

SUSTAINABLE CITY GEOMETRIES: SACRED GEOMETRY OF RITUAL SPACE, ARCHITECTURE AND CITY LANDSCAPE IN KANDY, SRI LANKA

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ABSTRACT

Esala perahera rituals, performing in Kandy, Sri Lanka re-establish spatial relationships between people, temples, the city, villages, river, valley and the mountains through walking and dramatic performances, evoke spiritual atmosphere. Analysing these revealed sustainable city concepts and mathematical geometrical patterns. However, there is a boundary, where cannot be researched beyond to understand the deeper dimensions of the sacred geometries, without geometrical and mathematical analysis. This research examines the geometries of the spatial relationships established by ritual space in Kandy, and its relevance to the city landscape and architecture, to understand sustainable city and sacred geometries. Ritual space created through performing *Esala perahera* for 15 continuous days is analysed for the purpose, in order to explain sacred dimensions and depth of the place, beyond the boundaries of architectural and landscape analyses. The method of study is by a geometrical analysis of ritual space, architectural elements and the city landscape, exploring geometry in two, three and higher dimensions; to understand the sacred geometries and geographies. It examines the higher dimensions of the centre, axis, and the circular motion and discusses sustainable city geometries. The geometrical analysis is done by utilizing architectural and landscape analytical diagrams developed in a previous study, employing a phenomenological, anthropological, ethnographical research approach. This study reveals further insights of the place; people, social/cultural/religious system, architecture, topographical location, the city and spiritual dimension of the space; where this place cannot be easily understood in isolation, by employing either research approach. Geometrical analysis is useful to further understand the phenomenological, anthropological, ethnographical perspective of the place and strengthened the conclusions of previous studies. Geometries of Kandy reveal the spiritual dimensions, unfolding physical and non-physical side of the place, and traditional city that sustains between these two, continuing sacred geographies, establishing sustainable city geometries, in contrast to new developments.

Keywords: sustainable city geometry, spatial relationships, ritual space, sacred geometry, sacred geography, *Esala perahera*, sacred heritage sites, place.

1 INTRODUCTION

Kandy is the last kingdom (1596–1815 CE) of Sri Lanka; however, some of its traditional understanding of the place still continues, in the form of rituals, festivals, and religious cultural concepts. The ritual space, established through fifteen continuous performing of *Esala perahera* annually, re-enacts the place, giving rebirth to the place [1]. Geometric formation of centre, line, circle, circumambulation and axis as important spatial dimensions, revealed through these performances, manifest the space and city landscape as sacred, establishing geometrical and mathematical relationships in the space and time. The role of the body is central in these dynamics of place. Analysing these revealed sustainable city concepts and mathematical geometrical patterns; however, mathematical geometrical realization of the space needed to be further examined. How do these important spatial dimensions reveal spiritual dimensions, and unfold the place spatially and temporarily,



realizing sacred geometry, harmoniously and proportionately? If these cosmic understanding of the place, city and landscape, could be further explained through mathematical geometrical realization, it would possibly reveal a different avenue to understand sustainable city geometries, which is a needful topic, however, rarely discussed today.

This research argues that, the space produced by rituals establishes sacred geometry, affirming the role of the body as the central tool of recognizing divine reality, weaving space through geometrical and mathematical relationships, between physical and non-physical realms of the place, referring to sacred geometry; manifests the city landscape and architecture. The research examines one, two, three and higher dimensions of centre, line, circle, circumambulation and axis; and its relevance to sacred geometry and the place concept. It discusses the earliest mathematician–philosophers’ ideas, that are holistic and more related to sacred geometry, to reveal how sacred dimensions and geometry harmoniously and proportionately manifest in space and time. Furthermore, the research examines the contextual concepts of sacred geometries of the place, and analyses the geometries of the spatial relationships established by ritual space, employing *Esala perahera* in Kandy, and its relevance to the city landscape and architecture, to understand the sustainable city and sacred geometries.

2 GEOMETRICAL MATHEMATICAL REALITY OF THE WORLD AND PLACE

Geometry is the branch of mathematics that deals with the deduction of the properties, measurement, and relationships of points, lines, angles, and figures in space; from their defining conditions, by means of certain assumed properties of space. Life is interwoven with geometric forms, such as the angles of atomic bonds in the molecules, the spherical shape of the cell that itself develops with a geometric progression from one to two, to four, to eight cells and beyond, the helical spirals of DNA, and the lattice patterns of crystals [2]; angles of planetary attraction and the spherical movements between earth, sun, moon and other planets, and with cosmic relationships. Mathematical reality of the divine beauty, usually seen in sacred art and architecture, contains universal patterns of designs, following sacred geometry.

