Study on the Influencing Factors of the Spatial Distribution of Ancient religious sites in Inner Mongolia

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Abstract: Background: Religious sites are carriers of religious culture communication, reflecting the types, development history and influence space of religions. However, the construction of religious sites in different historical times and different regions is affected by many factors. This study explores the spatial distribution characteristics and influencing factors of religious sites in Inner Mongolia under the influence of many factors, so as to provide reference for understanding the spread and influence of religion in different time and space. Methods: In order to show how religious sites are affected by these factors, this paper uses GIS to extract the relevant factor data of religious sites and analyze the relationship between the number of other religious sites. Results: Although religious sites were constructed at different historical times, it can be inferred according to the existing data that the religious sites are affected by the terrain, elevation, landscape, river, and lake conditions. At the same time, the religious sites are also restricted by the population and economic scale. The number and growth of religious sites show a certain regularity in different historical times. Conclusion: The distribution of religious sites in Inner Mongolia presents the characteristics of dual core distribution, and different religious types also have significant differences in the choice of cities and rural areas, mountains and plains, rivers, and lakes; religious sites are closely related to the local population, economy, and historical time.

Keywords: Ancient; religious sites; Number; Distribution Law; Inner Mongolia

1. Introduction

Religious belief is not only a reflection of human spiritual world and spiritual pursuit, but also a component of human social structure and cultural growth (Wiebe 2021). The common feature of all religions lies in the belief in gods [1]. Why do people believe in gods? This is because people wish gods to help them solve problems that they can't solve on their own. People worship gods and offer sacrifices to please them, so a certain time and a place are needed to "communicate" with gods or clergy staff of institutions. Besides, religion is a relatively pure assembly, often for the purpose of increasing social capital resources, so religious sites are open and popular. It is a multi-functional place for cultural propaganda, religious dissemination, knowledge popularization and assembly organization [2]. The concept that some famous religious sites are called sacred sites or holy ground has always been an important aspect of some major religions in the world [3]. It is a place where believers yearn for protection and explain their beliefs after being challenged or pressured. Many believers will go thousands of miles to worship, and such activities often need a larger place. The greater the power of belief is, the stronger this behavior will be. With the increase of believers, a new activity place will be arranged in the area where believers gather. In this way, the number of religious sites will increase.

China is a country rich in religious resources, and traditional religious sites have the same characteristics, that is, places for worshiping and serving immortals, praying and worshiping. These sites belong to the heritage of religious temples, and many religious sites have left precious material wealth for later generations. Inner Mongolia is a multi-religion ethnic minority area. Historically, it was influenced by Tibetan Buddhism (Lamaism), Christianity, Catholicism, Islam and Taoism. Religious sites were scattered in Inner Mongolia grassland and near human settlements. The study of the spatial distribution of religious

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sites facilitate better understanding of the development and evolution of human cultural phenomenon, and it is also helpful to understand the distribution trend of religious sites.

2. Materials and Methods

2.1 Study Area

The Inner Mongolia Autonomous Region, located in northern China (Fig. 1), is located at 37° 24′-53° 23′N, 97E° 12′-126° 04′E, bordering Russia and Mongolia in the north, with a total area of 1,183,000 square kilometers and a population of 24.04 million. Han, Mongolian, Korean, Hui and other 55 ethnic minorities dwell here. Inner Mongolia Autonomous Region is a multi-ethnic and multi-religious area. The existing religions include Buddhism, Taoism, Islam, and Christianity. In addition, there are also Shamanism believers (Shamanism belongs to the traditional national religion). A variety of folk beliefs are also popular here.

