

Exploring Architectural Orientation and Layout on Hindu Javanese Settlement toward Sustainable Cultural Landscape at Cetho Temple area, Indonesia

Fauzan Ali Ikhsan^{*1,2}, Bambang Setioko³ and Atiek Suprapti³

¹*URDC Laboratory, Architecture Program, Sebelas Maret University, Surakarta, Indonesia*

²*Doctoral Program of Architecture and Urban Science, Diponegoro University, Semarang, Indonesia*

³*Architecture and Urban Science, Diponegoro University, Semarang, Indonesia*

(Received 24 February, 2022; Accepted 27 March, 2022)

ABSTRACT

The influence of globalization on traditional settlements is an unavoidable phenomenon. Globalization is forming a new relationship between global and local that is dynamic. To maintain the continuity of traditional settlement identity, strengthening local cultural values has a strategic role. Traditional settlements in the Cetho Temple area are among the pockets of Hindu Javanese community settlements that still survive on Mount Lawu. This settlement has a unique cultural landscape. The East direction is sacred for the Javanese Hindu community in the Cetho Temple area. This research aims to identify Hindu Javanese community settlements' architectural orientation and layout in forming cultural landscapes in the Cetho Temple area. The discussion of this study was supported by a qualitative dataset, which included interview data on local informants and community leaders. The data is then triangulated with observations in the study area. The study's findings showed that settlements' architectural orientation and layout in the Cetho Temple area influenced sacred orientation towards the East. First, the east direction becomes the consideration of the Hindu Javanese community in determining the direction of the house of residence. Second, the east direction considers the Hindu Javanese community in determining the direction of *pawon* (fireplace furnace). Third, the east direction is considered by the Hindu Javanese community in determining the orientation of the burial place. Fourth, the east direction is considered by the Hindu Javanese community in performing religious ceremonies and meditation. This result is helpful as a reference for planning and structuring the cultural landscape in the Cetho Temple area and can enrich the theory of structuring historical areas elsewhere.

Key words: Architectural orientation, Hindu Javanese, Settlement, Landscape, Cetho

Introduction

Political, economic, and cultural globalization supported by advances in information technology hit all aspects of life in various regions, both in urban and rural areas. The influence of globalization has coloured the entire joints of human life. No commu-

nity can shut itself off from the effects of globalization. Globalization is a closer integration between regions and people in different parts of the world achieved by reducing transportation and communication costs and eliminating barriers to the flow of goods, services, capital, knowledge, and human movement (Jovane *et al.*, 2017). The effects of global-

ization have both positive and negative influences. The positive influence of globalization occurs when the confluence of global and local culture elements influences local culture towards a better civilization.

Meanwhile, the negative influence of globalization occurs if the confluence of elements of global and local culture causes conflict. In line with the *Sustainable Development Goals* proclaimed by the United Nations in 2015 (McDermott *et al.*, 2017; Nation, 2015), sustainable cultural landscape development is necessary. Sustainable cultural landscape development can preserve the authenticity of local heritage in traditional settlements (Fernández-Llamazares and Cabeza, 2018). Local wisdom can be a bulwark for a cultural entity not to become a community that loses its personality amid the rapid flow of globalization.

The cultural landscape depicts human creative activities in land use, adjustment, and landscape change characterized by the products of artifacts and spiritual-cultural elements of human civilization (Belěáková *et al.*, 2021). A cultural landscape can also be interpreted as the interaction between humans and nature in shaping the environment and setting their activities. The interaction between humans and their environment forms a view of life that influences the value system and activity patterns (Utami and Andalucia, 2021). The cultural landscape results from a process of shared evolution between nature and culture formed by humans in a social-ecological system (Sarmiento-Mateos *et al.*, 2019; Schmitz and Herrero-Jáuregui, 2021). Cultural landscape studies over the past few years are related to aspects of spatial structure and human culture (Ěuroviě *et al.*, 2019; Li *et al.*, 2019), financial aspects (Chrastina *et al.*, 2020; Rossitti *et al.*, 2021), management of cultural landscape object assessment (Delakorda Kawashima, 2021; Di Fazio and Modica, 2018) and the influence of global climate change (Aktürk and Dastgerdi, 2021). If elaborated more broadly, spatial structure aspects of traditional settlement landscaping are influenced by various factors. Some studies have found that the spatial structure of a settlement is influenced by cosmological factors (Mulyadi, 2016; Runa *et al.*, 2020; Wijaya, 2021), kinship factors (Bergman *et al.*, 2008; Hu and Tian, 2018; O'Brien and Surovell, 2017) and geographical factors (Bi *et al.*, 2021; Omer Atabeyoglu, 2016; Wang and Chiou, 2019; Wei *et al.*, 2021).