2.1 Sacred geometry

Sacred geometry is the place where mind and matter, the spiritual and the physical, the manifest and unmanifest, the bound and boundless meet. When understanding the universe, geometric proportions control the order of patterns in mathematical ratios, which are important elements in sacred geometry [3]. Sacred Geometry opens out the oneness of the world, underlying all forms and dimensions to the unity, the sacred origin of all things; while at the same time, flourishes the vivid nature of the world, through harmoniously and proportionately established geometrical relationships. Plato (circa 427–347 BCE) describes the geometric creation of the world in his book *Timaeus* [4]. On geometry, he writes in his *Republic* [5], “[Geometry is]... persuaded for the sake of the knowledge of what eternally exists, and not of what comes for a moment into existence, and then perishes,... [it] must draw the soul towards truth and give the finishing touch to the philosophic spirit”. Hence, geometry as the unchanging reality of the changing world, reflects in the world, nature, man, and in all good arts and architectural works, as Plato describes: the best bond between earth and sky (heaven), the geometric proportion, which is sacred. Sacred geometry by means of proportions, and harmonious relationships, establishes the links between the human world with the divine world.



2.2 Plato's Lambda: A world phenomenon

Plato (*Timaeus*) explained, the soul, the intermediate existence, between the unchanging essence of the universe and the changing existence of the physical universe itself, has been divided into harmoniously proportional subdivisions and formed into a long strip, by the Creator. The strip was then marked off into intervals [2]. The obtained seven integers; 1,2,3,4,8,9, and 27 are composed of the monad, source of all numbers, the first even and first odd, and their squares and cubes, which represent the dimensions of zero, one, two and three. These numbers are arranged in the geometric progression by 2 and the geometric progression by 3, and Plato arranged them into a universal model (Fig. 1).

| | | | |
|--------------------|------|-------|----|
| Monad | 1 | Point | 0D |
| First even and odd | 2 3 | Line | 1D |
| Squares | 4 9 | Plane | 2D |
| Cubes | 8 27 | Solid | 3D |

Figure 1: Plato's Lambda. (D = dimension).

This is called Plato's Lambda, because it is shaped like the Greek letter λ . In reality Plato's Lambda represents four dimensions, where all dimensions originate from the point, the zero dimension; an important world phenomenon. The four dimensions are described in Geometry as follows:

Point – A point has no size, width, length of depth; therefore, zero dimension.

Line – A line is defined as a set of points with no thickness; thus, one dimension.

Plane – A plane is two-dimensional, which has length and width.

Solid – A solid is three-dimensional, which has length, width and depth.

Plato shows the above discussed proportions in Pythagorean (“Music of Spheres”) music system, as the multiplication of 2 and of 3, which gives all the numbers by successive multiplication by fifths ($3/2$). Plato uses an arithmetic mean and harmonic mean to number musical octaves, fourths and fifths. This order of mathematical geometrical proportions in the space and time, unifying physical (earth) and the non-physical domains (heaven), establishes a holistic mathematical model of a place, a mini cosmos. The phenomenon of place [6], [7], is widely discussed in architecture [8], [9], landscape research [10], philosophical psychology [11] and phenomenological geography [12]; to explain the inseparable experience of people with their context: the buildings, architecture, cities and landscape.

Plato's idea of *lambda* explains a universal concept, where each dimension is reciprocally relating to the next dimension. All these dimensions, diverging from or converging to the point, establish a holistic place spatially and temporally, between the physical and non-physical regions; the dynamics of place that represents unity and multiplicity. In the Sri Lankan–Indian context, the cosmic dance (Fig. 2) of the dance of Shiva [13] and the Hindu gopuram (Fig. 3) are ideal examples that symbolize “dynamics of place” and “unity and multiplicity”, respectively, where myth evokes the sacred geometry, the reality of the place and the world. Therefore, *lambda* describes the holistic reality of the world of the divine

experience/higher dimension, which is not possible to understand, if only each dimension is focused separately. However, mathematics is considered as forms in four groups, dating back to the Pythagoreans [2]. The *Quadrivium*; Arithmetic (number), Geometry (as number in space), Music (or Harmony as number in time) and Astronomy (or Cosmology as number in time and space), as Plato points out, were as means for studying, the highest kind of knowledge: Wisdom.



Figure 2: Cosmic dance.



