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GLOBAL GEOPARKS IN CHINA

Think globally, act locally

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Abstract

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Abstract

UNESCO Global Geoparks, as approaches that are led by local communities for the conservation of heritage that is of international value, are considered to be effective tools at the local level in achieving certain of the Global Sustainable Development Goals. China has the largest number of UNESCO Global Geoparks of any country in the world. These UNESCO Global Geoparks in China have greatly contributed to the development of geotourism in China, however, multiple designations and overheating in pursuing tourism and economic development can result in negative impacts in the development of these UNESCO Global Geoparks. Whether the three main focuses of the UNESCO Global Geopark, heritage conservation, education and local economic development, as defined by UNESCO are equally concerned in the establishment and development of UNESCO Global Geoparks in China is questionable. Furthermore, this research is also devoted to understanding the relationship of the spatial distribution of UNESCO Global Geoparks in China with the relevant socio-economical situations in the areas in question.

This study is conducted through the qualitative research approach with questionnaires. Two questionnaires were developed for two different target groups in order to collect data from two different perspectives. One target group is the representatives of Chinese UNESCO Global Geoparks. The other is university students of various fields in China. Both questionnaires were distributed remotely to the target groups, through a shared link to the corresponding Microsoft Forms online survey page for that questionnaire. The results indicate that most people in these two groups regard geological heritage conservation itself as the most important goal for Chinese UNESCO Global Geoparks. Responses in this research also suggest that the representatives of Chinese UNESCO Global Geoparks are more concerned with the improvement in education and raising public awareness, while similarly university students in China tend to believe that the largest challenge for Chinese UNESCO Global Geoparks is raising public awareness so as to minimize the negative impacts people would bring to the natural environment in the territory of these UNESCO Global Geoparks.

Keywords

Conservation, Education, Geopark, Global Understanding, Raising Public Awareness, Sustainable Development

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LIST OF ABBREVIATIONS

APGN	Asia Pacific Geoparks Network
CGN	Canadian Geoparks Network
EGN	European Geoparks Network
GGN	Global Geoparks Network
IGGP	International Geoscience and Geoparks Programme of UNESCO
IUCN	International Union for Conservation of Nature
JGN	Japanese Geoparks Network
MAB	Man and the Biosphere
UGGp	UNESCO Global Geopark
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

1 INTRODUCTION

The phrase "think globally, act locally" has been used in many different contexts. In environmental context, it refers to a principle under which mankind should give serious consideration to the condition of Earth while taking any actions in local communities in order to help protect local environments as they are small components of the planet (iePEDIA 2015). As Éric Darier and Ralf Schüle stated in an article that was published on an international journal of justice and sustainability, this phrase was one of the most popular slogans in those discussions about global climate change and it was always used as a reference for vivid illustration of a new global thinking in the 1970s environmental movement (Darier & Schüle 1999). Confronting environmental pollutions in all aspects at a local level has become more and more important, all the communities and inner-city neighborhoods should have the rights to live in an unsoiled environment, local policymakers need to respond to the global calls and take appropriate actions locally. Appealed in another article from the same journal many years later, other researchers further requested people, including both ordinary people and decision makers, to take local actions carefully when dealing with global issues (Gilderbloom et al. 2017).

Although the phrase is referred in scenes like urban planning and climate change in the context of environmental management much more often, realistic application rather than references of this new thinking can also be found in other environmental fields. In geological heritage conservation, for instance, proactive local actions towards a broader global thinking is considered to play a very important role, and thus is also encouraged to be adopted widely. UNESCO Global Geoparks, the bottom-up approach aiming to contribute to environmental protection, education and sustainable development of society, has been one of the very successful concrete applications of this phrase from the geologically environmental protection perspective.

Thanks to the properly designed evaluation and revalidation processes controlled by UNESCO, the UNESCO Global Geopark label has been proven to be very successful and gained huge popularity worldwide in recent years. As of April 2019, there are 147 UNESCO Global Geoparks all over the world (UNESCO 2019). About 1/4, to be exactly 39, of all these UNESCO Global Geoparks are geoparks in China. All of these Chinese UGGps were a Chinese National Geopark before the nomination and ratification. Establishing National Geoparks in China has started already since 2000, it is believed by researchers and governors in China that conserving and developing geological heritage sites by creating these National Geoparks can bring favourable socio-economic and environmental benefits and furthermore make a positive climate for their inclusion in the

Global Geoparks Network under the assistance of UNESCO (Zhao & Zhao 2003). In addition, some of these UGGps in China even have some more other designations such as National Nature Reserve and National 5A Tourist Attraction mainly for tourism promotion purposes. However, multiple designations for one single natural park from different governmental sectors can lead to confusion and complexity in the park management and often cause the paper park phenomenon (Wang 2007). Nowadays, most of these Chinese UGGps are still promoted at least with the extra National Geopark label alongside with the UNESCO Global Geopark label, some of them are even stamped with several more other labels. Multiple labels can benefit tourism development by attracting more visitors, but it could also bring negative impacts in conservation and development of these areas. The value-added label of UNESCO Global Geopark has driven the rapid growth and development of geotourism in China even further, however, overheating in pursuing tourism and economic development has also resulted in some inappropriate and even irreversible actions taken place in these heritage sites. Additionally, about 6/7 UNESCO Global Geoparks in China are located in the most well-developed south-east area of the country against the Hu Line. This fact, on the one hand, tells the urgency and importance of protecting natural environments in these areas. On the other hand, it also attracts attention to the significance in emphasizing education and raising public awareness in environmental protection in these areas.

As the definition of UNESCO Global Geopark suggests, natural and cultural heritage conservation is only one of the three main concepts and goals to be achieved. Enhancing public awareness on environmental protection and understanding social problems is one other important goal from the education viewpoint. Furthermore, sustainable development should benefit local communities in all aspects. The benefits of establishing UGGps in China are more often concluded as effective tools for heritage conservation and socio-economic development while raising public awareness on environmental protection and understanding social problems through education with the UNESCO Global Geopark concept are easily neglected. Thus, this study aims to find answers for the following questions:

1. Which aspect is most concerned when establishing a UNESCO Global Geopark in China? Conservation, education or local economic development?
2. Most UNESCO Global Geoparks in China are located in the south-east area of the country. Is there a relationship between the spatial distribution of UNESCO Global Geoparks in China and other socio-economical situations in their territories?

In order to support this study and find answers for the research questions above, a rich enough knowledge base will be built to familiarize the background and history of geoparks, different Geoparks Networks, the UNESCO Global Geopark status and UNESCO Global Geoparks in China. Thereafter, based on the qualitative research method, which will be used for data collection and analysis in this study, two questionnaires targeting two different groups, of which one is the representatives of Chinese UGGps and the other is university students in China, will be undertaken, and results will be drawn from the data collected. At last, discussions upon a few confusing terms, sustainable development and global understanding on environmental protection through the UNESCO Global Geopark approach will be given, whilst recommendations on several relevant topics for further research will be placed.

2 HISTORY OF GEOPARKS

2.1 The Origin of the Geopark Concept

Most research studies and academic writing agree that the concept of a geopark was initially developed and adopted in Europe in the late 1980's. Cheryl Jones, for instance, confirmed in an article entitled "History of Geoparks", that "…*the philosophy behind the Geoparks concept was first introduced at the Digne Convention in 1991…*" (Jones 2008). According to Jones, this new concept is to provide a new means to protect geological heritage, raise public awareness in environmental protection, while also promoting sustainable local development. It is also recognized as a bottom-up approach which is led by local communities in order to guarantee that significant geological features in the area can be protected and promoted, so as to fulfill objectives regarding the science, education and cultural aspects of local communities. Furthermore, sustainable local development is promoted through responsible geotourism development and other local economic activities. Thus, a geopark refers to a kind of territory in which there is geological heritage with outstanding value and relevant local parties are strongly willing to conduct a sustainable territorial development strategy thereafter, where both environmental protection and local economy development goals are achieved.

2.2 European Geoparks Network

After the original formation of the geopark concept in 1980s, a series of actions on geodiversity protection and conservation using this new concept have been taken in some European countries. One remarkable local move within this scope at that time is the establishment of the Gerolstein District Geopark from Germany aiming to protect geosites, foster geotourism and promote local development (Henriques & Brilha 2017). As more and more philosophical ideas were emerged into this concept during that few years, the idea of forming an international network of geoparks in order to elevate geological heritage protection to a new stage became even clearer. The result was the creation of European Geoparks Network in 2000 (EGN 2019).

In June 2000, during a ceremony witnessed by the representatives of the Greek government and the press, representatives of four geoparks from four different European countries (Reserve Geologique de Haute-Provence from France, Natural History Museum of Lesvos Petrified Forest from Greece, Geopark Gerolstein from Germany and Maestrazgo Cultural Park from Spain) signed the convention, which defines the usage of the European Geopark label, what criteria need to be fulfilled in order to obtain and use this label, what attributes the label possesses that could benefit relevant stakeholders, and so on.

Networking plays an important role in the improvement of the efficiency of collaboration by gathering all stakeholders together in order to exchange expertise, ideas and best practices. There were already many different networks established in Europe for different kind of purposes. For example, the Trans-European Transport Network, which was firstly adopted with action plans in 1990s, aims to provide coordinated transport infrastructure improvements to different kind of transportation modes across most of the European territories (European Commission 2019). The European Anti-Poverty Network is another example, it was established in 1990, and continues to fight against poverty and social exclusion in its areas of work in Europe (European Anti-Poverty Network 2019). The newly established European Geoparks Network, however, aims to ensure its members would bring sustainable territorial development to the geopark itself and beyond by primarily promoting the development of geotourism so as to make use of the geological heritage in their territory by exchanging best practices of own experience and cooperating with each other. As concluded in the official website of the EGN, therefore, the main goals of the EGN are protecting and conserving geological heritage and promoting sustainable development of local communities in the territory of its member geoparks through the communication and cooperation between geoparks inside the European region (EGN 2019).

