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## Front Pages

# Athens Journal of Architecture

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# Athens Journal of Architecture
# Editorial and Reviewers' Board

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The current issue is the first of the eighth volume of the *Athens Journal of Architecture* (AJA), **published by the Architecture Unit of ATINER**

Gregory T. Papanikos
President
ATINER

# Athens Institute for Education and Research

*A World Association of Academics and Researchers*

**12th Annual International Conference on Architecture**
**4-7 July 2022, Athens, Greece**

The Architecture Unit of ATINER, will hold its **12th Annual International Conference on Architecture, 4-7 July 2022, Athens, Greece** sponsored by the Athens Journal of Architecture. The aim of the conference is to bring together academics and researchers from all areas of Architecture. You may participate as stream organizer, presenter of one paper, chair a session or observer. Please submit a proposal using the form available (https://www.atiner.gr/2022/FORM-ARC.doc).

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- Abstract Submission: **14 March 2022**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **6 June 2022**

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The Social Program Emphasizes the Educational Aspect of the Academic Meetings of Atiner.

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- Athens Sightseeing: Old and New-An Educational Urban Walk
- Social Dinner
- Mycenae Visit
- Exploration of the Aegean Islands
- Delphi Visit
- Ancient Corinth and Cape Sounion

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The Architecture Unit in collaboration with the Social Sciences Division of the ATINER will organize its **12th Annual International Conference on Urban Studies & Planning, 30-31 May & 1-2 June 2022, Athens, Greece** sponsored by the Athens Journal of Architecture. The aim of the conference is to bring together academics and researchers from all areas of social sciences such as urban sociology, urban geography, urban design, urban planning, architecture, etc. You may participate as stream leader, presenter of one paper, chair of a session or observer. Please submit a proposal using the form available (https://www.atiner.gr/2022/FORM-PLA.doc).

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- **Dr. Nicholas N. Patricios,** Vice President of Strategic Planning & Analysis, ATINER and Professor & Dean Emeritus, School of Architecture, University of Miami, USA.
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# Influence of Ancient Mesopotamian Aesthetics of Gardens/Parks and Water Installations on the Development of Landscape Architecture

*By Antanas Stančius[*]& Petras Grecevičius[±]*

*Based on the information from fundamental historical sources, the oldest origins of civilization can be found in the river valleys of the Tigris and the Euphrates. Throughout Mesopotamia important routes of trade and migration of peoples followed, which influenced the emergence and development of one of the world's first urban-type civilizations. It was here that the Sumerian civilization evolved, leading to a major cultural and technological breakthrough. Their widely used irrigation canals influenced not only the landscape, but also the entire ecological, economic and political systems of the time, water being a particularly important factor in this civilization. The oldest known gardens have also expanded here, and the Hanging Gardens of Babylon still fuel people's imagination. Due to its unique geographical location, the region has had a profound impact on the surrounding nations, and it is no accident that the Assyrian Imperial Parks of Northern Mesopotamia exerted a great influence on the civilizations that followed. Undoubtedly, ancient Mesopotamia occupies a fundamental place in the development of garden art. With the growing use of roof gardens and the use of plants in modern architectural constructions as an extremely important tool for composition, it is worth exploring more closely the origins of this landscape-relevant process.*

## Introduction

The knowledge gained from fundamental historical sources supports the statement that the origins of the oldest civilization are found in the valleys of the Tigris and Euphrates rivers. The territory of Mesopotamia is bordered on the north and the east by mountain ranges, on the south by the waters of the Persian Gulf, and on the west by desert areas. Unsurprisingly, due to the favorable natural conditions for agriculture, nomadic societies began to develop in these areas. The most fertile region consists of the areas between the two major rivers, where fertility was increased by the constantly renewed alluvial soil from water flows. However, there was a constant risk of river floods and droughts. In total, floods occurred as many as eight times a year, so it is not surprising that the region developed a complex system of irrigation, dikes, dams and canals. Artificial irrigation systems adapted in the southern part of Mesopotamia date back to the VI-V millennium BCE, which is a millennium earlier than in Egypt. Unlike other major river valley civilizations, the geography of this region does not have favorable natural barriers to protect against nomadic influxes, and that determines

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the special dynamics of this region, which has left a strong mark on the culture of many later civilizations.[1] However, despite the constant political changes in this region, the multicultural nature, the constant state of struggle, the stability of the visual and architectural unity of the Mesopotamian civilizational space is astonishing. Here, art not only empowered and reflected political power, but also developed a visual narrative in search of opportunities to convey narratives through art.[2] On the assumptions of other researchers, archaeological research, and aerial photographs, R. Pournelle arrived at the conclusion that the first water canals were used for navigation, transport, and trade, so there was no need for a long period of organized, mass slavery social development, as in Egypt, to lead to the establishment of an expanded hydraulic civilization. In her view, with the drying up of the climate and the onset of large-scale urbanization, this navigational experience was easily adapted to the subsequent engineering water system developed by perpendicular canals, dikes, dams, dams, reservoirs and irrigation furrows connecting Sumer crops, cities and the river form.[3] Early urbanization, writing, cultural and technological developments led to the relatively early emergence of political systems in the region, and the formation of the first known historical empires. The political and social system of the ancient Sumerian city-states was based on the belief in the divine origin of the rulers, supported by the social stratum of the priests. S. N. Kramer's[4] research also reveals the origins of democratic governance, which later spread widely in the Greek world. However, since the emergence of the first settlements, independent city-states have been fighting amongst themselves for political influence in the region, so the region had the characteristic nature of political fragmentation. Finally, the successful growth of food resources in Sumerian cities and the growing wealth due to trade ties did not go unnoticed by the surrounding nations, leading to the penetration of different communities of Semitic origin towards southern Mesopotamia. About 2334 BCE, the region was relatively easy to conquer by Sargon of Akkad who established the first Middle Eastern empire, which covered not only the Sumerian settlements, but also the northern lands of present-day Iran and Syria. The Akkadian period is historically important as it defines the period when the Sumerian city-states of southern Mesopotamia were first united. At that time in southern Mesopotamia, the increase in agricultural production led to a significant increase in population, whereas in the past city-states suffered from deprivation due to constant conflicts, which in turn increased the economic power of the region.[5] Towards the end of the Akkadian Empire (2334-2154 BCE), competition between many city-states intensified and around 2200 BCE as the centralized political influence of the

1. A. Andrijauskas, *Rytų Azijos tradicinė estetika ir meno teorija* (Vilnius: LKTI, 2017), 22-24.

2. P. J. E. Davies, W. B. Denny, F. F. Hofrichter, J. F. Jacobs, A. S. Roberts, et. al., *Janson's History of Art: The Western Tradition.* 8th Edition (London: Laurence King Publishing Ltd, 2010), 21.

3. J. R. Pournelle, "KLM to CORONA: A Bird's Eye View of Cultural Ecology and Early Mesopotamian Urbanization," in *Settlement and Society: Essays Dedicated to Robert McCormick Adams* (ed.) Elizabeth C. Stone (Cotsen Institute of Archaeology, UCLA and Oriental Institute of the University of Chicago, 2007), 29-62.

4. S. N. Kramer, *The Sumerians: Their History, Culture and Character* (Chicago: The University of Chicago Press, 1963).

5. A. Jamieson, "Empires of Ancient Mesopotamia," *Agora* 51, no. 3 (2016): 45-51.

Akkadian dynasty weakened, power was shared by local leaders. At that time, the Akkadian Empire was tormented by an influx of nomadic Gutta tribes, and they eventually took over. However, the Gutian rulers were unable to cope with the subtleties of the empire's rule, so the years of their reign are called the Dark Ages. The lands of Mesopotamia were engulfed in chaos, and after a while, the foreigners were driven out by the newly emerging third dynasty of Ur, also known as the Neo-Sumerian Empire, but covering a much smaller territory. This short but striking period in Sumerian history is described by experts as the "Sumerian Renaissance." Around the time of the Neo-Sumerian Empire, archaeological data revealed traces of the Amorites of Semitic origin who spoke a language related to the one spoken by Akkadians but in a different dialect. This nation lead a semi-nomadic way of life, and a few centuries later finally overthrew the third Ur dynasty and began to dominate southern Mesopotamia. In the meantime, across the region, competition between individual cities and states which lasted for several centuries, is starting again. The Sumerians, who came under the influence of the Amorites of Canaan origin, never recovered politically, while in the free northern part of Mesopotamia the Assyrian rulers dominated the Akkadian-speaking population. At that time, in southern Mesopotamia, Babylon, first ruled by the Amorites and later by the Chaldeans, emerged. The dynamics between the two Akkadian speaking states led to the development of the entire region, until Mesopotamia was finally conquered by neighboring peoples of Iranian descent, ushering in a whole new cultural phase of civilization. The history of Assyria is divided into three periods, which correspond to the expansion of Assyria, accompanied by periods of contraction and decline (see Table 1). These are the Old Kingdom of Assyria (2000-1740 BCE), the Middle Assyrian period (1363-1056 BCE) and the Neo-Assyrian Empire (934-609 BCE). The Assyrians were primarily famous for their military power. The discovery of vast iron ore resources in their populated areas led to the emergence of an arms industry that allowed Assyria to have the best-armed military forces of its era. However, to ensure successful trade, the Assyrians established colonies in Asia Minor and established ties with the cities of Egypt, the Mediterranean, Anatolia, Iran, and the Caucasus, making their capitals a major intersection of trade routes in the Middle East. They have achieved a breakthrough in sculptural and architectural arts, which stand out with their unique stylistic features, and the maturity of their art forms. The Assyrians paid much attention to the development of the royal palaces, which symbolized their power, and they were richly decorated with reliefs of war and hunting glorifying the rulers. Many of their artistic features were taken over by the Persians who later dominated its territory.[6]

Meanwhile, the early phase of Babylon's life that was run by the Amorite rule was called the Old Kingdom of Babylon (19th-16th century BCE). It was followed by a dark period in which Babylon, weakened by the attacks of the growing Hittite kingdom, fell into the hands of the Kassites (XVI-XII century BCE). At that time, the Mesopotamian region was influenced by four hegemonies: Egypt; the Hittite Empire; Mitanni, enslaved by Assyria; and the Cassite Babylon, renamed

6. Andrijauskas, *Civilizacijos istorijos metamorfozės: komparatyvistinis požiūris į neeuropinį pasaulį* (Vilnius: LKTI, 2018).

Karduniash. From the 12th century BCE, new waves of nomadic tribal migration began in Mesopotamia; it was so strong that scholars refer to it as the Aramaic Invasion. At this time, Babylon came under the rule of its eastern neighbors, the Elamites. However, the rise of the Central Assyrian kingdom halted further disintegration in the region.[7] Even before the beginning of this expansion, these tribes were influenced by Mesopotamian culture for centuries and their governance forms and social organizations were similar, and therefore these processes did not affect the civilizational and cultural changes of Mesopotamia.[8] In the 10th century BCE, Assyria was weakened briefly due to internal conflicts, but since 911 BCE thanks to the active ruler Adadnirari II, the Assyrian expansion resumed, leading to the third reunification of the region and the rise of the Neo-Assyrian Empire, whose rulers completely solved the so-called "Babylonian problem" and gained their independence.[9] The Assyrian Empire was in a state of constant military conflict, which is thought to have followed, with the addition of internal divisions. Finally, in 612 BCE, Nabopolassar, the ruler of Chaldean descent, extended his influence to Babylon, and in the east, the charismatic leader Cyaxares, who united Persia and Medes, carried out an uprising by mutual agreement and divided the vast possessions of Assyria. Thus, New Babylon arose, also known as the Chaldea, which prospered until 539 BCE until the Achaemenid Persia took control of Mesopotamia. Babylon lost power for centuries, but it continued to appear as one of the most important provincial centers of the empire. The ruler of the Achaemenid Empire also had the traditional Mesopotamian titles of "King of Akkad and Sumer," "King of Babylon," and "King of the Four Worlds." When Alexander the Great occupied the region in 330 BCE, cuneiform was still used. Later, during the Hellenistic period, the cuneiform remained largely in the limited strata of the intelligentsia, whom still supported the ancient cults of Babylon and Uruk, which survived until the Muslim era. The last cuneiform record was made around 70 CE, ending a tradition that was flourishing for more than three millennia.[10]

7. D. Charpin, "The History of Ancient Mesopotamia: An Overview," in *Civilizations of the Ancient Near East* (ed.) J. Sasson et al., 807-829 (New York, 1995).

8. Andrijauskas, *Civilizacijos istorijos metamorfozės: komparatyvistinis požiūris į neeuropinį pasaulį*, 2018, 70-76.

9. D. D. Luckenbill, *The Annals of Sennacherib* (Chicago: The University of Chicago Oriental Institute Publications, 1924).

10. Charpin, *The History of Ancient Mesopotamia: An Overview*," 1995.

**Table 1.** *The Evolution of the Civilizational Periods of Ancient Mesopotamia*

<table>
<tr><td colspan="2">The first settlement of Eridu in about 5400 BCE</td></tr>
<tr><td colspan="2">Uruk period 4100-2900 BCE</td></tr>
<tr><td colspan="2">Sumerian Early Dynamic Period 2900 - 2350 BCE</td></tr>
<tr><td colspan="2">Akkadian Empire - 2334-2154 BCE</td></tr>
<tr><td colspan="2">Gutian rule period - XXIII-XXI BCE</td></tr>
<tr><td colspan="2">Uro III, Neo-Sumerian Empire - 2047-1940 BCE</td></tr>
<tr><td>Amorites rule period XX-XIX BCE</td><td rowspan="2">Ancient Kingdom of Assyria 2000-1740 BCE</td></tr>
<tr><td>The ancient kingdom of Babylon in the 19th-16th centuries BCE</td></tr>
<tr><td>Babylon of the Kassites in the 16th-12th centuries BCE</td><td>Middle Assyrian period 1363-1056 BCE</td></tr>
<tr><td colspan="2">Neo-Assyrian Empire 934-609 BCE</td></tr>
<tr><td colspan="2">New Babylon, also called Chaldea, 612-539 BCE</td></tr>
</table>

## Ancient Mesopotamian Gardens

Recent archaeological and artistic research by scholars in various fields refutes the prevailing view that the ancient eastern countries developed under conditions of cultural isolation; on the contrary, they maintained close ties. This is evidenced by the material archeological monuments of culture and art, analogous art styles, aesthetic canons, cosmogonic myths, epics, motifs of light and radiance aesthetics. The Sumerian trade routes stretched incredibly wide, with economic and cultural ties with Egypt, India, and through the Orontes Valley and with Phenicia and Palestine. It is obvious that Mesopotamia was located at the center of cultural interactions between these ancient eastern countries --it was the place where the original mythological archetypes were formed, such as the ocean of creation, the flood, the gardens of paradise, the golden age of mankind, and many others. A lot of elements of the Sumerian worldview undoubtedly influenced the formation of biblical Hebrew texts, and thus the spread of all cultural spaces covered by Abrahamic religions.[11] One of the fundamental images that was formed in ancient Mesopotamia and reached our time, is that of the gardens of paradise. The Greeks used the Persian word "paradeisos" to describe the enclosure, the garden, the orchard, and the Eden garden of paradise. The famous Sumerian researcher S. N. Kramer observes that, although the divine gardens found in the myths of the Sumerians (and later the Babylonians), *Dilmun*, are inhabited only by the gods, and have many parallels with the later common images of paradise gardens, so they can be treated as the origins of the latter. Important here are the motives of the gardens, their implied location, fruit-eating, subsequent death, ribs, and painless childbirth, which, according to Kramer, it later transformed into a Semitic worldview.[12] Clearly, the idea of an enclosed space is fundamental to the gardens

11. Andrijauskas, *Rytų Azijos tradicinė estetika ir meno teorija*, 2017.
12. Kramer, *The Sumerians: Their History, Culture and Character,* 1963.

of ancient Mesopotamia, and the tree of life in the biblical gardens of paradise from which the four rivers flow, including the Tigris and the Euphrates, which occupy an important place. The tree, taken together, was the most important compositional element of the garden.[13]

Very little is known about early period gardens or ornamental water use, as these elements change the most over time and survived the shortest period of time compared to architecture, sculpture, or other archaeological heritage.[14] M. Laurie argues that the origins of orchards must be derived from agricultural practices, and that the first fenced orchards may be associated with primary garden prototypes and therefore the beds, shapes, and dimensions of these orchards corresponded to the parameters of the cultivated fields. Irrigation canals and ponds, in these primary gardens, were integrated not only for functional purposes, but also for sensory pleasures to enjoy the water in the hot climate. To protect crops and gardens from the scorching sun and dry winds, the Sumerians planted them, providing shelter and shade with a tree strip (Figure 1) that was irrigated with confusing canals, and the Sumerian gardens were walled to keep away wild and domestic animals and insects.[15] Such walled gardens have been found in many ancient Mesopotamian cities of various periods: Uruk, Mari, Babylon, and Nineveh.[16] The gardens of the city of Uruk are described in the Sumerian mythical "Epic of Gilgamesh," where it is stated that one-third of the city consisted of a residential urban area, one-third of cultivated fields and the remaining third of gardens. However, it is not very clear which specific gardens are involved, as the early Sumerian word describing gardens applies to both conventional and orchard gardens.[17]

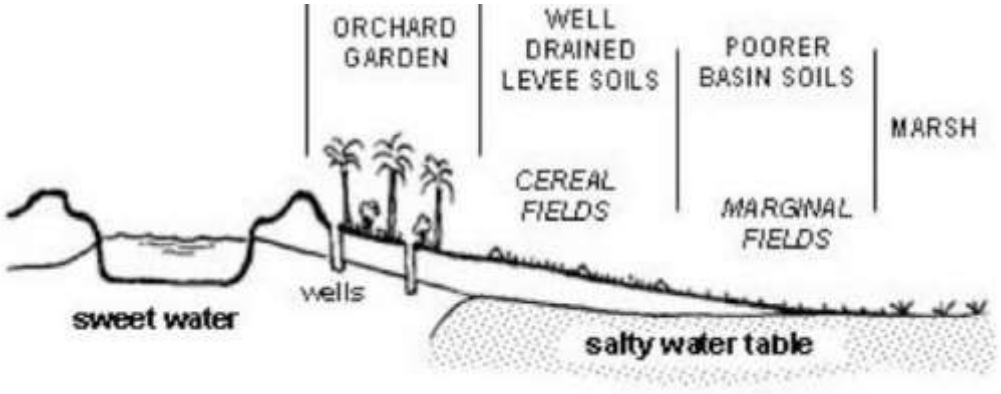


**Figure 1.** *Hypothetical Southern Mesopotamian Agricultural Cell Layout*
*Source:* Mays, 2010, 47.

13. D. P. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*. 2016. Retrieved from: https://bit.ly/3iG8laA. [Accessed 30 March 2021.].

14. C. S. Campbell, *Water in Landscape Architecture* (New York: Van Nostrand Reinhold Company, 1978), 15.

15. M. Laurie, *An Introduction to Landscape Architecture* (Elsevier, 1986), 17.

16. C. Girot, *The Course of Landscape Architecture* (Thames & Hudson, 2016), 53.

17. G. A. Jellicoe and S. Jellicoe, *The Landscape of Man: Shaping the Environment from Prehistory to the Present Day* (Thames and Hudson, 1995), 24.

Not surprisingly, in the Sumerian civilization space, complex pipelines and sanitary facilities were also found, and the cities had developed waste water and rainwater drainage technologies. Habuba Kabira, a short-lived Sumerian trade colony in northern Mesopotamia that has been discovered by archaeologists, was built in the city in the mid-fourth millennium BCE. It had a particularly complex sanitary system, with various pipes, drains and even toilets. There is no doubt that the settlement was built with prior knowledge based on the technology and design used in the central city of the metropolitan city of Uruk. It is far more surprising to researchers that these advanced sanitary technologies have become forgotten over time.[18] It is therefore not surprising that the first known aesthetic water facilities were also found in the civilized space of Mesopotamia. The oldest surviving cascades were located in Girsu (3000 BCE). The cascades consisted of water basins which were decorated with carvings. Water was going in thin pipes set in a downward stepped system until it reached the lowest basin that was decorated with a lion head. Another important find that was unearthed in Mari and dating back to the Akkadian-Sumer period, is a figure of a woman with a jug of water that dates back to 2000 BCE. Water was piped to the jug, and the bursting water can be considered the earliest known prototype of a fountain (Figure 2). The researchers associate this figure with the goddess of fertility and political power, Ishtara.[19]

**Figure 2.** *Mesopotamian Stone Fountain Figure, 2000 BC*
*Source:* Plumptre, 1993, 19.

18. L. W. Mays, *Ancient Water Technologies* (Dordrecht, Heidelberg, London, New York: Springer, 2010), 38-42.

19. G. Plumptre, *The Water Garden – Styles, Designs and Visions* (Thames & Hudson Ltd., 1993), 19; Girot, *The Course of Landscape Architecture*, 2016, 51. Britannica, Retrieved from: https://www.britannica.com/art/fountain/. [Accessed 30 March 2021.]

Located in the middle of the Euphrates, one of the largest courtyard gardens in Mesopotamia was also found. The tracks in these gardens were based on terracotta, fired clay bricks, and traditionally they were raised slightly above the yard surface to keep them from dusting. It is known from written sources that the palace had several gardeners and that the rulers often had snacks in their gardens. These gardens were planted with palm trees and had an ornamental pool. The pool, though, was not usually built in the center, but a little to the side. At the center was, in ancient Mesopotamia, a much more significant element -- the tree.[20]

According to one of the earliest written sources, gardens in southern Mesopotamia have been regular since Sumerian times. These gardens, dating back to the fourth millennium BCE, like the later Babylonian gardens, were based on ritual and economic incentives. In Mesopotamia, gardens were always associated with a sacred place, with links to economics, magic, poetry, and religion. The early functions of gardens were to give rulers a proper place to participate in religious rituals. It is known that the gardens were also a stage for cult ceremonies, such as the New Year Festival, and at the same time functioned as industrial harvest suppliers. Although both functions were associated with kings, it is difficult to determine whether the same places were used for both of these purposes, and whether the rituals occupied separate gardens. There is also not enough data to reconstruct the layout or appearance of these gardens, making it very difficult to estimate gardens from the fourth to mid-millennium BCE.[21] However, since the time of the Middle Assyrian Kingdom, there are far more written, archaeological and iconographic sources. Like many other cultural and ritual aspects of Mesopotamia and Babylon, the Assyrians absorbed many traditions and cult rites.[22] The ruler of the Neo-Assyrian Empire, Sennacherib (705-681 BCE), built a temple for the New Year Festival (Figure 3) outside of Nineveh. Archaeological excavations have also revealed traces of the layout of the gardens belonging to this rectangular temple. After a thorough examination of the planting pits found, it was still not possible to identify which trees or shrubs grew there. In the central inner courtyard, and outside it, plantings were planted at regular intervals on all sides. From the point of view of the scientist S. Dalley, although archeological excavations have reconstructed the plants as shrubs, it could also have been the trees of thin stems, giving the temple an impression among the grove.[23] A. Asadpor also notes Sennacherib's records, claiming that he dug two irrigation canals for the temple and planted it in orchards.[24] However, archaeological research reveals that the planting pits on the outside of the temple were irrigated with irrigation pipelines, confirming that the temple was surrounded by permanent

20. S. Dalley, "Ancient Mesopotamian Gardens and the Identification of the Hanging Gardens of Babylon," *Garden History* 21, no. 1 (1993); P. Taylor (Ed.), *The Oxford Companion to the Garden* (Oxford University Press, 2006), 308-309.

21. A. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," in *Studies in the History of Gardens & Designed Landscapes*, 91-114 (2015).

22. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*, 2016, 32.

23. Dalley, "Ancient Mesopotamian Gardens and the Identification of the Hanging Gardens of Babylon," 1993.

24. A. Asadpor, "Phenomenology of Garden in Assyrian Documents and Reliefs; Concepts and Types," *Bagh-e Nazar* 15, no. 60 (2018): 55-66.

gardens. However, the planting pits in the courtyard garden were not connected to the piping system, which suggests that the trees were planted here on designated occasions for ritual purposes. The rebuilding of the trees and their non-permanent installation, as well as the temporary exposition, clearly testify to the decorative nature of the aesthetics of these gardens. Various written sources also claim that the trees were sacrificed to the gods, and various cylindrical imprints describe the transportation of the trees in pots or baskets.[25] Using the oldest-known archeological example of temple gardens, it can be said that the courtyards of the temples, like the courtyards of the palace, were used for gardening. Still, the researchers note that comparing the northern Assyrian temples with the southern Babylonian ones, it is clear that the Babylonian temples owned much more land around them, and those lands were divided and successively supplied various crops, especially dates, figs, and pomegranates, for cult purposes.[26]

**Figure 3.** *New Year's Festival Temple, Archaeological Findings and Reconstructive Visualizations*
*Source:* Amrhein, 2015, 97.

Many ancient Mesopotamian temples were found decorated with columns imitating the trunks of date palms or a spiral trunk palm with inedible fruit, possibly *Chamaerops humilis*. The facades of the temples were also decorated in a similar manner. Using the deduction method, researchers make strong assumptions that the architectural form and decor given to some urban and suburban temples was intended to symbolize the environment of a sacred grove in a garden of paradise.[27] Temple gardens, or those adjacent to the temples, were given more attention to appearance, their smell, and the shadow they provided, as they were designed to convey the city's fame and prestige.[28] The records of Esarhaddon (681-669 BCE), the ruler of the Assyrians, describe the garden of the temple at Babylon, which had water canals, fruit trees and bearing beds. From the record of King Merodach-Baladan II (721-710 BCE and 703 BCE), a record of plants found in the royal gardens of Babylon reaches us from the briefly regained independence of Babylon, the reign of the Neo-Assyrian Empire. The records of another ruler,

25. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," 2015.