Figure 3: Gopuram.

2.3 Order of nature: Unity and multiplicity

Musical ratios have a close relationship with art and architecture, and the order of nature; those ratios that are pleasing to the ear would also be pleasing to the eye, mind and for the place. Furthermore, some systems of proportions, in mathematical geometrical agreement, illustrate sacred geometry, which has been recognized, as good, beauty and truth in traditional art, architecture and in nature.

Fibonacci sequence

The Fibonacci sequence is a sequence starting from 0 and 1, then formed adding the previous two numbers, to find the next number in the sequence:

$$0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, \dots$$

Golden ratio

Also called golden proportion, golden mean, divine ratio, divine proportion, sacred cut; found in nature: plants, flowers, shells, planets and galaxies. The golden ratio is evident in sacred architecture and arts throughout the history; golden ratio is designated by the Greek letter ϕ

$$\phi = \frac{1+\sqrt{5}}{2}$$

The significance of the golden ratio is found by dividing each number by the previous number of the Fibonacci sequence, which gives: $1/1 = 1$, $2/1 = 2$, $3/2 = 1.5$, and so on, up to $144/89 = 1.6179\dots$. Then the resulting sequence is:

$$1, 2, 1.5, 1.666\dots, 1.6, 1.625, 1.615\dots, 1.619\dots, 1.6176\dots, 1.6181\dots, 1.6179\dots$$

It can be seen that it's converging to the golden ratio. It symbolizes the regeneration and progression and extension from Unity [2], its relationship to birth, the zero dimension, the



point. The golden ratio is exhibited in many forms, which have been recognized as sacred geometries, evident in traditional art and architecture.

Great pyramid

By taking the slant height and half base length of the great pyramid of Giza, its significance to the golden ratio can be calculated (Fig. 4). Dividing slant height s by half base gives, $186.369 \div 115.182 = 1.61804$. Then, adding both the slant height and half base and dividing by the largest number (which, in this case, is the slant height) gives, $(186.369 + 115.182)/186.369 = 1.61803$; which differs from the golden ratio ϕ (1.618033) by only one unit in the fifth decimal place.

Spirals

Most commonly in nature, plants display the Fibonacci numbers. Sunflower seeds, pinecones, pineapples show spirals of successive Fibonacci numbers. Snail shells and the spiral of waves are also significant to the Fibonacci numbers. The Fibonacci spiral reveals the origin, the birth and mathematical geometrical relationship of the physical world to the origin (Figs 5 and 6).

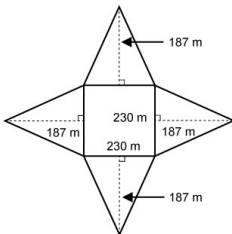


Figure 4: Proportions of the great pyramid.

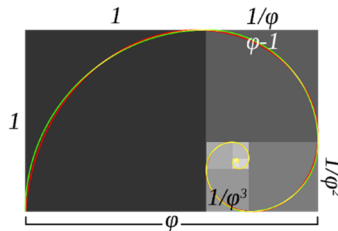


Figure 5: Fibonacci spiral, the sizes of squares are made corresponding to the Fibonacci sequence.

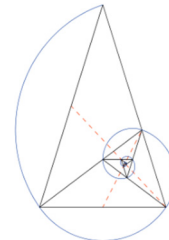


Figure 6: Golden triangles inscribed in a logarithmic spiral.

Circles

Circles are almost evident in creating sacred proportions, and as the base for projection of sacred geometries, for example, the golden ratio in the pentagon and pentagram (Fig. 7). Human body proportions consist of the golden ratio and circles (Fig. 8).

3 GEOMETRY OF THE RITUAL SPACE AND CONTEXTUAL CONCEPTS

How people experience the sacred geometry and geography, through embodied performing, and contextual concepts reveals more insights about the sacred geometry of the place.

3.1 Geometrical archetype

The above illustrated, geometries and proportions manifest the divine beauty, the nature of order and birth, a dynamic spatial temporal concept. Reality, as Plato stated, consisted of archetypal Ideas, or pure essences, of which the visible world is only a reflection. Sacred

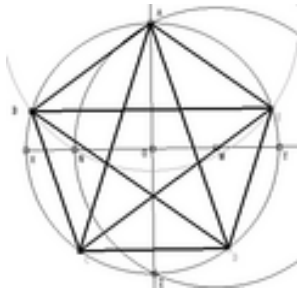


Figure 7: Pentagon and pentagram.