The settlement of the Hindu Javanese community in the Cetho Temple area has a unique cultural land-

scape on the western slope of Mount Lawu, Indonesia. Religious orientation towards the East becomes a characteristic of the cultural landscape in this settlement. Exploring architectural orientation and layout on Hindu Javanese settlement landscape aims to uncover local values that play a role in forming cultural landscapes in this area. Efforts to uncover the values of local wisdom are expected to provide new insight into how a traditional community survives the effects of globalization. These findings can be used as guidelines in managing a cultural landscape on an ongoing basis.

Materials and Methods

The research was conducted on the settlement of the Hindu Javanese community in Cetho Hamlet, Karanganyar Regency, Central Java Province. The location of Cetho Hamlet from the city of Karangnyar is approximately 35 km. This settlement is fused with the site of Cetho Temple, one of the Hindu temples relics of the Majapahit royal era. The hamlet of Cetho is at an altitude of 1413 m above sea level. The topographic state of the land has a land slope of 10-40 per cent (Ikhsan *et al.*, 2021). Most people live from the agricultural sector, mainly in carrots and onions.

There are two types of data sources used in this study: primary and secondary data. Primary data in building and environmental element data, spatial data, and socio-cultural data. Secondary data in supporting literature data that discusses the study area. Primary data collection is conducted by conducting field observations and interviews with several informants in the study area. The interview was conducted on several community leaders who have knowledge of Javanese Hindu culture in the Cetho Temple area. Data analysis combines physical and socio-cultural data to overview the Hindu Javanese community settlement structure. Figure 1 shows the

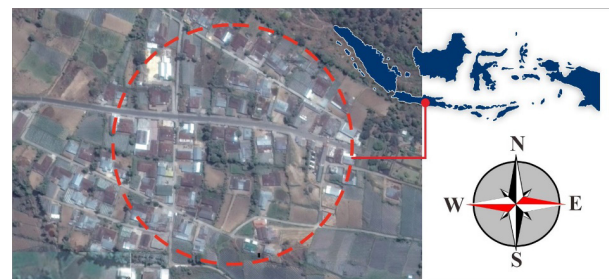


Fig. 1. Study area map of Cetho Hamlet

Source: Google Earth Map edited by author

study area map of Cetho Hamlet.

Results and Discussion

History of Hindu Javanese Community Settlements in Cetho Temple Area

Mount Lawu is one of the places considered sacred to Hindus. In Javanese Hindu Mythology, told in the Book of Tantu Pagelaran, Mount Lawu is part of a row of mountains formed in the land of Java at the time of the transfer of Mount Mahameru to the eastern part of Java. Mount Mahameru is a sacred mountain for Hindus and is considered the center of the cosmos of the universe. Tantu Pagelaran's book is one of the Literary Books produced during the Majapahit Kingdom in the 15th century A.D. Based on information obtained on the relief of several temples around Mount Lawu (Sukuh and Cetho), during the Majapahit kingdom, many built hermitage centers (*mandalas*) on Mount Lawu. This hermitage is managed by *Rsi* (Hindu priest) to get closer to *Sang Hyang Widi* (God). One of the *mandala* points is likely chosen to be the construction site of Cetho Temple in 1451 AD (Purwanto and Titasari, 2018). The settlement trail on the mandala slopes of Mount Lawu was cut off along with the collapse of the Majapahit kingdom. The existence of natural disasters and the influence of the entry of Islamic culture in Java at the end of the Majapahit kingdom era became the most rational explanation for the closure of *mandalas* on the western slopes of Mount Lawu. Traces of Hindu Javanese settlements in the Cetho Temple area began to be re-identified in 1885. Over time, more and more people settled in the Cetho Temple area. The settlement continued to expand to the west of Cetho Temple and form the hamlet structure as it appears at this time.