26. Dalley, "Ancient Mesopotamian Gardens and the Identification of the Hanging Gardens of Babylon," 1993.

27. Ibid.

28. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*, 2016, 34.

Nebuchadnezzar II, reveal that he grew fruits and vegetables as sacrifices to the gods, but imported grapes and raisins because the grapes did not ripen in southern Mesopotamia. Still, researchers do not find evidence or other data on former Assyrian-style public parks or hunting gardens in southern Mesopotamia.[29] However, the Babylonian royal palace gardens (*Kiril ekaliim*) were already mentioned during the reign of Adad-suma-usur (1200-1180 BCE), and are reaffirmed in later records. The temple gardens in Babylon have been known ever since the reign of the Kassites, from the 16th century BCE.[30]

In earlier centuries, during the time of the Neo Sumerian Empire, the region was united by King Ur-Nammu, the ruler of Ur. He is known for producing one of the first written acquis, restoring order, stabilizing the economy, and bringing back the Sumerian language.[31] During the reign of Ur-Nammu, the greatest surviving Sumerian monument was erected -- the Great Ziggurat of Ur-- which dates back to 2250 BCE; it caused quite a considerable fuss in our times. Initially, when this monument was unearthed, it was wrongly assumed that its terraces were planted with ornamental plants, although this was soon refuted.[32] However, this false statement is widespread and is still accepted after almost a century, based on the popular reconstructions of the Ziggurat of Ur presented by L. Woolley, and the presumed assumptions of mystical hanging gardens. S. Dalley explains that when archaeologist. L. Woolley excavated the ziggurat, he saw that it was composed of silt bricks and the outer layer was covered with burnt clay bricks, but the entire structure was perforated at regular intervals with holes that penetrated through masonry. Wooley interpreted these openings as drainage, but after a few more ziggurats had been excavated, researchers confirmed that the towers were not actually planted with trees or shrubs. S. Dalley argues that it was practically impossible to supply such greenery with the required amount of water without washing the sludge brick building. The openings were in fact intended to ventilate this structure in order to dry the structure so that it would not later decompose or collapse.[33] It is noteworthy that over time, some ziggurats broke and actually collapsed, and later such dilapidated structures in the eyes of contemporary Israelites may have provided the basis for the development of the myth of the collapse of the Tower of Babel.[34]

## Hanging (Terraced) Gardens of Babylon

In later times, during the reign of the New Babylonian kingdom, ruled by the Chaldean dynasties, Babylon became an influential Ancient World city, distinguished by the distinctive Babylonian stylistic aesthetics of architecture,

29. Taylor (Ed.), *The Oxford Companion to the Garden*, 2006, 309.

30. D. J. Wiseman, "Mesopotamian Gardens," *Anatolian Studies* 33 (1983): 138.

31. Jamieson, "Empires of Ancient Mesopotamia," 2016.

32. Taylor (Ed.), *The Oxford Companion to the Garden*, 2006, 308.

33. Dalley, "Ancient Mesopotamian Gardens and the Identification of the Hanging Gardens of Babylon," 1993, 6.

34. E. R. Rogers, *Landscape Design: A Cultural and Architectural History* (Abrams, 2001), 35.

sculpture and decor. Like the pre-dominated Assyrians, the Chaldeans also built monumental, astonishing architectural buildings on their scales, creating magnificent temples and palaces, ruled gardens, and surrounded the city with strong and impressive defensive walls.[35] Babylon was founded after one of the regular changes in the course of the Euphrates River bed, but the river acquired its now characteristic curvature around the 7th century BCE, during the New Babylonian period, when, for militaristic needs, three artificial bends and a huge artificial lake in the upper reaches were dug, according to Herodotus' testimony.[36] The ruins of the Old Babylonian city had unfortunately been washed away by the Euphrates, due to the constant rise in water levels, and now only the ruins of the New Babylonian city are known.[37] During this period, a unique Ishtar Gate, reinforced with heavy portals, with column-reinforced frames and bronze doors was also built. The legendary Tower of Babel was rebuilt from which only a large foundation has survived -- the base remains, and the representative buildings are no longer embossed with colored-glazed bricks.[38] Babylonian culture has traditionally nurtured temple gardens, and there were lots of them in Babylon dedicated to various gods and rites. Scholars know that the Babylonian gardens, which raised the prestige of the city, were renovated during the New Babylonian period.[39] Traditionally, the legendary "Hanging Gardens" are also attributed to Babylon of this period. At different times attempts have been made to create different visual representations of these gardens. A cycle in 1572 painted by Dutch artist Maarten van Heemskerck described seven wonders of the world. The artist's interpretation of these gardens met the aesthetic requirements of the time but relied more on the author's imagination than on real facts (Figure 4). However, later in the 17th century in Germany, the Jesuit Athanasius Kircher, a famous scholar of his time, referred to classical texts and the scientific knowledge, and presented a much more realistic version (Figure 5).[40] However, not all written sources attribute the construction of the latter to Babylon and its ruler Nebuchadnezzar II; some claim authorship of the kings of Assyria as well, so in recent years it has been hypothesized that these gardens may not have existed in Babylon, but actually were found in the Assyrian capital, Nineveh. Archaeological excavations have not yet confirmed the presence of these gardens in Babylon either, so scientists have several assumptions. One of them states that hanging gardens did not exist at all, and the surviving descriptions represented Mesopotamian gardens in general as such.[41] Another common hypothesis is that classical sources have somewhat

35. Andrijauskas, *Rytų Azijos tradicinė estetika ir meno teorija*, 2017.

36. Jellicoe and Jellicoe, *The Landscape of Man: Shaping the Environment from Prehistory to the Present Day*, 1995, 27.

37. J. J. Mark, *Babylon*, 2011. Retrieved from: https://www.ancient.eu/babylon/. [Accessed 30 March 2021.]

38. Andrijauskas, *Civilizacijos istorijos metamorfozės: komparatyvistinis požiūris į neeuropinį pasaulį*, 2018, 73.

39. Wiseman, "Mesopotamian Gardens," 1983, 138.

40. *The Gardens of Babylon*. Retrieved from: https://www.wonders-of-the-world.net/Seven/Gardens-of-Babylon.php/. [Accessed 30 March 2021.].

41. W. H. Jr. Stiebing and S. N. Helft, *Ancient Near Eastern History and Culture* (Routledge, 2017).

exaggerated and misinterpreted existing Babylonian buildings when describing these gardens. A proponent of this hypothesis, D. Wiseman,[42] argues that the terrestrial structures between the Euphrates (which possibly supplied water to these structures) and the Southern Palace were documented in ancient cylinders and were interpreted as hanging gardens (Figure 6). However, critics note that the Euphrates bed had changed again from those times until the period of the classical springs that reached us, and irrigating such gardens at the south gate would have been very impractical.[43]

**Figure 4.** *Maarten van Heemskerck (1498-1574) - "Hanging Gardens of Babylon" - Engraving-1572, Based on the Author's Imagination, a Widespread Visualization of Hanging Gardens*

*Source:* http://viticodevagamundo.blogspot.com/2011/02/seven-wonders-of-ancient-world-sete.html. [Accessed 30 March /2021.]

42. Wiseman, "Mesopotamian Gardens," 1983.

43. Stiebing and Helft, *Ancient Near Eastern History and Culture*, 2017.

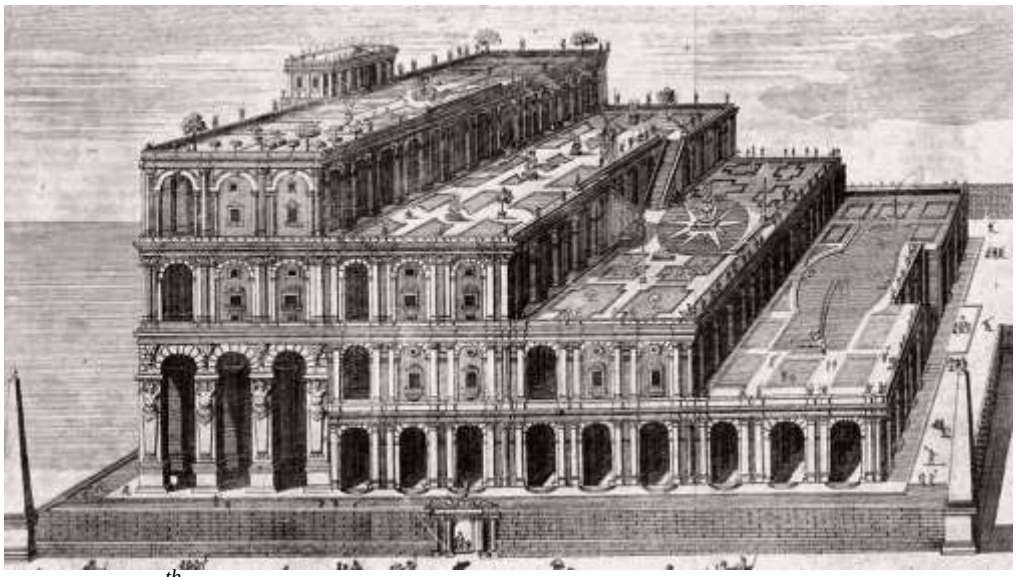

**Figure 5.** *17th Century Visualization Based on Literature Interpretation by Jesuit Athanasius Kircher*
*Source:* https://www.wonders-of-the-world.net/Seven/Gardens-of-Babylon.php. [Accessed 30 March 2021.]

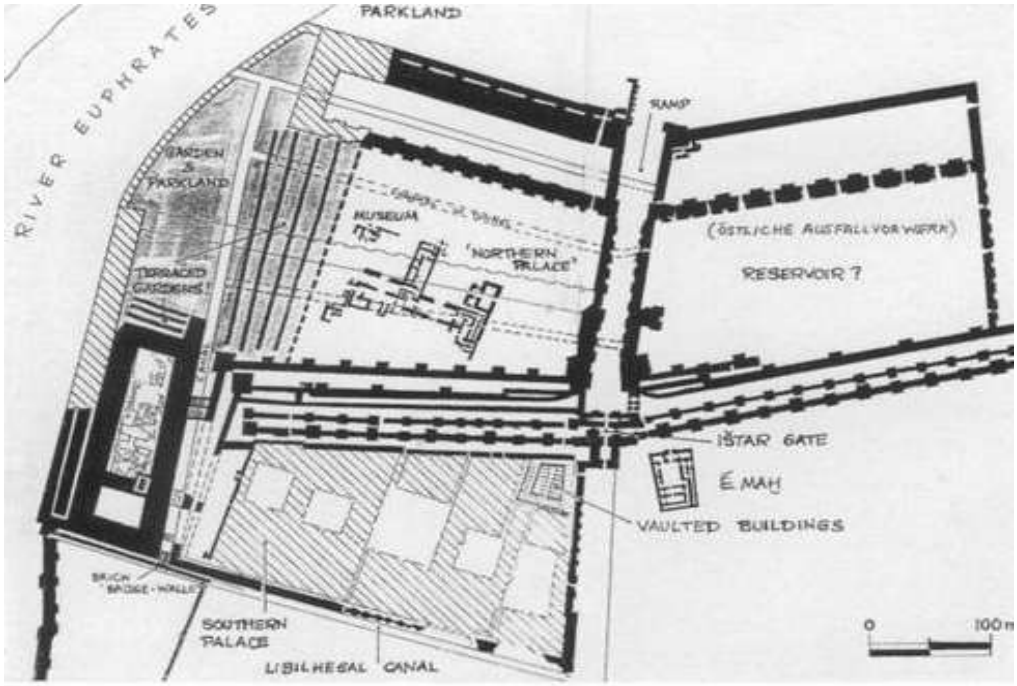


**Figure 6.** *Wiseman's suggested Location for the Hanging Gardens of Babylon*
*Source:* Wiseman, 1983, 144.

## Gardens of the Assyrian Empire

Much more knowledge about the gardens of ancient Mesopotamia comes from the Assyrian Empire. As the Assyrians originated from the plains, it also led

to changes in landscape architecture, much freer garden layout, and imitation of natural nature. They are characterized by hunting parks enriched with cedars and other imported trees, as well as exotic animals brought from conquered lands or donated by rulers of distant lands. It is assumed that since 2000 BCE the kings of Mesopotamia held exotic animals and plants in separate parks. These parks were further away from the palace of the rulers or even outside the city walls. One of the most impressive parks was owned by the ruler Tiglath-Pileser I (1115-1074 BCE), who, according to his royal records, bred herds of horses, cattle, donkeys, gazelles, various species of deer and mountain goats, and planted a hunting garden in cedar, beech, oak, and exotic fruit trees, and also had a crocodile and a large monkey.[44] These hunting gardens were called "*ambassu*" and were associated with kings, gods and rituals, and were somewhat open to the general public. Ritual hunting of lions took place in these places. These parks were less artificial and more naturalistic, as they mimicked the wild areas inhabited by lions. The hunts that took place here were for public viewing and were heavily staged. Successful hunting was associated with the re-establishment of the king's divine support for ruling force and reign, as well as the triumph of the Assyrian civilization.[45] Animals and plants from different countries collected in these gardens were designed to represent the whole known world.[46]

Over time, expressing their royal ideology, the rulers of Assyria began to build much larger gardens, and paid more attention to their layout and design. The king of the Neo-Assyrian Empire, Ashurnasirpal II (883-859 BCE), initiated huge water management projects and brought water from the hills and mountains to irrigate his newly planted city orchards in his new capital, Nimrud (also known as Kalhu). From the upper part of the Zab River in the mountains, water was diverted to the rocks through channels carved into the rocks.[47] His own records were found where he says that waters around these gardens get into the canal and then into the gardens from above.[48] Ashurnasirpal II called these gardens near his new capital Nimrud, "kiri rishate" – "the garden of pleasure." Here he planted 41 different species of trees, and also kept several different species of animals, suggesting that these gardens were fenced. These gardens, according to the ruler who implemented them, were for the enjoyment of the Assyrian people, while Tiglath-Pileser I said of his gardens that they were built exclusively for the joy of the king (for himself in this matter). However, at that time, the dichotomy of state and religion did not exist and therefore no great distinction could be made between royal and divine gardens, as in their worldview all aspects of life were associated with gods and cult. In an effort to imitate divine gardens, royal gardens were characterized by greater decorativeness, artificiality, introversion, and ritual activity. These gardens

44. Dalley, "Ancient Mesopotamian Gardens and the Identification of the Hanging Gardens of Babylon," 1993; Taylor (Ed.), *The Oxford Companion to the Garden*, 2006, 308.

45. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," 2015.

46. M. Novak, "From Ashur to Nineveh: The Assyrian Town-Planning Programme," in *Papers of XLIXe Rencontre Assyriologique Internationale 1* (Iraq 66), London, 2004, 181.

47. Taylor (Ed.), *The Oxford Companion to the Garden*, 2006, 308.

48. Dalley, "Ancient Mesopotamian Gardens and the Identification of the Hanging Gardens of Babylon," 1993.

covered an area of 25 $km^2$ and, for the first time in Assyria, were equipped with a panoramic platform connecting with the palace to gaze the view of the gardens. The term "bitumen" is used to describe this construction. These platforms were used not only for royal purposes, but also for ritual cult needs. There were porticoes and columns surrounding the facades, and it has been thought to have been adapted from the architecture of the Syrian-Hittite palace.[49] It is the first architectural element used in the Assyrian gardens that enabled visual communication between architecture and the landscape.[50] Interestingly, crypts of queens' graves are also found under the courtyard gardens of the Royal Palace in Nimrud. Thus, these gardens may have also functioned as memorial.[51]

Undoubtedly, the art of the Assyrian gardens and the conceptual worldview that accompanies it, judging by archaeological, literary, iconographic and cultural-historical research, were developed during the Sargon dynasty (722-609 BCE). It is probable that until then, most of the Assyrian gardens, in addition to their size, did not have highly-developed stylistic forms; the most striking feature of which was the terraces. During the Sargon Dynasty period, royal gardens were built outside of the palace, and were located alongside their walls. The terminology has also changed, as L. Oppenheim notes, where before that period the garden was called *kiru,* but it evolved into *kirimahhu*, meaning "large or glorious garden." This word is a Sumerian debt to emphasize the prestige of gardening as an ancient heritage.[52] Along with the name, the concept of gardens changed during the reign of Sargon II, and later of his son Sennacherib, when gardens changed their traditional, somewhat "utilitarian" function to a more predominant exposition assignment.[53] In Dur-Sharrukin, the new capital of Sargon II, a relief depicting a king resting in his gardens, near a pond and an artificial hill (c. 715 BCE) (Figure 7), is one of the earliest works of landscape style art.[54] Regularly planted dates grew in these royal gardens, which were also planted along the canals, along with a wide variety of fruit trees such as apples, figs, peaches, plums, cherries, and pomegranates.[55] Sargon II copied the model of the old capital, Nimrud, and all the characteristic elements in creating his new city. However, the layout of the city was almost an ideal square, and, as a result, it was far more regular in shape and geometric layout than other Assyrian cities. The main highlight here was the fortified citadel, which housed the public buildings--most prominently highlighted by the palace of the rulers--which extends beyond the citadel, thus breaking down the square layout and providing greater contrast. The palace, seen from the city side, was visible from three sides (Figure 8). Unlike in Nimrud, the main visual

49. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," 2015.

50. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*, 2016, 34.

51. Dalley, "Ancient Mesopotamian Gardens and the Identification of the Hanging Gardens of Babylon," 1993.

52. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," 2015.

53. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*, 2016, 33.

54. Jellicoe and Jellicoe, *The Landscape of Man: Shaping the Environment from Prehistory to the Present Day*, 1995, 27.

55. Rogers, *Landscape Design: A Cultural and Architectural History*, 2001, 39.

highlight of Dur- Sharrukin was no longer the temple, but the royal palace. On the other side of the palace were the royal gardens, which, as can be seen from the reliefs, also housed "bitanu" observation pavilions, artificial mountains, and ponds with boats.[56] Ponds, at the latest time since the time of Sargon II, have become a common feature of the Assyrian royal gardens.[57]

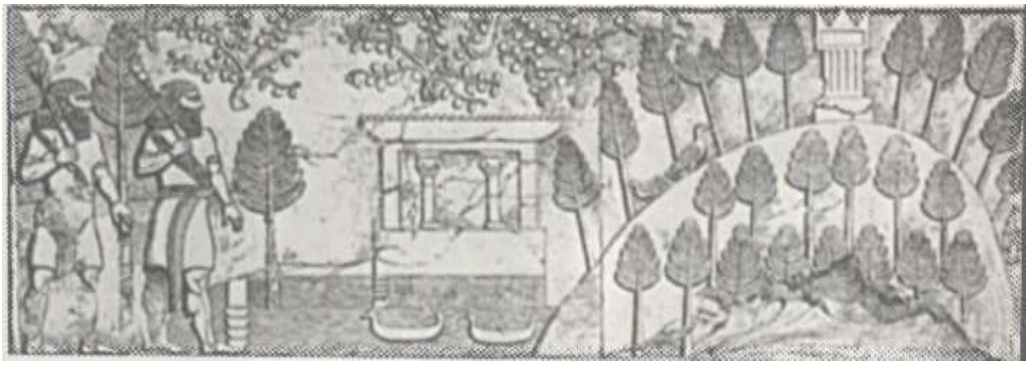

**Figure 7.** *Park of Sargon II*
*Source:* Jellicoe and Jellicoe, 1995, 27.

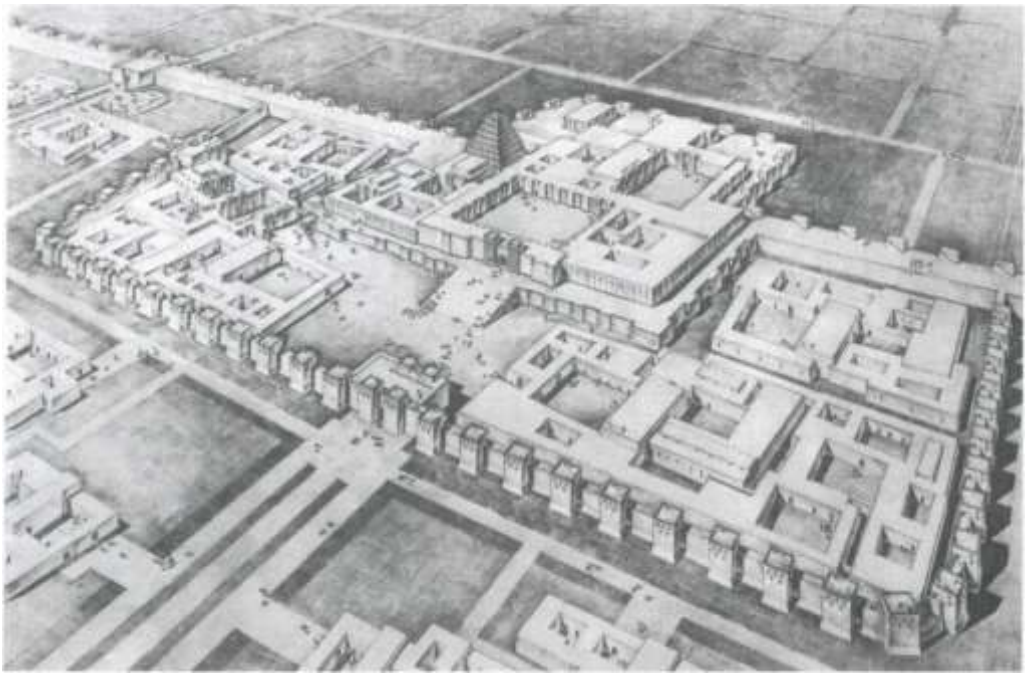

**Figure 8.** *Reconstruction of the Dur-Sharrukin Citadel with a Palace*
*Source:* Novak, 2004, 181-182.

Sargon's son Sennacherib (704-681 BCE) also developed gardens, and during his reign the gardens became a particularly prominent and characteristic part of the Assyrian landscape. Again, he moved the capital of Assyria to the pre-existing city

56. Novak, "From Ashur to Nineveh: The Assyrian Town-Planning Programme," 2004, 181-182.

57. P. Albenda, "Grapevines in Ashurbanipal's Garden," *Bulletin of the American Schools of Oriental Research* no. 215 (1974), 6.

of Nineveh, rebuilt and expanded it, surrounded by two walls, and planted gardens both inside and outside the city, probably for the sake of a more convenient and problematic water supply in Dur-Sharrukin. The two artificial mounds--mounds in the river crossing the city-- were transformed into powerful citadels. The basic urban structure used for the transformation of the city was taken over from the former capitals Nimrud and Dur-Sharrukin. At the top of the main, larger citadel closer to the edge, the Royal Palace of Sennacherib was built, overlooking the riverbank and gardens, and later on the sides and the palace of his grandson Ashur-nasir-pal II (668-627 BCE), with temple buildings in the center. Due to its positioning, the facade of the royal palace was visible from outside the city. This largest and last capital of the empire reveals the culmination of the development of urban planning in Assyria, and the growing importance of urban elements, namely citadels, fortifications, and royal gardens, in the architecture of the time.[58] Significant New Year Festival temple gardens were found outside the city, by the river valley. These are the best archaeologically-preserved temple-type gardens in Mesopotamia, where semi-public ceremonies for the elite took place. The New Year Festival was a very important cultural and ideological celebration, enshrining the symbolism of the king and his reign, and unity with the god Ashur.[59] Hunting and play gardens were also set up outside the city walls--those were *ambassu*-type gardens-- some on the north side of the Adad Gate and the others east of the Shamash Gate. Ritual hunts were held here, and judging by the reliefs of the later ruler Ashur-nasir-pal II, military exercises were also organized in these gardens. These gardens, as usual, were looser structures to mimic chaos-dominated wildlife. The other part of the city's land was also used for public purposes; the plots were designed for growing trees and vegetables and divided for the people of Nineveh. It is not known exactly what was grown in these private gardens, but Sennacherib left a record assigning them to human health and joy, giving them an individual source of food. Many of these gardens were distributed to high-ranking officials who generated income from them.[60] Finally, in the northern part of the city, there were also public gardens and orchards, which were also used for harvesting and were thought to have little cultic significance and were therefore poorly developed stylistically. But here, too, public, landscaped observation platforms were also found from which the entire city and its visual structure were to be seen, thus symbolically showing the viewer the full grandeur of the Assyrian Empire.[61] For its ambitious projects from the mountains, Sennacherib brought waters to its new capital, and with the help of canals and aqueducts, the surviving ruins are still visible today. He initiated impressive canals, which in some places reached 80 m area and 20 m depth, according to data collected by researchers. The construction of the canals underwent four stages: first implementation of the Kisiri Canal, 13.4

58. Novak, "From Ashur to Nineveh: The Assyrian Town-Planning Programme," 2004, 181-182.

59. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," 2015.

60. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*, 2016, 35-43.

61. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," 2015.

km, 702 BCE; the system was later supplemented by the Musri mountain canal, which collects spring and basin waters, in 694 BC; then the Northern System was created, 46.4 km, 690 BCE; and finally, the ambitious Khinnis system, 55 km, 690-688 BCE. Khinnis, the latest water supply system, consisted of canals and tunnels, and as the city crossed the lowlands, water reached the aid of an aqueduct. It consisted of 6 columns -- pillars, had breakwaters and lasted for 280 m. To Sennacherib's pride, innovative automatic water slides were also installed that did not require human physical effort to operate. All of these systems helped supply water to meet Nineveh's enormous needs throughout the year; but in spring, with the melting mountain snow, floods formed that could cause damage. To address this problem, Sennacherib designed an excess water discharge system that directed unnecessary water outside the city to specially designed artificial ponds. It is one of the oldest known and the first-described sewage pond regulating excess water, based on the principles of sustainable architecture, which is especially relevant in our time.[62] The design of these ponds was inspired and developed after Sennacherib's successful military expedition to the then semi-independent, rebel province of Assyria, Babylon, which ended in the destruction of the latter city. Therefore, this nature reserve was planted with plants and animals and birds typical of southern Mesopotamia, which is much wetter, and therefore likely to be poorly adapted,[63] thus symbolically emphasizing not only nature but also the kingdom of Babylon. The natural area of this artificial pond, which was near the city gate of Kar-Mulissi (Figure 9), allowed wildlife to breed and reproduce naturally. Over time, this area, having reached the stage of maturity, became dangerous for local people coming to enjoy the reed harvest that was abundant here.


**Figure 9.** *Urban Structure of the City and Surroundings of Nineveh*
*Source:* Patrick, 2016.

62. Mays, *Ancient Water Technologies*, 2010, 7, 38.

63. Dalley "Ancient Mesopotamian Gardens and the Identification of the Hanging Gardens of Babylon," 1993.

The most important gardens, from Sennacherib's perspective, were his own royal gardens, located within the city walls of the Kuyunjik Citadel. They were no-doubt perfectly planned and decorated, and every element had to be thought through in detail, as these were the most important gardens of the empire. They were meant for the pleasure and joy of the gods and the king and his queen, as well as for ritual rites. These royal gardens were laid out in such a way as to provide easy access to temples and royal residences.[64] In addition, based on the latest hypotheses and research, Sennacherib is credited with realizing one of the wonders of the ancient world, the Hanging Gardens. Typically, these gardens, based on Greek sources, were attributed to Babylon, but until recently there were no archeological or Babylonian textual sources to determine the location and characteristics of the hanging Babylonian gardens, which allowed many speculations to occur. However, S. Dalley argues, using reasoned arguments, that Greek sources relied on gardens built by King Sennacherib of Assyria, Nineveh. They, in her opinion, are also depicted in the reliefs of Nineveh (Figure 10). Nineveh and Babylon were often confused by biblical, classical, and authors of later times, and thus Sennacherib of Assyria was merged with Nebuchadnezzar II of Babylon. The gardens, according to S. Dalley, were built on an artificial hill next to the palace and were designed and laid out to mimic a natural mountainous landscape with trees and flowing water. The shape and dimensions were similar to Greek theater (Figure 11), and the water was supplied to the top by bronze screws mounted in cylinders. The present invention is often attributed to Archimedes several centuries later, but images of propellers are found in Assyrian reliefs. Sennacherib's annals also testify to this garden. He is proud of the new water supply technologies that have earned them the name of a world wonder.[65] The stone vaults supported the upper part of the gardens; the highest levels consisted of open terraces and columned paths with roofs planted with trees so that visitors walked under the roots, and the gardens were equipped with a pavilion with columns, *bitumen*, and probably in the lowest level was a recreational lake.[66] However, Dr. David Stronach[67] criticizes this hypothesis in his lectures, and although he agrees with the possible argumentation of confusion between Nineveh and Babylon in classical sources, he believes that such gardens near the royal palace, especially the artificial lake, are unlikely as they block and impede the most obvious and direct access to the palace. The relief, he argues, depicting the gardens of Nineveh is of a more abstract nature, conveying not so much a realistic world, rather a picture with all the achievements of the ruler in one place.

64. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*, 2016, 35-38.

65. Dalley "Ancient Mesopotamian Gardens and the Identification of the Hanging Gardens of Babylon," 1993, 7-10.

66. Taylor (Ed.), *The Oxford Companion to the Garden*, 2006.

67. D. Stronach, *Ancient Persian Gardens: Evolution and Legacy* (video) Retrieved from: https://www.youtube.com/watch?v=43kX_QWHy6M&ab_channel=AsianArtMuseum. [Accessed 30 March 2021.]

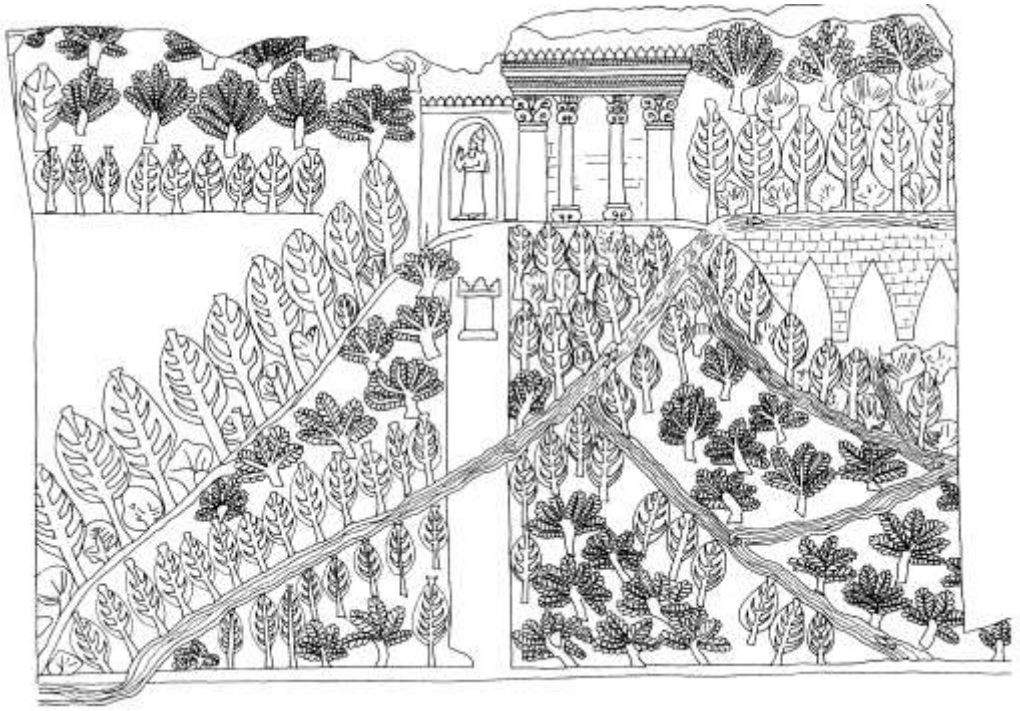

**Figure 10.** *Nineveh Gardens, Believed to Possibly Convey "Hanging Gardens," Repainted by S. Dalley from a Fragment of Relief*
*Source:* Dalley, 1993, 10.

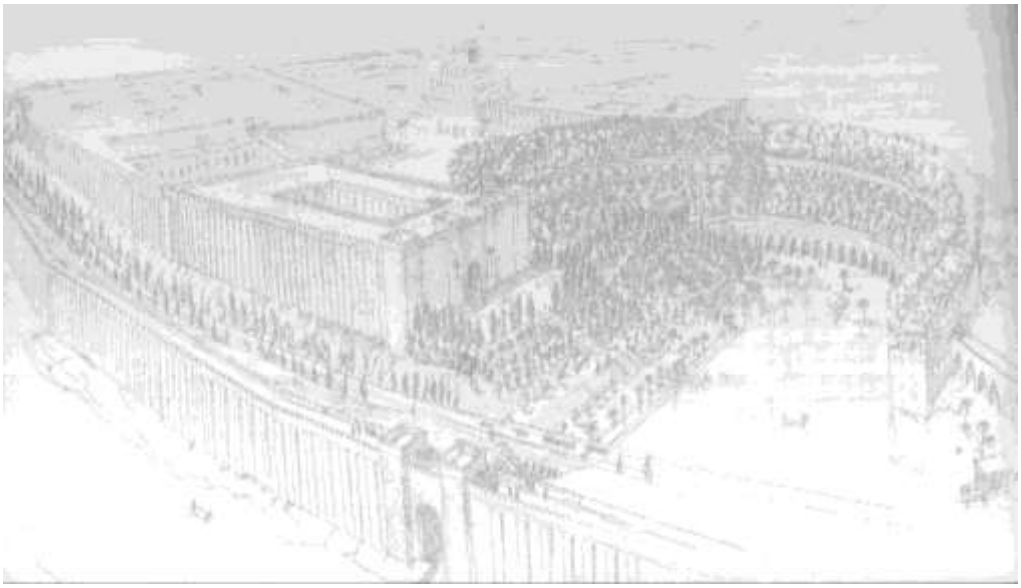

**Figure 11.** *Visualization of Hanging Gardens in Nineveh*
*Source:* Taylor, 2006, 30.

## Iconography of Mesopotamian Gardens

In the context of Assyria, all gardens and parks were permeated with sacral meaning. The gardens were the meeting place of the gods, and also mediated between man and the gods. They were imbued with religious, cult, magical and political underpinnings. The visual discourses of the ritual rites taking place in them became forms of political-religious indoctrination. Textual sources indicate that the gods of both Babylon and Assyria also had personal, private gardens in their heavenly habitats.[68] However, in addition to the physical manifestation, the Assyrian gardens also had a visual representation conveyed in the reliefs of the royal palace. A particularly large number of such reliefs are found in the new palace built by Ashur-nasir-pal II, the grandson of Sennacherib, who continued to nurture his grandfather's gardens in Nineveh. Such a relief, called The Garden Party (Figure 12), depicts a resting king with a queen in the gardens of Nineveh after the victory over Elam, where the head of King Teumman's is evidently hung on a tree. In the hands of the ruler is a water lily; it is believed that these gardens had one or more ponds, the latter being covered with their flowers. Scientists believe that water lilies (*Nymphaea*) in Mesopotamia originated from Egypt.[69] The image of these depicted royal gardens conveys a complex composition based on a high level of layout and design, combining different greenery. Art historian P. Albenda reconstructed the full context of the image of this relief (Figure 13), revealing that the image was found in three registers depicting a wider panorama. The upper register, which contains the original relief, is dedicated to the king and depicts the gardens closest to the palace. The middle register depicts more public hunting gardens, and the last, lower register, conveys artificial ponds outside the city walls. This layout reveals that the gardens closest to the royal palace were most carefully designed for ritual activities, but the gardens farther away from the palace deliberately used far less formality by compositional means, even in forms of permissible chaos, and uncontrolled nature.[70] After a more detailed analysis of Assyrian gardens, A. Asadpor also drew conclusions about the existing connection between the center and the periphery, and the level of application of geometric planning and design. In the center, the gardens of the palaces or temples of the rulers apply the highest degree of design, which decreases steadily as you move towards the peripheries. Such planning is related to the dichotomy of order/chaos, conveying the ideological worldview of Assyria. In this context, the city is to be treated as a symbol of order, and wildlife as an opposition to unrest and chaos. The king, as a trustee of God, introduces order and harmony in a chaotic world, which is especially noticeable as he approaches from the periphery to the center. As a result, fully-fledged gardens flourished throughout the Assyrian Empire, the culmination and apogee of which were entrenched in the imperial capital, thus

68. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*, 2016, 39.

69. Albenda, "*Grapevines in Ashurbanipal's Garden*," 1974, 6.

70. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," 2015, 100.

emphasizing the political, ideological, and religious dominance of the Assyrians in the country.[71]

**Figure 12.** *Asurbanipal II Palace "Garden Party" Terrain*
*Source:* Rogers, 2001, 39.

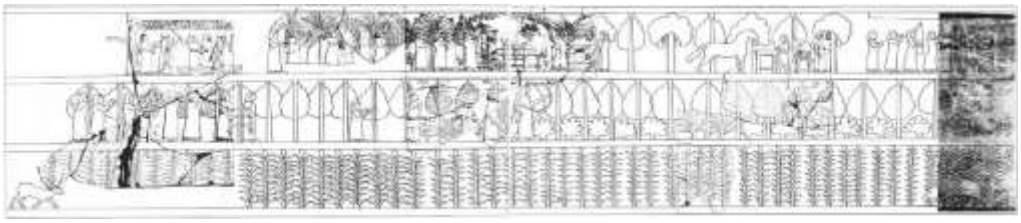

**Figure 13.** *Reconstructed Full-Length Reconstruction of "Garden Party" by P. Albenda*
*Source:* Amrhein, 2015, 100.

The Iconography of the gardens themselves, as well as their visual representation, played an equally important ideological role in propaganda. In the conceptual perception of the world in Mesopotamia, both Babylon and Assyria, the visual did not differ from the real world, and was a more active factor than just the visual representation of the environment. A phenomenon, object, or person could have been easily reached through its visual representation or even in name. Those who had access to the reliefs perceived them in a context adjacent to the physical gardens, and therefore gained a fuller experience, and a broader perception of the reliefs. However, real gardens have more sensory features such as smell, sound, and space, creating a deeper mental spectacle, and the perception of terrain requires some education, iconography, and symbolism, making it a more conceptual experience as opposed to direct physical garden experiences. In this way, the "sixth sense" is used to understand the reliefs, which requires specialized doctrinal knowledge.[72] Thus, gardens were magical places where sculptures of gods were perceived as equally real and could be revived during ritual rites.[73]

71. Asadpor, "Phenomenology of Garden in Assyrian Documents and Reliefs; Concepts and Types," 2018.

72. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," 2015, 107-108.

73. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*, 2016, 66.

Looking more broadly, it is clear that textual rhetoric was aimed at the educated elite, future generations and most importantly, the gods. Visual iconography in relief was for those who lived or worked in the palace, foreign kings or diplomats, and gardens more symbolic than real physical places for the general public. Thus, the conceptual discourse of gardens was widely developed on many levels and functioned inextricably as a message of propaganda, indoctrination, cult, and ideology. For greater persuasiveness, gardens have been eroticized in both religious and poetic texts, providing a wide variety of allegories. In order to achieve the mystery effect, the rituals of the gods were also performed here in the second month of the Assyrian calendar, during which the cult statue of *Nabu* was transferred to the cult statue's *Tashmetum* bedroom.[74] Thus, the image was established that fertility, fruitfulness, and the prosperity of the kingdom were given to the people by the gods, and were supported and cherished by the kings of Assyria. The reliefs established the image of Assyria as the center of civilization, from which the order spread to the otherwise chaotic peripheries. The gardens were designed to convey the king's control over the environment — land, water and plants — thus strengthening his authority. The greenery brought from the conquered lands was treated not only as trophies, but also symbolized dominance over the conquered nations.

## Conclusions

The technology of Mesopotamian gardens originated in the early period of the Eridu and the influence of this garden art spread over time to Egypt, Susa in Media, Mohenjo-Daro in the Indus Valley and Pataliputra in the Mauryan Empire of India. In Europe, this influence was first manifested in the construction of the Minoan palaces in Crete.[75] In Mesopotamia, two different types of gardens are traditionally distinguished; the Assyrians are characterized by northern-type gardens, most of which are more free in layout and tend to mimic the natural landscape, and southern-style gardens, typical of the Sumerians and Babylonians, with geometric planning structures, are mostly associated with temples and cult needs. However, courtyard gardens found in palaces can also be singled out in this region.[76] The famous Hanging Gardens of Babylon, while not reaching the visual form of our time, have been heating our imaginations for centuries and causing different interpretations at different times, which in turn deserve special attention in the evolution of the idea of landscape architecture.

Clearly, gardens in ancient Mesopotamia acquired much broader cultural value and served as an agent of cult, worldview doctrine, formalization and dissemination of mythical thinking. Gardening was not only a matter of prestige but also a tool of politics. Some scholars tend to hold the view that the gardens depicted in the Assyrian reliefs are of a clear naturalistic nature and therefore

74. Patrick, *The Imperial Gardens of Mesopotamia: Landscapes of Power*, 2016, 40.
75. Girot, *The Course of Landscape Architecture*, 2016, 55.
76. Taylor (Ed.), *The Oxford Companion to the Garden*, 2006, 308-309.

cannot be the origins of geometric Persian gardens.[77] However, to declare it in this way would be too narrow approach.

Many scholars point out that although Assyrian gardens are more naturalistic than geometric, ornamental Egyptian gardens or Mediterranean peristyle gardens, they do not have a sentimental and romantic attachment to nature as did the 18th-century English or three-thousand-year-old Chinese, and later Korean and Japanese gardens.[78] Therefore, in comparison, it is not appropriate to look at them as more natural or wild, but equivalent, or even more artificial and decorative, as they primarily sought to imitate alien landscapes.[79] Nonetheless, as the authoritative scholar D. Stronach observes, for the first time in the history of Mesopotamia the tradition of royal, public gardens developed, and this culture of gardens as a political tool was first adopted by the Persians and later by other surrounding civilizations.[80] It is clear that ancient Mesopotamia occupies a fundamental place in the development of world garden art.

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78. P. Grecevičius, J. Abromas, et. al., "Aspects of Continuity of Historic Japanese Traditions in Lithuanian Landscape Design," in *Proceedings of the 52th World Congress of the International Federation of Landscape Architecture "History of the Future"* (Saint-Petersburg, 2015), 519-526.

79. Amrhein, "Neo-Assyrian Gardens: A Spectrum of Artificiality, Sacrality and Accessibility," 2015, 91-114.

80. Stronach, "The Garden as a Political Statement: Some Case Studies from the Near East in the First Millennium BC," *Bulletin of the Asia Institute, New Series* 4 (1990): 171-180.

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# How Can Landscape Architecture Influence Systemic Change to Achieve Sustainable Cities and Regions

*By Anastasia Nikologianni*[*]

*This paper presents how the ideas of landscape, design quality and drawings can influence systemic change to result in sustainable cities and regions. The research related to this paper explores project frameworks and design methods in order to reveal innovative ways and processes for creating environmentally friendly cities and regions that will have the power to adapt and mitigate climatic issues of the future. Through a series of explorations on existing landscape projects and while using a series of stakeholder engagement workshops contacted at a pan-European level the paper examines ways in which systemic change is possible and the outcomes it has in relation to the landscape. Using previously implemented and ongoing landscape projects such as the Room for the River (the Netherlands) and the West Midlands National Park (UK), the paper discusses how bold landscape-led visions influence decision making and support systemic change on a spatial scale. Drawing on experience gained during a series of stakeholder engagement workshops, where the projects of the Tame Valley Wetlands Partnership (UK) and the Urban Farming and Growing Network (UK) were selected as case studies, the research presents key findings and presents lessons learned that can build capacity and improve the understanding and management of stakeholders when it comes to spatial planning and urban design. The paper argues that a new way of thinking in design, policy or governance is not enough if these disciplines act individually. The breakthrough comes when each discipline collaborates with the aim to future proof our cities and regions. By presenting pioneering examples and models giving us tools for a systemic change, the paper aims to demonstrate that large scale developments can be brilliant examples of the new methodologies applied and lessons learnt. This research concludes that systemic change is represented across all levels, policy, decision making, governance, design and implementation if the aim is to deliver a sustainable city.*

## Introduction

This paper uses a series of innovative workshops and pioneering project frameworks to explore the significance of landscape design and the ways in which this can influence systemic change at a city and regional level. Using the process from two strategic landscape schemes, the Room for the River in the Netherlands and the West Midlands National Park in the UK, the paper aims to discuss key elements, such as design, policy, decision making and governance, that need to be in place in order to support systemic change. In addition to presenting two case studies from the pan-European project EIT Climate-KIC SATURN, the Tame Valley Wetlands and the Urban Farming and Growing Network (both in the UK),

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the paper indicates that stakeholder engagement and communication also play a significant part when it comes to large-scale landscape projects and the way they can transform the planning and decision making processes.

Cities and regions are believed to be a significant part of the "climate crisis puzzle" and their significant contribution needs to be assessed if we are to address the various environmental and social challenges to achieve sustainability and resilience on a large scale. For this to be materialized though, design principles need to take part in the territorial transformation processes.[1] As von Wirth *et al.*[2] suggest, cities are increasingly experimenting in response to climate crises, exploring new methods and attempting to be innovative. However, at a large scale, we have not yet witnessed a consistent pattern of transformation, so this paper suggests that for such a spatial transformation a systemic change is crucial. Masson *et al.*[3] argue that even though several studies have investigated cities and the change of climatic behaviour, none has "allowed the city to change (either in form or function)", revealing that the issue is not the identification of new processes and technologies, but how to apply them to transform both the shape and operational system of an area. The focus of this paper is to demonstrate how landscape design and planning can support a behavioural and systemic transformation as well as extract key elements from pioneer schemes on how this has been proven possible.

Using innovative models that have integrated a holistic landscape vision, this paper presents and analyses how crucial parts of a landscape project, such as design and policy, governance and decision making, become the key parts to transform a system and its processes. In addition, with the help of stakeholders and real-life schemes, the importance of stakeholder engagement and communication is being revealed when it comes to behavioural change and delivery. The paper suggests that all these elements are necessary and the negligence of one or another can cause the system transformation to fail, leading to potentially another inspirational plan or vision not being successfully implemented.

## Systemic Change and Environmental Challenges

Systemic change occurs when change reaches all or most parts of a system, thus affecting the general behaviour of the entire system. This broad definition can apply to any system, therefore in the spatial context of planning and landscape design, the system consists of all the relevant actors that are involved, from the designers to the decision makers, civil servants and also users of the area. Studies have been conducted on the importance of systemic change as well as the meaning

1. S. Nijhuis and D. Jauslin, "Urban Landscape Infrastructures. Designing Operative Landscape Structures for the Built Environment," *Research in Urbanism Series* 3 (2015): 13-34.

2. T. von Wirth, L. Fuenfschilling, N. Frantzeskaki and L. Coenen, Impacts of Urban Living Labs on Sustainability Transitions: Mechanisms and Strategies for Systemic Change Through Experimentation," *European Planning Studies* 27, no. 2 (2019): 229-257.

3. V. Masson, C. Marchadier, L. Adolphe, R. Aguejdad, P. Avner, M. Bonhomme, et al., "Adapting Cities to Climate Change: A Systemic Modelling Approach," *Urban Climate* 10 (2014): 407-429.

or interpretation of a sustainable city and region, however there is not much coherence on how cities can achieve systemic change and the benefits of spatial planning in such initiatives. As Angheloiu and Tennant[4] state, "although academic-led literature advocates for systemic change towards sustainability as an outcome of a diverse palette or urban interventions, less consideration is given to the means and enablers for achieving these". Therefore, this paper's focus is to present and analyse the means and key elements to achieve systemic change in a spatial context.

Several studies examining the sustainability transitions indicate that "we are facing persistent systemic problems - often referred to as grand challenges such as climate change, biodiversity loss, resource depletion and social inequalities - that neither individual technological solutions nor individual policy instruments can effectively solve."[5] Our cities and regions are constantly under threat with environmental phenomena becoming more often and more severe. As a result of the continuous environmental changes and the climate crisis, Bai explains that by 2030 millions of people will be at risk from climate related events, such as floods, wildfires, heavy rains, mudslides and drought.[6] Emphasizing the vulnerability of cities and urban centres, Bulkeley states that "cities are central to the ways in which the vulnerabilities and risks of climate change are produced and to the possibilities and challenges of responding to these issues."[7] As Ostberg et al. state, our landscapes will also face big changes related to the change of climate[8] and therefore we need to focus on cross-silo solutions rather than focusing on individual perspectives of each discipline. Even though scientists have started recognizing cities as complex systems and turn their focus on communities and wellbeing, there is still no strong evidence of coherent cross-silo approaches. It is now apparent that we have been ignoring nature and natural processes with regards to our cities and communities, and that this has resulted in several challenges, of increasing severity, for our urban centres, economies and our health. As Bai points out, the lack of long-term studies of urban climates, their impacts as well as the focus on single disciplines research funding and 'business as usual' approaches provide little scope for cross disciplinary projects,[9] a fact that creates great difficulty to the establishment of a holistic approach for a whole city or region based on its landscape, urban characteristics and community. In addition, the literature mentions that "infrastructure over the last centuries was in service of

4. C. Angheloiu and M. Tennant, "Urban Futures: Systemic or System Changing Interventions? A Literature Review Using Meadows' Leverage Points as Analytical Framework," *Cities* 104 (2020): 102808.

5. L. Gorissen, F. Spira, E. Meynaerts, P. Valkering and N. Frantzeskaki, "Moving Towards Systemic Change? Investigating Acceleration Dynamics of Urban Sustainability Transitions in the Belgian City of Genk," *Journal of Cleaner Production* 173 (2018): 171-185.

6. X. Bai, R. J. Dawson, D. Ürge-Vorsatz, G. C. Delgado, A. S. Barau, S. Dhakal, et al., "Six Research Priorities for Cities and Climate Change," *Nature Publishing Group* 555 (2018): 23-25.

7. H. Bulkeley, *Cities and Climate Change* (Abigdon: Routledge, 2013).

8. S. Ostberg, S., L. R. Boysen, S. Schaphoff, W. Lucht and D. and Gerten, "The Biosphere under Potential Paris Outcomes," *Earth's Future* 6 (2018): 23-39.