By the year 2019, 74 geoparks from 24 European countries are members of the European Geoparks Network, and these member geoparks are also members of the Global Geoparks Network assisted by UNESCO, since the EGN is essentially the regional division of the GGN in Europe (EGN 2019).

2.3 Global Geoparks Network

The European Geoparks Network offered lessons and experiences in the field of geological heritage conservation and more, thus the idea of establishing a network across regions so as to meet sustainable development goals in each heritage sites with significant geological characteristics spreads out all over the world. Geoscientists and experts expressed specific interest in seeking supports from UNESCO so as to promote a geoparks programme at global level. In order to fulfill this vision, firstly, an initiative was approved to suggest that UNESCO should take certain actions to gradually promote a global network of geological heritage sites having significant geological features. And then, only one year after the establishment of the EGN, in 2001, UNESCO decided to begin its work with geoparks in a more global matter. After that, a feasibility study on developing a UNESCO geoparks programme has been carried out. The study at first concluded that geological heritage promotion has recognized a very important need, given the fact that there is now broad public awareness of the necessity for the conservation of nature, then it

recommends a geoparks activity to be developed by creating a “Geoparks seal of excellence” in the territory of all members of the World Network of Biosphere Reserves of the MAB (Man and the Biosphere) Programme (UNESCO 1999).

In 2004, under the auspices of UNESCO, representatives of 17 members of the European Geoparks Network and 8 Chinese National Geoparks gathered together at UNESCO headquarters in Paris and established the Global Geoparks Network (GGN 2019). As of April 2019, 147 geoparks in 41 Member States of UNESCO are currently members of the Global Geoparks Network.

Global Geoparks Network is a great way for taking geological heritage conservation worldwide to the next level, as it keeps working on gathering new expertise and knowledge from different cultures and areas all over the world, developing applicable models of best practices for all its members, and setting high quality standards for geological heritage sites that are willing to combine heritage conservation, education and sustainable local economic development together.

2.4 Other Regional Geoparks Networks

The very important role that networking has played in the success of the promotion of the geopark concept was recognized very soon, the GGN therefore encourages the creation of Regional Geopark Networks that include all the existing GGN members at a regional or continental level so as to coordinate GGN activities regionally for the exchange of information and cooperation between Global Geoparks and Global Geopark professionals in the region (Ramsay et al. 2016). A number of Regional Geoparks Networks at a national or continental level have been established later for such a purpose. Two other existing continental-level Geoparks Networks, in addition to the European Geoparks Network, are the Asia Pacific Geoparks Network and the Latin American and Caribbean Geoparks Network. The APGN, which was formed in 2007 with the support of UNESCO, consists of 57 UNESCO Global Geoparks in 8 countries across Asia and Oceania by 2019. The aim of the APGN is to provide all member geoparks a work platform to exchange experiences and conduct common strategies for heritage conservation and promotion in those areas through sustainable development (APGN 2011). The Latin America and Caribbean Geoparks Network, also known as the UNESCO Global Geoparks Network for Latin America and the Caribbean, was founded in 2017 and act as one regional network of the GGN in the South America area (Red Geolac 2019).

Some Member States of UNESCO have also expressed an interest in establishing Geoparks Network at national level. The Japanese Geoparks Network is one such

networking platform for the geoparks in Japan. In 2019, the JGN includes 9 UNESCO Global Geoparks in Japan and 35 Japanese National Geoparks (JGN 2019). The JGN brings all the geoparks and aspiring geoparks within Japan together, in order to promote the geopark concept in Japan, help heritage conservation and the growth of regional economies and communities in those areas. Canadian Geoparks Network is another Geoparks Network pursuing both heritage conservation and sustainable development for local societies at the national level (Canadian Geoparks Network 2019). The activities of the CGN are basically undertaken in the name of the Canadian National Committee for Geoparks which was established in 2009 mainly for the purpose of coordinating applications for UNESCO Global Geoparks from Canada.

2.5 Benefits of networking

The benefits are evident through networking all regional or global geological heritage sites together as the experiences and best practices can be shared between each other. Because meetings and conferences are held regularly by the management body of these networks, members of them thus communicate more frequently and collaborate more closely. The European Geoparks Network has kept its tradition of meetings long even before the EGN itself was officially established (EGN 2019). The European Geoparks Meeting, formerly known as the EGN – Coordination Meeting, was held three times a year in the first few years after the foundation of the EGN, it was later scheduled to be twice every year starting from year 2006. The European Geoparks Conference, originally named as the European Geoparks Annual Meeting, occurred every year at the beginning, it also changed its schedule to be held in each odd-numbered year after year 2006. The International Conference on Geoparks, recently known as the International Conference on UNESCO Global Geoparks, have taken place in each even year since the foundation of the Global Geoparks Network. These frequently operated meetings and conferences call for exchange of best practices and experiences from each member sites, they are also responsible for periodic review of relevant projects, criteria satisfaction evaluation and so on. Besides this, geoparks usually decide to sign cooperation contracts with each other during the conference or meeting session.

2.6 Beyond networking

Global Geoparks Network continues to expand year by year, it has enhanced the communication and cooperation between each of its member sites, and it also has become very important for UNESCO to get local communities involved in the Earth Sciences and world heritage conservation.

However, the limitation of this non-for-profit organization is that, although it provides sufficient support for its Member States to exchange ideas of best practices with each other and raises the quality standards for the geological heritage sites in its Member States, the international image itself of these geological heritage sites is not well known by the public, therefore the education aspect of geopark development is disregarded. The significance of geological heritage itself in these territories needs to be emphasized (Henriques & Brilha 2017). Thus, an urgency arose for creating a new label for these geological heritage sites, so as to express governmental recognition of the significance of heritage conservation, education and local sustainable development in the territory of all these outstanding geological heritage sites and landscapes, as well as to increase public awareness of the new image of each heritage site both locally and internationally. The creation of this new label, the UNESCO Global Geopark, was then settled by the ratification from the 195 Member States of UNESCO during the 38th session of UNESCO's General Conference in 2015 (UNESCO 2019). More about UNESCO Global Geoparks are explained in the following chapter.

3 UNESCO GLOBAL GEOPARKS

The Global Geoparks Network, described in the previous chapter, is a non-for-profit non-governmental organization which intends to bring cooperation and communications to its members so that they can exchange experiences and lessons learned with each other. The UNESCO Global Geopark, however, is essentially a new quality label, created lately in 2015 and thereafter awarded and systematically controlled by UNESCO. This label serves to express governmental recognition of the importance of heritage conservation, education, and local economic development in the territory of these geological sites and landscapes (GGN 2019). It is a means of international cooperation, by which conservation in areas of geological heritage of international value is conducted properly with a bottom-up approach. Public awareness in local communities where that heritage is found is raised and, furthermore, local sustainable development is promoted consequently in that area. In order to enhance cooperation and communications between each other, all UGGps are obliged to be a member of the GGN. In other words, 147 geoparks have entitled to the UNESCO Global Geopark label by far. Figure 1 below illustrates the number of UGGps varying by countries.

UNESCO Global Geoparks are "*single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development*" (UNESCO 2019). A UNESCO Global Geopark is not only about geological heritage conservation, the idea behind it is to achieve more than that. As some researchers have already pointed out, A UNESCO Global Geopark is not a new category of protected area, it is not the same as a geological park, it is not a statutory designation to protect geological heritage, it is also not just about geology (Henriques & Brilha 2017). The essential purpose of a UNESCO Global Geopark can be seen as establishing an ecosystem which consists of geological heritage resources and other local values in its territory, in order to link heritage conservation with educational and economic development, and furthermore back up heritage conservation by such educational and other local sustainable development activities. Firstly, by recognizing itself as a member entitled to use this new international label, a UGGp values its geological heritage resources, along with all other nature and culture heritage resources in the area, so as to increase public awareness and common understanding of key facts and problems that human society is facing. Thereafter, it encourages local people in believing that the area in which they live is of crucial importance and they should be proud of this area, by raising public awareness in local communities. As public awareness and common understanding is raised in local communities, the support added for heritage conservation is improved, more new jobs are created, more new businesses are attracted into local

communities through sustainable geotourism development. Local economic development is thereby advanced. Sustainable development of local communities in the territory of UNESCO Global Geoparks in turn gives more support to heritage conservation and education in environmental protection in that area.