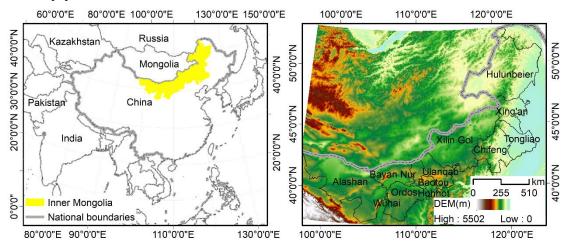


Fig. 1. Map of Inner Mongolia Autonomous Region

2.2 Data Acquisition

- (1) In this spaper, the data of religious sites in Inner Mongolia sources from the POI data set supported by bigmap. The scenic spots data were selected, and the types of Muslim temples, churches, temples and Taoist temples were manually selected. The geographic coordinate data of religious sites were corrected by Google Earth. For repeated name information screening, a total of 241 religious sites, 57 Muslim temples, 74 churches, 110 temples and Taoist temples were screened.
- (2) The economic data of population, GDP, administrative area and number of schools in Inner Mongolia sources from the statistical yearbook of Inner Mongolia Autonomous Region (2000).
- (3) Landsat TM/ETM Remote Sensing Images in 2000 were used as the main data source of land use data, which were generated by manual visual interpretation.
- (4) The spatial distribution data of elevation (DEM) comes from the SRTM (Shuttle Radar Topography Mission) data of space shuttle Endeavor. The 30m data was generated after data splicing and sorting.
- (5) In this paper, the administrative boundaries and other map data of Inner Mongolia Autonomous Region come from 1:250000 basic geographic information data of Inner Mongolia Autonomous Region.
- (6) Population and GDP spatialization data sets come from the resource and environmental science and data center https://www.resdc.cn/Default.aspx

2.3 Methods

This study employs the GIS spatial analysis method (Masoud et al. 2010), including buffer analysis, overlay analysis, and spatial query data analysis based on spatial relationship, extracts the spatial data of religious sites and spatial location, administrative location, terrain, altitude, population, economy, and then conducts correlation analysis or descriptive statistical analysis. Through the visualization map and

data correlation map, this paper analyzes the spatial characteristics of religious sites in Inner Mongolia and finds out the influencing factors of their spatial distribution.

3. Results

3.1 Distribution Characteristics of religious sites in Inner Mongolia

3.1.1 Spatial Distribution Characteristics of religious sites in Cities

Monasteries, temples, mosques, churches, and other fixed places for religious activities are protected by law in China. In the registration of the ownership of real estate, the registration shall be confirmed according to relevant laws and regulations. At the same time, a large part of religious sites are also key cultural relics protection units, and the government and the people have become the main source of funding for the restoration and construction of various religious sites. The distribution of religious sites in the 12 cities of Inner Mongolia Autonomous Region is non-uniform (Fig. 2, Table 1), showing the characteristics of "double core" distribution. Most of the religious sites in southwest Inner Mongolia were built in Qing Dynasty. It has formed the first core area (colored in yellow) with Hohhot City and Baotou City, and the second core area (colored in green) with Tongliao City and Chifeng City as the center. These two areas are the main agricultural planting areas in Inner Mongolia, with a dense population and a long history.

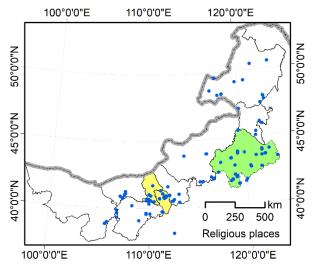


Fig. 2. Spatial Distribution of Religious Sites in Inner Mongolia Autonomous Region

City	Temples	Church	Mosque	Religious Sites	City	Temples	Church	Mosque	Religious Sites
Hohhot	34	16	21	71	Xilin Gol	5	3	0	8
Baotou	10	23	10	43	Ulanqab	4	4	4	12
Hulunbeier	5	3	5	13	Ordos	7	1	0	8
Xing'an	5	1	0	6	Bayan Nur	5	7	1	13
Tongliao	14	10	6	30	Wuhai	1	1	1	3
Chifeng	16	4	8	28	Alashan	4	1	1	6

Table 1. Statistics of Religious Sites in Inner Mongolia

3.1.2 Distribution Characteristics of the Number of Religious Sites

According to the scale of human settlement, there are three administrative regions: City, small town, and village. In different administrative regions, the number and type of population are different, so missionaries will also arrange religious sites in varied administrative regions based on their own religious characteristics. According to the distribution of religious sites in Inner Mongolia at all levels of administrative regions (Table 2), mosques are mostly distributed in the city, churches are mostly distributed in the streets of small towns, and temples and Taoist temples are mostly distributed in small towns. Overall, religious sites tend to be small towns (Tam and Lui, 2019), followed by cities. The three religious types distributed in villages are relatively close, accounting for less than 10% of all types. The spatial distribution of religious sites is mainly concentrated in cities and towns.

