communities lined the lanes of the main city and surrounding villages with fruit-yielding trees like jackfruit, custard apple, tamarind, guava, *jamun* and shading trees such as banyan, *peepal* and other flowering trees.

The two illustrations in this article highlight the multiple benefits of traditional ponding water systems which were self-reliant, ecologically sustainable and cost-effective. They depict water conservation methods which evolved over centuries and were ingrained in local culture, customs and traditions. The *kere* system highlights community ownership, responsibility and participation. With unsustainable development patterns and rapid depletion of natural resources, today Bengaluru faces an acute water crisis and considerable challenges towards building a resilient future. Reviving and managing indigenous water management systems in the city can show us the way forward in designing with natural systems, without further undermining our environment.

Anita C Jakkappanavar is an architect and urban designer actively involved in various sectoral fields of architecture, urban transport and urban design. She is also an urban illustrator and has won awards at state, national and international level.
Email: anitacjakkappanavar@gmail.com