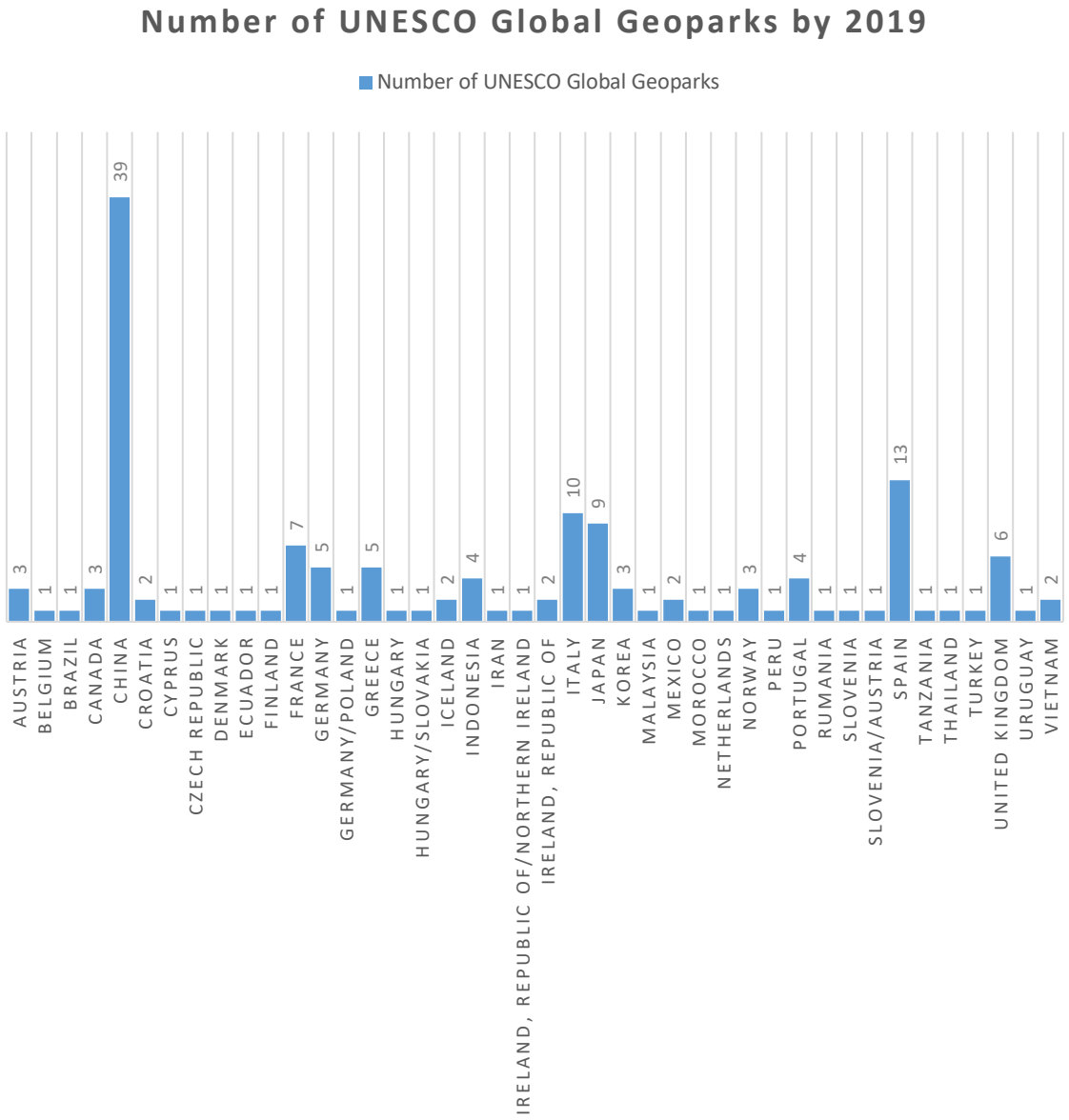


FIGURE 1. Number of UNESCO Global Geoparks in Each Country

3.1 Three focuses

To understand the “UNESCO Global Geopark” label even better, it is necessary to emphasize its three focuses: conservation, education, and local sustainable development.

3.1.1 Conservation

Earth geology and landscape have significantly influence on the human civilization, societies and even the whole biological diversity on the planet (UNESCO 2011). The landscapes and geological formations are not only primary witnesses of the evolution of the planet, they are also key determinants of the future development of mankind. Protecting and conserving these landscapes can be seen as protection and insurance of the future of humanity. Heritage conservation can also help local people to realize the importance of the territory and be proud of it, thus improve their education level within this context.

3.1.2 Education

Azman et al. (2010) believe that "*...education at all levels is at the core of the UNESCO Global Geopark concept…*". The promotion and development of UNESCO Global Geoparks also suggests that both researchers and other stakeholder groups in local communities should all raise awareness of the history and present conditions of the planet. Furthermore, the promotion of UGGps should cover not only geological heritage, but also the natural and cultural heritage of the area. Azman et al. (2010) further conclude on the topic of public education in heritage conservation that the level of public awareness and appreciation on the heritage value is one of the key success factors for sustainable conservation.

3.1.3 Sustainable development

Sustainable development is usually referred to as "*…development that meets the needs of the present while not compromising the ability of future generations to meet their own needs…*" (World Commission on Environment and Development 1987). In the geological context, this means the development of local communities in the geological heritage area can supply their needs in current period, without overtaking the resources of that geological heritage for future needs. It is important that sustainable development can be promoted and established in the global geopark territories, as it would help in protecting and conserving the geological heritage itself.

The UNESCO Global Geopark label is very beneficial to geological heritage sites all over the world, especially to those developing areas yet having no geopark. However, in order to become a UGGp, it does not only require application paperwork, but also ask for sufficient development of the geological heritage site itself. One quality standard amongst many others for applying a UGGp is that the designation area of representatives of heritage sites aspiring to be a UGGp should have been running as a de facto Global Geopark

for at the minimum one year. In the following section, the requirements for being a UGGp and other related topic will be described in detail.

3.2 Becoming a UNESCO Global Geopark

The UNESCO Global Geopark label has gained increasing popularity recent years and has been attracted by many geological heritage sites who have an interest in conserving heritage in their territories through a sustainable development way. Getting familiar with the application process and other related matters in how to become a UGGp can help to turn it into a success. In the following section, these topics are covered.

3.2.1 Before formal application

Preparation and planning are important in the process of applying for a UNESCO Global Geopark. An aspiring UGGp should have started the project several years before the formal application submission (UNESCO 2017). During the preparation, the aspiring UGGp needs to work on gaining advice from other UGGps as well as the Global Geoparks Network through discussions, exchange programmes and participation in international or regional Geopark meetings or conferences. The expression of interest should be documented and submitted through the official channel as stated in the Operational Guidelines for UNESCO Global Geoparks. As mentioned in the previous section, it is important that the aspiring UGGp can tell that the area applying has been operating as a de facto Global Geopark for no less than one year.

In addition to the expression of interest, the aspiring UGGp must certainly have geological heritage that is of international value in its territory. It should also have a management body that is legally existing and recognized under national legislation. The management body of the aspiring UGGp is responsible of providing a comprehensive management strategy that promotes sustainable development of local communities. Moreover, the visibility and accessibility of the aspiring UGGp should be improved to a certain degree through different media channels, such as a dedicated website, detailed map of the area, etc.

The designation of a UNESCO Global Geopark is only applicable to the Member States of UNESCO. Furthermore, the UNESCO Secretariat does not accept more than two “active” applications from one Member State at the same time, in order to make sure the geographical distribution of UGGps is in balance.

3.2.2 Formal application process

The submission of a formal application to apply for the UNESCO Global Geopark status should be made in between October and November of the year in question. The application includes the expression of interest submitted earlier and an application dossier along with six mandatory annexes. The application dossier on the whole should present general information of the aspiring UGGp, the location of the area, the main geological highlights and other relevant elements, the verification of UNESCO Global Geopark criteria and arguments for becoming a UGGp (UNESCO 2018). The mandatory annexes contain a self-evaluation document, an additional and separate copy of the section E 1.1 of the application dossier, an explicit endorsement of any relevant local and regional authorities and a letter of support from the National Commission for UNESCO or any other government body in charge of relations with UNESCO, a large-scale map of the aspiring UGGp, one-page geological and geographic summary of the aspiring UGGp and a complete bibliography of the area in Earth Sciences highlighting international publications.

The completeness and formatting correctness will then be verified by the UNESCO Secretariat before the geological section of the application is sent for a desktop evaluation by the International Union of Geological Sciences. A field evaluation mission will be carried out at the same time. Reports will be all sent to the UNESCO Global Geoparks Council for review, and the final decision-making is carried out by the Executive Board of UNESCO during its spring session. The success on becoming a UGGp will automatically make that UGGp a member of the Global Geoparks Network, the membership fee is paid annually, and the membership period will be four years (GGN 2016).

3.2.3 Revalidation process

The UNESCO Global Geopark label is not a lifetime guarantee for any UGGp. A revalidation process is undertaken every four years after a UGGp is established, in order to review the functioning and quality of that UGGp and decide whether its membership can be retained (UNESCO 2017). According to the guidelines provided by UNESCO, several reports and forms need to be submitted through the official channels to UNESCO before the actual revalidation. One year prior to the revalidation taken place, the UGGp under review should have already sent a one-page summary about the UGGp to the UNESCO Secretariat. Then three months prior to the field evaluation mission being carried out, the UGGp which is under inspection should submit a progress report, a self-evaluation report, and a progress evaluation form using the templates provided by UNESCO.

A field evaluation report will be generated after two evaluators revalidate the functioning and quality of the UGGp in a field evaluation mission. Based on this report, a UGGp retain the UNESCO Global Geopark label for another 4 years if all criteria are fulfilled, also known as a “green card", or it could be given a so-called “yellow card” and informed to take proper actions over a two-year period when some criteria cannot be satisfied. If problems still cannot be solved within the extended two years’ time, the UGGp will lose its membership as a UNESCO Global Geopark. This is called a “red card”.

This traffic-lights-based revalidation process ensures that the quality of the area applied as a UGGp will remain high, and the UGGp truly continues work as an effective tool for geological heritage conservation, other intangible heritage protection, education on global understanding and local sustainable development.

3.3 Showcases of UNESCO Global Geoparks in Europe

Many UNESCO Global Geoparks have continued to function at a high-quality level for a long time, they conserve unique and significant geological heritage that is of international value in their territories and provide a functional strategies of management plan at the meantime to keep themselves stay in the valuable UNESCO Global Geopark status. In the following sections, Lesvos Island UNESCO Global Geopark and Rokua UNESCO Global Geopark are presented in detail as showcases of UGGps in Europe.

3.3.1 Lesvos Island UNESCO Global Geopark

Lesvos Island UGGp, one of the founding members of both the European Geoparks Network and the Global Geoparks Network, is located in the third largest Greek island and mainly features with rare fossilized ancient trees that were formed by intense volcanic activities 15 to 20 million years ago (Lesvos Island UGGp 2019). Picture 1 below illustrates a fossilized tree trunk in Lesvos Island UGGp. As a witness of geological history in this particular area in the last 20 million years, the territory of the Lesvos Island UGGp is of significant value in environmental, geological and also paleontological perspectives.

PICTURE 1. Fossilized ancient tree trunk in Lesvos Island UGGp (Lesvos Island UGGp 2019)

Lesvos's success as a UNESCO Global Geopark is not only determined by its valuable world heritage to be conserved but has also been characterized by educational activities with schools and the support of local economic development. A Natural History Museum was built for all visitors to understand better about geological history and evolution in this area, educational programmes are organized for students to come and learn through different activities such as field observation and so on. Through geotourism and relevant activities, new opportunities for local stakeholders and other business parties are created in its territory. The Lesvos Island UNESCO Global Geopark pays special attention on the cooperation with women's argrotourism in order to promote local agriculture products with high quality (Lesvos Island UGGp 2019).