9. Bai, Dawson, Ürge-Vorsatz, Delgado, Barau, Dhakal, et al., "Six Research Priorities for Cities and Climate Change," 2018.

the conquest of nature, whereby the environment was denied its natural dynamism in favour of more controlled and static systems."[10] Other sources agree that a system cannot be addressed in silos, either related to urban infrastructures or technical challenges. As Wolfram et al. remarks "system change is almost exclusively addressed by STS [socio-technical system] studies concerned with urban infrastructures, thus still reflecting the original focus on sectoral (national) STS and relative disregard of the role of place."[11]

Looking into how a transition can be achieved in urban centres, Masson et al. explain that "if cities are to be adapted to the projected future climate, it is necessary to start adaptation now by modifying city structure, building design, urban planning habits etc.,"[12] but this research also argues more than that is needed. A wider change in the way in which the systems and processes operate is essential and it is also a matter of behavioural change both for the citizens as well as the decision makers. Cities and regions need to concentrate their focus on achieving the goals of global policy frameworks[13] in response to the climate crisis while they focus on a response to zero-emissions, net zero routes and zero-waste solutions. As Anghelou and Tennant explain, urban sustainability is often interpreted as "urban ecology", "eco-city", "low-carbon city" or "green" city,[14] but what this paper seeks to understand is how we achieve this at a city or regional scale. What are the necessary steps and processes that lead to a true low carbon city and what changes are required in the governance and decision-making processes? It is suggested that society often tries to respond to environmental challenges in a way that guarantees 'business as usual' without major alterations in our lives,[15] but perhaps we need to consider that behavioural changes are unavoidable at this stage if we are to future proof our cities and regions. The society is at a stage where a transition to sustainable cities and methods is essential and as Gorissen *et al.*[16] state, this is defined as "a radical transformation towards a sustainable society, as a response to a number of persistent problems confronting contemporary modern societies. As such, it brings about fundamental change in the ways of thinking (cultures), ways of organizing (structures) and ways of doing (practices) that unfold in phases with different distinct dynamics". As argued by Papa et al. the "first step is shifting from current silo approaches towards a systemic

10. S. Nijhuis, D. Jauslin and C. De Vries, *Flowscapes: Infrastructure as landscape, landscape as infrastructure. Graduation Lab Landscape Architecture 2012/2013* (Delft, The Netherlands: Delft University of Technology, 2012).

11. M. Wolfram, N. Frantzeskaki and S. Maschmeyer, Cities, systems and sustainability: status and perspectives of research on urban transformations." Current Opinion in Environmental Sustainability 22 (2016): 18-25.

12. Masson, Marchadier, Adolphe, Aguejdad, Avner, Bonhomme, et al., "Adapting Cities to Climate Change: A Systemic Modelling Approach," 2014.

13. Angheloiu and Tennant, "Urban Futures: Systemic or System Changing Interventions? A Literature Review Using Meadows' Leverage Points as Analytical Framework," 2020.

14. Ibid.

15. I. Blühdorn, "Sustaining the Unsustainable: Symbolic Politics and the Politics of Simulation," *Environmental Politics* 16, no. 2 (2007): 251-275.

16. Gorissen, Spira, Meynaerts, Valkering and Frantzeskaki, "Moving Towards Systemic Change? Investigating Acceleration Dynamics of Urban Sustainability Transitions in the Belgian City of Genk," 2018.

one,"[17] as this could support multidisciplinary work and cross-sectoral strategies, dealing effectively with interconnected challenges. This paper agrees with this approach and aims to present innovative projects that have indicated best practices towards systemic change in a spatial context.

## Methodology

This paper explores ways in which systemic change has been introduced and implemented in urban and regional landscape schemes. Examination of innovative schemes aim to assess whether a system's change is possible and the outcomes it has in relation to our communities, wellbeing and future of our cities. The methodology is based on close examination of implemented and ongoing landscape-led projects such as the Room for the River (the Netherlands), the West Midlands National Park (UK), and the Tame Valley Wetlands (UK) and Urban Farming and Growing Network (UK) case studies from the EIT Climate-KIC SATURN pan-European project. Exploration and evaluation of these strategic schemes focus on the identification of key stages in the process of a system's change that cannot be avoided or overlooked in order to transition to sustainable cities and regions.

The methodology includes an in-depth analysis of the projects' structures, the process followed and the changes in governance and management. It has been conducted at the various project locations including workshops, observations, interviews with experts, field visits, and activities with local stakeholders. The methodological process developed for this paper looks at the selected projects from a different lens to a prior investigation that had focused on ways in which such projects had been integrating qualities such as "sense of place" and "environmental principles". The methods used in this paper, examined the projects based on their achievements on behavioural and systemic change and their outcomes in the different regions. After the initial research, results indicated that systemic change actions shall be separated into three key stages of a. Achieving systemic change through design and policy, b. Achieving systemic change through decision making and governance and c. Achieving systemic change through stakeholder engagement and communication. Each stage is equally important, however, some of the examined landscape cases, have more powerful examples and therefore this paper uses them to communicate the importance of each stage in relation to landscape schemes.

The data collected for this paper is based on stakeholder engagement workshops, meetings and policy roundtables with decision makers, visuals and observations. Case study and workshop notes, drawings and images of sustainable approaches, maps, policy and technical documents, as well as outputs from the stakeholder workshops were collected and analysed through content analysis.

17. R. Papa, A. Galderisi, M. C. Vigo Majello and E. Saretta, "Smart and Resilient Cities. A Systemic Approach for Developing Cross-Sectoral Strategies in the Face of Climate Change," *TeMA Journal of Land Use, Mobility and Environment* 8, no. 1 (2015): 19-49.

## Achieving Systemic Change in Large-Scale Landscape Projects

The report of the results of this empirical analysis is as follows. This section describes and analyses the different strategies observed that facilitated the embedding of; key actions, the processes and outcomes of systemic change for each examined project. Each of these projects is likely to have more than one or all of the key stages identified, however for the purposes of this paper the author focuses on the most crucial stage from each scheme in order to effectively demonstrate its importance in achieving systemic change.

### Design and Policy: Achieving Systemic Change (Room for the River)

The whole Room for the River programme (the Netherlands) is about re-defining the way we have learned to deal with water. It is about using skills and experience to design places where water is enhanced, valued and appreciated without losing any of the social or economic benefits of the area. The Room for the River (RftR) is a national-scale climate adaptation programme[18] that was intended to form sustainable ways of dealing with rising sea levels in the country and make more room for its various rivers. Based on an innovative design and management process, the programme ensured a high level of protection against rising water levels in 34 project locations across the Netherlands, while introducing several design and policy elements that led to a significant change of processes and behaviours in the region. To achieve behavioural and systemic change, practitioners cannot infuse separate elements in an area and expect them to work collectively, a vision is needed for the whole region, and design needs to drive this vision as demonstrated by the RftR. The planning and design process needs to put the landscape at the core of any development. "Design thinking should be a part of creating the vision and designing the brief of a new project" clearly states the Design Council,[19] but as implementation shows through the RftR, policy is an important step for the successful delivery of this design.[20] This pioneering scheme managed to achieve systemic change in the Netherlands by working on ideas on the regional as well as the local scale and continuously addressing challenges across all levels. As the materialization of a project cannot be successful if the large and local scale are not coherent, similarly such a system cannot be changed only from a bottom up or top down approach. One of the key outcomes of the RftR programme, in relation to the focus of this paper, is that a system requires transformation from both sides, on a macro as well as a micro level.

The role of landscape design is key from the conceptual stage to delivery of the RftR, demonstrating that design and drawings can convey messages in a much

18. D. Sijmons, Y. Feddes, E. Luiten, F. Feddes, M. Nolden and J. Bosch, *Room for the River: Safe and Attractive Landscapes* (The Netherdlands: Blauwdruk, 2017).

19. Design Council, *A Design-Led Approach to Infrastructure* (Cabe, 2012).

20. A. Nikologianni, *The Role of Low Carbon, Spatial Quality and Drawings in Landscape-Based Regional Strategies* (Birmingham, U.K.: Birmingham City University, 2018).

more effective way than documents or text[21] and therefore design is much more likely to be the forerunner of new ideas and transitions as it enhances aspirations and visions. Figure 1 is one of the visuals used for the RftR project location of Noordwaard and its goal was to communicate the broader vision for the project. Based on the flood plain the Noordwaard RftR project was proposing the recreation of wetland areas, boat and cycling routes, contemplation spots and a nature reserve for the region. However, this achievement needed to overcome the current flood infrastructure, water policies and most importantly needed to alter the mindset and way of living of the nearby community which was mainly consisted of farmers and breeders. The success was not only in completing the project, but delivering a new way of interacting with water, a way that would give more room to the local river Nieuwe Merwede. As a result of its effective implementation, the Noordwaard RftR project is perceived, by this research, as a successful demonstration of many systemic processes as well as behavioural transformations. The challenges were many, from physical and technical issues to habits and traditional ways of living. However, this pioneering design has promoted the creation of new ideas as well as increased communication towards a systemic change in the area.

**Figure 1.** *Design Drawing from Noordwaard, Room for the River Programme*
*Image Courtesy:* Rijkswaterstaat, Room for the River.

Another example is the Citadel Bridge in Nijmegen (Nijmegen project, part of the RftR). Even though this is only one element of a very large urban scheme, it has managed to connect concept, design, as well as behavioural change. The Citadel Bridge (Figure 2) is a mixture of design and policy innovations. As presented in Figure 2, when the water levels are normal then pedestrians and cyclists can use the wide part of the bridge, but when water levels rise, pedestrians can only walk on the narrow stepping-stones. It might initially seem as a simple design trick, however this paper suggests that by "forcing" someone's body to use the stepping stones, it alerts their mind to understand the change and adapt to it. It is a step towards greater awareness and behavioural change. Observations show that the Citadel Bridge has a pioneering design that allows the commuters to engage with water, but it has also overcame several policy issues related to safety and

21. A. Nikologianni, K. Moore and P. J. Larkham, "Making Sustainable Regional Design Strategies Successful," *Sustainability* 11, no. 4 (2019): 1-20.

standardization. Therefore, using this evidence, this research argues that to achieve systemic change both a bottom up and a top down approach are needed. We need the bottom up approach, the public to understand, residents and visitors to appreciate an area, designers and engineers to go at great lengths to deliver new ideas, but we also need the top down approach. We need policy and legislation to support these initiatives, to make sure elements of sustainability, resilience, climate adaptation and mitigation are being delivered on the ground.

The RftR has been chosen by this paper to demonstrate why design is so significant for a systemic change. It is one living example, of behavioural and systemic change in the spatial environment both in urban and rural scales. But it has also revealed that a system change in spatial and large scale requires continuous support from policy and legislation as well as inspirational design initiatives.

**Figure 2.** *Visual Drawings of the Citadel Bridge in Nijmegen, Room for the River Programme*
*Image Courtesy:* Rijkswaterstaat, Room for the River.

## Decision Making and Governance: Achieving Systemic Change (WMNP)

The West Midlands National Park (WMNP) proposal developed by the CATiD research centre at Birmingham City University offers a broad vision that sets the basis for a greener recovery in the area of the West Midlands, UK. Using visuals and drawings to understand and evaluate the landscape, the proposal aims to create a strong landscape identity for the region and to demonstrate the value of the landscape, the environment as well as the social and cultural elements of the area. The WMNP proposal is based on cross boundary and multidisciplinary approaches and focuses on the relationship communities have with their surrounding landscapes. It examines a new idea of a National park, "embracing the ambition of UK Government's DEFRA 25-year plan,"[22] with a new approach on how a whole region can be regenerated and sets goals for a more sustainable future, without losing out on economic or social benefits.

Even though this is an ongoing proposal, it has been instrumental in raising aspirations for the region. Having been adopted as the drive behind the West Midlands green economic recovery from COVID-19 and being the force to help

22. S. Consortium, *SATURN Conference, Workshop, Exhibition*. K. Moore and A. Nikologianni (Birmingham, U.K.: Birmingham City University, 2019).

achieve a heathier, more inclusive region[23] the WMNP is evidence that landscape design plays a crucial part on the decision making and governance processes when it comes to systemic change. With the use of a series of powerful drawings and visuals, numerous workshops and lots of high-level discussions, the WMNP has demonstrated, that decision making on a strategic scale requires a deeper knowledge of the area. The powerful diagrammatic drawings (Figure 3) are intentionally designed to focus on the large instead of the small scale, allowing for the significant morphological, environmental and social elements (e.g., rivers, valleys, geology, historical sites, views) to be presented. These influential drawings are becoming a strong communication tool revealing new ideas and approaches that truly influence governance and decision making.

Cities are possibly the most affected, but also the most privileged to adapt to the climate crisis, however a significant part of their planning system is their decision making and governance mechanism and therefore if they are to address the climate challenges we face, a new way of making decisions, with criteria based on the value of landscape and healthier communities is of major importance. As Dreier et al. mention "system change initiatives must be grounded in knowledge and insight about how the system functions"[24] and therefore one wonders if the right approach at a strategic level is to redefine and re-evaluate the system from the inside, while seeking support from pioneering external approaches and experts in the field of strategic visioning.

The West Midlands Combined Authority (WMCA) is using the WMNP as the vehicle towards the transition to a net zero carbon future and resilience[25] basing on its success the possibility to open up new opportunities for the region and to change peoples' perceptions. The WMNP has demonstrated that landscape design can be a driving force in the way we evaluate our surroundings and make decisions for the future of our cities and regions. A true systemic change on a regional level cannot be achieved if the governance mechanisms are not re-evaluated with a focus on resilience, climate adaptation and mitigation as well as public wellbeing. The WMNP proposal explored by this paper offers an innovative approach that can be beneficial across the globe, and the initial evidence gathered from the West Midlands region are encouraging that such an approach can transform the governance processes in place, in cases where design and landscape are seen as the core of any future development for that area.

23. WMCA, *WMCA Signs up to West Midlands National Park* (West Midlands, U.K.: WMCA, 2020).

24. L. Dreier, D. Nabarro and J. Nelson, *Systems Leadership for Sustainable Development: Strategies for Achieving Systemic Change* (USA: Harvard Kennedy School, 2019).

25. WMCA, *WMCA Signs up to West Midlands National Park*, 2020.

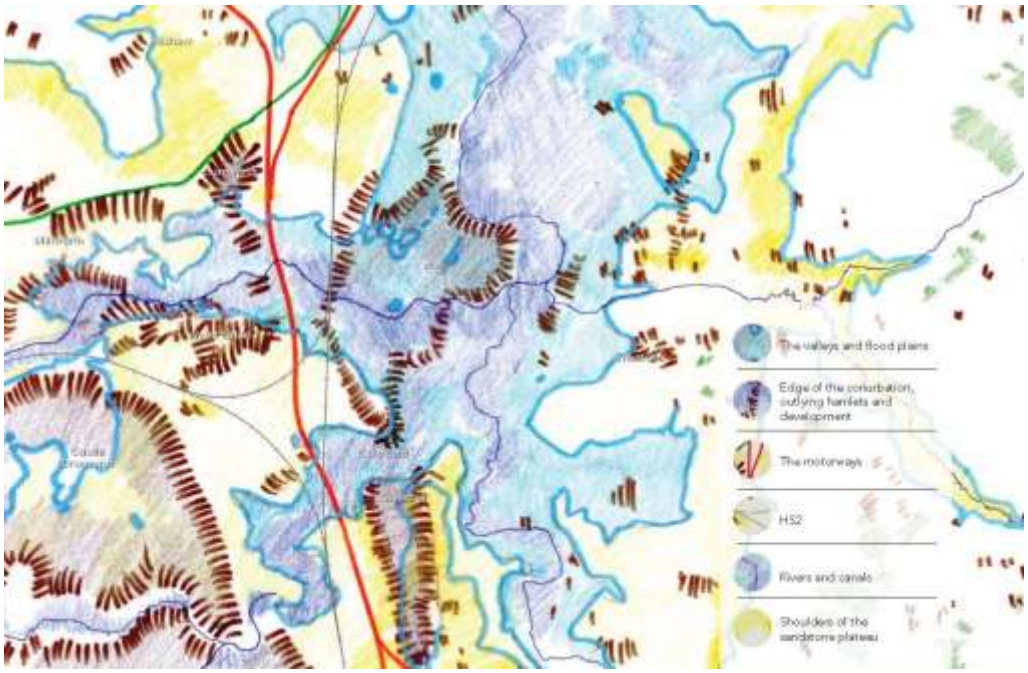


**Figure 3.** *Diagrammatic Drawing Focusing on the Tame Valley, West Midlands*
*Image Courtesy:* Professor Kathryn Moore.

## Stakeholder Engagement and Communication: Achieving Systemic Change (Tame Valley Wetlands & Urban Farming and Growing Network)

SATURN is an EIT Climate-KIC pan-European collaborative project which deals with landscape fragmentation in urban and peri-urban areas. A collaboration between Italian, Swedish and UK organizations which aims to support cities to address their challenges in relation to the climate crisis, food production and landscape management.[26] For the purposes of this paper, the author focuses on the ways in which cities operate as well as the interaction of various stakeholders involved in order to achieve holistic transformation in the region. The paper explores two case studies conducted by SATURN in the UK, the Tame Valley Wetlands (TVW) and the Urban Farming and Growing Network (UFGN) examining the importance of communication and a rigorous stakeholder engagement process as the pathway towards systemic change.

Cities and regions are perceived as innovation systems, contested sites of implementation or seedbeds for a transition to new behaviours and methods[27] and therefore the way in which their key actors will respond to change is of great relevance for the overall result of the city's system transformation. Dreier et al. also explain that "complex systems are viewed, understood or experienced

26. A. Nikologianni, A. Betta, A. Pianegonda, S. Favargiotti, K. Moore, N. Grayson, et al., "New Integrated Approaches to Climate Emergency Landscape Strategies: The Case of Pan-European SATURN Project," *Sustainability* 12, no. 20 (2020).

27. Wolfram, Frantzeskaki and Maschmeyer, "Cities, Systems and Sustainability: Status and Perspectives of Research on Urban Transformations," 2016.

differently by their various stakeholders"[28] and this paper agrees that a broad pool of actors and stakeholders has been a great source of knowledge for the SATURN project objectives. The SATURN project is heavily based on a series of stakeholder engagement workshops, dealing with mapping, analysis, management, visioning and capacity building. Observations and outputs from workshops conducted in both the TMV and the UFGN case studies indicate that local actors are very significant to the successful delivery of "systemic change". Both TVW and UFGN aimed to build on stakeholder knowledge in order to improve the understanding and management process of landscape planning in the area. Following a series of hands-on online workshops, the participants were asked to communicate their goals, identify their own stakeholders (for their individual projects), map them and draw the connections formed between them. The results have been eye-opening to the SATURN team as well as the case study representatives participating in the workshops. It has been revealed that communication between the representatives has allowed greater knowledge sharing between them. It is agreed that "no single stakeholder has total knowledge of the system; […]. For this reason, diversity is not just desirable but essential to generating a collective understanding of the system."[29] What the TVW and UFGN have demonstrated is that the process of stakeholder mapping, analysis and engagement has opened up ideas for new actions related to each project's goals and has eventually led to the identification of what extra is needed and how structure and governance can change in order to achieve it.

The Tame Valley Wetlands case study started by an initial evaluation of the broad landscape of the valley (Figure 4) helping to understand the scale of the open and green spaces as well as existing settlements and therefore the vast number of stakeholders who have interests in the area. The workshops have highlighted the need for re-evaluation of the current communication methods and have demonstrated who are the most appropriate actors to engage with in order to achieve sustainable development in the area.

28. Dreier, Nabarro and Nelson, *Systems Leadership for Sustainable Development: Strategies for Achieving Systemic Change*, 2019.

29. Ibid.

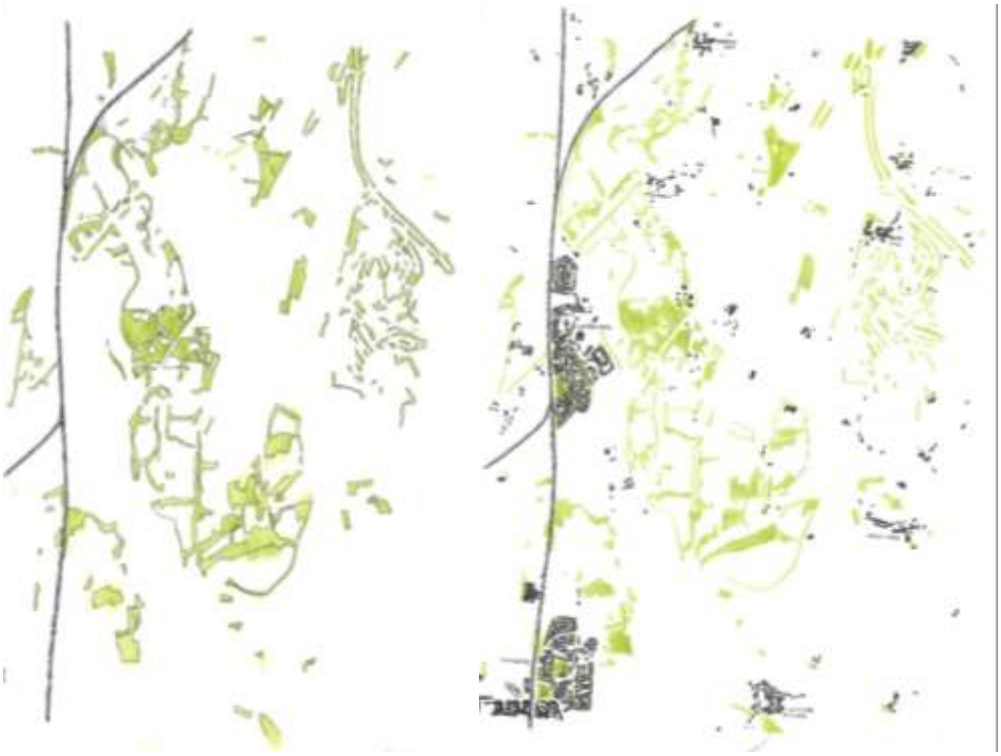

**Figure 4.** *Diagrammatic Drawing Depicting the Current Situation of Green Spaces and Settlements around the Tame Valley, West Midlands UK*

In addition, the workshops focusing on the Tame Valley Wetlands area, identified the lack of a broader vision that will support both bottom up initiatives and top down approaches, revealing the issue of communication. Despite the initiatives and good efforts of the governmental stakeholders in the area as well as the calls for actions from the various institutions and individual stakeholders, strong communication has been a challenge, creating several hurdles in the route to a behavioural and systemic transformation. The workshops have revealed that some less influential parties are in close communication, but usually not in strong, decision focused positions and decision-making stakeholders are not interested or do not have the capability to follow all the interesting initiatives happening in the area.

The chance to experience and work with the UFGN has revealed many hidden beneficiaries of the area who had either not been identified or not thought relevant for the scheme's goals. The UFGN has identified itself as a group providing support to the community, not just by growing plants and vegetables, but by "growing people" using the farming activities as both mental health support as well as a community bonding method. During the workshops, key outputs were recognised; the need for evaluation of the landscape, the recognition of the barriers in the area and the number of challenges in which the case study needs support from the city council. Routes of collaboration and ways to engage with several stakeholders the group was not possible to engage before, have also been discussed. The stakeholder engagement process has been of greater benefit than originally anticipated, helping the participants to understand that great initiatives

need to be disseminated, that they also need great collaborators if they are to change some of the governance issues they face and support the transformation of their city and region.

## Discussion

This paper has explored some of the pioneering schemes dealing with governance and decision making in strategic scale and has revealed six necessary steps that cannot be missed or overlooked to successfully achieve systemic change in cities and regions. All key actions presented here, Design, Policy, Decision Making, Governance, Stakeholder Engagement and Communication have been found fundamental in the way a system operates and therefore crucial when a transformation is needed. Having established that a systemic change is perhaps the only way to a zero-carbon future, the paper points out that a truly successful change of a regional system requires the re-evaluation and potential transformation of all the key actions. Even though current practice often approaches these steps in isolation or addresses them individually, the vision for a sustainable future and the requirement of behavioural change calls for a holistic approach. The interrelation of the six steps towards systemic change, from a landscape design and planning perspective, is apparent and any exclusion of one or the other will result to difficulties achieving systemic change.

To fully embrace a systemic change at a city and regional scale we not only need a great inspirational design, a set of generic policy rules and the willingness from the decision makers to change the way the governance operates, we also need behavioural change. Systemic change is a test of how well, we can change our behaviours and bad habits, and therefore to achieve this and have effective outcomes, it is necessary to engage with every and all stakeholders and start a collaborative process with them.

## Conclusions

The significance of resilient, green and healthy cities is evident. Especially in a post pandemic (COVID-19) world, the necessity of access to nature, proximity to open spaces and the ability to adopt a healthier lifestyle seems a more future proof option for urban communities. This paper suggests that fully sustainable cities and regions cannot be created successfully if residents, decision makers and stakeholders do not change the way they operate and live. A behavioural and systemic change is necessary across all levels if we are to achieve resilience on a large scale.

The key actions of this paper are all important elements of systemic change on a spatial context. The need for all of these to work together has also been emphasised. A new policy cannot function without changing the decision-making process, and innovative design ideas cannot be delivered if not communicated to the stakeholders on the ground. Multidisciplinarity and cross-silo approaches are

key in the fight against a changing climate, but landscape architecture and planning are great vehicles to achieve systemic change and they support concept and delivery. The establishment of a cross sectoral, interdisciplinary and environment-focused project framework, supported by policies and legislation, can make a real difference in the way in which professional practice and politics deliver resilient concepts at a strategic level. However, a new way of thinking in design, policy or governance is not enough if these disciplines act in isolation. The breakthrough comes when each discipline collaborates with the aim to future proof our cities and regions. The key actions revealed by the landscape-led strategic schemes on this paper demonstrate how putting the landscape at the core of a development can create new concepts and raise aspirations for the future of our urban and rural environments. The paper suggests that landscape design is a powerful driver towards a net zero carbon transition, whilst at the same time can enhance social and landscape identity and boost the economy of a region. Through design, professionals and the public can better understand, test and evaluate their surrounding landscapes and imagine how their behavioural changes will result in a sustainable community to live in.