Figure 8: Body proportions, dance of Shiva.

geometry and mathematical proportions remind the “divine reality”, which cannot be perceived by senses alone [4], De Silva [1] proposes that rituals evoke bodily understanding of the world and place, through embodied performing [14]. The place could be explained as unfolded mathematical geometrical proportions in space and time, originated from the zero dimension and flourishing to one, two, three and the cosmic level, and vice versa; where buildings, architecture, villages, cities and landscapes at different scales reflect the same universal understanding, relating to higher dimensions, to zero dimensions, the geometrical archetype.

3.2 Contextual concepts: Sacred geometry and geography

How sacred geometry is utilized in this region, is evident in pilgrim journeys to holy centres, parading in the city, and the circumambulation of cities, temples, sacred trees, sacred objects and geographic regions; a cosmological, mythical understanding of the place and geography, by means of the bodily performing. The central role of the body as the mediator of the “sacred geometry” between the earth and the divine domain, is evident in all these. The geometries of distinctive geographies, and topographies evoke myth, and are honoured by pilgrimages throughout human history; a universal phenomenon, which belongs to human experience of sanctity of place [15], the cosmic understanding of human being [16]. The pilgrim journey establishes a line, a sacred axis uniting the holy centre/point with the mundane dimension. Circumambulation establishes the circle, and unifying with centre and axis of the place, that reminds archetypal geometry, the holistic concept of the place. Sinha [17] relates the archetypal idea to sacred geographies; landscape of mountains, hills, trees and water; and explains how these evoke the mind toward the sacred geometries of centre, axis/path, and the transcending experience between physical and non-physical realms.

Mandala, is a geometrical mathematical diagram (Figs 9 and 10), common in the Indian–Sri Lankan context, utilized in placing buildings, temples, palaces, cities. The centre of these geometrical forms is recognized as most spiritual, where Brahma the creator of the world resides, and the two dimensional mandala can project as a pyramid of three dimensional, where the axis passes the centre uniting with the origin of the place. Pilgrim mandala [18] worships specific geographic region, and continuous repeating of circuits enhances the sacred geographies of the Mandala, as the evidence of the human component/body in mediating the sacred geometry between earth and heaven. These contextual understandings highlight the centre/point, axis and circumambulation, the unity and multiplicity of the place, and its

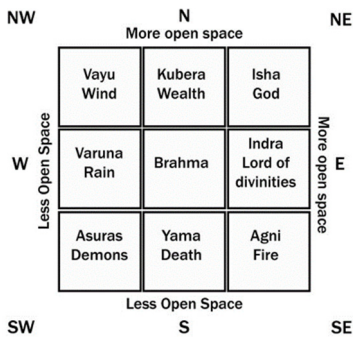


Figure 9: Brahma, at the centre.

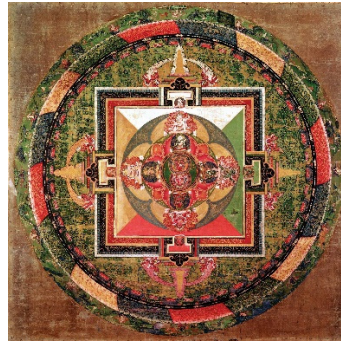


Figure 10: Tibetan Buddhist mandala.

relevance to rituals and myth. Life is interwoven with geometric relationships, mathematical proportions of divine order. According to the *Manasara*, a 10th century CE text of Hindu architecture, the layout of the Hindu city is based on the “Cosmic cross”, the cardinal points of which are from the universe. Thus, the whole city is a celestial city, a cosmogram [18]. Also, cosmic cross marks the point, the unity and the birth of the place; important phenomenon related to sacred geometry and sacred dimensions.

4 SACRED GEOMETRY AND SACRED GEOGRAPHY, KANDY

How *Esala perahera* rituals establish sacred geometry and sacred geography, can be explained by mathematical–phenomenological and ethnographical analysis.

4.1 *Esala perahera* rituals in Kandy

Esala perahera festivals, one of the major rituals performed annually in Kandy during July/August, celebrate intact relationship of people with the place, temples, old city and landscape. These celebrations are more than cultural displays [1], signify the role of the body and dynamics of the place. These rituals are performing through fifteen continuous days, ending on full moon *poya* day, as evidence of the cosmic relationship. Table 1 illustrates the details of events and the significant aspect of performing. The last kingdom of Sri Lanka, Kandy was taken under British power in 1815 CE. Some old city streets during 1815 CE (Fig. 11) do not exist today; but *Esala perahera*, parades only along the old streets of the city.