3.3.2 Rokua UNESCO Global Geopark

So far, the Rokua UNESCO Global Geopark is the only member of European Geoparks Network which is located in Finland. The Rokua Geopark joined the EGN in 2010, and has lately been entitled to the UNESCO Global Geopark label in 2015, when the label was created.

The Rokua UGGp, which is situated in Northern Finland, is promoted mainly through the Ice Age theme (Rokua Geopark 2019). The outstanding geology here tells the story about the unique bedrock laid in the territory of the UGGp that was formed during the Ice Age.

PICTURE 2. Rokua Geopark as a natural classroom (Rokua Geopark 2019)

The development in the Rokua UGGp has made the unique locally produced “Geofood” popular by combining geological heritage conservation and agricultural heritage conservation together. The Rokua UGGp’s operation with local business and local companies made it possible to enforce the idea of “UNESCO Global Geopark companies” so as to grow their businesses with respect to the conservation of the heritage sites. The close collaboration with local schools and other educational institutions also sets up many “UNESCO Global Geopark schools”, letting them properly use the UNESCO Global Geopark itself as the natural classroom for teaching lessons and organizing workshops, as shown in Picture 2 above.

The Rokua UGGp has actively cooperated with many other UNESCO Global Geoparks all over the world. Four of them are Chinese UGGps which are Qinling Zhongnanshan UGGp, Yantangshan UGGp, Funiushan UGGp and Yuntaishan UGGp. The Rokua UGGp also strongly collaborates with Schwäbische UGGp from Germany, Sesia Val Grande UGGp from Italy, as well as Chablais UGGp from France nowadays (Rokua Geopark 2019).

3.4 The Present and the Future

In the past few decades, quite many geological heritage sites that are of international value, from both developed and developing countries, have been ratified as UNESCO Global Geoparks and joined the Global Geoparks Network. There are now 147 UNESCO Global Geoparks in the whole world. As the UNESCO Global Geopark concept spreads into other parts of the world, there will be more enthusiasm to join up with the will to conserve geological heritage in their territory and promote economic sustainable development at the same time. What local actions towards a global thinking each communities of the human society have taken, what the future members of the Global Geopark Network can learn from the lessons that have already learned, these are things to be highlighted. While the “UNESCO Global Geopark” label provides an effective tool for geological heritage conservation and local community sustainable development, it also emphasizes the importance of raising public awareness in environmental protection with regard to the education aspect. China is one of the forerunners in adopting this new tool, and thus is also a good example for others to learn from its experiences. In the next chapter, the situation of UNESCO Global Geoparks in China will be given.

4 GLOBAL GEOPARKS IN CHINA

China has been very active in promoting the concept of geoparks so as to conserve geological heritage and raise public awareness in environmental protection. This can be seen from a series of past occurrences in which China was positively involved and played an important role. One such occurrences is the establishment of the Global Geoparks Network. The Global Geoparks Network initially comprised 8 members of the National Geoparks Network of China as well as 17 members of the European Geoparks Network. The very first International Conference on Geoparks that was then held in June 2004 in Beijing, the capital city of China, is another historical event which conveyed a message to the rest of the world that China has a strong will in the promotion of the concept of geoparks. As a consequence of such an active and positive attitude towards promoting the concept of geoparks, by the time of writing, China has the most UNESCO Global Geoparks established of any other country on Earth. The very first International Conference on Geoparks was of crucial importance. At this meeting, firstly all interested parties exchanged their ideas and point of views during the discussion on what the geopark concept was exactly about; secondly, a declaration aiming to promote, stimulate and expand the geopark concept into more places throughout the world was accepted; lastly, a further step was taken between the European and Chinese members of the Global Geoparks Network, the agreement between these two parties encourages a one to one paring partnership between two member geoparks from each side in order to foster cooperation and exchange experience, knowledge and information (McKeever & Zouros 2005).

4.1 Contributions to the GGN from China

The establishment of the GGN was a good sign in the perspective of providing an efficient way for local economic development promotion as well as world heritage protection. It encourages many Chinese National Geoparks in becoming aspiring UNESCO Global Geoparks, and then UNESCO Global Geoparks. As shown in Figure 2 below, after the 8 National Geoparks' initial joining into the GGN in 2004, 4 other Chinese National Geoparks were ratified as GGN members in 2005, 6 new members of the GGN in the year of 2006 are from China. Between the years 2008 - 2015, almost every year the Global Geoparks Network welcomed two new Chinese members, with the exception of the year 2012, in which only one joined the network. It is also noticeable that there were two more new Chinese members in each year after 2017.

FIGURE 2. Number of New GGN Members from China in Each Year

In total, up until 2019, there are 39 UNESCO Global Geoparks located in China. As already illustrated in Figure 1 in the previous chapter, China dominates the statistics by having the largest number of UNESCO Global Geoparks among all member states in the Global Geoparks Network. The number of Chinese UNESCO Global Geoparks keeps growing year by year.

China's continuous contribution to the Global Geoparks Network is certainly derived from the rapid development of National Parks and geotourism in China. Zhangjiajie National Forest Park, the first National Forest Park that was established in 1982, turned out to be a forerunner in the large scale establishment of different kinds of National Parks (Wang et al. 2012). All these National Parks are established and developed in accord with the requirements and criteria that are defined by "Guidelines for Applying Protected Area Management Categories" (Dudley et al. 2008) that was published by IUCN (International Union for Conservation of Nature). As illustrated in Table 1 below, amongst other types of National Parks, by the year 2018, there were already 270 National Geoparks established, including 212 approved sites and 58 pre-qualified sites (Chinese Academy of Geological Sciences 2018).

TABLE 1. Different kinds of National Parks in China

Type	**Quantity**	**Ratified by**
National Forest Park	898	National Forestry and Grassland Administration
National Nature Reserve	474	State Council
National Geopark	270	National Forestry and Grassland Administration
National Wetland Park	898	State Forestry Administration
National Mining Park	88	Ministry of Land and Resources
National Ecopark	18	State Forestry Administration
National Water Park	832	Ministry of Water Resources
Total	3478	

4.2 Classification

Differing from other types of parks, geoparks should usually be of geological significance. However, most of the time, the geological significance is not recognized at the very beginning of the development of the natural areas for environmental protection. This phenomena is even more evident in China, as most of UNESCO Global Geoparks in China are developed from existing National Geoparks, and these National Geoparks in China were mostly developed on the base of existing National Parks and National Scenic Areas (Ren et al. 2013). Furthermore, researchers also found that the varied range of landforms in China represent the natural environments and landscape forming process in the country and are of interest locally and internationally (Yang et al. 2011). It is the unique geological significance in each UGGp that differentiates this geopark itself from all others. Thus, knowing the geoheritage categories, classification and major features of each UGGp in China, can help to better understand what designation purposes they fulfill as well as the unique international geological value they possess.

Moreover, one natural area may contain more than one geological feature, since most elements on Earth are interrelated. Wudalianchi UNESCO Global Geopark represents one example of this kind, the volcanic landforms in its territory were formed after the eruptions of several volcanoes during the 1970s, and they are the features of major geological significance in this area, however the place is renowned mostly for the waterfalls and lake

views and “Wudalianchi”, the name of the place, means “Five big interconnected lakes” in Chinese. Huangshan UNESCO Global Geopark is another example, Mesozoic granite landscape in its territory is the main geological characteristic for this UGGp, but Huangshan Mountain is recognized as a place of interest mainly for its “5 Wonders of Nature”: spectacular rocks, peculiar pines, cloud sea, hot spring and winter scenery (UNESCO 2019). Therefore, distinguishing the major geological features of each UGGp in China through the classification using different geoheritage categories is also helpful in getting familiar with the main task of geological heritage conservation these UGGps should focus on.

There are many different classification methods for geoparks depending on the perspectives from which researchers approach it. In a more recent article entitled “A Study on Classification and Zoning of Chinese Geoheritage Resources in National Geoparks”, Luan et al. (2016) argued that currently most classification methods in the geology field only focus on either material composition or formation cause. The authors thus provided a new method for geoheritage classification that is based on both the cause of formation and the factors that support the reason for protection. According to this geoheritage classification method, geoparks in China can be classified into seven different categories. These seven categories are: geological sections, geological structure, paleontology, mineral and ore deposits, geomorphological landscape, water landscape, and environmental geoheritage landscape. Luan’s method gives clear information about the major cause of the formation of each geological heritage, as well as the factors why the geoheritage in question deserves special conservation. In this text, thus, this new intuitive classification method is used to illustrate the different types of UNESCO Global Geoparks in China. Listing of the classification of all UNESCO Global Geoparks in China can be found with detailed information of major features of them in APPENDIX II.