In 2007 Cetho Temple was designated as a Cultural Heritage Object (BCB) based on the Regulation of the Minister of Culture and Tourism No.PM24 / PW.007/MKP/2007. Since then, the tourism sector began to squirm in the Cetho Temple area. Tourism impacts the emergence of supporting activities of tourist accommodation such as stalls, lodging, parking businesses, and souvenirs. In addition to religious tourism, the Cetho Temple area is also used as one of the climbing entrances to Mount Lawu. This activity also fosters new space activities that have not previously appeared, such as daycare for climbers' vehicles, stalls, and transit houses.

The East direction is a Sacred Orientation

The East direction is sacred for the Javanese Hindu community in the Cetho Temple area. The east direction becomes a consideration of the direction of environmental orientation religious and social activities in residential neighborhoods. Some of these phenomena can be explained as follows;

First, the east direction becomes a consideration of the Hindu Javanese community in the Cetho Temple area in determining the direction of the house of residence. The majority of residential orientations in this area face north and south. If the condition of the site is not possible, then the orientation of the house will be faced to the west. For the orientation of the house facing west, the entrance to the house is attempted to face north or south. The East is a direction that is avoided as a direction of home. The house facing East is believed to bring misfortune and difficulties in life for its residents (Ikhsan *et al.*, 2021). This understanding affects the configuration of the house's layout in the Cetho Temple area. An illustration of the direction of the house can be seen in Figure 2.

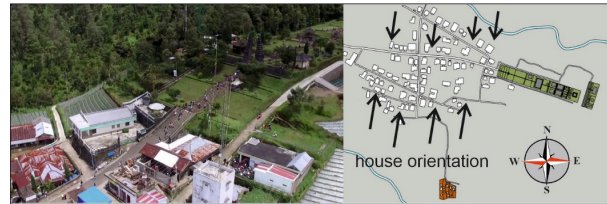


Fig. 2. House orientation illustration in the Cetho Hamlet
Source: author

Second, the east direction considers the Hindu Javanese community in determining the direction of *pawon* (fireplace furnace). The *pawon* (cooking stove) position direction in the kitchen of houses in the Cetho Temple area also has a still attached tradition. The respect to the East gives rise to the phenomenon of direct *pawon* facing the East, so food cooking activities always face the east. Cooking activities include activities that are important for Hindu Javanese communities. Cooking food is a time to be grateful for the blessings that God has given. Cooking facing East is a way for the Hindu Javanese community to honor and be grateful for God-given food through good crops. *Pawon* room occupies a strategic function in the configuration of rural Javanese houses in Cetho Hamlet. *Pawon* room is not merely an area for cooking daily needs. *Pawon* room is used

to store produce and interact with family members at certain times (when eating, relaxing, warming the body at night, even receiving guests are considered close). The layout of the *Pawon* area for south or north-facing houses is relatively the same. In general, the *pawon* room is on the left of the house (Ikhsan *et al.*, 2021). An illustration of the direction of the *pawon* can be seen in Figure 3.

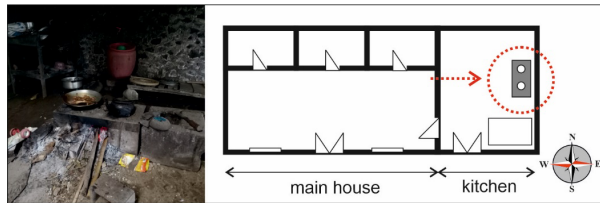


Fig. 3. Pawon orientation in the kitchen room
Source: author

Third, the East direction is considered by the Hindu Javanese community in determining the orientation of the burial place. The burial area for Cetho villagers is located to the south of the settlement. In the hamlet of Cetho, there is only one tomb location. The location is located to the west of the settlement. Access to the tomb via a two-meter-wide walkway. For the residents of Cetho Hamlet, a burial area is a sanctified place. This tomb is a place to bury family members who died and the burial place of an ancestor of the village. Every year in the month of *ruwah* (before entering the fasting month), there is always a customary event to honor the ancestors in the tomb area. The distribution of tomb formations in the hamlet of Cetho is based on kinship groups. An ancestral tomb is given a special place at the location.