## Acknowledgments

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# The Role of Nursing Homes Architectural Design in Mitigating the Risk of COVID-19 Pandemics: The Case of Slovenia

*By Vesna Žegarac Leskovar[*] & Vanja Skalicky Klemenčič[±]*

*Currently, many older people live in institutions for various social and health reasons. In Slovenia, this proportion is almost 5% of the population aged 65 and over. In the COVID-19 pandemic, the elderly proved to be the most vulnerable social group, as they are exposed to a number of comorbidities that increase the risk of mortality. At that time, nursing homes represented one of the most critical types of housing, as seen from a disproportionate number of infections and deaths among nursing home residents worldwide, including Slovenia. During the emergency, a number of safety protocols had to be followed to prevent the spread of infection. Unfortunately, it turned out that while the safety measures protected the nursing home residents, they also had a negative effect on their mental health, mainly due to isolation and social distancing. It follows that especially in times of epidemics of infectious respiratory diseases, the quality of life in nursing homes requires special attention. In this context, it is also necessary to consider whether and how an appropriate architectural design can help mitigating the spread of infections, while at the same time enable older people to live in dignity and with a minimum of social exclusion. To this end, the present study examined 97 nursing homes in Slovenia, analysing the number of infections in nursing homes and their correlation with the degree of infection in the corresponding region in Slovenia. Additionally, 2 nursing homes were studied in more detail with the use of newly developed "Safe and Connected" evaluation tool, analysing the architectural features of each building. The advantages identified so far include living in smaller units, single rooms with balconies, the possibility of using green open spaces and the use of an adequate ventilation. Conclusions of this study are useful for further consideration of design of new nursing homes and the refurbishment of existing ones.*

## Introduction

In recent decades, the world has increasingly faced the phenomenon of an ageing population due to a prolonged period of declining birth rates and increased life expectancy. In the European Union, the proportion of elderly people over 65 years of age exceeded 20% of the total population in 2020, while projections for the coming decades indicate that this proportion will continue to increase, reaching 29.5% by 2050.[1] In the COVID-19 pandemics it became clear that older people in

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1. Eurostat, *Population Structure and Ageing* (Eurostat, 2021).

our society are the most vulnerable. Data from 20 European countries showed that the proportion of people over 70 years of age among confirmed SARS-CoV-2 infections accounted for 79-89% of COVID-19 associated deaths in 16 of 20 countries with available data.[2] Likewise for Slovenia, mortality data showed that the population aged 65 years and older accounted for the largest proportion of deaths in the actively infected population.[3] The reason for such drastic numbers is likely that older age is often associated with the presence of comorbidities that increase the risk of death[4].

Alleviating the risk of COVID-19 spread among a demographic group of seniors has much to do with their living environment. Throughout the world, many older people live in long-term care facilities (LTCFs). In Europe, for example, there is a wide range of facilities, from home-based settings to those that provide specialized medical care, such as nursing homes, retirement homes, skilled nursing facilities, assisted living facilities, residential care homes, and palliative or rehabilitation centres. All of these facilities care for older people who are no longer able to live independently in the community due to a combination of various physical, mental, intellectual, or sensory impairments.[5] The 2020 COVID-19 pandemics showed a disproportionate share of infections and loss of life among residents of LCTFs worldwide.[6] In the EU/EEA countries and the UK, there has been a remarkable morbidity and mortality among LTCF residents since August 2020,[7] which poses a major challenge for disease prevention and control in such facilities.[8] In Slovenia, nursing homes (NHs) are the most common type of LCTFs, with about 4.59% of the elderly population living in such facilities[9] (as of 1.1.2020) and this proportion could be even higher if there were no lack of available capacity. At this point, nursing homes represented one of the most critical housing types, as all similar facilities where people congregate for living, working or educational purposes, such as educational, work and student residences, could be temporarily abandoned, while nursing home residents did not have this option. Despite the fact that the first wave of the COVID-19 pandemic had a relatively small number of infected residents in Slovenian NHs, the number of infections by the beginning of December 2020 was immense. In comparison, the

2. Christian Hoffmann and Eva Wolf, "Older Age Groups and Country-Specific Case Fatality Rates of COVID-19 in Europe, USA and Canada." *Infection* 49, no. 1 (2020): 111-116.

3. COVID-19 Sledilnik. 2021. [COVID-19 Tracker 2021.] https://covid-19.sledilnik.org/si/stat.

4. A. Fallon, T. Dukelow, S. P. Kennelly and D. O'Neill, "COVID-19 in Nursing Homes," *QJM: An International Journal of Medicine* 113, no. 6 (2020): 391-392.

5. Hubert Blain, Yves Rolland, Jos M. G. A. Schols, Antonio Cherubini, Stéphanie Miot, Desmond O'Neill, et al., "August 2020 Interim Eugms Guidance to Prepare European Long-Term Care Facilities for COVID-19." *European Geriatric Medicine* 11, no. 6 (2020): 899-913.

6. Jennifer K. Burton, Gwen Bayne, Christine Evans, Frederike Garbe, Dermot Gorman, Naomi Honhold, et al., "Evolution and Effects of COVID-19 Outbreaks in Care Homes: a Population Analysis in 189 Care Homes in One Geographical Region of the UK," *The Lancet Healthy Longevity* 1, no. 1 (2020): e21-e31.

7. European Centre for Disease Prevention and Control - ECDC, *Increase in Fatal Cases of COVID-19 Among Long-Term Care Facility Residents in the EU/EEA and the UK* (ECDC, 2020).

8. European Centre for Disease Prevention and Control – ECDC, *Surveillance of COVID-19 at Long-Term Care Facilities in the EU/EEA* (ECDC, 2021).

9. SiStat, Podatkovna baza SiStat (Republic of Slovenia, SiStat, 2021).

first wave peaked between 30.3.2020 and 5.4.2020 with 96 confirmed infections in NHs, while the last peak of the second wave was between 30.11.2020 and 6.12. 2020 with 1,410 confirmed infections among NH residents.[10] In 2020, according to National Institute for Public Health, 2891 people died in connection with COVID-19 in Slovenia, out of these 1682 or 58% of the deaths were NH residents.[11]

In general, the risk of infection among nursing home residents can be attributed to a variety of reasons, among them most likely to failures in organizational protective measures, but also shared spaces. As is well known, most accommodation for older people is planned as a conglomerate of shared and private spaces, with private spaces often being double, triple or multiple in the case of Slovenian facilities. Sharing of spaces, which are associated with a greater risk of infection COVID-19, on the other hand, are of great importance for the socialization of residents. In[12] the authors emphasize that the desire for connection leads many older adults to live in different models of connected facilities. The authors also argue that collective spaces and the transition between public and private spaces are critical to managing the spread of infections. The COVID-19 pandemic increases the urgency to rethink the design of NHs to create safer environments.[13] The built environment has a significant impact on the health and well-being of its users. Inadequately designed spaces can have a negative impact on users' health, both physical and mental.[14] Interdisciplinary integration of health and design professions can encourage design solutions that improve quality of life in addition to pandemic preparedness and resilience. It follows that there is a need to review the architectural design of the existing built environment in order to develop alternative and holistic models that balance infection control and quality of life.[15] The latter is particularly important given that the number of people potentially in need of care in the EU-27 will increase from 19.5 million in 2016 to 23.6 million in 2030 and 30.5 million in 2050,[16] and that societies of the future face the prospect of living in "new realities". In the existing literature, there are few studies that address the design of NHs in the context of the COVID-19 outbreak, most of which are guidelines for their architectural design within epidemic safety protocols.[17] Unlike the above studies, this research focuses on the comprehensive

10. Ibid, 3.

11. GOV.SI., *Država v Domove Starejših Občanov ni Vlagala, Zato je Veliko Smrti Stanovalcev* (GOV.SI., 2021).

12. MASS Design Group, *The Role of Architecture in Fighting COVID-19, The Role of Architecture in Fighting COVID-19: Designing Senior Housing for Safe Interaction* (MASS Design Group, 2020).

13. Ibid, 5.

14. Jakub S. Bil and Leszek Pawłowski. 2016, "Influence of Architecture on Mental Health - Selected Issues," *Space&FORM*, no. 28 (2016): 41-52.

15. Diana C. Anderson, Thomas Grey, Sean Kennelly and Desmond O'Neill, "Nursing Home Design and COVID-19: Balancing Infection Control, Quality of Life, and Resilience," *Journal of the American Medical Directors Association* 21, no. 11 (2020): 1519-1524.

16. European Commission, *Green Paper on Ageing: Fostering Solidarity and Responsibility between Generations* (Brussels: European Commission, 2021).

17. Mengying He, Yumeng Li and Fang Fang, "Is There A Link Between Nursing Home Reported Quality And COVID-19 Cases? Evidence From California Skilled Nursing Facilities," *Journal of the American Medical Directors Association* 21, no. 7 (2020): 905-908.

design of NHs. However, in order to establish guidelines for the quality architectural design of NHs, it is first necessary to identify which qualities are essential to combat the adverse effects of COVID-19, which requires a more detailed analysis and evaluation of the quality of existing NHs in relation to the demonstrated epidemiological picture.

The review of existing quality assessment systems for nursing homes showed that numerous definitions of quality exist, while the range of quality indicators for nursing homes is considerable.[18] One of the most commonly used systems is the Five-Star Nursing Home Quality Rating System, also known in the field as Nursing Home Quality Measures. The areas of assessment are extensive. They include the nursing home environment, resident rights, staff/resident interaction, skin care, medication management, quality of life, nursing home administration, and proper food preparation and storage.[19] However, the outbreak of the COVID-19 pandemic presented new challenges for NS quality assessment. The urgent need for measures to prevent the spread of infection became apparent, followed by the introduction of safety protocols that have been repeatedly modified and adapted to new evidence since the outbreak. Over time, the protocols based solely on preventing the spread of infection and thus on the measure of isolation - preventing contact between residents- have shown their inadequacies, particularly in terms of worsening the psychosocial well-being of residents. The latter is also evidenced by the fact that high quality nursing homes have successfully prevented the spread of COVID-19 and deaths from COVID-19 following safety protocols, but have had significantly more non COVID-19 deaths related to the consequences of loneliness.[20] It follows, that two very important starting points need to be considered when developing new qualitative guidelines for NH: First, measures as well as architecture must ensure that the risk of spreading infections is minimised, and second, the quality of social integration of residents must be promoted. This equates the two conditions of mental health vs. physical health, which are considered equivalent at the time of the epidemic outbreak - and which have been shown not to be mutually exclusive.

This study focuses on Slovenian NHs, as Slovenia was at the top of the EU in terms of incidence of the virus,[21] and also had the highest mortality rate in Europe. The aim of this study is to analyze the influence of the architectural design of NHs on the risk of infection of COVID-19 and at the same time on the social integration of its inhabitants. For this purpose, the study uses a newly developed "Safe and Connected" quality evaluation tool for NHs with a focus on architectural design, which comprehensively considers both the safety aspect against the spread of the virus and ensuring maximum opportunities for social inclusion and connection of residents.

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18. N. G. Castle and J. C. Ferguson, "What Is Nursing Home Quality and How Is It Measured?" *The Gerontologist* 50, no. 4 (2010): 426-442.

19. American Council on Aging, *Using CMS' Nursing Home Compare and 5-Star Quality Rating System* (American Council on Aging, 2020).

20. Christopher Cronin and William Evans, *Nursing Home Quality, COVID-19 Deaths, and Excess Mortality* (Cambridge, 2020).

21. Nuška Čakš Jager, *Po Mnenju Epidemiologov Policijska ura ni Potrebna, Slovenija je Sicer po Pojavnosti Virusa v Vrhu EU* (Maribor: Večer, 2021).

Based on theoretical assumptions, the authors propose three basic hypotheses:

H1: The degree of infections in the region affects the degree of infections in NH.
H2: The size of NHs building correlates with the degree of infections in NH.
H3: The architectural design of NH environment affects the degree of infections in NH.

In this study the term "infection" is related to COVID-19 infection disease caused by SARS-Cov-2. Based on the framework developed, it will be possible in the future to develop guidelines for the design of new nursing homes and the renovation of existing ones. Such recommendations could avoid a risk that the construction of new homes only creates the necessary capacity, which, without sufficient architectural quality, impairs the mental, social and physical health of the residents in the long term!

## Nursing Homes in Slovenia

Taking into account formal institutional care, there are currently 97 public and private nursing homes in Slovenia with a total capacity of 19,729 beds,[22] which corresponds to approximately 4.50% of the elderly population. Slovenia is also characterised by a rather uneven distribution of homes, including small homes with a capacity of up to 150 places, medium-sized homes with a capacity of between 151 and 300 places, and large homes with a capacity of more than 300 places.[23] The existing capacity of Slovenian NHs is far too small for the demand. According to official figures, 9,621 people are waiting for a place in a home. Data from recent years show that the number of applications continues to rise year on year.[24] The shortage of space in NHs is an acute problem, especially since the government has not built a new home in 15 years.[25] Although private and foreign investors are appearing, the construction of such homes is subject to economic interests and is not systematically addressed as part of the national policy on care for the elderly.

In light of the above, and in addition to the fact that population aging projections indicate a continued increase in the proportion of the elderly population,[26] there is a need to increase NHs capacity. However, in addition to the need to increase capacity, it is increasingly important to ensure a high quality of life, which in the context of the spread of infectious disease means both ensuring safety from the spread of infection and enabling appropriate social interaction

22. Skupnost Socialnih Zavodov Slovenije, *Pregled Kapacitet Institucionalnega Varstva Starejših in Posebnih Skupin Odraslih* (Skupnost Socialnih Zavodov Slovenije, 2021).

23. Jana Breznik, Ženja Brezovar, Barbara Lampič, Nina Ocvirk, Maja Šipelj, Alma Zavodnik Lamovšek, et al., "Dostopnost Zelenih Površin Za Oskrbovance Domov Starejših Občanov V Majhnih Mestih Slovenije," *Dela*, no. 52 (2020): 61-91.

24. Ibid, 23.

25. Alenka Marovt, *Država je Zadnji dom Zgradila pred 15 Leti, na Posteljo Čaka 12.300 Starostnikov* (24ur. Com, 2020).

26. Ibid, 1.

between those cared for in the home and with the outside world. The occurrence of the COVID-19 pandemic has contributed to a shift in the way society and its needs are approached - from sustainability to resilience. Both, existing NHs architecture and new construction need to be considered comprehensively. In particular, it is important to identify which architectural parameters have a pronounced impact on reducing the risk of spreading respiratory infections and enabling a healthy, comfortable and inclusive living environment, even in times of emergency related to the spread of Sars-Cov 2 and similar infectious diseases, such as the influenza virus, which occur annually in Slovenia.

## Methodology

The research focuses on environment of NHs in the period COVID-19, considering NHs from different scales; location in the region, building size and architectural design. Based on the various literature, considering architectural design strategies to balance infection control and social interaction, and surveys conducted by NH directors, we developed an evaluation tool titled "Safe and Connected". The tool focuses more on the architectural design of the NH, considering organizational - architectural protocols. Prior to defining the evaluation tool, we also investigated whether the degree of infection in NHs was influenced by the degree of infection of the region in which the individual NH was located, and the size of the home in terms of the capacity of available spaces. An analysis of all 97 NHs in Slovenia, divided into 12 statistical regions, was performed.

The research methodology is based on eight phases, which basically consist of:

1. *NH inventory in Slovenia*

From the document,[27] we obtained data on the number of NHs, their capacity (number of vacancies) and the structure of rooms in terms of number of beds and their categorisation by region.

2. *Statistics on infections*

   - *in individual NHs between 20.07.2020 and 7.12.2020*
   - *in the population by region between*[28] *20.07.2020 and 7.12.2020*

The cut-off dates of 20.7.2020 and 7.12.2020 were chosen due to the following facts; on 20.7.2020, after the cancellation of the first wave of the epidemic (11.5.2020), a slight increase of infections in NH is again observed, which reaches a peak on 7.12.2020. After this date, there is a resumption of the decline of infections in NH.[29]

27. Ibid, 22.
28. Ibid, 3.
29. National Institute of Public Health, 2021. https://www.nijz.si.

3. *Analysis of the correlation between the infection degree of a region and the infection degree of NHs in that region*
4. *Statistics on infection degree in relation to the size of NH environment: small, meduim, large NH*[30]
5. *Review and analysis of existing literature - existing guidelines for the architectural design of NHs in the Covid-Pandemics situation*

Based on the literature analysis it is evident that many guides for NH (safety and health protocols) in fighting COVID-19 focus on how to keep people distanced from each other. But there are also some design guidelines which aim to achieve infection control principles, while offering solutions that allow elderly to safely interect.[31] Moreover, the role of open spaces and green areas are very important for the well-being of elderly people,[32] as for the NH residents mental and physical health in the COVID-19 period.

6. *Establishment of an internal rating scale linked to the quality of the NH's architectural design and development of survey questionnaires*

To facilitate data processing, the survey was prepared on the 1ka.si portal (open source application). Since not all responses were used in the web applications, we emailed the surveys in pdf format. The response rate to the surveys was very low. 97 questionnaires were sent out and after the first mailing we received only 3 completed questionnaires. We formally requested the assistance of the Ministry of Labour, Family, Social Affairs and Equal Opportunities to reissue a call for surveys. Following a second call from the Ministry to NHs, we subsequently received a further 10 completed questionnaires by the end of April 2021.

7. *Evaluation of the completed questionnaires, obtaining additional information through interviews with the NH leaders and home visits (on site)*
8. *Correlation of the influence of architecture on infection rates in NH*

In this paper we have included only 2 cases of NH from different regions, of different size and with different infection rates: NH_A (Primorsko-Notranjska region) and NH_B (Savinjska region). Due to the time delay, we included in the final analysis updated data on infections during the cut-off dates 19.10.2020 and 11.4.2021 to make the correlation more reliable. The new cut-off dates were chosen due to the following facts; 19.10.2020 was officially declared the second wave of the COVID-19 epidemic in Slovenia, and 11.04.2021 is the last day of the spring lockdown in Slovenia.

At this stage, we excluded mortality due to COVID -19 for the following reason; in Slovenia, all deaths of population having addition to other comorbidities

30. Ibid, 29.
31. Ibid, 12.
32. Artmann, Chen, Iojă, Hof, Onose, Poniży, et al., "The Role of Urban Green Spaces in Care Facilities for Elderly People Across European Cities," 2017: 203-213.

having also COVID-19 were categorised as deaths due to COVID-19. In fact, many residents of NHs died from the psychological consequences of isolation or from comorbidities. Because it was not possible to identify or isolate cases of deaths attributable solely to COVID-19 from national statistics, we excluded mortality data from the final analysis for reasons of study relevance.

In contrast to the previously mentioned guides (safety and health protocols) which are mainly involved in the prevention of infections COVID-19 in NH, this research focuses on the comprehensive design of NHs taking into account protocols to prevent the spread of infections as a starting point and additionally including the quality of social live to prevent the mental health problems of residents. Designing of NHs does not only focus on interior and floor plan design of the NH-s buildings, but also on open space and green areas or any connection with outdoors spaces.

## Results

As mentioned in Chapter 2, there are 97 public and private nursing homes in Slovenia with a total capacity of 19,729 beds and 11,801 rooms. There are 45% single rooms, 47% double rooms, 5% 615 triple rooms, less than 3% four-bed rooms, 0.3% five-bed rooms and 0.1% apartments.[33]

Slovenia is divided into 12 statistical regions, which at the time of the epidemic were also closed regional areas between which citizens were allowed to move only with specific exceptions. During a certain period of the epidemic, freedom of movement was even restricted to smaller municipal units within each region.

In the first phase of the study, we aimed to determine whether the degree of infection in the region affected the degree of infection in NHs located in that region. For this purpose, the analysis of statistical data on infected cases in individual Slovenian regions and associated NHs was performed, as shown in Table 1.

33. Ibid, 22.

**Table 1.** *Statistical Data on Infected Cases in Regions and NHs in Slovenia*

| **Regions** | **N° of NHs** | **N° of residents REGION** | **Share of infections REGION (%)** | **N° of residents NH** | **Share of infections NH (%)** | **Share of NH/REGION residents (%)** | **Share of infections NH/REGION residents (%)** |
|---|---|---|---|---|---|---|---|
| Pomurska | 8 | 114,396 | 5.51 | 1263 | 54.32 | 1.10 | 10.89 |
| Podravska | 9 | 324,875 | 4.10 | 2822 | 46.39 | 0.87 | 9.83 |
| Koroška | 3 | 70,683 | 5.34 | 697 | 58.11 | 0.99 | 10.73 |
| Savinjska | 15 | 257,425 | 4.47 | 2527 | 33.24 | 0.98 | 7.30 |
| Zasavska | 4 | 57,059 | 3.73 | 663 | 21.42 | 1.16 | 6.68 |
| Posavska | 2 | 75,807 | 3.71 | 760 | 32.11 | 1.00 | 8.66 |
| Jugovzhodna Slovenija | 8 | 144,688 | 4.08 | 1295 | 47.72 | 0.90 | 10.46 |
| Gorenjska | 9 | 205,717 | 5.34 | 1626 | 36.41 | 0.79 | 5.39 |
| Primorsko-notranjska | 3 | 52,818 | 3.31 | 433 | 50.58 | 0.82 | 12.54 |
| Goriška | 7 | 118,008 | 2.62 | 1393 | 48.38 | 1.18 | 21.76 |
| Obalno-kraška | 4 | 115,613 | 2.11 | 698 | 30.23 | 0.60 | 8.66 |
| Osrednje-slovenska | 25 | 552,221 | 3.90 | 4944 | 33.47 | 0.90 | 7.69 |
| Total | 97 | / | / | / | / | / | / |
| Average | | | 4.02 | | 41.03 | 0.94 | 10.05 |

The different statistical regions vary in size and number of residents, ranging from a minimum of 52,818 to a maximum of 552,221. For the first phase of the survey, we examined available data from 97 NHs in 12 different regions. In each region, there are between 3 and a maximum of 15 units of nursing homes. In the first phase, we analysed the proportion of infected residents in the region, as well as the proportion of infected residents a in the nursing homes. We considered the available data on infections on 7.12.2020 for the period starting from 20.7.2020, i.e. the cumulative number of confirmed cases. Different regions had different infection rates during the epidemic period. For example, the cumulative proportion of infected inhabitants in a region as of 7.12.2020 ranged from 2.11% for the Obalno-Kraška region to a maximum of 5.51% for the Pomurska region, while the average proportion of infected inhabitants in all regions was around 4%. Another important figure is that the number of residents of the NHs in question is on average barely 1% of the total population of each region. In most Slovenian nursing homes, the number of infected residents in the second wave of the epidemic was extremely high. On average, 41% of residents in NHs were infected, highest in NHs in Koroška and Pomurska regions with 58.11% and 54.32%, respectively, and lowest in homes in Zasavska region with 21.42%. The high figures are also reflected in the analysis when we look at the percentage of infections among nursing home residents in the region. The data in Table 1 show that infections in nursing homes account for an average of 10.05% of all infections in the region, which is a highly alarming figure considering that the average proportion of

residents in nursing homes is barely 1% of the population in each region. The latter suggests that a high concentration of infections was found in nursing homes.

While we confirmed that NHs were a hotspot for infections during the epidemic, we were interested in whether the infection rate in each of the 12 regions (proportion of infected residents in a region) had an impact on the infection rate of NHs (proportion of infected NHs in the region) located in a given region. We analysed the infected cases data for regions and nursing homes and found an R correlation coefficient, with a calculated value of R=0.3545, as shown in Figure 1. Although technically a positive correlation, the relationship between the regional infection degree and nursing home infection degree variables is weak (the closer the value is to zero, the weaker the relationship), so the correlation could not be demonstrated, nor could the influence of regional infection rate on nursing home infection rate.

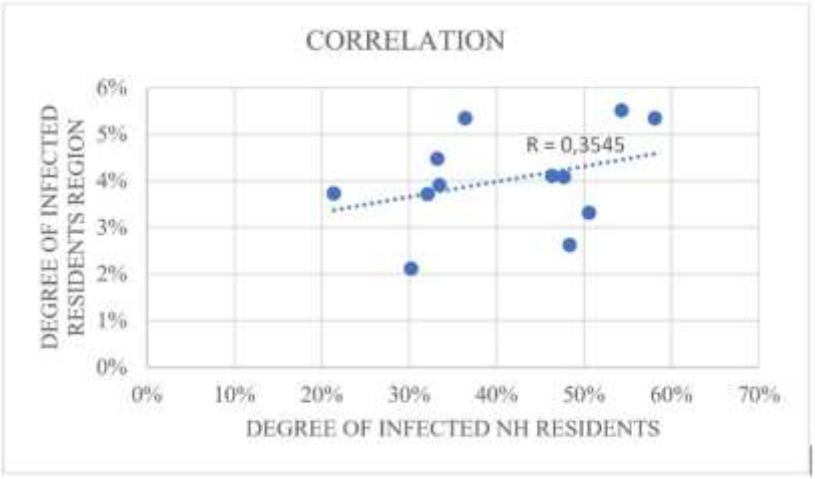


**Figure 1.** *The Correlation Between Infection Degree of Each of 12 Regions and Infection Degree of NHs Located in Each of Those 12 Regions*

The almost non-existent correlation, as shown in Figure 1, indicates that the infection rate in NHs is not primarily influenced by the condition in the region and places a high responsibility on NH design, organizational measures and quality, which will be analysed in further steps of the study.

The next step we analysed a correlation between the size of NHs and infections. Generally, as mentioned earlier, we divide NHs into small, medium and large homes, depending on the number of residents. Some homes also have several units in different locations. The analysis shows that in Slovenia the type of medium-sized NH predominates, accounting for about 50% of all NHs. About 46% are small and about 4% are large. After reviewing the number of infections by individual NH (National institute of Public Health), we can conclude that the size of NH does not affect the number of infected residents, as a high number of infections occurs in both small and medium and large NH, and vice versa; a low number of infections occurs in both large and medium and small NH.