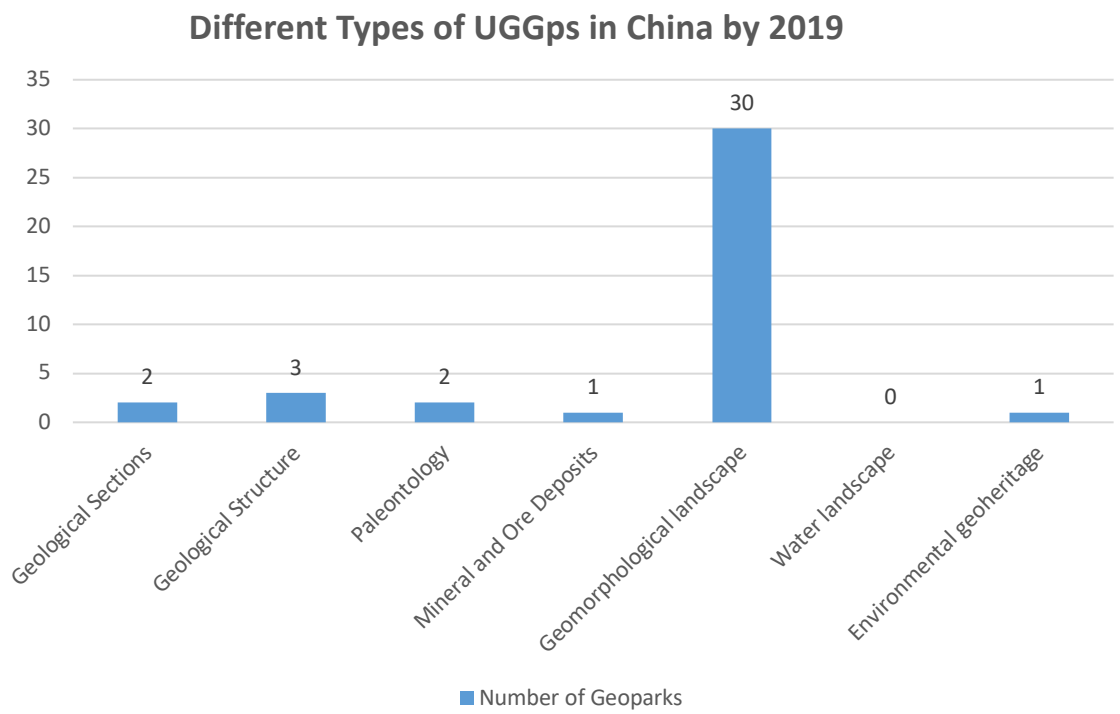


FIGURE 3. Different Types of UNESCO Global Geoparks in China

Figure 3 above illustrates how many UNESCO Global Geoparks in China there are in each of the seven geoheritage categories. As it can be seen, most of them fall into the category of geomorphological landscape. In the following text, however, each category is explained in more detail.

4.2.1 Geological sections (body and formation)

A major feature of geoparks in this category is the rich stratigraphic sections that show the history and evolutionary development of the planet. Songshan UNESCO Global Geopark and Wangwushan-Daimeishan UNESCO Global Geopark are the two Chinese UNESCO Global Geoparks of the stratigraphic features classification. Both of them are located in the same province of China, Henan Province. Henan Province, which is located in the central part of China, is also well known as the birthplace of Chinese civilization. Picture 3 below captures the Shuce Cliff of Mount Song in Songshan UGGp. “Shuce” means books in Chinese, it is intended to indicate that the appearance of the cliff has the appearance of books on a shelf. The upright fold was formed about 1.8 billion years ago by an intense orogeny called the Zhongyue Movement.

PICTURE 3. Shuce Cliff, a landmark of Mount Song, Henan, China (Ding 2018)

4.2.2 Geological structure

Geological structure tells what crustal movements have occurred on the surface of Earth. There are three UNESCO Global Geoparks in China in this category. One of them, the Funiushan UGGp, is also located in Henan province. Qinling Zhongnanshan UGGp, the sister-geopark of Rokua Geopark, which is the first UNESCO Global Geopark in Finland, is located in Shaanxi province, which is also in the central part of China and is next to Henan province. Picture 4 below is an autumnal view of mountains in Qinling Zhongnanshan UGGp. The third one, however, Alxa Desert UNESCO Global Geopark, is in Inner Mongolia.

PICTURE 4. Autumn view of Qinling (Qinling Zhongnanshan Geopark 2012)

4.2.3 Paleontology

Two UNESCO Global Geoparks are well developed for paleontological research particularly in China. Zigong UNESCO Global Geopark has become famous already since the extensive dinosaur fossil excavations during the 1980s. Picture 5 below presents an on-site view of a dinosaur fossil in Dashanpu, a geological site located in the territory of the Zigong UNESCO Global Geopark. Yanqing UNESCO Global Geopark, however, features both dinosaur footprints and abundant silicified woods formed in association with the Yanshanian movement during the Jurassic Period.

PICTURE 5. Dinosaur Fossil in Dashanpu (Zigong UNESCO Global Geopark 2018)

4.2.4 Mineral and ore deposits

National Geoparks in China that are mainly characterized by mineralogical and ore resources are relatively rare. Keketuohai National Geopark was the only National Geopark of this kind by 2015, according to a recent research study on classification of geoheritage resources in Chinese National Geoparks (Luan et al. 2016). This geopark is located in the far northwest of China in Xinjiang Province. Due to its geological significance and conservation importance, in 2017, Keketuohai National Geopark was ratified as a Global Geopark by UNESCO.

4.2.5 Geomorphological landscape

As shown in Figure 3 above, most UNESCO Global Geoparks in China are mainly featured with geomorphological landscape. A total of 30 of the 39 UNESCO Global Geoparks in China fall into this category. This category can be further divided into 6 sub-categories. These sub-categories are Danxia landform, karst landform, volcanic landform, tectonic landform, Yardang landform, and glacial landform. As can be seen from Figure 4 below, karst landform, volcanic landform and tectonic landform are the three major

geomorphological features in UNESCO Global Geoparks in China. Dunhuang UNESCO Global Geopark is the only geopark having Yardang landform geomorphological feature.

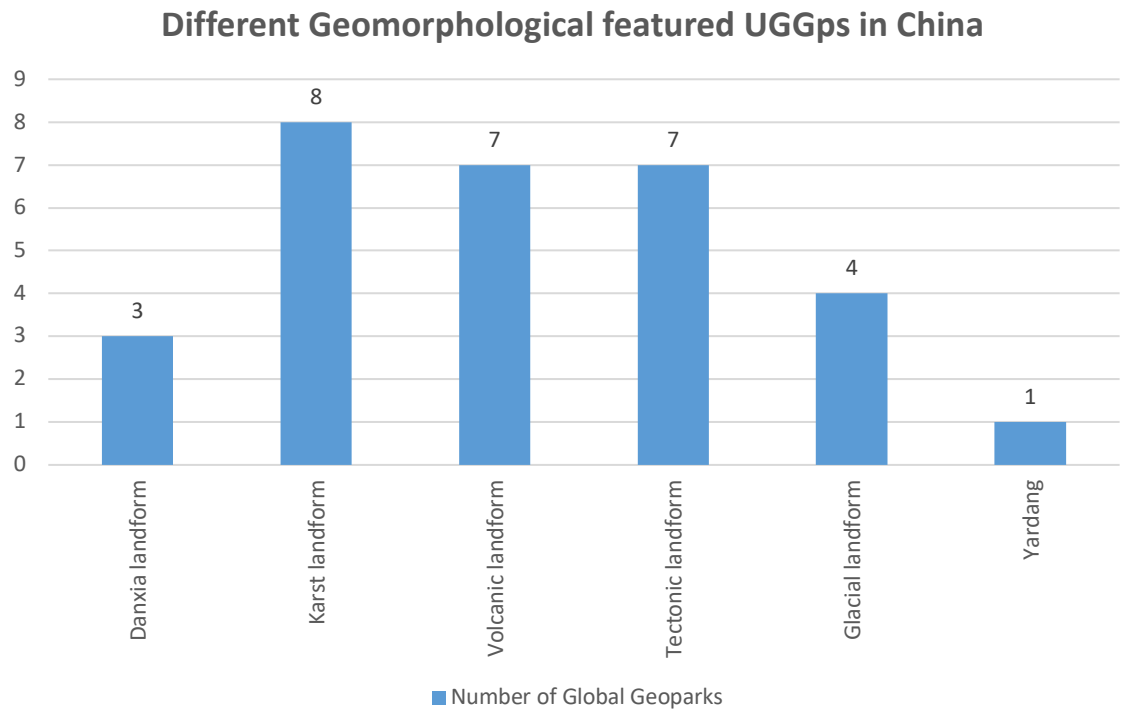


FIGURE 4. Different Geomorphological Featured UNESCO Global Geoparks in China

4.2.6 Water landscape

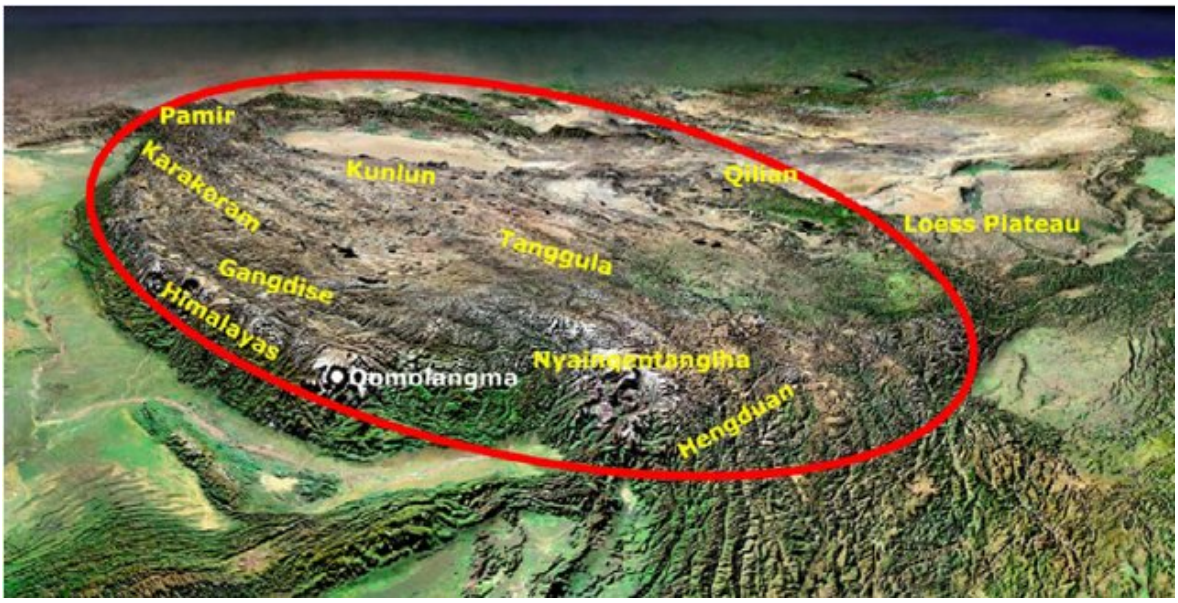
There are over 10 National Geoparks featuring water landscape (Luan et al. 2016). According to Luan et al. (2016), these National Geoparks are mainly located alongside the two biggest rivers in China, the Yangtze River and the Yellow River, with very different and unique geological heritage types depending on the rainfall and topographic characteristics. However, none of them is further ratified as a UNESCO Global Geopark. Some of these National Geoparks with water landscape features are very outstanding and have been attracting a large number of visitors for years. For example, the Jiuzhaigou National Geopark located in Sichuan Province, has been designated as a National Geopark already since 2004.