The body's position buried in this place stretched north-south with the direction of the head is in the north (Figure 4). The husband's body is always in the East of the wife's body. Children are usually found under the position of the parent's body. This conception of the direction of the cemetery is likely closely related to traditional Javanese beliefs that



Fig. 4. Cemetery orientation in Cetho Hamlet
Source: author

avoid the sacred east-west orientation. When compared to Hindu funeral traditions in Bali, the orientation of tomb direction in Bali can be divided into three variants, namely based on the axis of the cosmos (top-Down) such as cemeteries in the Buleleng area, ritual axes (*Kangin-kauh* / east-west) such as cemeteries in Sanur area and natural axes (*Kaja-kelod* / mountain-sea) such as cemeteries in Gilimanuk (Suastika, 2006). Differences in funeral orientation in Bali are often associated with the concept of *Tri Premana*, which is the understanding that funeral ordinances can be adapted to the place (*village*), time (*kala*), and circumstances (*patra*).

When viewed from the topographical conditions, the location of this tomb is the lowest place compared to the position of temples and settlements. Suppose it is associated with understanding the Hindu concept's three levels of space (*mandala*). In that case, the position of the tomb is at the lowest level (*nista*), during the settlement at the middle level (*madya*), and the temple area at the highest (main) level. The tomb's position in the south of the settlement is thought to be related to the concept of *Dewata Nawa Sanga*, where the south is in the direction of The God Yama, which is often associated with death.

Fourth, the East direction is considered by the Hindu Javanese community in performing religious ceremonies and meditation. The communal place of worship in Cetho Temple is arranged with a space setting facing eastwards. The East and Northeast directions are the holiest directions for religious ceremonies and meditation. Many sacred buildings in the Cetho Temple area are in the easternmost locations. Illustrations like the Figure 5.



Fig. 5. Orientation in performing religious ceremonies and meditation
Source: author

Hindu Javanese Cosmology as a Concept of Forming the Orientation of Settlement Space

Understanding the East as a sacred orientation in the settlement environment of Cetho Temple cannot be separated from Hindu Javanese cosmology. Cos-

mology is related to the understanding of the universe. In traditional societies, cosmology forms an ideological system based on cultural structures. Finally came the symbols of cosmology that are integrated with belief, knowledge systems, social organization, living equipment/technology, art, and economics. These symbols have the meaning of strength, might, and so forth (Blanchard, 2010). Feng shui (China), Javanese Primbon (Java), and Hasta Kosala-Kosala (Bali) are examples of cosmological forms of knowledge (Xu, 1998).

Based on antiquity and ancient Javanese texts, Hindu Javanese people know cosmology and Hinduism in India. However, in its development appears interpretations that are typical of Java. Interactions with natural symbols such as the heavens, earth, sun, and stars led to cosmological concepts embodied in symbolic classification.

The five-category symbolic classification system influences religious orientation to the East. In the fifth category symbolic classification system, a region has five principal elements: four wind points (North, South, East, West) and one orientation center point. Javanese people believe that the four corners of the wind are a place of the gods. Each direction is ruled by a god who has different characteristics. These gods serve to keep the world from evil influences (*bhuta kala*).

If traced further, the classification of category five is still related to Hindu cosmology, namely the concept of *Maha Butha* (five elements). The concept of *Panca Maha Bhuta* is to build knowledge that divides nature into five primary elements, namely *Pritivi* (land), *Agni* (fire), *Jal* (water), *Vayu* (air), and *Akash/Ether* (space). Each element represents the energy present in nature. In Hindu mythology, a built environment is supposed to be in harmony with the five elements of nature. In addition, these five elements also become elements forming the human body, so that humans and the built environment must always be in harmony in order to provide safety and profit (Karani, 2014).

Hindu belief, these five elements are placed in a 9x9 box cosmological grid called *Vastu Purusha Mandala*. This grid consists of three components; *Vasthu*, *Purusha*, and *Mandala*. These three components symbolize the existence of life consisting of knowledge (mind), body (body), and soul (spirit). *Vasthu Purusha Mandala* in *vasthu shastra* is often referred to as the site's spirit. The mandala concept symbolizes the rectangular earth's surface, the most

basic form of Hinduism. *Vastu-Purusha-Mandala* configuration, forming a kind of diagram map of astrological influences underlying the makeup of the universe and the destiny of human life. This concept is then translated into building planning benchmarks. The place of space function in a building planning follows the characteristics of a God who occupies the direction/position in the *Mandala*. Based on the concept of *Vasthu Purusha Mandala*, eight gods surround one orientation center point. The gods of the eight-way ruler of the direction of the wind in the Hindu book are known as the God *Astadikpalaka* (ruler/protector of the eight directions), while in Hindu Bali (Indonesia), known as *Nawadewata / Dewata Nava Sanga* (God of the guardian of the wind with Lord Brahma as the ruler of the Middle).