To conduct additional analyses on factors influencing infections in NHs, we proceeded with the development of an evaluation tool. First, we selected 2 NHs to be analysed more in detail with its basic data presented in Tables 2 and 3.

**Table 2.** *Data on Residents and Infections*

| **NH Case Study** | **NH_A** | **NH_B** |
|---|---|---|
| Nº of Infectioned Residents (19.10.2020-11.4.2021) | 22 | 31 |
| Degree of Infected Residents (%) | 53 | 20 |
| Nº of Residents | 42 | 157 |

**Table 3.** *Data on Architectural Design and Parameters*

| **NH Case Study** | | **NH_A** | **NH_B** |
|---|---|---|---|
| Building Typology | | Block | Semi-Open Perimeter Block |
| Floor Area ($m^2$) | | 2673 | 8000 |
| Nº of Storeys | | P+2 | P+5 |
| Room Configuration | Nº of Rooms (total) | 33 | 106 |
| | Single bed room – share (%) | 73 | 52 |
| | Double bed room - share (%) | 27 | 48 |
| | Triple bed room – share (%) | / | / |
| | Four bed room – share (%) | / | / |
| Residential Density ($m^2$/resident) | | 63 | 51 |
| Residential Density of Share Space in Bubble* (average of $m^2$/resident) | | 1.75 | 4.07 |

*Common space in bubble: community rooms have been set up on each floor for people to meet and participate in community programmes. When used outside of the peak of an outbreak, these spaces can help reduce social isolation while reducing the level of vulnerability.

Based on the literature review, the following facts represent a major motive in the development of evaluation tool. The tool includes an assessment of 5 different fields of Quality Measures: bubble concept, open space and green areas, distancing spaces, ventilation and organizational-architectural measures. Each of these fields consists of different sets of criteria (each field consists of 3 criteria), where each criterion is scored with 1 point, which means a total of 3 points per field, as shown in Table 4. Achieving 1 point means a 100% match with the criterion. In total, a maximum of 15 points can be achieved in the tool, which is the highest score in terms of NH quality associated with the period COVID-19. In the area of organizational-architectural measures, 2 sets of sub-criteria also appear exceptionally, which define the criteria "Prevention of entry of infections into NH" ([a]) and "Prevention of transmission of infections into NH" ([b]) in more detail.

**Table 4.** *Results of Evaluation Tool "Safe and Connected"*

| Fields | Criteria | Scores (max) | NH_A | NH_B |
|---|---|---|---|---|
| Bubble Concept* | Smaller units (100%=12 residents) | 1 | 0.67 | 0.71 |
| | Share of single bed rooms with private bathroom | 1 | 0 | 1 |
| | Share of residents living in single rooms | 1 | 0.59 | 0.31 |
| Open Space and Green Areas | Open space and green areas with the programme | 1 | 0 | 1 |
| | Rooms with balconies | 1 | 0.18 | 1 |
| | Common rooms with balconies/teracces and visual contact with outdoor environment | 1 | 0.25 | 0.4 |
| Distancing Space | Flexible room** | 1 | 0 | 1 |
| | Safe room for visitors***(external access and separation of physical contact) | 1 | 0 | 0.5 |
| | Red zone**** (flexible room/outdoor unit/common rooms/rooms of residents) | 1 | 0 | 0.5 |
| Ventilation | Bedrooms (mecanical with fresh air or direct natural with adequate frequency) | 1 | 0.5 | 0.5 |
| | Common rooms | 1 | 0.5 | 0.5 |
| | Corridors and staircases | 1 | 0.5 | 0,5 |
| Organizational-Arhitectural Measures | Quarantine of delivered goods***** | 1[a] | 0.33 | 0.33 |
| | Staff working in bubble | | 0.33 | 0.33 |
| | Limited movement of visitors | | 0.33 | 0.33 |
| | Contactless door (main entrance, bathrooms, rooms) | 1[b] | 0 | 0,11 |
| | Use of outdoor areas by healthy residents | | 0.33 | 0.33 |
| | Individual entrance (employees/residents/delivery) | | 0 | 0.33 |
| | Common rooms (reduction of capacity if being in use/protocol of use/partition of space) | 1 | 0 | 1 |
| **Scores Total** | | 15 | **4.51** | **10.68** |
| **Estimated Degree (%)** | | 100 | **30** | **71** |

*Bubble concept: It is scientifically proven that the social bubble helps slow the spread of COVID-19 because it limits the number of people with whom someone interacts meaningfully. **Flexible room: multipurpose space of the NH that could be the red zone during COVID-19. ***Safe room for visitors: the visiting room in the NH allows residents to spend time with their visitors in a safe manner during the colder months. Residents and visitors are separated by a large glass (window). The safe room is equipped with what is called a plastic "hug bubble" that allows people to touch and hug each other. ****Red zone: All residents, including any new or readmitted, known to have tested positive for COVID-19 (asymptomatic or symptomatic). *****Quarantine of delivered goods: Ready room for cleaning of packages. This should be done in the lobby to avoid unnecessary exposure within tight circulation paths such as hallways and elevators.

From Table 2, it can be seen that NH_A represents a small NH (42 inhabitants) where 53% of the inhabitants were infected, and NH_B represents a medium NH (157 inhabitants) where only 20% of the inhabitants were infected.

From the results of the comparative analysis (Table 4), we can conclude that in NH_B more than 70% of the criteria apply, which provides a quality living

environment for the elderly. We also found that NH_A does not meet the "Safe and Connected" criteria as only 30% of the criteria match. The final assessment score by percentage is shown in Figure 2 on a five-colour scale.

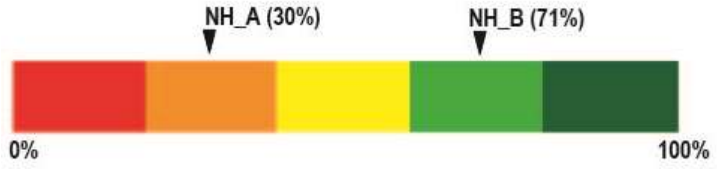


**Figure 2.** *Final Evaluation Mark of the "Safe and Connected" Tool by Percentages for NH_A and NH_B*

The additional compliance with "Safe and Connected" tool criteria is represented by fields in Figure 3. It can be seen that the NH_B, unlike the NH_A, includes many of the criteria of the "Safe and Connected" tool. The deficiencies have been identified in the criteria relating to the "distancing spaces" and "open space and green areas".

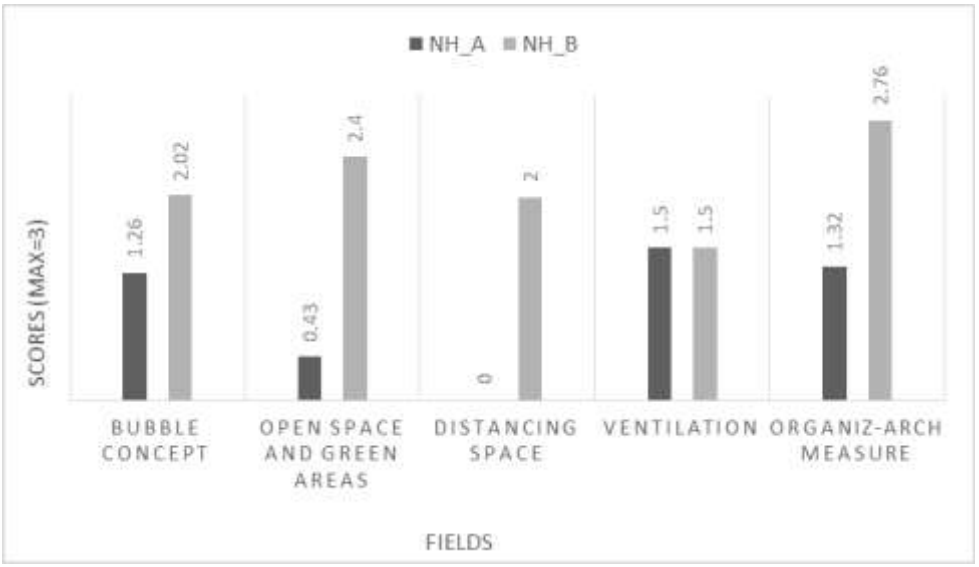


**Figure 3.** *Evaluation Scores for Different Fields of the Evaluation Tool "Safe and Connected" for NH_A and NH_B*

The NH_A has no open or green spaces nearby. Barely a fifth of all rooms have a balcony, also only a quarter of the common areas have direct contact with the outdoors, whereas in NH_B all rooms have a balcony, almost half (40%) of the common rooms have contact with the outdoors and, most importantly, NH_B also includes a spacious, open, green atrium that allows for a variety of programming for the elderly. To prevent infections, the NH_A does not have a safe room for visitors, the building also does not have a flexible room, but the red zone is organized directly in the department of dementia. However, not to be neglected, NH_A has no single room with private bathroom, although it has a higher

percentage (73%) of single rooms compared to NH_B (52%), while NH_B still has all single rooms with private bathroom, as shown in Table 2.

## Conclusions

The COVID-19 pandemic has indicated the need to rethink the design of NHs to create quality living environments that enable residents to live healthy, safe, and socially inclusive lives. While there are many existing assessment methods for determining the quality of NHs, the COVID-19 pandemic has highlighted the need for more comprehensive assessment tools that, in addition to established criteria, include criteria for assessing safety in terms of reducing the possibility of the spread of infection and, at the same time, criteria that focus on reducing resident isolation.

One of the objectives of this study was to find out whether there are certain correlations from which important factors influencing the spread of infections among NH residents can be extracted, and these factors include the architectural design aspect. In this context, three basic hypotheses were formulated. After careful analysis, the first 2 hypotheses were rejected:

H1: The degree of infections in the region does not affect the degree of infections in NH.

H2: The size of NHs building does not correlate with the degree of infections in NH.

On the other hand, the hypothesis H3: The architectural design of the NH environment affects the degree of infections in NH, was confirmed. To validate the hypothesis, a "Safe and Connected" evaluation tool was developed. According to the evaluation results, the NH_B shows significantly better quality than the NH_A in terms of all the estimated quality fields, which correspond to the lower degree of infection in the NH_B.

The paper shows that architectural design can serve as a foundation for creating a comprehensive healthy, safe and inclusive social environment. Based on the findings of the "Safe and Connected" evaluation tool, it is possible to make some recommendations for the design of nursing homes that are somewhat easier to consider when designing new homes than when renovating existing ones. In general, it is recommended that NHs should be designed with smaller units of up to 12 residents per unit, consisting primarily of single rooms with private bathrooms and balconies. It is very beneficial if some surplus space is planned, since it can be used as flexible room that can be adapted for any purpose in different situations. In the event of an epidemic of infectious disease, the flexible room could be used to isolate COVID-19 patients. In addition, safe rooms for visitors are very useful to prevent the spread of infections and allow social contact with family and friends. Furthermore, it is important to design the associated open spaces and green areas to allow safe social interaction and a variety of active and passive activities for residents. Finally, adequate ventilation of all indoor spaces should be given high priority, especially as adequate air exchange can significantly reduce the risk of infection. It can be concluded that architectural design plays an

important role in creating a healthy and safe environment in nursing homes, as more organisational measures can be taken to prevent infections in appropriately designed homes. The conclusions of this study are useful for further consideration of the design of new nursing homes and the renovation of existing homes.

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# Arrangement Plan of Inner Mongolia Buddhist Temple

*By Enke Haoribao[*], Yoshinori Natsume[±] & Shinichi Hamada[‡]*

*Since BC, the construction of cities has been started in the Mongolian Plateau with the establishment of dynasties, but many were turned into ruins. However, the Tibetan Buddhist temples built after the 16th century, which are an indispensable element in the process of settling the Mongolians from nomadic life, have been relatively well preserved in Inner Mongolia. These temples have been thought to be the epitome of the Mongolian economy, culture, art, and construction technology. Therefore, it has a great significance to research them systematically. Interestingly, these temples in Mongolia were originated from Inner Mongolia, which is located on the south side of Mongolia. The architectural design of these temples has been primarily influenced by Chinese and Tibetan temple architecture, suggesting that the temples appear to be considered a vital sample for studying temple architecture in Mongolia or East Asia. So far, there is still no study systematically on temple architecture in Inner Mongolia. Therefore, this research aims to study the arrangement plan of Inner Mongolian Tibetan Buddhist temples, which is the most important factor to consider in the first stage of temple construction.*

## Introduction

On the Mongolian Plateau, cities have been constructed with the establishment of dynasties Since BC, but most turned to ruins, and a few old buildings still exist.[1] Under such circumstances, the temple buildings that were built after the 16th century occupy the majority.[2] According to data, up to the 19th century, more than 1,200 temples in Inner Mongolia, more than 700 temples in Mongolia, and more than 100,000 monks in Inner Mongolia were confirmed[3]. These temples were built by combining the power of each level of society and are considered the epitome of the Mongolian economy, culture, art, and construction technology of the time. The Mongolian region after the Yuan Dynasty corresponds to a wide area like the present Inner Mongolia Autonomous Region and Xinjiang Uygur Autonomous Region of the People's Republic of China, Mongolia, and the Republic of Buryatia, Republic of Tuva, and the Republic of Kalmykia in the Russian Federation.[4] However, many Buddhist temples in these countries and regions were destroyed by

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1. N. Tsultem, *Mongolian Architecture* (Ulan-Bator: State Publishing House, 1988), 2-3.
2. Yuhuan Zhang, *Inner Mongolian Ancient Architecture* (Tianjin University Press, 2009), 1-9.
3. Rasurong, *Daci Temple-Hyangarwa* (Inner Mongolia Culture Press, 2013), 2-31.
4. Baichun Wu, *A Brief History of the Mongolian Empire* (Inner Mongolia People's Publishing House, 2011), 31-42.

religious persecution caused by Soviet Socialism[5] or the Cultural Revolution in China.

Interestingly, these temples originated from Inner Mongolia, the southern part of Mongolia. And the architectural design of these temples has been primarily influenced by the architecture of Han Buddhist temples and Tibetan temples. Therefore, these temples' architecture is considered a vital sample for studying temple architecture in Mongolia and East Asia. Until now, these temples have been relatively well preserved for a long time, fortunately. Yet, due to there is still no systematic study on this subject, the value of these old buildings is not widely recognized by society, there are many cases where they are demolished during repairs.

Therefore, there is great value and significance to study the temples of Inner Mongolia and systematically clarify the characteristics of Mongolian temple architecture not only in Mongolia but also in the architectural history of East Asia, and there is an urgent need to make the value known to society. This study focuses on Buddhist temples in the Inner Mongolia region and considers the arrangement plan of the temple, which is the most important aspect in the design and first stage of temple construction.

## Literature Review

The previous study on the architecture of the Tibet Buddhist temple in Inner Mongolia is mainly summarized in two studies, mainly by Japanese and Chinese researchers.

Studies of Japanese researchers are "Notes of the Mongolian Plateau Crossing"[6] by Mongolian investigation class of Eastern Archaeological Society of Japan in 1930-1940, "Mongolian Academic Temple"[7] by Gajin Nagao, a Buddhist scholar from Eastern Culture Research Institute, "Mongolian Buddhist travelogue"[8] by Akira Suganuma, "A Comprehensive Survey of Buddhist Temples at Western Inner Mongolia: A Study on the History of Mongolian Buddhist Architecture (Part 1)"[9] and "The process for Establishment of Buddhist Temple Ushin Dzuu and Its Spatial Structure: A Study on the History of Mongolian Buddhist Architecture (Part 2)"[10] by Bao Muping.

5. H. Baasansuren, *Erdene Zuu: The Jewel of Enlightenment*《Позитив》агентлаг, 2011), 13.

6. Toa Archaeology Society Mongolian Survey Group, *Notes of the Mongolian Plateau Crossing* (Asahi Shimbun Press, 1945).

7. Nagao Gajin, *Mongolian Academic Temple* (Chuko Bunko, 1992).

8. Suganuma Akira, *Mongolian Buddhist Travelogue* (Shunmei Sha, 2004).

9. Muping Bao, "A Comprehensive Survey of Buddhist Temples at Western Inner Mongolia: A Study on the History of Mongolian Buddhist Architecture (Part 1)," in *Summaries of Technical Papers of Annual Meeting*, 193-194 (Architectural Institute of Japan, 2007).

10. Bao, "The Process for Establishment of Buddhist Temple Ushin Dzuu and its Spatial Structure: A Study on the History of Mongolian Buddhist Architecture (Part 2)," in *Summaries of Technical Papers of Annual Meeting*, 195-196 (Architectural Institute of Japan, 2007).

These studies are valuable materials that record the appearance of temple architecture at that time. Still, they are limited to a few temples in Inner Mongolia and have not yet clarified the characteristics of the whole Inner Mongolia temple.

Studies by Chinese researchers are "Inner Mongolian Ancient architecture"[11] by Zhang Yuhuan, "Archaeology of Tibetan Buddhist Temple"[12] by Su Bai, "Inner Mongolian Tibetan Buddhist Architecture"[13] by Zhang Pengju. Among these research surveys, "Inner Mongolian Tibetan Buddhist Architecture" by Zhang Pengju conducts an actual measurement survey of temple architecture in the whole area of Inner Mongolia, organizes photographs and drawings of the building. Although it is possible to grasp the characteristics of temple architecture in a comprehensive manner, it has not yet reached a systematic study on the changes in the times of temple architecture.

There are currently about 110 existing temples built between the 16th and 19th centuries in the Inner Mongolia region.[14] However, only 30 temples, including ten leagues and cities, can master the situation of each building through their arrangement plan, so this study takes these 30 temples as the research object. Among the 30 temples, there are 9 in Tongliao City and Chifeng City in the eastern region, 10 in Hohhot City, Xilingol League and Ulanqab City in the middle region, and 11 in Alxia League, Ordos City, Bayannaoer City, and Baotou City in the western region (Figure 1).


**Figure 1.** *The Map of Inner Mongolia*
*Source:* Drawn by author.

## Methodology

As a research method, Firstly, the temples are divided into different levels according to the historical background of the temples in the part of "the judgment of the temple level". Further, the temple buildings are also classified based on their

11. Zhang, *Inner Mongolian Ancient Architecture*, 2009.
12. Bai Su, *Archaeology of Tibetan Buddhist Temple* (Cultural Relics Press, 1996).
13. Zhang, Pengju, *Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III)*. (China Architecture & Building Press, 2013).
14. Pengju Zhang, *Inner Mongolian Tibetan Buddhist Architecture (I)* (China Architecture & Building Press, 2013), 6.

functions, in the part of "the classification of temple building". Lastly, the arrangement plan has been modeled to clear the difference between them and clarify the characteristics of the arrangement plan of the Inner Mongolian Buddhist temples by analysis of each type, in the part of "The Classification and analysis of temple arrangement plan".

## The Judgment of Temple Level

When determining the temple level, it is necessary to consider the Development and Change of Mongolian society's background, as well as the construction background of each temple.

These temples in the Mongolian area were mainly built between the 16th and 19th centuries. Specifically, at first, the Mongolian Khan Altan Khan and Lindan Khan introduced the Gelug Tibetan Buddhism[15] and Sakya Tibetan Buddhism[16] respectively in the Mongolian area after the Yuan dynasty.[17] After that, due to the power of them was subsided, and the intervention to the Mongolian through politics, and religion in the Qing Government, all regions of Inner Mongolia were successively brought under the jurisdiction of the Qing.[18]

In the 17th century, the Gelug Tibetan Buddhism became unreliable on Altan Khan's forces and relied on the powerful Gushi Khan of Oirat Mongolian to become the largest sect of Tibetan Buddhism, and its supreme leader, the Dalai Lama, became the supreme religious leader of all sects of Tibetan Buddhism.[19]

From the Qianlong period[20] of the Qing Dynasty after the 18th century, Xinjiang, and Qinghai, where the Oirat Mongols lived, and the whole region of Tibet was brought under the jurisdiction of the Qing Dynasty[21] Under this great background change, in about 300 years, most of the temples in Inner Mongolia were built by Mongolian nobles. Still, in the construction process, they were also influenced by the political influence of the Qing Dynasty from the East and the religious impact of Tibet from the West.

The time from the 16th century to the 19th century is the period from the Northern Yuan Dynasty to the end of the Qing Dynasty in Mongolia, and most of the time in the Qing Dynasty. Therefore, this paper will divide the temple level in

15. The Gelug Tibetan Buddhism was founded by Tibetan philosopher Tsongkhapa in the 15th century, and it is the newest and currently most dominant of Tibetan Buddhism.

16. The Sakya Tibetan Buddhism was founded in the 11th century, and it is one of the major schools of Tibetan Buddhism.

17. Patricia Berger and Terese Tse Bartholomew, *Mongolia the Legacy of Chinggis Khan* (Hong Kong: C&C Offset Printing Co., 1995), 1-6.

18 Namusilai, *History of Mongolia in Qing Dynasty* (Inner Mongolia People's Publishing House, 2011), 1-23.

19. Saiyinchaogetu, *The Great Khan in the Late Northern Yuan Dynasty* (Inner Mongolia Culture Press, 2014), 104-124.

20. The Qianlong period refers to the reign of Emperor Qianlong of the Qing Dynasty from 1735 to 1796.

21. Namusilai, *History of Four Oirat Mongolia* (Inner Mongolia People's Publishing House, 2011), 146-160.

Inner Mongolia according to the social background and the construction background of each temple in the Qing Dynasty.

The administrative divisions of the Qing dynasty that governed Mongolia at that time generally had "Province" called "Sheng" under the "State" called "Guo", and had "prefecture" called "Fu" or "Zhou" under the "Province", also had "County" called "Xian". The current Inner Mongolia Autonomous Region and Mongolia were called "Inner Mongolia" and "Outer Mongolia" from the Qing dynasty at that time, and both were equivalent to the administrative divisions of the "Province" of the Qing dynasty. The administrative units equivalent to "Fu" or "Zhou" are called "League" (Aimugu in Mongolian), equal to "Xian" is called "Banner" (Hosho in Mongolian)[22]. It has been used as the name of the administrative divisions of Mongolia and Inner Mongolia Autonomous Region until now. Since Inner Mongolia was an administrative division corresponding to the "Province" of the Qing dynasty, the name of the administrative division "Province" will be treated as the name of the administrative division of the whole of Inner Mongolia in this paper. From the above, based on the social background of the history time and the level of each temple (Table 1) the levels of the Inner Mongolia temples can be summarized as follows: "Province Level Temple", "League Level Temple", and "Banner Level Temple".

There are 4 Province Level temples, Ihezhao Temple, Xiretzhao Temple, Hoh Temple, and Jiang-Jia Hoh Temple, which were built by Mongolian khan and the emperor of the Qing dynasty (Figure 2).

There are 18 League Level temples. In these temples, the Chaganbure Temple belongs to the imperial temple of the Qing dynasty, and the Maidarzhao Temple, Xiaramuren Temple, Osutozhao Temple, Maritui Temple, Badgar Temple belong to the Province Level temples. East Huhger temple, Batahalaga Temple, Fuhui Temple, Lingyue Temple, Maritu Temple, Merigen Temple, Zhungaarzhao Temple, Yamen Temple were built by the nobles of Leagues, and Xingyuan temple was constructed by the high-ranking Hutuhetu. Xiaramuren Temple, Shaletew Temple, Beis Temple have subordinate temples (Figures 3 and 4).

There are 8 Banner Level temples. In these temples, Changshou Temple, Faxi Temple, Agui Temple, Badanjiren Temple, and Fuyuan Temple belong to the League Level temples, and the Balaqirude Temple built by the local Hutehetu, and Xiara Temple and Han Temple were built by the local nobility of each Banner[23] (Figure 5).

22. Miyawaki Junko, *History of Mongolia-From the Birth of Nomads to Mongolia* (Toui Shobo, 2002, 10), 219-220.

23. The Judgment of Province level, League Level, and Banner Level temples are mainly based on the contents of the background of each temple written by Zhang, *Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III)*, 2013.