It is unclear why these National Geoparks have never applied for the designation of UGGp, but one recent research study on water in descriptions of all UNESCO Global Geoparks may offer an explanation to this phenomenon in certain cases (Ruban 2019). In

this research, Ruban found that over 35% of the Chinese UNESCO Global Geoparks actually have either specified water object(s) in their official description or included water object(s) in photos presented in their official description. But Ruban further indicated that the content inclusions of water object(s) in the official description of these Chinese UGGps are primarily for aesthetic reasons, because only 30% of these UGGps actually contain water object(s) which can be considered to be relevant to geological heritage in their territory. Ruban thus outlines that UNESCO Global Geopark designation for "…*full-scale consideration of water objects and total rejection of non-geological landscape elements*…" is not recommended, and he further suggests that designation for water heritage might need to be reconsidered differently if the hydrological features are totally unique and different from the geological features.

4.2.7 Environmental geoheritage

National Geoparks with environmental geoheritage landscape in China are mainly distributed in the western part of the country, especially on the Tibetan Plateau. The Tibetan Plateau and the mountains surrounded its edges is also well known as the Third Pole scientifically (Qiu 2008). Outside of the two polar regions, the most snow and ice on Earth are located in this region. This region is also the main source of over 10 major rivers in Asia. The Yangtze River and the Yellow River, the two biggest rivers in China, both originate from this region.



PICTURE 6. The Geographical Location of the Third Pole (Yao et al. 2012)

As shown in Picture 6 above, Kunlun and Qilian mountains are the northern edges of Tibetan Plateau. Due to the importance of mountain systems and geological heritage that reflects the evolution history of the planet, Mount Kunlun UNESCO Global Geopark plays an important role in geoheritage conservation in this region.

4.3 Spatial distribution

Although the topography of China is fairly complicated in general, it is widely known that the terrain in China is terraced and it descends in three main steps from the west to the east. From this perspective, some Chinese researchers suggest that there are coincidences between the spatial distribution of Chinese National Geoparks and natural geological conditions in the three-steps of China's terrain (Wang et al. 2014). As UNESCO Global Geoparks in China are all upgraded from Chinese National Geoparks, the same coincidences can be found between the spatial distribution of UNESCO Global Geoparks in China and the three-steps terraced geological characteristics of China’s terrain. From another perspective, in particular, from the human activity perspective, coincidences between the population distribution of China and the spatial distribution of UNESCO Global Geoparks in China are evident as well.

Back in the year of 1935, Chinese demographer Hu Huanyong published one article concerning the distribution of population in China (Hu 1935). In this article, he divided China’s terrain into two nearly equal parts by drawing an imaginary line which links two cities: Aihui (named Heihe later) in Heilongjiang Province and Tengchong in Yunnan Province. This imaginary line later became well known as the Hu Line internationally. Most Chinese geologists and researchers in other relevant fields regard the Hu Line as one of the greatest geographical discoveries in the country, and almost all socio-economic relationships with the Hu Line have remained in the same relatively steady situation over the last 80 years (Qi et al. 2016). As of 2015, still only about 6% of the whole population inhabited in the north-west part against this imaginary line, while 94% of the whole population is crowded into the south-east part of the country.

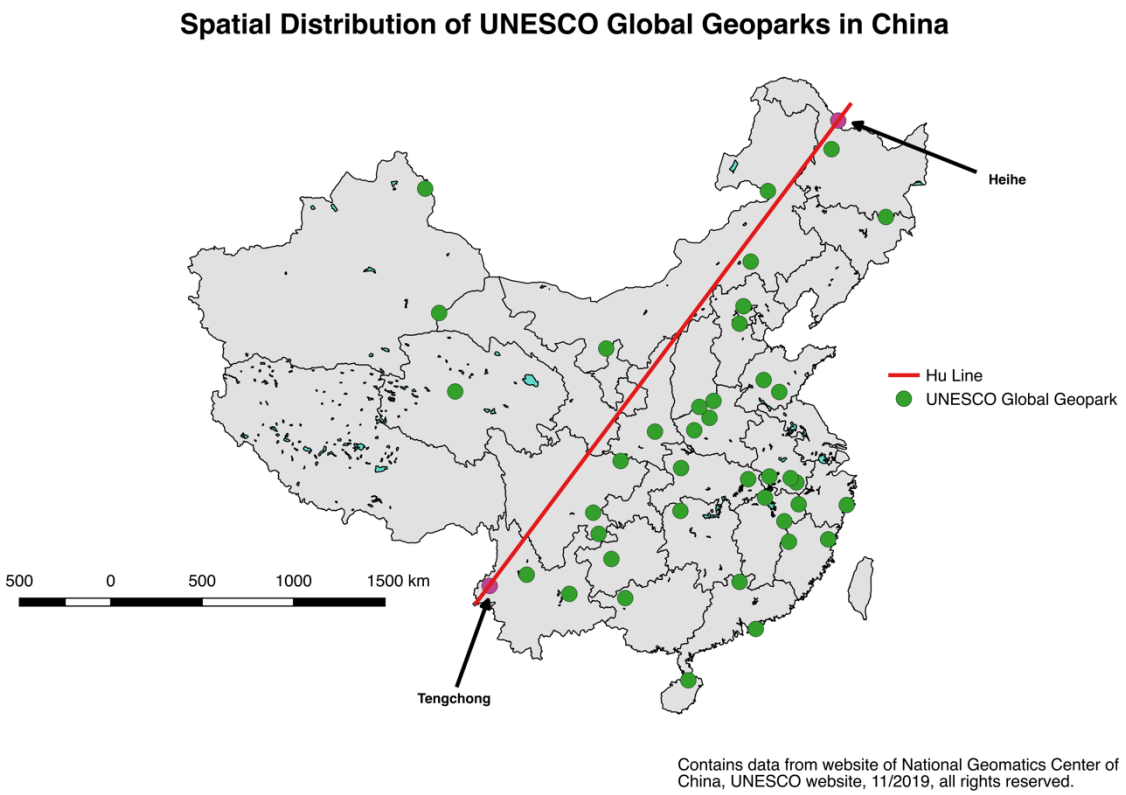


FIGURE 5. Spatial Distribution of UNESCO Global Geoparks in China

The Hu Line can be used to illustrate many other imbalanced relationships between the natural environment and human activities in China. In addition to the distribution of population, the Gross Domestic Product (GDP) ratio of north-west area to south-east area against the Hu Line is about 4:96. Similarly, cities and infrastructures are mostly well developed in the south-east area, while the north-west part of the country remains relatively rural and undeveloped. As illustrated in Figure 5 above, the spatial distribution of UNESCO Global Geoparks in China coincidentally overlaps with the distribution of population and the economic development tendency in China. Only 5 UNESCO Global Geoparks are distributed in the north-west area, while 34 of them are located in the densely populated south-east area.

4.4 Concerns

The continuous contribution of UNESCO Global Geoparks from China has not only added significance to the development of UGGps throughout the world, but has also driven the development of geotourism and geological heritage conservation in China even further. However, almost all of these Chinese UGGps were and still are also Chinese National

Geoparks, some even possess several more other designations mainly for tourism promotion purposes. Multiple designations can bring many positive benefits to the development and protection of the heritage sites, it can also lead to confusion and be misleading for different parties and stakeholders involved in site management work.

As defined, a geopark should always be of geological significance. Geological significance can be classified using different classification methods. From the perspective of both the cause of formation and the factors that support the reason of protection, there can be seven different geological significance categories for the classification of National Geoparks in China. Due to the fact that almost all Chinese UNESCO Global Geoparks were and still are Chinese National Geoparks, as mentioned previously, the same classification method can be applied to UGGps in China. While dividing UGGps in China into different categories using this classification method, interesting findings show most of the Chinese UGGps are of geological significance with geomorphological landscape, but none of them are of geological significance with water landscape as mentioned earlier in this chapter.

The category of geomorphological landscape can be further divided into six subcategories, and observation shows that most of them are of either Karst landform or Volcanic landform. Such kinds of geomorphological landscape are mainly found on the south-east part of China. This is also one of the reasons why most of UNESCO Global Geoparks in China are distributed spatially on the south-east part of China.

The imbalance of the spatial distribution of population and of the economic development tendency in China in relation to the imaginary Hu Line has existed for many decades and the situation has remained the same way over years. Research study on the spatial distribution of UNESCO Global Geoparks in China illustrates that imbalance of the spatial distribution of UGGps in China coincidentally overlap with that of many other socio-economical situations. However, what aspect is mostly concerned when establishing a UNESCO Global Geopark in China, whether the imbalanced spatial distribution of UNESCO Global Geoparks in China is in turn favourable to the development and conservation of these geological heritage, these are questions to be answered.

In order to find answers to these research questions, in the following chapter, the methodology used for data collection in this study, and its reliability and validity are described in detail. In brief, two different questionnaires were designed to target two different groups of people in order to collect data from two different perspectives, questionnaire-based online surveys using Microsoft Forms were then carried out, and the answers were later collected for interpretation. Although questionnaires as a research method has drawbacks,

the reliability and validity were checked regularly at each stage of the research process in this study.