Illustrations can be seen in Figure 6.

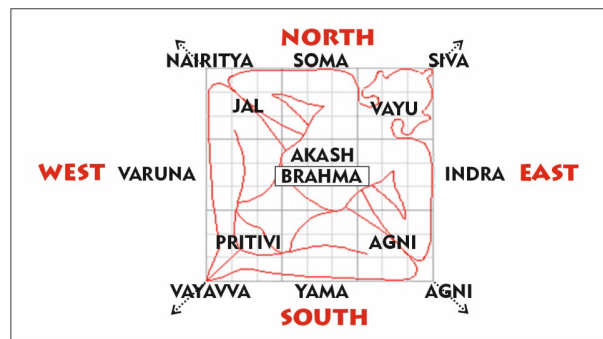


Fig. 6. Overlay of PancaMaha Bhuta elements on Vasthu Purusha Mandala grid

Source: Panca Maha Bhuta element (Karani, 2014) edited by author

From the various opinions of experts, the religious orientation to the East cannot be separated from the various ancient concepts that developed in society. Hindu Javanese believe the East direction is identical to the direction of the sunrise to be a place where *Dewa Surya (Indra)* resides. The sun, in Hindu belief, is not a sun ball but the ultimate *devata*. *Sang Hyang Batara Surya* is one of the theological symbols in Hindu Javanese teachings that symbolize the supernatural forces that govern the macrocosm and microcosm order. In the Vedas, all the Gods are the names of other forms of the Solar God who emits His light. These Gods are manifestations of the traits of the Solar God that are sacred by Hindus. The Solar God is an integral unity of the gods, the reality of absolute unity, and His creation. The one view in

everything and everything in this one in the philosophy of divinity is called Monism.

Conclusion

For the Hindu Javanese community, the spatial structure of settlements formed in the Cetho Temple area is a form of ancestral heritage in building interaction with the environment. The study's findings showed that settlements' architectural orientation and layout in the Cetho Temple area influenced religious orientation towards the East. The Hindu Javanese community respects the sacred orientation towards the East. The East is the position of *Sang Hyang Batara Surya* (the supreme God), who symbolizes the supernatural forces that govern the macrocosm and microcosm order. The implications of sacred orientation towards the East form the settlement structure of Hindu Javanese communities based on the values of local wisdom. First, the East direction becomes the consideration of the Hindu Javanese community in determining the direction of the house of residence. Second, the East direction considers the Hindu Javanese community in determining the direction of *pawon* (fireplace furnace). Third, the East direction is considered by the Hindu Javanese community in determining the orientation of the burial place. Fourth, the East direction is considered by the Hindu Javanese community in performing religious ceremonies and meditation. These four aspects' interrelationships form the Javanese Hindu community settlement in the Cetho Temple area. The results of these research findings are helpful for planning and structuring the cultural landscape in the Cetho Temple area in a sustainable manner. For advanced research, the findings of this study can be a foundation of knowledge for the research of the cultural landscape of traditional historic settlements located in the mountains.

Acknowledgment

Thanks are due to LPPM Sebelas Maret University for the funding assistance in this research. The author also thanks to Architecture and Urban Science-Diponegoro University for the guidance and facilities in preparing this research.

Conflicts of Interest

The paper has not been published earlier or sent to some other journal for consideration for publication.

There are no known conflicts of interest associated with this paper.