Location	Urban District		Town		Village		Amount	
Unit	Quantity	%	Quantity	%	Quantity	%	Quantity	%
Mosque	35	61%	17	30%	5	9%	57	24%
Church	28	38%	40	54%	6	8%	74	31%
Temples	34	31%	65	59%	11	10%	110	46%
Amount	97	40.20%	122	50.40%	22	9.10%	241	100%

Table 2. Distribution of Religious Sites in Inner Mongolia

3.2 Relationship between the Spatial Distribution of Religious Sites and Natural Factors

3.2.1 Terrain and Altitude Factors

Because of different religious doctrines, religious sites are chosen in different locations. There are many religions that are accustomed to quiet and puritanical practices, such as high-altitude places that ordinary people can't often reach, low-altitude areas that aim to spread doctrines and actively accept the public devout worship, and the places where religions follow the natural selection of residents without fixed places of activity. The altitude data of 241 religious sites are classified into three areas: the plain area at an altitude of 0-200m, the mountain area at an altitude of 200-500m and the plateau area at an altitude of 500-2,000m. According to the relationship between the number of religious sites and altitude (Fig. 3), the number of the three major religious sites in Inner Mongolia increases with altitude, and most of them are distributed in the plateau mountainous area at an altitude between 500-2000m. In general, temples and Taoist temples are built at the highest altitude, followed by churches and mosques. In low-altitude areas, there is no significant difference in altitudes among the three religious' sites, and the difference gradually increases with the increase of altitude.

3.2.2 Landscape Factors of Land Type

Religious sites are the combination of natural landscape and human culture. Convenient transportation, a large population and a high level of culture are favorable conditions for religious exchange. According to the land use types of religious sites, the number of religious sites was classified and counted (Fig. 4). Cities are areas where religious propagation and places of worship are densely distributed, whereas the number of religious sites in the countryside, agricultural areas far from settlements and grassland areas is gradually decreasing. Temples and Taoist temples are distributed in all kinds of land types, especially in towns, farming areas and village settlements, while churches and mosques are mostly concentrated in towns, villages and other areas with obvious urban construction history, which are also the settlements of human long-term production and life.

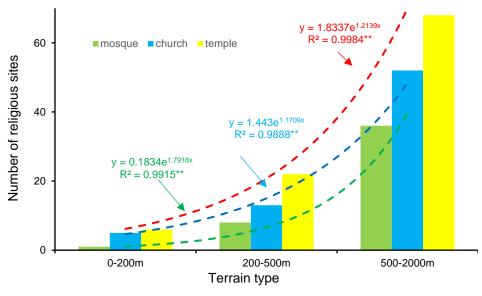


Fig. 3. Correlation between Religious Sites and Altitude. (Note: The symbol ** represents statistical significance at the 0.1 level)

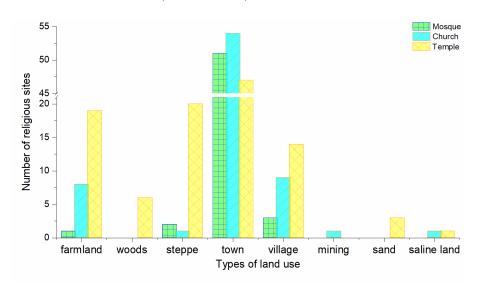


Fig. 4. Land Use Types around Religious Sites

3.2.3 River and Lake Factors

Inner Mongolia is in the hinterland of the mainland China. Although the number of rivers and lakes is small, religious sites tend to be laid out close to river and lake wetlands. Taking the religious sites as the center, this study makes a 10km buffer zone (Fig. 5), and calculates whether there are rivers and lakes in the buffer zone (Table 3). It is found that 64.73% of religious sites are close to rivers and lakes. Compared with mosques and churches, religious sites of temples are more likely to be located near rivers and lakes. The distribution proportion of mosques and churches along rivers and lakes is close, almost half of that of temples. At the same time, the proportion of religious sites located near relatively fixed lakes is more than that near multi seasonal rivers.