5 DATA AND METHODS

Although the most suitable research format to adapt in a research process can be difficult to distinguish, in order to identify the research problem and thereafter test out the feasibility of a solution to that research problem, and furthermore challenge the traditional belief of absolute truth, an exploratory research stage and empirical research are usually conducted. Depending on the nature of the research topic and the research questions accordingly, common approaches for the empirical research design are the qualitative research methodology, the quantitative research methodology and the mixed method of both approaches (Williams 2007). According to Williams, qualitative research refers to a scientific method that requires observation and collection of non-numerical data in order to help researchers to explore and better understand the complexities behind a phenomenon, while quantitative research is more about providing an objective measure of study with numerical data through some statistical methods. As the nature of research in this study is about understanding the phenomena of the establishment and development of the UGGps in China, the research method chosen for this study is the qualitative research method through questionnaires. Two questionnaires were designed in order to collect the data from two different perspectives. One questionnaire was designed for the representatives of Chinese UNESCO Global Geoparks, so as to collect the data that is seen from the inside of the UGGps in China, the other was distributed to university students in China for the purpose of obtaining a point of view from the outside of the UGGps in China. These two questionnaires can be found in the appendices of this paper.

5.1 Questionnaire design

Designing a suitable questionnaire is very difficult, thinking of what questions should be asked and what groups of people should be targeted for the questionnaire is also not easy. A well-designed questionnaire should always meet the research objectives, it should contain as complete and accurate information as possible, the structure of it should make it easy for the respondents to follow and give the most appropriate answers, and it should retain the respondents' interests in the topic concerned (Crawford 1997). As Crawford (1997) indicates, there are nine steps involved in the development of a questionnaire. These steps are: deciding the information required, defining the target respondents, choosing the method(s) of reaching the target respondents, deciding on question content, developing the question wording, putting the questions into a meaningful order and format, checking the length of the questionnaire, carrying out a pre-test for the questionnaire, and developing the final survey form. Similar steps have been taken in the design and development of the questionnaires for this paper. The author took two months' time to think

through as many aspects as there could be, and with the assistance from Paul Carroll and Eeva Aarrevaara, tutor teachers of the author, two questionnaires are finally formalized.

Although it took a lot of time and energy to accomplish the questionnaire design, the journey from start to finish was full of experiences and lessons learned. Bearing in mind the research topic to be covered, figuring out the target groups for the questionnaire or questionnaires should always be the first step, which can therefore point out the direction for the development of questions. Starting with a small list of questions which come to mind makes things easier, these draft questions can be then refined and reordered with better wording and meanings afterwards. How the questions are asked can affect the final results in the answers from the respondents a lot. People tend to prefer quick ticks on multiple-choice questions over long text open-ended questions that they need to think more and then write down. The questionnaires designed in this study are both composed with a list of 10 questions, of which 9 are multiple-choice questions and the final one is an open-ended question for free answers.

5.2 Target groups

As mentioned above, defining the target group or target groups for questionnaires is of critical importance because it can then lead the development of the questions into different directions. In this study, two target groups are chosen for the purpose of looking into the research questions in two totally different viewpoints. One target group is the representatives of all Chinese UNESCO Global Geoparks. The primary intention of having this target group is to know what opinions there are from the perspective of an insider. The other target group chosen is university students of various fields in China. In designing a questionnaire specifically for this target group, it was mainly aimed to find out the popularity of the UGGps in a group of people at higher educational level, what the objectives and challenges of a UGGp are in their opinions, and so on.

5.2.1 Representatives of Chinese UNESCO Global Geoparks

The management of a UGGp is one of the many very important aspects for a UGGp. As stated in the latest UGGp Application Dossier from UNESCO, "… *UNESCO Global Geoparks are managed by a body having legal existence recognized under national legislation. This management body should be appropriately equipped (finances, staff) and should include all relevant local and regional actors and authorities (organigram)…"* (UNESCO 2018). Representatives of Chinese UNESCO Global Geoparks are the key staffs in the management body of these UGGps, thus their opinions towards the current and future development of these Chinese UGGps are of importance. There are 10

questions in total given in the questionnaire for this target group. These questions are mainly concerning the management of the UGGp itself, the development of geotourism and local economics in the territory of the UGGp, as well as the goals and challenges in the present and for the future.

5.2.2 University students in China

University students in China represent the best educated group of people in the country, who could be expected to have a sufficient knowledge base about the functionality and conditions of the planet and common sense in environmental protection and other matters. The opinions about the conservation of geological heritage from the point of view of university students could be expected to provide information about the state of the education on this topic in China in general, thus further supporting this study in its research question about whether the educational aspect of UGGps is equally balanced and considered in the establishment and development of UGGps in China. Similar to the questionnaire for the other target group, this questionnaire also contains 9 multiple-choice questions and 1 open-ended question.

5.3 Means of data collection

The next step taken after finalizing the questionnaires themselves is to find a proper way to reach the respondents in order to collect the answers from them. The people in the target groups of the questionnaires for this study are basically all residents in China, and it is hard to reach each of them in person. And besides, sending paper copies of the PDF or Microsoft Word version of the questionnaires can be time consuming and inefficient for both data collection and data analysis.

Online survey tools have overcome these difficulties by providing remote access to the survey services and visualization of the responses for data analysis. Microsoft Forms is one of these useful survey creators, and it is used for this study. Both questionnaires were rebuilt with Microsoft Forms, so that respondents could reach them easily on the Internet via a shared link. The ability to export the answers into Microsoft Excel from Microsoft Forms and the data visualization for the answers collected on the Microsoft Forms website also improve the efficiency and correctness of data analysis.

In order to reach the representatives of all 39 Chinese UGGps, email addresses were collected at first from the UNESCO official website for each of these UGGps. Thereafter, by writing a small piece of Python script as shown in APPENDIX VII and then executing it, emails with the shared link to the Microsoft Forms survey page of the corresponding

questionnaire for the representatives of Chinese UGGps were sent all at once to these 39 addresses. One result of this mailing activity is that one email could not be delivered, because the corresponding email address could not be found, while the other 38 emails were delivered successfully. Compared to the number of emails sent, the number of replies received for the survey was relatively low. Only 13 answers were received, even after one extra email reminder was provided.

The questionnaire for university students in China was distributed to university students, located in three different places in China, using the Chinese popular social networking app known as WeChat. These three groups of university students have different educational backgrounds and knowledge levels about geology. With the help from Professor Cheng Xiaoying from Jiangnan University, 37 answers were gathered from university students in Jiangnan University. This group of university students from Jiangnan University all have geology background, as it is related to the studies what they learnt in the university. The second group of university students is a group of students who had already graduated from Southwest Petroleum University. They do not have a geology background, but most of them currently work in a petroleum related field, and thus know a lot about the planet as a resource provider. There were 96 students in this group, but only 26 of them answered the questionnaire. The last 38 answers were collected from a total of 126 university students who have various backgrounds and know quite little about geology.

5.4 Reliability and validity

Reliability and validity are important for evaluating the quality of a research study. Reliability is referred to as the ability of research to yield the same results consistently by repeating the same research process using the same research method; while validity is concerned with the truthfulness and accuracy of the results, and refers to the extent to which a research method measures what it is supposed to measure (Brink 1993). As indicated by Brink (1993), although many other qualitative researchers prefer using terms such as trustworthiness, credibility, consistency and applicability rather than reliability and validity when evaluating a qualitative research, reliability and validity are key terms that determine the difference between good and poor research in every case. Brink (1993) also believes that there are four major risks to the reliability and validity of a qualitative research study. These four sources of error are the researcher, the participants or participating subjects, the social circumstances of the participants and the method using in data collection and analysis. In the following section, reliability and validity of this research in accordance with these four sources of error are explained in detail.

In order to collect data for this research, two questionnaires are designed for two different target groups for the purpose of obtaining different perspectives. However, questionnaires as a research method has many downsides, although it can help to gather enough sampling data. The drawbacks of questionnaires as the method for data collection can be big risks to the reliability and validity of qualitative research if they are not taken into consideration carefully throughout the questionnaire design and development process. A low response rate, a lack of in-depth details in the data collected and disregarding of the significance of the data collected are considered as three major disadvantages of a questionnaire and thus introduce sampling bias into the study (Kelley et al. 2003). To increase the low response rate, for instance, one or more extra email reminders can be sent, as was done for the data collection in the questionnaire for the representatives of Chinese UGGps in this research. Kelley et al. (2003) also suggest that 65% is not a defined level, but an acceptable and achievable response rate for self-completion questionnaires. Considering that there are in total 259 university students who have participated in the survey for the questionnaire for university students in China in this study, the response rate is still fairly low since only 101 answers are gathered at last.

There are some other disadvantages in using questionnaires as the method for data collection in a research study. Firstly, it is impossible to guarantee the honesty of the answers received, especially when the questions being asked are sensory, it is highly likely that different answers will be given in different circumstances. Secondly, there can be mismatching between the understanding of questions by the participants and the interpretation of answers by the researcher. While the researcher, as the designer of the questionnaire, will have built a sufficient knowledge base upon the topic before developing the questions, the knowledge on the same topic may vary amongst all the respondents. Thirdly, depending on how much time a participant is willing to take to answer the questionnaire, some questions can be easily neglected by the respondents without deep thinking. Furthermore, accessibility issue can be a big barrier especially for an online survey. Although this era is a modern digital information age, as Manuel Castells states in one of his books (Castells 2010), accessibility issues such as no Internet connection, insufficient infrastructure for computer access, hardware or software problems and other kinds of obstacles for online activities still exist. Likewise, there can be many different reasons why about 2/3 of the Chinese UGGps did not answer the questionnaire for the representatives of Chinese UGGps in this study regarding the disadvantages of questionnaires as a research method. Although some of these participants might simply have had no time for doing a survey, it is more than likely that even though they had time to read the email, they might think that it is malware or a spam message in the link in that email. Or perhaps

it was just because the mailbox provided has not been checked for a while for some reason, but most likely it could be that there are some accessibility issues in checking that mailbox on a regular basis. Accessibility issues for online surveys represent one big disadvantage of questionnaires as a research method, as mentioned earlier.