References

- Aktürk, G. and Dastgerdi, A. S. 2021. Cultural landscapes under the threat of climate change: A systematic study of barriers to resilience. *Sustainability (Switzerland)*. 13(17): 1–18. <https://doi.org/10.3390/su13179974>
- Belěáková, I., Olah, B., Slámová, M. and Pšenáková, Z. 2021. A cultural and environmental assessment of a landscape archetype with dispersed settlements in ěadca Cadastral District, Slovakia. *Sustainability (Switzerland)*. 13(3): 1–25. <https://doi.org/10.3390/su13031200>
- Bergman, I., Liedgren, L., Ostlund, L. and Zackrisson, O. 2008. Kinship and Settlements: Sami Residence Patterns in the Fennoscandian Alpine Areas around A.D. 1000. *Arctic Anthropology*. 45(1): 97–110. <https://doi.org/10.1353/arc.0.0005>
- Bi, Z., Chen, C., Li, Y. and Cheng, P. 2021. Analysis on the Human Settlement Environment of Huizhou Ancient Villages Based on the Heritage of Ancient Roads - A Case Study of Chengkan Village. *E3S Web of Conferences*. 237. <https://doi.org/10.1051/e3sconf/202123704025>
- Blanchard, K. 2010. *Maya in the mountains: ecology and cosmology in the rocks and caves of highland Guatemala*. 1–20. https://apps.carleton.edu/curricular/ocs/guatemala/assets/Blanchard_2010.pdf
- Chrastina, P., Hroněk, P., Gregorová, B. and Zoncova, M. 2020. Land-use changes of historical rural landscape-heritage, protection, and sustainable ecotourism: Case study of Slovak Exclave ěv (Piliscsév) in Komárom-Esztergom County (Hungary). *Sustainability (Switzerland)*. 12(15). <https://doi.org/10.3390/su12156048>
- Curovic, Z., Curovic, M., Spalevic, V., Janic, M., Sestras, P. and Popovic, S. 2019. Identification and Evaluation of Landscape as a Precondition for Planning Revitalization and Development of Mediterranean Rural Settlements-Case Study: Mrkovi Village, Bay of Kotor, Montenegro. *Sustainability*. 11(7): 2039. <https://doi.org/10.3390/su11072039>
- Delakorda Kawashima, T. 2021. The Authenticity of the Hidden Christians' Villages in Nagasaki: Issues in Evaluation of Cultural Landscapes. *Sustainability*. 13(8): 4387. <https://doi.org/10.3390/su13084387>
- Di Fazio, S. and Modica, G. 2018. Historic Rural Landscapes: Sustainable Planning Strategies and Action Criteria. The Italian Experience in the Global and European Context. *Sustainability* 10(11): 3834. <https://doi.org/10.3390/su10113834>
- Fernández-Llamazares, Á. and Cabeza, M. 2018. Rediscovering the potential of indigenous storytelling for