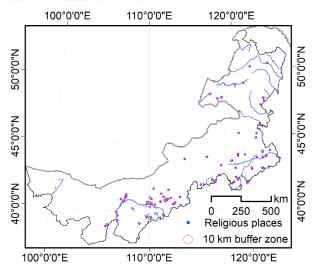


Fig. 5. Spatial Distribution of Religious Sites, Rivers, and Lakes

Table 3. Number and Proportion of religious sites along Rivers and Lakes

Types	Rivers	Proportion	Lake	Proportion	Amount	Proportion
Mosque	31	12.86%	48	19.92%	79	32.78%
Church	19	7.88%	17	7.05%	36	14.94%
Temples	18	7.47%	23	9.54%	41	17.01%
Amount	68	28.22%	88	36.51%	156	64.73%

3.3 Relationship between Religious Sites and Population Economic Factors

In this study, the kilometer grid data of population density and GDP spatial distribution of each

religious place in Inner Mongolia was collected, the GDP density (Fig. 6[a]) and population spatial distribution density (Fig. 6 [b]) of three religious sites were extracted, and the number of religious sites in different sections was counted (Table 4).

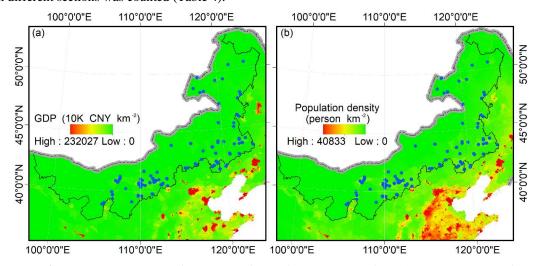


Fig. 6. GDP Density (a) Population Spatial Distribution Density (b) (1995) in Inner Mongolia

Table 4. Population Density and GDP Numerical Classification in Inner Mongolia

Index	Unit	Numerical classification and code				
GDP density zoning	10 K CNY km ⁻²	0-1000	1000-2000	2000-3000		16000-17000
GDP density interval code	10 million CNY km ⁻²	1	2	3		17
Population density zoning	person km ⁻²	0-100	100-200	200-300		3800-3900
Population density interval code	100 people km ⁻²	1	2	3		38

As for the relationship between the distribution of religious sites and GDP in Inner Mongolia (Fig. 7), the two extremes of wealth are closely related to the number of religious sites.

There are more religious sites in poor and backward regions and rich regions, and the number of religious sites in poor regions is more than that in rich regions. The same distribution characteristics are obvious in the population density map (Fig. 8). There are more religious sites in areas with lower and higher population density, and the number of religious sites in areas with lower population density is more than that in areas with higher population density. At the same time, the areas with the highest GDP and population density have the least number of religious sites.

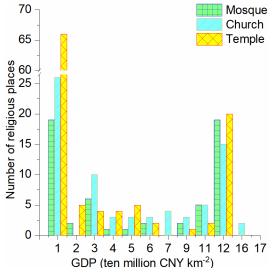


Fig. 7. GDP of Religious Sites

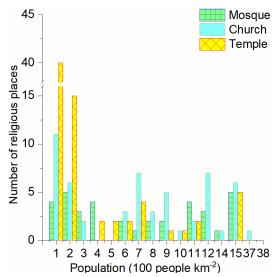


Fig. 8. Population Density of Religious Sites

3.4 Relationship between Religious Sites and Historical Time

By investigating the earliest time of garrisoning or the earliest time of official establishment in the areas where religious sites are located and counting the corresponding number of religious sites in each dynasty in Chinese history (Fig. 9), it is found that the number of religious sites in the grassland area of northern China, which is closest to China, has increased with the development of history. Taking Liao, Yuan, Ming and Qing Dynasties as examples, the number of religious sites increased significantly after the unification of the northern minorities. These dynasties were tolerant of religious activities, allowing not only the inhabitants to practice various religions, but even the emperor himself practiced Taoism (Yuan Dynasty), Taoism (Ming Dynasty), Buddhism (Liao Dynasty and Qing Dynasty).