4.2 Analysis: Place emerges through establishing rituals

The first five ritual events mark geometries of point, line and circle during the first four days, performed at the four main temples: Natha, Vishnu, Kataragama and Pattini (Fig. 12).

Numbers in space and time comply with the order of Fibonacci series (Table 2); birth of the place from point or zero dimension and emerging to the next dimensions. In the ritual place the point is marked by the religious/cultural event called “*kapa situweema*” (planting a pole): the historical origin goes back to ancient times, interpreted as the birth of the Vishnu, the guardian of the place/world, a main god in the divine triad of Hinduism, an important world phenomenon. Hence, the geometries formed by the first five events of inner parades and *kumbal perahera*, re-enact the place, unfolding the holistic dimensions of the place, as in the world phenomenon of Lambda.



Table 1: *Esala perahera*, Kandy: Time, space and method of performing.

| Ritual | Time intervals | Methods of performing | Significant aspect |
|--|-----------------------------------|---|--------------------------------------|
| <i>Kapa situweema</i> | Once a year Two days | Parades, rituals, music, offerings. Cutting the tree, planting <i>Kapa</i> . | Marking a centre and axis |
| Inner parade | Four consecutive days | Small procession, music, offerings, and rituals. | Marking a place/encircling |
| Outer parade <i>Kumbal perahera</i> and <i>Randoli perahera</i> | Ten days at night | Long procession parades clockwise along the old streets, walking, dancing, acrobatics, singing. | Circumambulation the city and valley |
| <i>Diya kapeema</i> | From full moon midnight till dawn | Walking, dancing, playing, bathing, music, offering food. | The city is connected with water. |
| Day parade | From midday till evening | Walking, dancing, playing music, acrobatics. | Revisiting the place. |

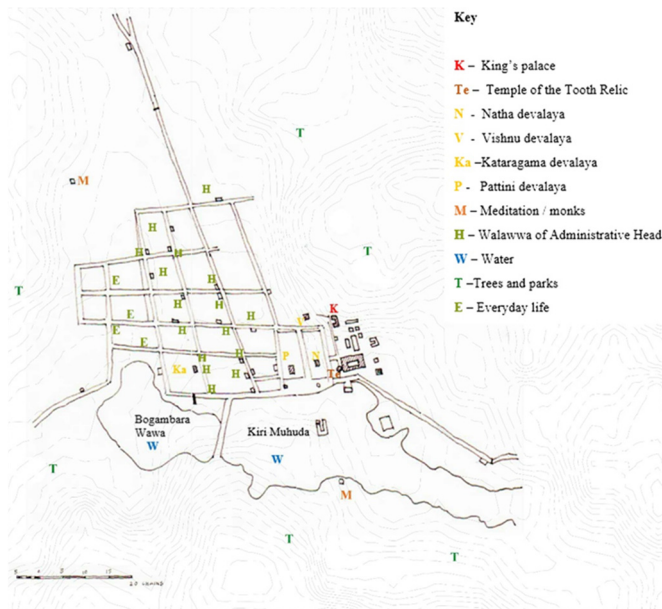


Figure 11: Kandy 1815 CE plan.

The evidence of the golden ratio is examined in these parades, by calculating distances of circumambulation (Fig. 13 and Table 3).

Let distance $a > b$. Then, find a/b and $(a + b)/b$. If a/b and $(a + b)/b$ are equal to 1.618 the proportion has the golden ratio.



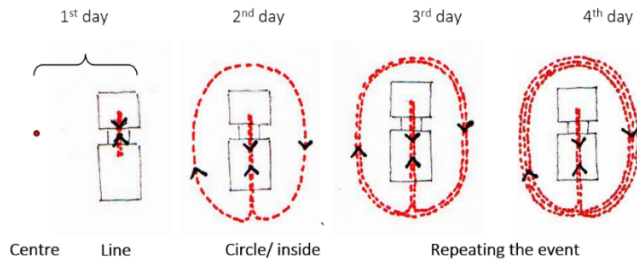


Figure 12: First five events.