**Table 1.** *List of Temples Classified by Temple Level*

| No. | Temple Level | Temple Name | Built | Location | Remarks |
|---|---|---|---|---|---|
| 1 | Province Level | Ihezhao Temple | 1578 | Huhhot City in Middle Region | Mongolian first tibetan buddist temple built by Altan Khan |
| 2 | | Xiretzhao Temple | 1585 | Huhhot City in Middle Region | The temple Where the Fourth Dalai Lama ascended the throne |
| 3 | | Hoh Temple | 1691 | Xilingol League in Middle Region | The temple built by the Qing Emperor for Jetsun Dampa Hutuhetu |
| 4 | | Jiang-Jia Hoh Temple | 1701 | Xilingol League in Middle Region | The temple built by the Qing Emperor gor Jiang-Jia Hutuhetu |
| 5 | League Level | Chaganbure Temple | 1743 | Chifeng City in Eastren Region | The temple belongs to the Yonghe Temple |
| 6 | | Maidarzhao Temple | 1606 | Baotou City in Western Region | The temple belongs to the Xiretzhao Temple |
| 7 | | Xiaramuren Temple | 1769 | Baotou City in Western Region | The temple belongs to the Xiretzhao Temple |
| 8 | | Osutozhao Temple | 1606 | Huhhot City in Middle Region | The temple belongs to the Xiretzhao Temple |
| 9 | | Maritu Temple | 1729 | Baotou City in Western Region | The temple belongs to the Xiretzhao Temple |
| 10 | | Badgar Temple | 1749 | Baotou City in Western Region | The temple belongs to the Jiang-Jia Hoh Temple |
| 11 | | East Huhger Temple | 1706 | Chifeng City in Eastern Region | Built by Gulun Princess who is the Emperor Kangxi's third daughter |
| 12 | | Batahalaga Temple | 1702 | Baotou City in Western Region | Built by the noble of Halaha Mongols |
| 13 | | Fuhui Temple | 1679 | Chifeng City in Eastern Region | Built by the noble of Right Horchin Mongols |
| 14 | | Lingyue Temple | 1692-1711 | Chifeng City in Eastern Region | Built by the nobles of Right Horchin Mongols as a palae building |
| 15 | | Maritu Temple | 1745 | Chifeng City in Eastern Region | Built by the nobles of Middle Horchin Mongols |
| 16 | | Merigen Temple | 1692-1722 | Baotou City in Western Region | The temple built by the nobles of Wurat Mongols and it has 5 subordinate temples |
| 17 | | Zhungaarzhao Temple | 1623 | Ordos City in Western Region | The temple built by the nobles of Jungaar Mongols and it has 18 subordinate Temples |
| 18 | | Yamen Temple | 1731 | Alxia League in Western Region | The temple built by the nobles of Hushuut Mongols and it has 11 subordinate Temples |
| 19 | | Xingyuan Temple | 1649 | Tongliao City in Eastern Region | Built by the Jiasag Da Lama Hotogtu who has actual control over local religion and politics |
| 20 | | Xiaramuren Temple | 1708 | Ulanqab City in Middle Region | The temple manages some temples in central Inner Mongolia and Qinghai |
| 21 | | Shaletew Temple | 1723 | Bayannaoer City in Western Region | The temple has 3 subordinate temples |
| 22 | | Beis Temple | 1743 | Xilingol League in Middle Region | The temple has 1 subordinate temple |
| 23 | Banner Level | Changshou Temple | 1697 | Huhhot City in Middle Region | The temple belongs to the Osutozhao Temple |
| 24 | | Faxi Temple | 1725 | Huhhot City in Middle Region | The temple belongs to the Osutozhao Temple |
| 25 | | Agui Temple | 1803 | Bayannaoer City in Western Region | The temple belongs to the Yamon Temple |
| 26 | | Badanjiren Temple | 1755 | Alxia League in Western Region | The temple belongs to the Yamon Temple |
| 27 | | Fuyuan Temple | 1742 | Tongliao City in Eastern Region | The temple belongs to the Xingyuan Temple |
| 28 | | Balaqirude Temple | 1770 | Tongliao City in Eastern Region | Built by the attendants of the Qing dynasty princess and the local Hutuhetu |
| 29 | | Xiara Temple | 1864 | Xilingol League in Middle Region | Built by the local nobility |
| 30 | | Han Temple | 1671 | Tongliao City in Eastern Region | Built by the local Hutuhetu |

Note: English names are transliterated if they cannot be translated.

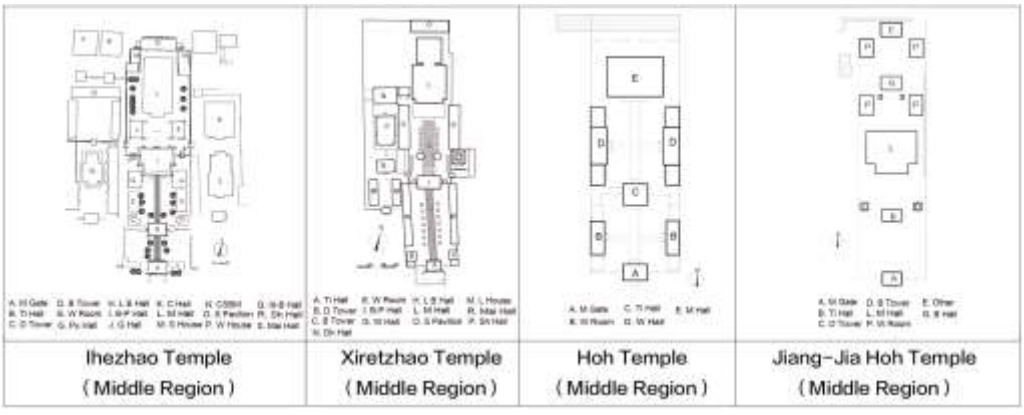


**Figure 2.** *The Arrangement Plan of Province Level Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

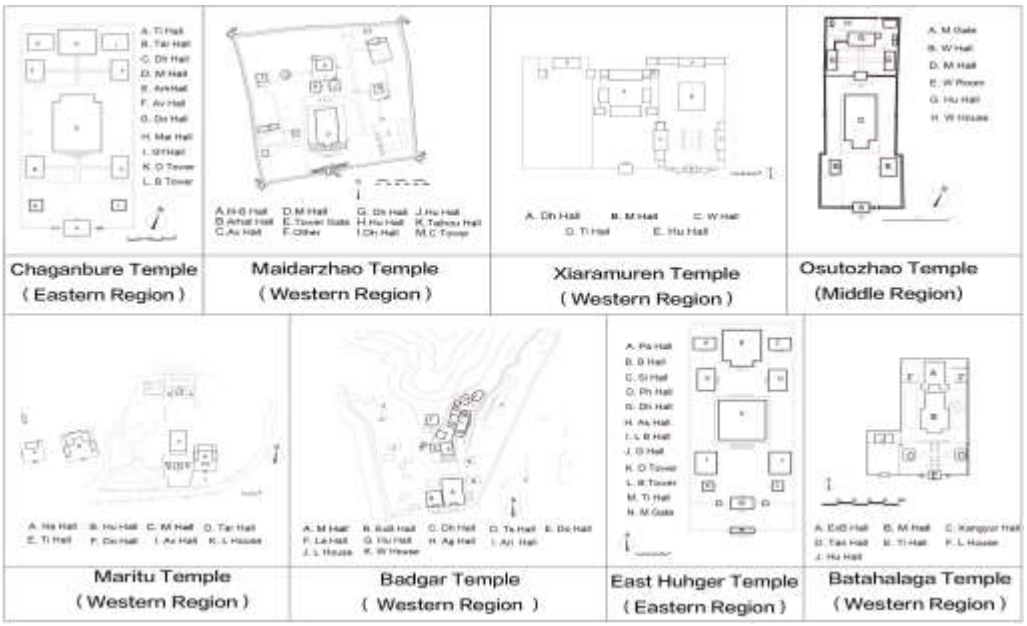


**Figure 3.** *The Arrangement Plan of League Level Temples 1-8*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

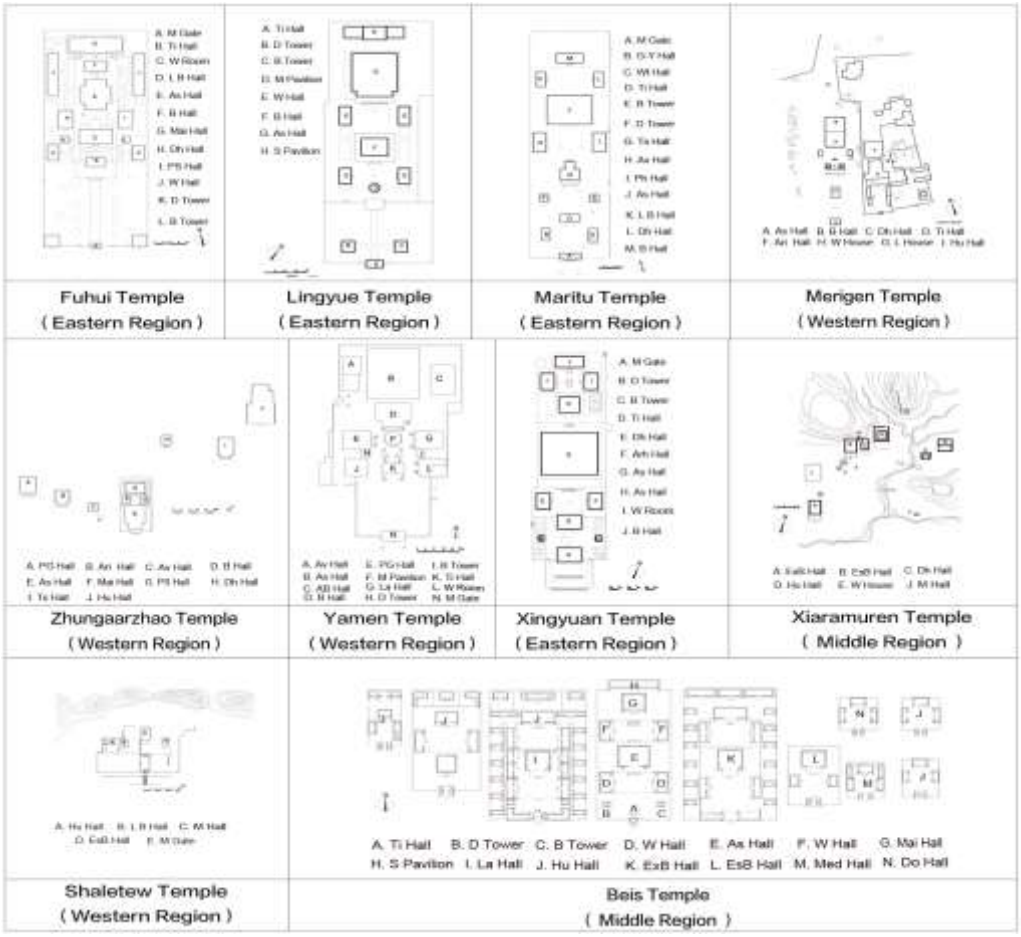


**Figure 4.** *The Arrangement Plan of League Level Temples 9-18*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

## The Classification of Temple Building

The architecture of the target temple has 56 types classified by the name, function, Buddha statue enshrined inside. It can be roughly divided into three types according to the primary purpose of each building (Table 2).

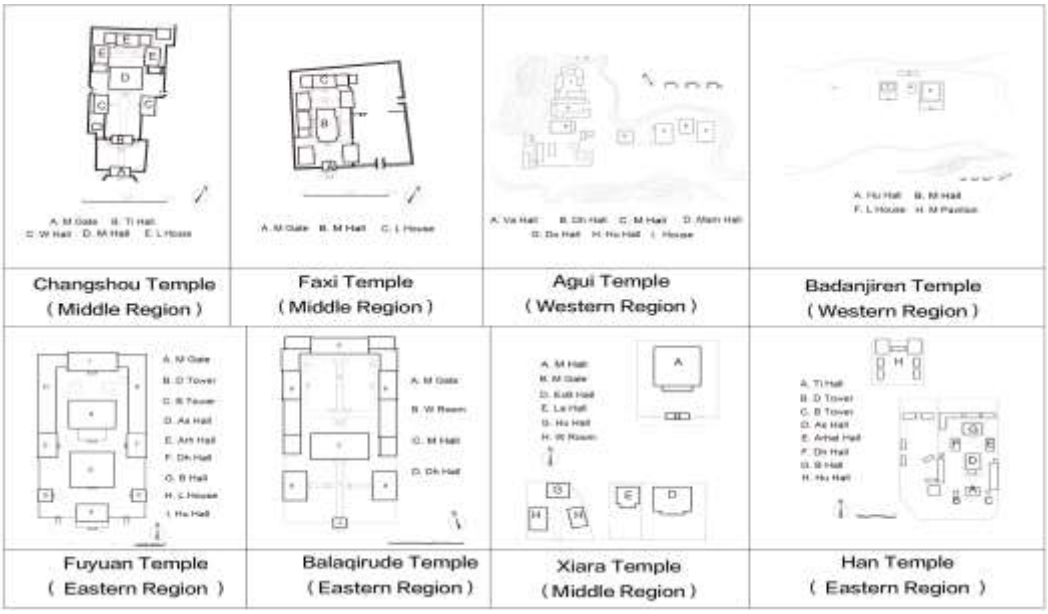


**Figure 5.** *The Arrangement Plan of Banner Level Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

First, the Class I is to place Buddha statues. According to the level of Buddha statues, they are the Honzon, the Tathagata, the Bodhisattva, the Vajra, the Mother Buddha, the Local Buddha, the Disciple, the Patriarch, the Four Heavenly Kings, and the Hutuhetu. According to the level of the Buddha statues, these buildings can be further divided into six groups. The first group is the Mahavira Hall and Buddha Hall, dedicated to the Honzon, the most important Buddha statue of the temple. The second group is the buildings dedicated to the Buddha statues of the Tathagata or Bodhisattva, which are not the Honzon of the temple. The third group is the Vajra and the Buddha mother, which are regarded as the incarnation of the Tathagata and Bodhisattva and the Disciples, the Patriarch. The fourth and the fifth group are the Tianwang Hall dedicated to the Four Heavenly Kings guarding the temple and the Hutuhetu Hall. The sixth group is the building where the Buddha statues cannot be distinguished, such as the Wing Hall.[24]

Class II is for religious ceremonies such as sermons, worship, and ceremonies, and it consists of the below four groups of buildings. Assembly Hall and Buddhism Hall are for teaching Buddhist chanting and Buddhist scholarship. The Sutra

24. Wing Hall is called "Jiguurin Dugan" in Mongolian, and it is translated as "Wing Hall" by the mean of the building's name. Although it can also be translated as the "Pei Dian" in Chinese, it generally refers to the "Dharmapalas Hall" and the "Patriarch Hall" in Han Buddhist temple. Still, there are not only these two Hall in Mongolian temples. Therefore, this paper uses the name of "Wing Hall" to differentiate them.

Pavilion, the Mani Pavilionare, the Tangyur Hall, and the Kangyur Hall preserve the scriptures.[25] The Bell Tower and the Drum Tower are used for time signals and ceremonies. The Arira Hall, the Arira Tower and the Taihou Hall are used for worship.

Class III is the attached building, and it consists of the below three groups of buildings. The Monastery Gate, the Tower Gates, the Corner Tower are for protecting the site. The Wing room and the Lama house for customers and people to live. The Supporting House and the Buddhist Items House, the Warehouse are all used as a storeroom.

In the Mongolian temple, the Mahavira Hall of class I is Integration of the Buddha Hall and the Assembly Hall. Moreover, the Buddha Hall dedicates the Honzon of the temple. The Assembly Hall of class II is where the monks gather and read the scriptures every day. So, these three buildings are the most critical three buildings of all the temple buildings. Furthermore, when the Buddha Hall and the Assembly Hall are integrated, it is arranged as the Mahavira Hall, and when the Buddha Hall and the Assembly Hall are separated, there is no Mahavira Hall in the temple.

**Table 2.** *List of the Temple Buildings Classed by Function*

| No. | Name | Abbreviated name | Classification by Function | Subclassification | Details | No. | Name | Abbreviated name | Classification by Function | Subclassification | Details |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mahavira Hall | M Hall | Class Ⅰ For Enshrine the Buddha Statue | The Honzon | Sakyamuni Tathagata, Maitreya Bodhisattva, Avalokiteshvara Bodhisattva, Padmasambhava, Yamantaka | 30 | Tsongkhapa Hall | Ts Hall | Class Ⅰ For Enshrine the Buddha Statue | Vajra, Mother Buddha, local Buddha, disciple,Patriarch | Tsongkhapa |
| 2 | Shakyamuni Hall | Sh Hall | | | Shakyamuni Tathagata | 19 | Tianwang Hall | Ti Hall | | Four Heavenly Kings | Tamon-Ten, Zocho-Ten, Jikoku-Ten, Komoku-Ten |
| 3 | III-Buddha Hall | III-B Hall | | | Kasyah Tathagata,Sakya Tathagata,Maitreya Bodhisattva | 31 | Hutuhetu Hall | Hu Hall | | Hutuhetu | Hutuhetu of each temple |
| 4 | Maitreya Hall（in the Case of the Honzon） | Mai Hall | | | Maitreya Bodhisattva | 32 | Others | Others | | Unknown | Unknown |
| 5 | Boddhi-Path Hall | B-P Hall | | Tathagata, Bodhisattva | Pharmacist Tathagata,Guardian,Prayer Wheel | 33 | Assembly Hall | As Hall | Class Ⅱ Religious Etiquette | Chanting | The Hall for daily chanting and important ceremony |
| 6 | Longevity Buddha Hall | L B Hall | | | Wuliangshou Tathagata | 34 | Exotoric Buddhism Hall | ExB Hall | | | The Hall for learning Exotoric Buddhism |
| 7 | Puming Hall | Pu Hall | | | Amitabha Tathagata | 35 | Esoteric Buddhism Hall | EsB Hall | | | The Hall for learning Esoteric Buddhism |
| 8 | Pharmacist Hall | Ph Hall | | | Pharmacist Tathagata | 36 | Dongkhor Buddhism Hall | Do Hall | | | The Hall for learning Dongkhor Buddhism |
| 4 | Maitreya Hall | Mai Hall | | | Maitreya Bodhisattva | 37 | Medical Hall | Med Hall | | | The Hall for learning Medicine |
| 9 | Avalokiteshvara Hall | Av Hall | | | Avalokiteshvara Bodhisattva | 38 | Agwaa Hall | Ag Hall | | | The Hall for learning Agwaa Buddhism |
| 10 | Ksitigarbha Hall | Ks Hall | | | Ksitigarbha Bodhisattva | 39 | Lamrim Hall | La Hall | | | The Hall for learning Bodhi Daoism Buddhism |
| 11 | Dongkhor Hall | Do Hall | | Vajra, Mother Buddha, local Buddha, disciple,Patriarch | Donhor | 40 | Sutra Pavilion | S Pavilion | | Buddhist Sutras | The Hall where the Buddhist Sutras are stored |
| 12 | Guhyasamaja Hall | G Hall | | | Sandoi | 41 | Mani Pavilion | M Pavilion | | | The Hall having prayer wheel that store the Buddhist Sutras |
| 13 | Chakrasamvara Hall | C Hall | | | Damchag | 42 | Tangyur Hall | Tan Hall | | | The Hall where the Tangyur Buddhist Sutras are stored |
| 14 | Dharmapalas Hall | Dh Hall | | | The Main Buddha is Yamantaka,other Buddha have Sandoi,Damchag,Hyangrwa, Green Tara,Maricideva,Baldanham,Yangchenma, Chagaan-Shuhuurt,Mahakala,Vaisravana | 43 | Kangyur Hall | Kangyur Hall | | | The Hall where the Kangyur Buddhist Sutras are stored |
| 15 | Vajravarahi Hall | Va Hall | | | Vajravarahi | 44 | Drum Tower | D Tower | | Ritual | Notify the time and also used for ceremonies |
| 16 | Tara Hall | Tar Hall | | | Green Tara | 45 | Bell Tower | B Tower | | | Notify the Time and also used for ceremonies |
| 17 | Chagaan-Shuhuurt Buddha Mother Hall | CSBM Hall | | | Chagaan-Shuhuurt | 46 | Arira Hall | Ari Hall | | Worship | Enshrine the Buddhist Relics |
| 18 | Lakshmi Hall | La Hall | | | Lakshmi | 47 | Arira Tower | A Tower | | | Enshrine the Buddhist Relics |
| 20 | Weituo Hall | Wt Hall | | | Weituo-Ten | 48 | Taihou Hall | Taihou Hall | | | Ancestral Hall |
| 21 | Mammon Hall | Mam Hall | | | Vaisravana | 49 | Monastery Gate | M Gate | Class Ⅲ Associated Building | For Protect the Site | Exit and Entrance |
| 22 | Pehar Gyalpo Hall | PG Hall | | | Pehar Gyalpo | 50 | Tower Gate | T gate | | | Exit and Entrance |
| 23 | Alxa Big Hall | AB Hall | | | Alxa Burhan | 51 | Corner tower | C Tower | | | Watchtower |
| 24 | Guan-Yu Hall | G-Y Hall | | | Guan-Yu | 52 | Wing Room | W Room | | For Living Room | Service Room |
| 25 | Hasaer Hall | Hasaer Hall | | | Hasar | 53 | Lama House | L House | | | Monk Dormiory |
| 26 | Siming Hall | Si Hall | | | Siming Buddha | 54 | Supporting House | S House | | For Storage | For storage used in ceremonies |
| 27 | Pantheon Hall | Pa Hall | | | Pantheon | 55 | Buddhist Items House | BI House | | | For storing Buddhist instruments |
| 28 | Arhat Hall | Ari Hall | | | 18 Arhat | 56 | Warehouse | W House | | | Warehouse |
| 29 | Padma Sambhava Hall | PS Hall | | | Padma Sambhava | Note: English names are transliterated if they cannot be translated. | | | | | |

25. Kangyur Hall and Tangyur Hall are buildings that preserve the Kangyur Buddhist Sutras and Tangyur Buddhist Sutras. The Kangyur Buddhist Sutras and Tangyur Buddhist Sutras are the rules, sutras, and essays of the Tibetan Buddhist Canon.

## The Classification and Analysis of Temple Arrangement Plan

Based on the distinction of temple level and the classification of buildings, the arrangement of each temple is categorized.

Firstly, according to the temple level, the temples can be roughly classified into three types, Province Level Temple, League Level Temple, and Banner Level Temple.

Secondly, according to the relation between the most important building, the Mahavira Hall, the Buddha Hall, and the Assembly Hall, the temples can be classified into five types. Specifically, the temple form with the Mahavira Hall, which is integrated by the Buddha Hall and the Assembly Hall, and the temple form that the Buddha Hall and the Assembly Hall are separated are defined as Integrated Type and Separated Type. So, these temples can be classified as Integrated Type and Separated Type.

Furthermore, the temples can be classified into the symmetric type and asymmetric type depending on whether the buildings are arranged symmetrically along the axis. Finally, it can be divided into seven types according to the temple's level and architecture (Table 3). Then, arrangement plan of the seven types is modeled in order to clarify the characteristics[26] (Figure 6). In order to make the building names easy to distinguish, the abbreviated names of all buildings are adopted in the Model Figure of each temple's arrangement. Please refer to the abbreviated names of each building in Table 2.

**Table 3.** *List of Temples Classified by Arrangement Plan*

| Temple Level | Number | Type | Number | Detailed Type | Number |
|---|---|---|---|---|---|
| Province Level | 4 | Integrated | 4 | Symmetric | 4 |
| League Level | 18 | Integrated | 9 | Symmetric | 7 |
| | | | | Asymmetric | 2 |
| | | Seperated | 9 | Symmetric | 9 |
| Banner Level | 8 | Integrated | 6 | Symmetric | 4 |
| | | | | Asymmetric | 2 |
| | | Seperated | 2 | Symmetric | 2 |

26. The model figure showing the arrangement of the temples are mainly created by referring to the arrangement plan of each temple written in books, such as *Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III)* by Zhang Pengju, *Mongolian Academic Temple* by Gajin Nagao, *Mongolian Buddhist Travelogue* by Akira Suganuma.

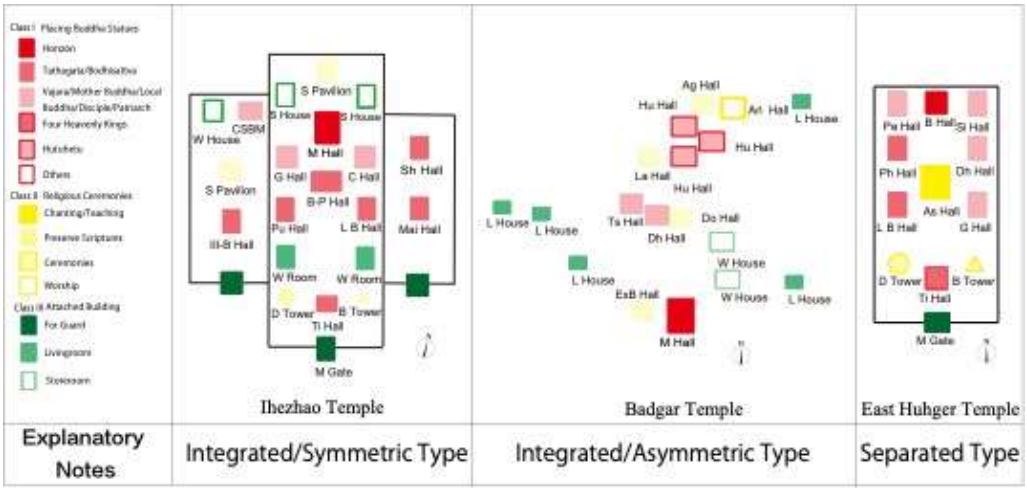


**Figure 6.** *Legend of Model Figure Created by Arrangement o Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

## The Province Level Temple

There are four Province Level temples, all of which are Integrated and Symmetric Type. All the buildings are arranged symmetrically along the axis. Among them, many temples are equipped with buildings of Class I, II, III, the site is surrounded by walls, the Monastery Gate and the Tianwang Hall is always built on the front side, and Bell Tower and Drum Tower are built symmetrically on both sides behind it, and Wing house is built further behind. Moreover, these characteristics are the same as the arrangement of Han Buddhist temples, which has the following characteristics:

- All the buildings are arranged symmetrically and orderly along the axis.
- Walls surround the temple site.[27]
- The Monastery Gate or Tianwang Hall are equipped in front of the site.
- The Bell Tower and Drum Tower are built symmetrically on both sides behind the Tianwang Hall.

Due to the characteristics of these temple arrangement plans are the same as the arrangement plan of the Han Buddhist temples (hereinafter referred to as the Han Buddhist temple style), it is considered that they were built based on the arrangement plan of the Han Buddhist temple style (Figure 7).