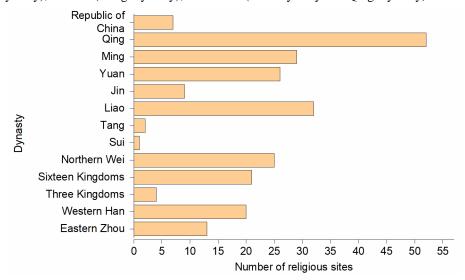


Fig. 9. Number of Religious Sites in Different Dynasties

At the same time, the relationship between the number of religious sites and the historical age was observed by grouping the earliest historical age of religious sites according to the interval of 200 years (Fig. 10). From the Eastern Zhou Dynasty to the Northern Wei Dynasty, the influence of the Central Plains culture and rule on Inner Mongolia was not particularly significant. At that time, the political, economic, and cultural center was still the Central Plains area south of the Great Wall. However, there has been a certain accumulation of religious sites throughout history, and mainly during the turbulent dynasties (Wuhu Sixteen States, Northern Wei). After the unification of China by the Sui and Tang dynasties, the economic and cultural center in in Inner Mongolia moved away from "Chang'an" (now Xi'an, Xianyang and other places in Shaanxi Province). After that, the nomads in northern China split up and established a regime from unifying the north to unifying the whole country, which also led to a sharp increase in the number of religious sites between 1600 and 1799.

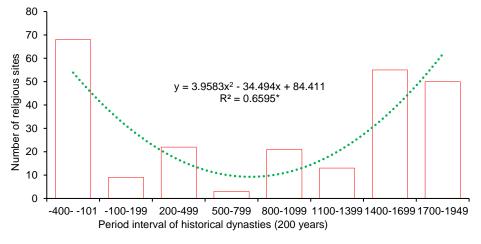


Fig. 10. The Number of Religious Sites in Different Historical Periods (Note: The symbol * represents statistical significance at the 0.1 level)

Based on further analysis of the relationship between the time of existence of each dynasty and

religious sites (Fig. 11[a]), there is a linear relationship between the number of religious sites and the time of the dynasties. The number of religious sites in the Tang and Qing Dynasties does not fully conform to this rule. According to historical documents, the cultural center of the Tang Dynasty is in the south of China, and the religious communication influence is weak in the remote northern grassland, as a result, the number of religious sites in this period was less. On the contrary, the reign of the Qing and Tang dynasties was similar in length, but the Qing Dynasty has the largest number of religious sites in history. After the exclusion of religious sites built during the Tang Dynasty, the number of religious sites was found to be highly consistent with the duration of the dynasty (Fig. 11[b]).

Due to the relative solidification of the number of settlements and religious believers, however, the religious sites in the region are relatively saturated, and the religious sites show a slow growth trend over time.

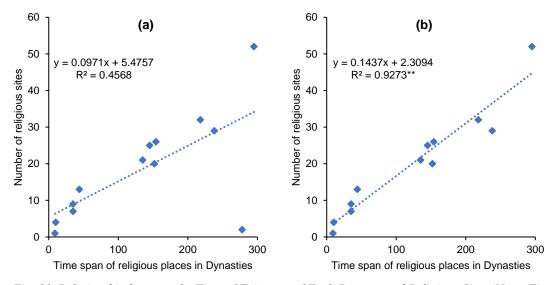


Fig. 11. Relationship between the Time of Existence of Each Dynasty and Religious Sites (Note: Fig. 11(a) includes data of Tang Dynasty, Fig. 11(b) excludes data of Tang Dynasty; the symbol ** represents statistical significance at the 0.01 level)

4. Discussion

It is obvious that religious sites are influenced by natural conditions and socio-economic and political conditions (Cheng, 2021). The spatial distribution and evolution of religious sites can reflect the natural environment, population (Xue et al., 2009), and economic development of a place (Bergsten, 1985). As an important part of religious landscape and religious culture, religious sites are the focus of religious geography and religious religion.