Table 2: One temple: Inner rituals and *Kumbal perahera*.

| Day | Geometry | Numbers in the space | Numbers in the time | Dimensions – space factor |
|-----|------------------|----------------------|---------------------|---------------------------|
| 1 | Point | 01 | 00 Continues/static | Zero |
| 1 | Line | 01 | 01 | One |
| 2 | Circle | 01 | 01 | Two |
| 3 | Circle | 02 | 02 | Two |
| 4 | Circle | 03 | 03 | Two |
| 5–9 | Circumambulation | 05 | 05 | Three |

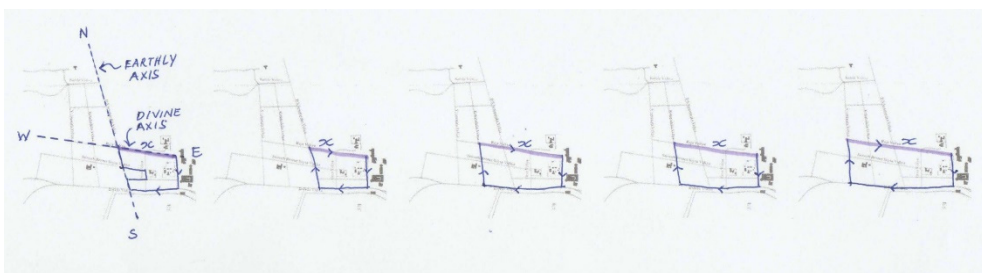


Figure 13: Circumambulation, days 5–9 *Kumbal perahera*.

Table 3: *Kumbal perahera*.

| Day (2012) | Length of axis (x) | Length of rest of circumambulation (y) | y/x 2012 | (x + y)/y 2012 | y/x (from 2020 results) | (x + y)/y (2020 results) |
|------------|--------------------|--|----------|----------------|-------------------------|--------------------------|
| 5 | 554.74 m | 1089.21 m | 1.96 | 1.51 | 2.67 | 1.37 |
| 6 | 312.91 m | 657.55 m | 2.10 | 1.48 | 2.10 | 1.48 |
| 7 | 444.24 m | 795.65 m | 1.79 | 1.56 | 1.85 | 1.54 |
| 8 | 444.24 m | 820.62 m | 1.85 | 1.54 | 1.85 | 1.54 |
| 9 | 554.74 m | 956.53 m | 1.72 | 1.60 | 1.72 | 1.60 |



The research compares the data from 2012 with the data from 2020, and in both 2012 and 2020, results converge towards the golden ratio. The slight deviation of results from the golden ratio is apparent, as the Kandyan kingdom lost its independence in 1815 CE: British power dominated over the land and the system, and made significant changes. Furthermore, the place is open to substantial changes, due to contemporary developments and globalization, despite temple priests who believe the traditional performing continues without changes to the original version happening during the king’s period. The research checked for the evidence of the golden ratio, in *Randoli perahara*, 2020 (Fig. 14 and Table 4).

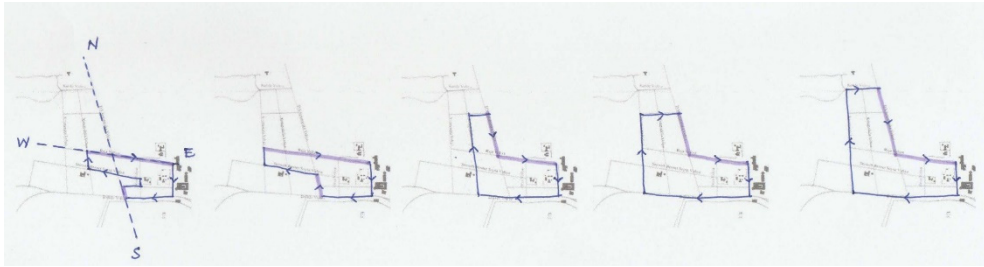


Figure 14: Circumambulation, days 10–14 *Randoli perahara*.

Table 4: *Randoli perahara*.

| Day | Length of divine and earthly axis (x) | Length of rest of circumambulation (y) | y/x | $(x + y)/y$ |
|-----|---------------------------------------|--|-------|-------------|
| 10 | 570.05 m | 846.61 m | 1.49 | 1.67 |
| 11 | 605.6 m | 859.58 m | 1.42 | 1.70 |
| 12 | 556.43 m | 1131.29 m | 2.03 | 1.49 |
| 13 | 556.43 m | 1336.86 m | 2.40 | 1.41 |
| 14 | 698.21 m | 1436.34 m | 2.06 | 1.49 |

These results show that, inner rituals are more spiritual and closed to sacred geometries, than outer parades. Temple priests believe the same. Repeated patterns of circumambulation of parades in a clockwise movement do highlight the temple square (Fig. 15), as the most sacred. The spiral movement of parades could be related to the golden spiral (Fig. 16) which represents the same temple square, as the sacred origin. Furthermore, historical evidences prove the origin of Kandy was in the same place, associated with the story of a Brahmin (sage), who resided at this place, having transcendental experience. The sacred geometry of Kandy city is primarily guided by sacred geography, the topography of the place, and the formation of the triangular-shaped valley by the three surrounding mountains [19] (Fig. 17).