27. Qingxi Lou, *Chinese Palace Architecture* (Yi Shu Jia Press, 1994), 12.

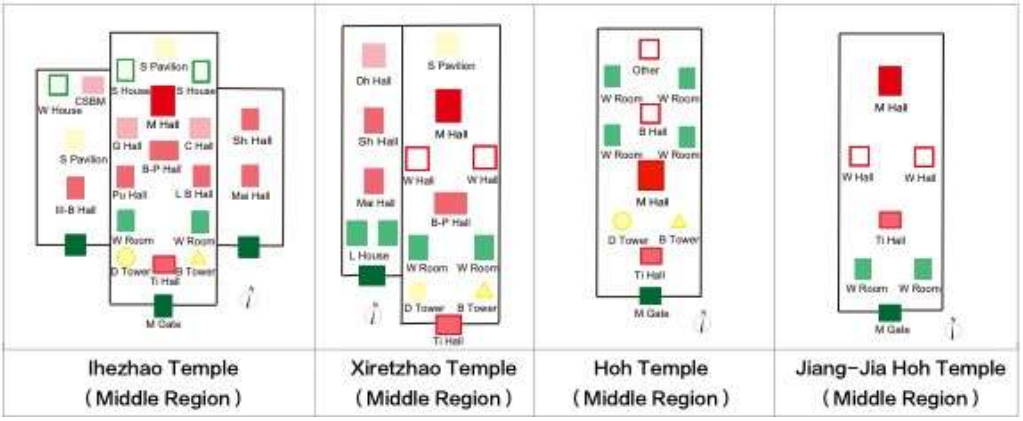


**Figure 7.** *Model of Province Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

Furthermore, the Ihezhao Temple (Figure 8) and Xiretzhao Temple are the oldest Tibetan Buddhist temples in Mongolia, so they are the birthplace of Tibetan Buddhism in Mongolia. Therefore, it is a place where translate and print Tibetan scriptures to each region in the Mongolian area. And also in order to demonstrate the authority of Altan Khan, and his grandson became the supreme leader of Tibetan Buddhism, the fourth Dalai Lama, the two temples were built with all the resources of Mongolian society at that time. So they have become the highest level temple with numerous buildings among all temples in Inner Mongolia.

The Hoh Temple, and Jiang-Jia Hoh Temple, which were built later by the emperor of the Qing dynasty after the war with the Oirat Mongols, to give preferential treatment to the Hutuhetu of Mongolia. Although these two temples were built for the highest-ranking Hutuhetu in Mongolia at that time, due to the investment and construction of the Qing Dynasty had just ended the war with the Oirat Mongols, Mongolia was still in a period of turbulence, they were not built as magnificent as the temples built by the Khan of Mongolia.

From above, it shows that the arrangement plan of the temple at the same level is also different due to different builders and periods.

**Figure 8.** *Ihezhao Temple*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

**The League Level Temple**

There are 18 League Level Temple. In these temples, it can be confirmed that seven temples are the Integrated/Symmetric Type Temple, two temples are Integrated/ Asymmetric Type Temples, and the left nine temples are Separated Type Temples.

The Integrated/Symmetric Type

Among the seven temples of this type, five are in the western region, and one is in the middle and eastern regions (Figure 9). Except for the Chaganbure Temple, in the other six temples, the main buildings are arranged along the axis, and the Monastery Gate or Tianwang Hall are equipped in front of the site. This characteristic is the same as the characteristics of the Han-Buddhist-temple style. However, they also have other following characteristics that differ from the Han-Buddhist-temple style.

1. As the building moves away from the axis, and minor level buildings are freely allocated.
2. The Bell Tower or Drum Tower are omitted.
3. Compare with the Province Level temples, due to the buildings that dedicate high-level Buddha statues such as Tathagata and Bodhisattva are also omitted, the number of buildings is reduced.
4. The Hutuhetu Hall, which is not found in the Province Level Temple, is located away from the Mahavira Hall, and the Buddhism Hall also.

Furthermore, these characteristics of the arrangement plan are the same as the characteristics of temples in Tibet. There are few regulations on the architectural arrangement and attach importance to the arrangement of buildings related to the education of Buddhism, such as Hutuhetu Hall, Exoteric Buddhism Hall, Esoteric Buddhism Hall. Due to the characteristics of these temples' arrangement plans that not only have the Style of Han Buddhist temples but also have the Style of Tibetan temples, it is considered that the arrangement plan is combined of both (hereinafter referred to as the Compromise temple style).

In fact, it can be seen from the background of these temples that many of them are in the western region and belong to the temple founded by Mongolian Khan. such as the Maidarzhao Temple (Figure 10), Xiaramuren Temple, Osutozhao Temple, Maritui Temple belong to the Xiretzhao Temple of Province Level Temple. Therefore, these temples are not constrained by the architectural form of Han Buddhist temples in the East and are more integrated into the characteristics of arrangement plans in Tibet.

However, the Chaganbure Temple that belongs to the Yonghe temple in Qing Dynasty is constrained by the architectural form of Han Buddhist temples strongly. The arrangement plan is the same as the Province Temple, a Symmetric Type. All the buildings are arranged symmetrically and neatly along the axis, and walls surround the site. The Tianwang Hall is always built on the front side, and Bell

Tower and Drum Tower are built symmetrically on both sides behind it, which is the same as the Han Buddhist temple style (Figure 11).

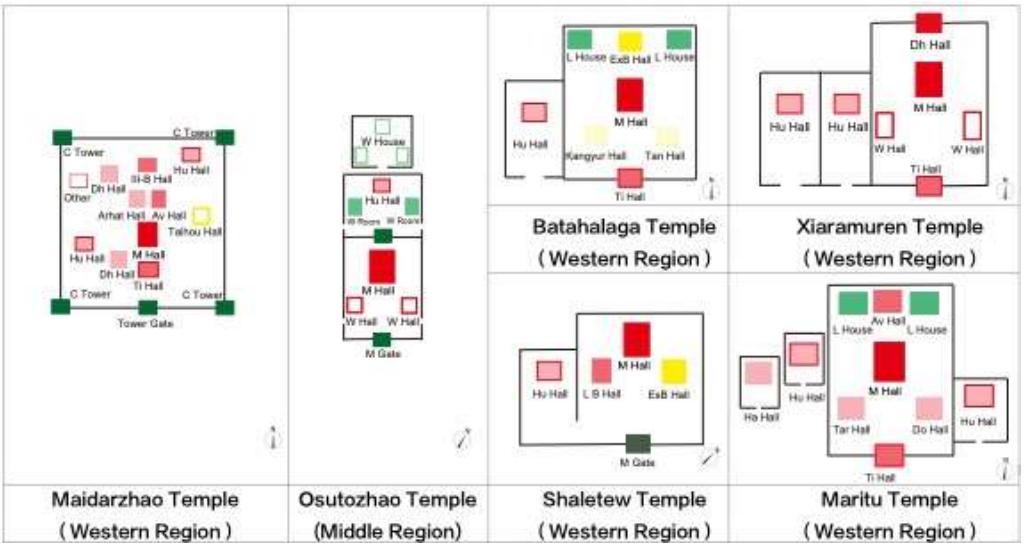


**Figure 9.** *Model Figure of League Level/Integrated/Symmetric Type Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

**Figure 10.** *Maidarzhao Temple*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

The Integrated/Asymmetric Type

In this form, the Xiaramuren temple and Badgar temple buildings are freely arranged along the terrain, and the walls are surrounding the site, the Monastery Gate, the Tianwang Hall, the Bell Tower, and the Drum Tower, are omitted. In addition to the Mahavira Hall, the Dharmapalas Hall, and the Hutuhetu Hall, the buildings dedicated to other Buddha statues were also omitted. However, the Buddhism Hall, the Lama House, and the Warehouse are all located, and it has a high attribute of the Academic Temple[28] that emphasizes academic professors (Figure12). In both cases, the Mahavira and the Exotoric Buddhism Hall are built

28. The Academic Temple is a temple that worships religions every day like other temples, but at the same time consists of several faculties such as Exotoric Buddhism, Esoteric Buddhism, and other faculties, and emphasizes academic professors. Nagao, *Mongolian Academic Temple*, 1992, 55-57.

in front to show off the temple's authority, and the Hutuhetu Hall is built in the back of the site to concentrate on the work of the live Buddha.

These temples do have not the characteristics of the Han Buddhist temple style. All of them have the following characteristics of the Tibetan temple arrangement plan (hereinafter referred to as the Tibetan temple style).

1. All buildings are freely arranged along the terrain.[29]
2. There is no wall surrounding the site.
3. Buildings such as the Monastery Gate, Tianwang Hall, Bell Tower, and Drum Tower are omitted.
4. There are few types of buildings dedicated to Buddha statues.
5. There will always be the Buddhism Hall that teaches academics and The Hutuhetu Hall.

The reason why the Xiaramuren temple and Badgar temple (Figure 13) were built in this way was determined by the time and location fo construction. They were built in the middle of the 18th century in the western region. It is the Qianlong period of the Qing Dynasty; the whole region of Tibet and Mongolia were brought under the jurisdiction of the Qing Dynasty. So Inner Mongolia and Tibet became the same country, and it makes easier to have religious exchanges between regions, so Tibetan temples influenced Inner Mongolia temples in the western region more than Han Buddhist temples compare with the eastern region.

Moreover, in terms of the building's kind, these two temples have many buildings that pay attention to religious academic teaching, such as Exotoric Buddhism Hall, Esoteric Buddhism Hall, Agwaa Hall, Lamrim Hall. Therefore, when paying attention to the teaching of Buddhism, these temples also completely imitate the free arrangement plan of temples in Tibet.

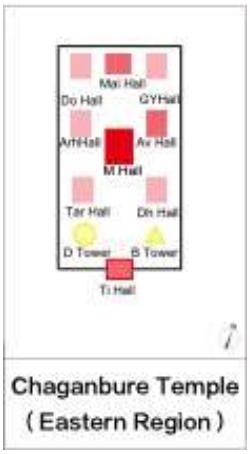


**Figure 11.** *Model Figure of League Level/Integrated/Symmetric Type Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

29. Yongping Wang, *Tibetan Buddhist Architecture In Lhasa* (Southeast University Press, 2019), 58-59.

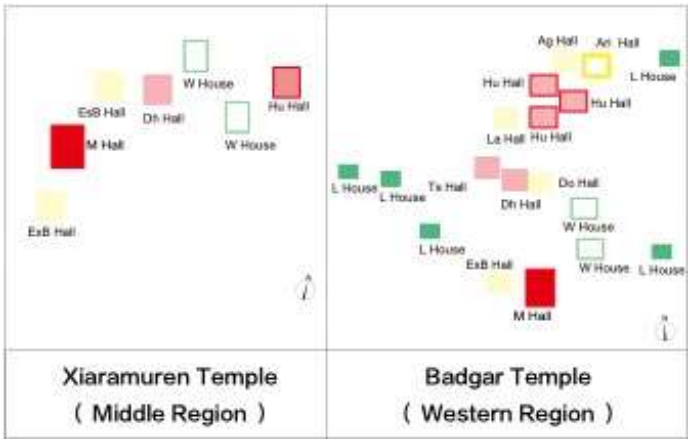


**Figure 12.** *Model of League Level/Integrated/Asymmetric Type Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

**Figure 13.** *Badgar Temple*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

The Separated Type

There are nine temples of this type. In these nine temples, three temples are in the western region, one is in the middle region, and five are in the eastern region (Figure 14).

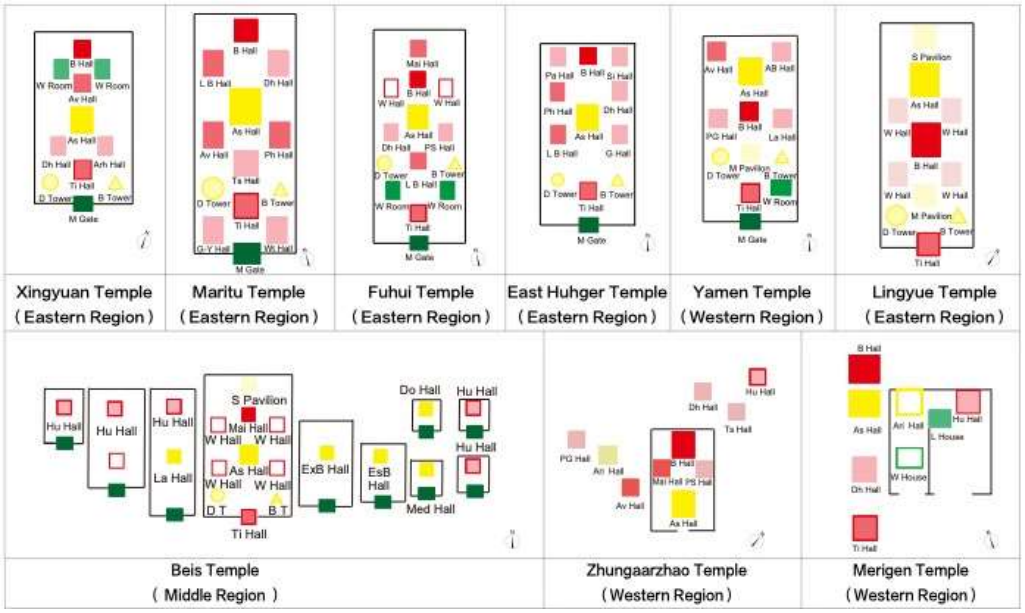


**Figure 14.** *Model Figure of League Level/Seperated Type Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

In the seven temples other than the Zhungaarzhao Temple and Merigen Temple in the western region, all the buildings are arranged symmetrically along the axis, and walls surround the site. The Tianwang Hall is placed in front of the temple, and the Bell Tower and the Drum Tower are placed symmetrically behind the Tianwang Hall, as in the provincial temple. The buildings with the high level of Buddha statues, such as Tathagata and Bodhisattva, are arranged along the axis. And the buildings with the other Buddha statues, such as Vajra, Mother Buddha, disciples, patriarchs, and local gods, are arranged on both sides of the axis symmetrically. And all these characters are the same as the Han Buddhist temple style.

Most of these temples are in the eastern region. They had a close relationship with the Qing government at the initial stage of construction, so they received a lot of assistance from the Qing Dynasty. As a result, the temple is mainly built based on the Han Buddhist temple style. However, only the Beis Temple in the middle region has buildings that pay attention to teaching Buddhism. But is still based on the central axis and symmetrically arranged left and right according to the way of Han Buddhist temples (Figure 15).

**Figure 15.** *Beis Temple*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

In the Zhungaarzhao Temple and the Merigen Temple (Figure 16), Only the main buildings are arranged along the axis, and as the building moves away from the axis, low-level buildings are freely allocated. The walls surrounding the site, the Monastery Gate, the Bell Tower, and the Drum Tower are omitted, and the Hutuhetu Hall is located away from the Mahavira Hall. Through these characteristics, the two temples can be regarded as the Compromise temple style.

Both temples are in the western region. In particular, the construction of Zhungaarzhao Temple was built shortly after the introduction of Buddhism by the Mongolian Khan at that time, but it was a certain distance from the middle region. And the Merigen Temples was also built by the nobles in the western region[30]. Therefore, the construction of the Mahavira Hall was not confined to Integrated Type but Separated Type. Combined with the Tibetan temples style, all buildings are not rigidly adhered to the axis.

**Figure 16.** *Merigen Temple*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

[30.] Galalu Se, *History of Culture and Art of Mongolian Buddhism (I)* (Inner Mongolia People's Publishing House, 2013), 17-21.

**The Banner Level Temple**

There are 18 Banner Level Temple. In these temples, it can be confirmed that four temples are the Integrated/Symmetric Type Temple, two temples are Integrated/ Asymmetric Type Temples, and two temples are Separated Type Temples.

The Integrated/Symmetric Type

Among the four temples of this type, three are in the middle region, and one and the eastern regions (Figure 17). Except for the Xiara Temple, in the other six temples, all the buildings are arranged symmetrically along the axis, and walls surround the site. The Tianwang Hall is placed in front of the temple, and the Wing house and Wing Hall, Lama house are arranged symmetrically on both sides. Even the building enshrined Tathagata and Bodhisattva, the Bell Tower, and the Drum Tower are omitted in these Banner temples, but it is still considered the Han Buddhist temple style. At the Xiara Temple, the buildings are not neatly arranged along the axis, and the Tianwang Hall, the Bell Tower, and the Drum Tower are omitted, and Hutuhetu Hall and two Buddhism Halls in the temple. So, it is considered the Compromise temple style. No matter what style, these Banner level temples omit some high-grade buildings compared with league level temples of the same type.

Moreover, most of these temples are in the middle region. Therefore, as same as many temples in the middle region of high-level temples, the Assembly Hall and Buddha Hall are integrated as Mahavira Hall. However, because the temple level is Banner level, many buildings have been omitted.

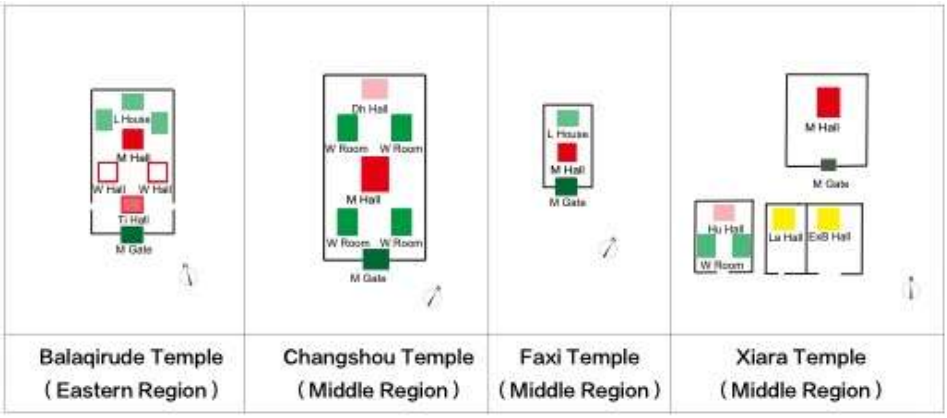


**Figure 17.** *Model Figure of Banner Level/Integrated/Symmetric Type Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

The Integrated/Asymmetric Type

In this form, the buildings of the Agui Temple and the Badanjiren Temple are freely arranged along the terrain, and the walls surrounding the site, the Monastery

Gate, the Tianwang Hall, the Bell Tower, and the Drum Tower are omitted. They are considered as the Tibetan temple style (Figure 18).

These two temples are in the western region where is close to Tibet, so it's easier to accept the influence of Tibetan temples, so their arrangement plans are freely arranged along the terrain. In terms of building kind, the Agui temple has many buildings dedicated to high-level Buddha statues. This is determined by its construction background. Differ from other temples, the Agui temple is the only Sakya Tibetan Buddhist temple in Inner Mongolia, and it was built as a League Level Temple. Later, because Gelug Tibetan Buddhism became the main sect in Tibet, the temple was included in the management of Yanfu temple, a Gelug Tibetan Buddhist temple, so it became a Banner level temple[31]. But it still retains the buildings with the high-level Buddha statues of the construction period. In contrast, the Badanjiren Temple of the Banner Temple omits many buildings, and the arrangement plan becomes simple.

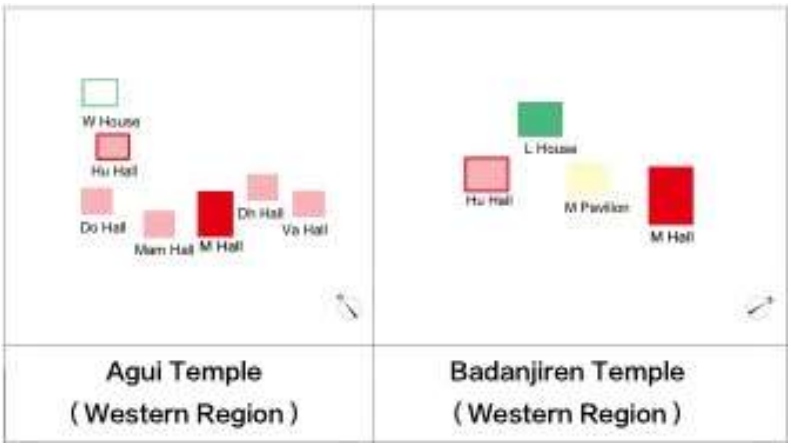


**Figure 18.** *Model Figure of Banner Level/Integrated/Asymmetric Type Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

The Separated Type

The two temples of this type, both are in the eastern region. The buildings are arranged along the axis. The Tianwang Hall and the Monastery Gate are arranged in front of the site. Moreover, the Bell Tower and the Drum Tower are arranged on both sides behind them. Furthermore, the Arhat Hall and the Dharmapalas Hall are arranged symmetrically behind them. They are considered the Han Buddhist temple style. Compared with the League Level temples of the same type, these Banner Level temples omit some high-grade buildings, such as the building enshrined Tathagata and Bodhisattva (Figure 19).

The reason why the two temples have the above characteristics is that they are in the eastern region, so they are easier to influenced by Han Buddhist temples, and they are also Banner Level temples, so many buildings are omitted compared with higher grade temples of the same type.

[31]. Refer to remarks of Agui Temple in Table 2.

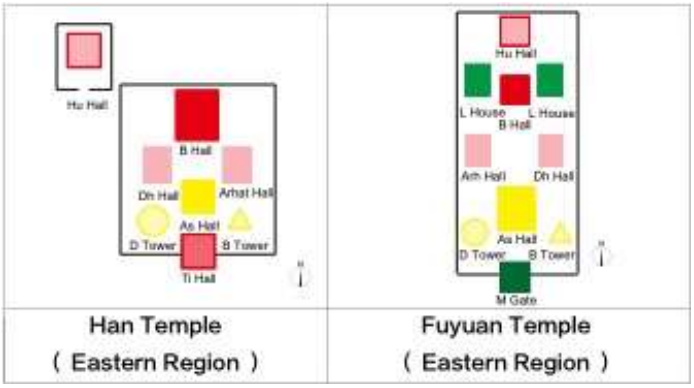


**Figure 19.** *Model Figure of Banner Level/Seperated Type Temples*
*Source:* Inner Mongolian Tibetan Buddhist Architecture (I), (II), (III).

## Conclusions

This paper defines the arrangement plans characteristics of Buddhist temples in Inner Mongolia by clarifying the architectural grade and building category of 30 well preserved old Buddhist temples in the whole region of Inner Mongolia and analyzing their architectural forms of arrangement plan.

Results-wise, this article suggests that these temples could be divided into three levels: Province Level, League Level, and Banner Level based on the social background of the history time and the construction background of each temple. Furthermore, 56 kinds of temple buildings among these 30 temples were divided into three types according to their functions. Lastly, the arrangement plan has been modeled, which is also classified into different types. In accordance with the main buildings among the 56 classifications, the arrangement form of the temple has shown to be divided into Integrated Type and Separated Type. Importantly, Integrated Type could be divided into more detailed types like Symmetric Type and Asymmetric Type. And considering the level of temples, these temples are divided into seven types, and the arrangement plan of various types of these temples is compared and analyzed. The characteristic arrangement plans of these temples in different regions have been found through a comparative analysis of each level's temple arrangement of various types. It was analyzed in detail the characteristic of the arrangement plans of a wide variety of Inner Mongolia temples and systematically clarified the characteristics of the arrangement plans of Buddhist temple architecture in Inner Mongolia. The summary is as follows.

Among the temples, the most prestigious Province Level temples are in the middle region, the political center of Mongolia. Moreover, these temple buildings are built and arranged according to the arrangement plan of the Han Buddhist temple style.

The League Level temples and the Banner level temples are dispersed in the eastern, middle, and western regions, and three types of temples, Integrated/ Symmetric, Integrated/Asymmetric, and Separated, can be confirmed, and the arrangement plans differ greatly for each type. Even if the type is basically the

same, the number and types of buildings tend to decrease as the temple level decreases.

Among the temples, the arrangement plan belonging to the Han Buddhist temple style, there are 1 Integrated/Symmetric Type Temple and 7 Separated Type Temples in League Level Temple, and 3 Integrated/Symmetric Type Temples and all the Separated Type Temples in Banner Level Temple.

The temples, which have the same arrangement plan as the Tibetan temple style, are all Integrated/asymmetrical temples of the League Level and Banner Level temples.

Among the temples, the arrangement plan belonging to the Compromise temple style, there are 6 Integrated/Symmetric Type Temples and 2 Separated Type Temples in League Level Temple, and 1 Integrated/Symmetric Type Temples of Banner Level Temple.

The regional characteristics of the arrangement plan of temples are mainly shown as follows: In the eastern region, which is near Beijing, all the temples are belonging to the Han Buddhist temple style; In the western region, which is near Tibet, the number of the Compromise temple style temples is the largest, but the number of the Tibetan temple style temples is also large (the Tibetan temple style temples number is largest compare with other regions). In the middle region, the number of temples that belong to the Han Buddhist temple style is the largest and have the Compromise temple style and the Tibetan temple style temples.

In the transition of the times, Mongolian temples were initially built in the Han Buddhist Style. Although the Tibetan temple style had influenced it, it had not been completely imitated. Instead, the Compromise temple style Temple combining Han Buddhist Style and the Tibetan temple style was built. Finally, the pure Tibetan temple style was built in Inner Mongolia.

From the above characteristics, the arrangement plan of Buddhist temples in Inner Mongolia is different due to the level of the temple, different regions, and times. The regional and time changes of these temples can also prove that the background of the times and the influence of the surrounding culture are the reasons behind the emergence of multi-form temples in Inner Mongolia. Moreover, through the comparative analysis of various forms, the characteristics of the temple arrangement plan in Inner Mongolia are systematically clarified.

In conclusion, the Inner Mongolia temple has a rich arrangement form, and according to the temple level and different regions and times, its form is also different. The main reason for this phenomenon is the historical background of Mongolia at that time and the influence of the surrounding ethnic architecture.

The comprehensive analysis of the arrangement characteristics of the Inner Mongolia temple and its reasons will provide a basis for the systematic study of Mongolian temple architecture.

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