Different religions have different communication histories and religious doctrines, and there are certain differences in the choice of space places (**Re-materialising the religious tourism experience: A post-human perspective**), such as the urban layout tendency of mosques and the rural tendency of temples and Taoist temples. This historical religious preference is also very typical in the choice of religious sites (Cohen-Zada and Elder, 2009). In Inner Mongolia, the area of temples and Taoist temples is generally larger than that of mosques and churches, which leads to the layout of temples and Taoist religious sites in the periphery of the city. The conditions of land production and utilization are poor. It is not easy to integrate with the city in mountainous and forest areas with large land area, while mosques, churches and other architectural landscapes are more distributed in the city.

For religions in areas with high levels of economic development, believers donate their wealth to build and expand religious sites. They often take actions against economic interests. This phenomenon is more typical in the era of peace and higher economic development (Dubois, 2021; Savage, 2019). With the increase of national and local government wealth, they are more inclined to the construction of religious sites, transportation facilities, education, and health care projects (Janzen, 1983). At the same time, religious sites are also tourist attractions, attracting both religious and non-religious believers. If goods or services are sold, the income of residents and religious site owners will also be increased. To maintain such economic sustainability (Pertiwi et al., 2021), the phenomenon of increasing and expanding religious sites will be more frequent (Irfan and Ali, 2020).

Different religions compete in the scope of missionary work and the space of religious sites. Consequently, the number and scale of places for activities of religions that can be supported by the government (Franck and Iannaccone, 2014) will have more opportunities than other religions (Kvande et al., 2014). If a dynasty exists for a long time, it has a strong influence on the number of religious sites. The difference in the number of religious sites between the Qing Dynasty and the Sui Dynasty in the Chinese historical era in this paper is two diametrically opposite cases. Political unrest and social change have an impact on religious sites. In an unstable political situation and chaotic political environment, the opportunity for increased religious sites will be reduced. In this period, residents prefer to find a stable living environment and material supply, rather than waiting in prayer. Only in times of peace can they enjoy religious services and activities. Therefore, at the end of war or in times of separation and unrest, the number of places of worship will increase rapidly. The religion in this period can make up for the problems of multi-ethnic integration caused by the war (Karklins and Zepa, 1996), and the government will increase its support for religion to achieve multi-ethnic integration and exchange, so as to maintain new social relations and personal friendship (Caber et al., 2021). The Northern Wei Dynasty, Yuan Dynasty and Qing Dynasty in this paper are typical representative dynasties. At the same time, religion is the result of secularization of social change (Goh and R., 2006). It reflects that different stakeholders respect their own religious beliefs while rejecting other religious beliefs (Bertolani et al., 2021, Nunziata and Rocco 2016). This not only includes the advocates of social change, but also makes most residents forced to accept. The emperor of Qing Dynasty believed in Tibetan Buddhism, and most of the same herdsmen in Mongolian grassland believed in this religion (Franck and Iannaccone, 2014).

Different religious cultures have different effects on social economy. In a special historical period, in order to deal with the conflicts in politics, economy, war, culture, moral concepts and other aspects under the background of the times, the upper rulers may choose a religion different from the previous dynasty to be the main belief of this dynasty. Through the spread of religious belief, most residents adapt to the good environment at that time.

5. Conclusions

Combined with spatial analysis and statistical analysis, this paper analyzes the influencing factors of the spatial distribution of religious sites in Inner Mongolia Autonomous Region. It is found that religious sites in Inner Mongolia are influenced by natural conditions, economic conditions, population conditions, political stability and the history of dynasty development. Religious sites in Inner Mongolia are concentrated in two agricultural developed areas, showing a "double core" spatial distribution structure. Different types of religious sites have obvious differences in the choice of spatial location. Churches and mosques are mostly distributed in towns with beautiful natural environment, while Taoist temples and temples are mostly distributed in rural mountains or near rivers and lakes. Religious sites are distributed more at the two extremes of economic development levels, that is, there are more religious sites in poor areas and rich areas. What's more interesting, the most densely populated areas are not the areas with the most religious sites. There is a positive correlation between the number of religious sites and the ruling years of the dynasty. If emperors and other nobles believe in a religion, the number of the corresponding religious sites will increase significantly.

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References

[1] (Bergsten, 1985) Bergsten, G. 1985. On the role of social norms in a market economy. Public Choice 45: 113-37.