- conservation practice. *Conservation Letters*. 11(3), e12398. <https://doi.org/10.1111/conl.12398>
- Hu, A. and Tian, F. 2018. Still under the ancestors' shadow? Ancestor worship and family formation in contemporary China. *Demographic Research*. 38(1) : 1–26. <https://doi.org/10.4054/DemRes.2018.38.1>
- Ikhsan, F. A., Setioko, B. and Suprapti, A. 2021. Omah Cagak Wolu: The rural Javanese house architecture in the Cetho Temple area of Lawu Mountain, Indonesia. *IOP Conference Series: Earth and Environmental Science*. 830(1). <https://doi.org/10.1088/1755-1315/830/1/012001>
- Jovane, F., Seliger, G. and Stock, T. 2017. Competitive sustainable globalization general considerations and perspectives. *Procedia Manufacturing*. 8 (October 2016) : 1–19. <https://doi.org/10.1016/j.promfg.2017.02.001>
- Karani, M. 2014. Understanding Vernacular: Vastu Shastra and Carl Jung's theories of Psychology. *ISVS E-Journal*. 3(1) : 20–29. https://isvshome.com/pdf/ISVS_3-1/ISVS_3-1_2_Malini.pdf
- Li, Q., Wumaier, K. and Ishikawa, M. 2019. The spatial analysis and sustainability of rural cultural landscapes: Linpan settlements in China's Chengdu Plain. *Sustainability (Switzerland)*. 11(16). <https://doi.org/10.3390/su11164431>
- McDermott, D., Binan, D., Bumbaru, D., Jungeblodt, G., Odiava, I., Soule, J., Kuban, N., Murray, C., Avrami, E., Wilson, H., Jackson for Australia NSCES, R., Turner, M., Motta, P., Burke, S. and Colletta, T. 2017. *ICOMOS Action Plan: Cultural Heritage and Localizing the U.N. Sustainable Development Goals (SDGs)* (Issue July). https://www.icomos.org/images/DOCUMENTS/Secretariat/2017/ICOMOS_Action_Plan_Cult_Heritage_and_Localizing_SDGs_20170721.pdf
- Mulyadi, L. 2016. The Character and the Spatial Concepts of Cakranegara The Historical City of Indonesia as an Alternative Urban Design. *Paradigma, Jurnal Kajian Budaya*. 2(1) : 65. <https://doi.org/10.17510/paradigma.v2i1.19>
- Nation, U. 2015. *Transforming our world: the 2030 Agenda for Sustainable Development*. https://doi.org/10.1057/978-1-137-45443-0_24
- O'Brien, M. J. and Surovell, T. A. 2017. Spatial expression of kinship among the Dukha reindeer herders of northern Mongolia. *Arctic Anthropology*. 54(1) : 110–119. <https://doi.org/10.3368/aa.54.1.110>
- Omer Atabeyoglu, 2016. The correlation of water with settlement and transportation network: A case study of turkey. *Journal of Environmental Engineering and Landscape Management*. 24(3): 200–209. <https://doi.org/http://dx.doi.org/10.3846/16486897.2016.1179198>
- Purwanto, H. and Titasari, C. P. 2018. Arca di candi Cetho: Interpretasi baru sebagai arca Panji. *Forum Arkeologi*. 31(1): 57. <https://doi.org/10.24832/fa.v31i1.513>
- Rossitti, M., Oppio, A. and Torrieri, F. 2021. The Financial Sustainability of Cultural Heritage Reuse Projects: An Integrated Approach for the Historical Rural Landscape. *Sustainability*. 13(23): 13130. <https://doi.org/10.3390/su132313130>
- Runa, I. W., Warnata, I. N. and Anasta Putri, N. P. R. P. 2020. Conservation of cultural heritage architecture and development of tourism in Denpasar, Bali. *Journal of Architectural Research and Education*. 1(2): 99. <https://doi.org/10.17509/jare.v1i2.22298>
- Sarmiento-Mateos, P., Arnaiz-Schmitz, C., Herrero-Jáuregui, C., D. Pineda, F. and Schmitz, M. F. 2019. Designing protected areas for social-ecological sustainability: effectiveness of management guidelines for preserving cultural landscapes. *Sustainability*. 11(10): 2871. <https://doi.org/10.3390/su11102871>
- Schmitz, M. F. and Herrero-Jáuregui, C. 2021. Cultural landscape preservation and social-ecological sustainability. *Sustainability (Switzerland)*. 13(5): 1–5. <https://doi.org/10.3390/su13052593>
- Suastika, I. M. 2006. Orientasi kubur dalam dimensi ruang di Bali. *Forum Arkeologi*. 19(2): 25–38. <http://forumarkeologi.kemdikbud.go.id/index.php/fa/article/view/629/506>
- Utami, W. and Andalucia. 2021. Managing Toba area as cultural landscape heritage. *IOP Conference Series: Earth and Environmental Science*. 780(1): 012059. <https://doi.org/10.1088/1755-1315/780/1/012059>
- Wang, H. F. and Chiou, S.C. 2019. Study on the sustainable development of human settlement space environment in traditional villages. *Sustainability (Switzerland)*. 11(15): 1–22. <https://doi.org/10.3390/su11154186>
- Wei, D., Wang, Z. and Zhang, B. 2021. Traditional village landscape integration based on social network analysis: A Case study of the Yuan river basin in south-western China. *Sustainability*. 13(23) : 13319. <https://doi.org/10.3390/su132313319>
- Wijaya, I. K. M. 2021. The paradigm of antithesis and harmony as the dualism of pattern fundamental in architecture of residential houses in Bali, Indonesia. *Civil Engineering and Architecture*. 9(4): 1110–1122. <https://doi.org/10.13189/cea.2021.090413>
- Xu, P. 1998. Feng-shui models structured traditional Beijing courtyard houses. *Journal of Architectural and Planning Research*. 15(4): 271–282. <http://www.jstor.org/stable/43030469>