5 SUSTAINABLE CITY GEOMETRIES

5.1 Architecture and landscape of the traditional city

Architecture, urban landscape and the social cultural system of the traditional city, manifest the agreement, with the sacred geometry and the sacred geography (Table 5). In this geometrical model of the city, the dimensions of centre and axis are more sacred, while the city landscape, topography and geography, exist at the bottom level, uniting with the rest of

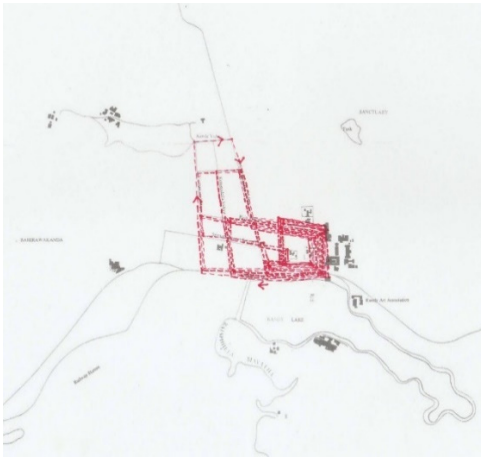


Figure 15: Spiral movement.

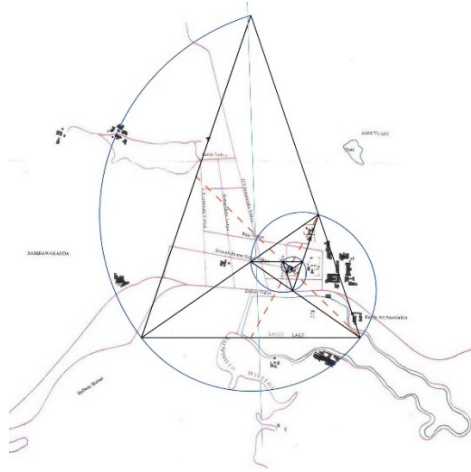


Figure 16: Fibonacci spiral.



Figure 17: Kandy city is in a triangular-shaped valley enclosed by three mountains.

other levels or dimensions and the origin/unity. The traditional city is the result of all the dimensions being organized in the same order of nature, divulge unity and multiplicity in the place; signify that, the worldly dimensions sustain with the sacred dimensions. All the physical components establish a link, by means of sacred geometry, to unity. Sacred physical elements; mountains, water and trees or forest are interwoven in the city landscape, responding to the triangular-shaped valley and the volume of the valley, the pyramid. The resulting city is in unity of harmony, following the order of sacred geometries, establishes sustainable city geometries. Continuous rituals establish sacred geometry spatially and temporarily, strengthen the place attachment, with its origin, the sacred dimensions. The city landscape and architecture manifest this understanding, reserving space for the human component, for walking and experience the city landscape and re-enacting sacred geometries.

Table 5: Sacred geometry in different dimensions and scales.

| Sacred geometry | Architecture/city/topography/rituals | Number |
|---|--|--------|
| Centre/point | Natha temple square (origin of the place) | 1 |
| | Inter-section of two primary axis | 1 |
| | Total crosses in 1815 plan | 16 |
| | Valley (converging effect) | 1 |
| | Planting Kapa at 4 temples | 4 |
| Line/axis | NS principal axis – Earthly axis | 1 |
| | EW principal axis – Divine street | 1 |
| | Divine street | 2 |
| | Taking sacred insignia to the door step | 4 |
| Circle/ circumambulation/ circuits | Dome above the Natha temple | 1 |
| | Ruins – (area utilized for the consecration rituals) | 1 |
| | Circumambulation the city | 10 |
| Square | Temple square | 1 |
| | Total squares in the city grid (1815) | 21 |
| Octagon | Pattirippuwa | 1 |
| Rectangle | Temple of the tooth relic | 1 |
| | Pavilion to perform music rituals in temples and temple of the tooth relic | 5 |
| | | |
| Triangle | City form (including buildings, water, fields) | 1 |
| | Entrances in temple square make a triangle valley | 1 |
| Conical shape | Stupa | 2 |
| | <i>gopuram</i> | 2 |
| Pyramid | Volume of the valley – including city and the topography/geography | 1 |

5.2 Concluding discussion: Sustainable city geometries and issues today

Today, except for the 15 evenings, when rituals take place once a year, the streets are overcrowded and dominated by cars and other vehicles, exhausting the bodily understanding of the place. The divine agreement between the place, architecture, people, with the unity, is disturbed, and guided by contemporary developments. What could be missing today is, as we are learnt to perceive, each dimension as a separate entity, and our city planning regulations, policies, and design aspects focused only at the bottom level of the place, where only the three dimensional buildings, streets and city landscape exist physically; we don't realize how these sustain with the sacred origin of the place, the unity.