[2] (Bertolani et al., 2021) Bertolani, Barbara, Sara Bonfanti, and Paolo Boccagni. 2021. At home in the gurdwara? Religious space and the resonance with domesticity in a London suburb. Religion: 1-20.

- [3] (Caber et al., 2021; aber, M., N. Drori, T. Albayrak, and R. Herstein, 2021. Social media usage behaviours of religious tourists: The cases of the Vatican, Mecca, and Jerusalem. International Journal of Tourism Research.
- [4] (Cheng, 2021) Cheng, Hongmeng. 2021. A Review of Mormon Studies in China. Religions 12: 375. [5] (Cohen-Zada and Elder, 2009; Cohen-Zada, D., and T. Elder., 2009). Historical religious concentrations and the effects of Catholic schooling. Journal of Urban Economics 66: 65-74.
- [6] (Dubois, 2021) Dubois, Heather M. 2021. THE INTENSIFYING INTERSECTION OF ETHICS, RELIGION, THEOLOGY, AND PEACE STUDIES. Journal of Religious Ethics 49: 188-212.
- [7] (Franck and Iannaccone, 2014) Franck, R., and L. R. Iannaccone. 2014. Religious decline in the 20th century West: testing alternative explanations. Public Choice 159: 385-414.
- [8] (Goh and R., 2006) Goh, and B. H. R., 2006. Religious sites. Theory Culture & Society 23: 450-52. [9] (Irfan and Ali, 2020) Irfan, E., and Y. Ali, 2020. Religious tourism in Pakistan: Scope, obstacles & strategies. Journal of Convention & Samp; Event Tourism.
- [10] (Janzen, 1983) Janzen, J. 1983. The modern development of nomadic living space in Southeast Arabia the case of Dhofar (Sultanate of Oman)1. Geoforum.
- [11] (Karklins and Zepa, 1996) Karklins, R., and B. Zepa. 1996. Religious-Centered Multiethnic Societies. American Behavioral Scientist 40: 33-45.
- [12] (Kvande et al., 2014) Kvande, M. N., R. Johansen, A. Lehre, M. E. Nielsen, and G. A. Espnes. 2014. Religiousness and Social Support: A Study in Secular Norway. Review of Religious Research 57: 1-23. [13] (Masoud et al., 2010) Masoud, T., M. S. Ali, and B. Y. Gholami. 2010. AN INVESTIGATION OF DEVELOPING RELIGIOUS TOURISM (A CASE STUDY: NURABAD MAMASANI TOWN).
- [14] (Nunziata and Rocco, 2016) Nunziata, L., and L. Rocco. 2016. A Tale of Minorities: Evidence on Religious Ethics and Entrepreneurship from Swiss Census Data. Journal of Economic Growth 21: 189-224.
- [15] (Pertiwi et al., 2021) Pertiwi, H., K. Swastika, Sumarjono, M. Na'Im, and A R Pratama. 2021. Megalithic culture at the Suco Lor site Bondowoso. IOP Conference Series: Earth and Environmental Science 747: 012069 (11pp).
- [16] (Re-materialising the religious tourism experience: A post-human perspective) Re-materialising the religious tourism experience: A post-human perspective. Annals of Tourism Research 83.
- [17] (Savage, 2019) Savage, L. 2019. Religion, partisanship and preferences for redistribution. European Journal of Political Research 59.
- [18] (Tam and Lui, 2019) Tam, and Lui. 2019. Something More Than a Monument—The Long-term Sustainability of Rural Historic Temples in China. Religions.
- [19] (Wiebe, 2021) Wiebe, Joseph. 2021. CULTURAL APPROPRIATION IN BIOREGIONALISM AND THE NEED FOR A DECOLONIAL ETHICS OF PLACE. Journal of Religious Ethics 49: 138-58.
- [20] (Xue et al., 2009) Xue, X. M., H. Zhu, and X. Q. Tang. 2009. SPATIAL DISTRIBUTION AND EVOLUTION OF URBAN RELIGIOUS LANDSCAPE——A Case Study of the Protestant Churches in Guangzhou after 1842. Human Geography.