6 CONCLUSION

This research disclosed that performing *Esala perahera* establishes sacred geometries, re-enacting the place spatially and temporally, revealing holistic dimensions and dynamics of place, signify the birth of the place; affirming Plato's idea of Lambda. All the dimensions of the traditional city Kandy, are holistically inter-related, following the order of nature; unity and multiplicity, and systems of proportions. The city landscape manifests the agreement between sacred geometry and geography. Three dimensional components; buildings, streets, landscape of the city has the co-relationships with other dimensions, sustaining the worldly dimensions with the origin, the unity. The resulting city establishes sustainable city geometries, while continuous rituals re-establish the place; weaving the place by means of



sacred geometry, empowering the body–place attachment with the origin. In conclusion, this research approach has opened more insight, to understand sustainable city geometries.

REFERENCES

- [1] De Silva, W., Performing place: Natural landscape, cultural place, performances of Sri Lankan traditional settlements, Kandy and Lankathilaka. PhD thesis, University of Nottingham, UK, 2014. (Also published in EThOS e-thesis, British Library, 2014.)
- [2] Hejazi, M., Geometry in nature and Persian architecture. *Building and Environment*, **40**(10), pp. 1413–1427, 2005.
- [3] Dabbour, L.M., Geometric proportions: The underlying structure of design process for Islamic geometric patterns. *Frontiers of Architectural Research*, **1**, pp. 380–391, 2012.
- [4] Plato, *Timaeus* (trans. Thomas Taylor), Wizard’s Bookshelf: Minneapolis, 1975.
- [5] Plato, *Republic* (trans. Robin Waterfield), Oxford University Press: Oxford, 1993.
- [6] Heidegger, M., *Being and Time*, Harper & Row: New York, 1962.
- [7] Norberg-Schulz, C., *Genius Loci: Towards a Phenomenology of Architecture*, Rizzoli: New York, 1980.
- [8] Madanipour, A. (ed.), *Whose Public Space? International Case Studies In Urban Design And Development*, Routledge: London, 2010.
- [9] Dovey, K., *Becoming Places*, Routledge: London, 2010.
- [10] Porter, N., *Landscape and Branding: The Promotion and Production of Place*, Routledge: Oxford, 2016.
- [11] Casey, E.S., *Getting Back into Place: Towards a Renewed Understanding of Place World*, Indiana University Press: Bloomington, 1993.
- [12] Relph, E., *Place and Placelessness*, Pion: London, 1976.
- [13] Coomaraswamy, A., *The Dance of Shiva: Fourteen Essays*, Rupa Publications: India, 2013.
- [14] William, S.J. & Bendelow, G., *The Lived Body, Sociological Themes, Embodied Issues*, Routledge: London, 1998.
- [15] Singh, P.P.B., The geography of Hindu pilgrimage in India: From trend to perspective. *Geography and Sacrum*, eds B. Domanski & S. Skiba, IGIU Krakow, pp. 417–429, 2005.
- [16] Osterrieth, A., Pilgrimage: Lived space and spiritual quest, *Sacred Places, Sacred Spaces: The Geography of Pilgrimages*, eds A. Morinis & R. Stoddard, Louisiana State University Press: Baton Rouge, 1997.
- [17] Sinha, A., *Landscapes in India: Forms and Meanings*, University Press: Colorado, p. 36, 2006.
- [18] Singh, R.P.B., Sacred geometry of India’s holy city Varanasi: Kashi as cosmogram. *National Geographical Journal of India (Varanasi)*, **40**, pp. 189–216, 1994.
- [19] De Silva, W., Mountains and urbanism in Kandy. *Urban and Transit Planning. Advances in Science, Technology and Innovation*, eds H. Bougdah, A. Versaci, A. Sotoca, F. Trapani, M. Migliore & N. Clark, Springer: Cham, pp. 351–366, 2020.