The social circumstances of the participants when data are collected can influence the reliability and validity of a qualitative research as well, as Brink (1993) suggests. In the case of this study, the questionnaire for the representatives of Chinese UGGps was sent by email separately and privately to each of these representatives, while the questionnaire for university students in China was spread through a social networking app in group chats publicly. Some of the participants may also take things like privacy, their job roles and responsibilities to certain opinions into consideration when they are participating a survey. Such kinds of context can possibly result in differences in responses. Special attention should be paid to it in order to reduce the effects of any possible bias.

The participants themselves have also been considered as risks to the reliability and validity of the research they are involved in. As Brink (1993) indicates, the participants would either try to please the researcher by giving responses they believe the researcher would expect or fear to provide honest opinions or negative answers in the questionnaire. This did happen in the data collection of the questionnaire for university students in China in this study. Some students asked the researcher before conducting the survey that whether there are standard answers for the questions given. In order to increase the reliability and validity of the data collected in the responses, it is important that the researcher should make it clear to the participants that there are no standard answers and they should be very honest on the answers they give. Other actions can be taken to reduce bias caused by the participants. For example, repeating the survey with the same respondent many times can be helpful. However, this can be time consuming for both the researcher and the participants, and it can perhaps introduce more complexities into the study.

Since the questionnaire designer is usually also the researcher of the study, the researcher himself/herself, as the instrument for data collection, can threaten the reliability and validity of the research the most if either the questions are developed with information that misleads people, or the results are interpreted in a rather wrong way, which is in favour of the researcher's own opinions. According to Brink's research (1993), the researcher can introduce bias into the research in several ways. One is that the researcher may influence the reliability of the data given by participants by displaying certain social behaviour such as untrustworthiness or intimidation. Another is that the researcher may

not be objective to the topic in data collection depending on the status that he or she holds. In addition, the researcher may selectively interpret the data collected when carrying out data analysis in favour of his or her own values and opinions. There are also many suggestions for overcoming these effects. The researcher should firstly be aware of these possibilities of introducing bias into the research. Secondly, it is necessary to reserve a long enough period of time for data collection and data analysis, so that the researcher can be more objective with the research topic and the participants can be more familiar with being studied.

Although there might be other elements in the research process which could lead to bias to the qualitative research, the ones presented above are the major risks and should be considered and checked regularly during the research process in order to increase the reliability and validity of the research itself.

6 RESULTS

This study was conducted using the qualitative research approach. Two different questionnaires were developed for two different target groups in order to collect data from two different perspectives. The representatives of Chinese UGGps form one target group, who can provide valuable information from the perspective of the UGGp itself, while the other target group, university students in China, could give viewpoints as observers, information receivers and beneficiaries.

6.1 Response rate

As mentioned in the previous chapter, the response rate for both questionnaires in this study was for different kind of reasons rather lower than 65%, which is suggested as an acceptable rate by Kelley et al. (2003) in an article on the topic of good practices in conducting and reporting of survey research. The sample size for the target group of the representatives of Chinese UGGps is 39, but only 13 answers were collected. The total number of university students in China involved in the distribution of the other survey for this study is 259, while only 101 of them actually responded to it. Thus, the response rate for the questionnaire for the representatives of the Chinese UGGps is only about 33%, and that for the questionnaire for university students in China is about 39%, as shown in Table 2 below.

TABLE 2. Response rate of each questionnaires in this research

Questionnaire	**Sample size**	**Responded**	**Response rate**
Representatives of Chinese UGGps	39	13	33.3%
University students in China	259	101	38.9%

In the following sections, the results generated from the responses to these two questionnaires will be explained in detail.

6.2 From the representatives of Chinese UGGps' perspective

Earlier in chapter 4, from the observation and literature review, facts were found that all Chinese UGGps are developed from existing Chinese National Geoparks, and they all still possess the designation of National Geopark mainly for tourism promotion purposes.

Multiple designations in the same natural environment area could bring positive benefits to the promotion of the heritage sites, it could also introduce confusion and be misleading in the management of the site in question. Responses in this survey show that these Chinese UGGps are still holding the Chinese National Geopark label for promotion, some of them even have some more other designations such as National Nature Reserve and National 5A Tourist Attraction. There are possibilities that multiple designations could result in confusion and misunderstanding in the management of the territory concerned. However, when asked about how the management work of the UGGp is carried out, all of these Chinese UGGps replied that they all manage themselves under an independent management team.

Cooperation and networking between different UNESCO Global Geoparks is of crucial value, as it is important to learn from the experiences that others have had, especially the best practices in the geopark development. Responses shows the Chinese UGGps all cooperate with other geoparks, most of them cooperate with more than one UNESCO Global Geopark domestically or internationally, as friendly geoparks or as twinned geoparks.

Heritage conservation, education and local economic development are three main focuses of UNESCO Global Geoparks in the global trend of pursuing the Global Sustainable Development Goals. Local economic development can take advantage of the geological heritage and other cultural and intangible heritage resources in the territory of these UGGps, and the improvement of local economic development can conversely support the conservation and protection of the heritage features in those areas. Responses from the questionnaire for the representatives of Chinese UGGps indicate that all these Chinese UGGps have created employment opportunities for local people, most of them have more than 10 local workers in the geopark. In addition, the significant increase in the number of domestic visitors after becoming a UNESCO Global Geopark can be seen in all Chinese UGGps, while most of these Chinese UGGps have also received more international visitors since the rewarding of the new UNESCO Global Geopark label. Amongst all these visitors, tourists represent the major visitor group to the Chinese UGGps, which can be an important factor for local economic development, since more local businesses such as restaurants, hotels and other relevant local economic stakeholders usually benefit from the tourism development of these areas. Additionally, all these Chinese UNESCO Global Geoparks charge for an entrance fee for visiting.

The three main focuses of UNESCO Global Geoparks, as mentioned above, are equally important, however, keeping a balance among them can be difficult in reality. Regarding

the question about the most important goal of a geopark, the responses to both questionnaires are more positive in regard to geological heritage conservation itself, but in the questionnaire for the representatives of Chinese UGGps, respondents have expressed even less interest in raising public awareness in environmental protection, as shown in Figure 6 below. It is also noteworthy that although other cultural and intangible heritage conservation is one option for this multiple-choice question, none of these 13 respondents refer to it as the most important goal for a Chinese UNESCO Global Geopark.

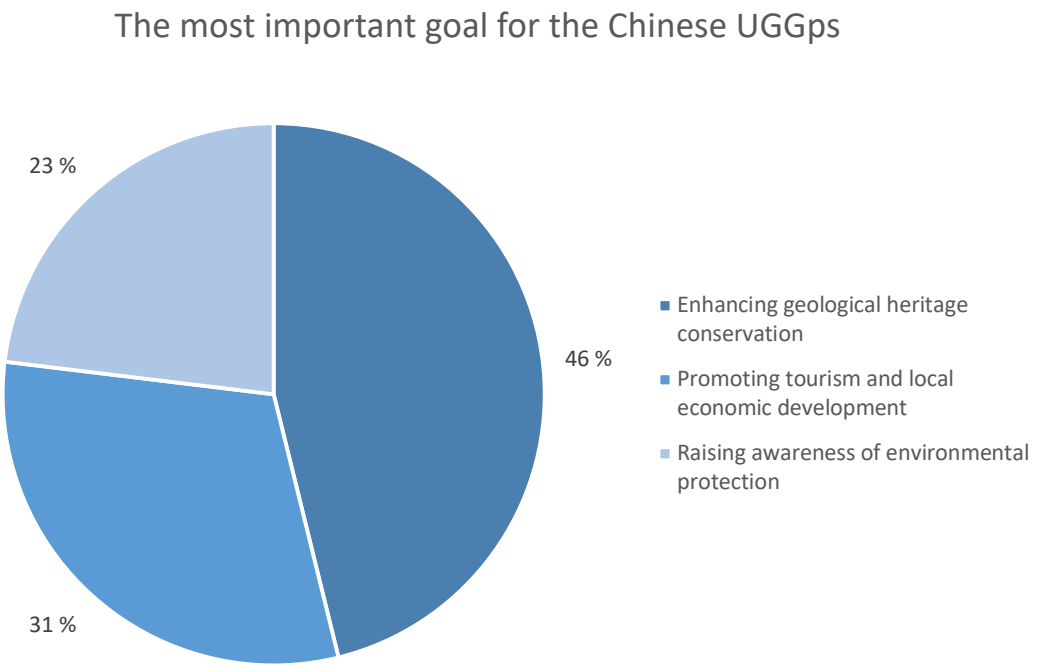


FIGURE 6. Representatives' responses on the most important goal for the Chinese UGGps

The most important goal for the Chinese UGGps might indicate the tendency towards the current and future development in these UGGps, while the largest challenge for the Chinese UGGps may be represented by worries and concerns mostly regarding future development. Almost half of the respondents believe that education and raising public awareness is one big challenge that is of vital importance. About 30% of the respondents are concerned about the local economic development in the territory of the UGGps. Only 1 out of the 13 answers mentions that heritage conservation itself is a big problem that the UGGp faces. Since this question asked is an open-ended question, there are many other interesting answers given. For instance, over 38% of the respondents reply that the

management of the Chinese UGGps faces problems for different kind of reasons. Some of them argue that there is a shortage of professionals working in the UGGp. Some other indicate that it is hard to balance the relationship between heritage conservation and the dramatical increase in the number of visitors to the UGGp and the scheduling of visiting. Other than these challenges, one response also criticizes that the high-quality standards defined by UNESCO is difficult to be kept, which reflects the necessity and importance of having the traffic-lights-based revalidation process carried out every four years by UNESCO.

6.3 From university students' perspective

The concept of the UNESCO Global Geopark was rarely familiar to university students in China. Only a couple of the respondents knew it well, almost 80% of them had only heard of it and the remaining 20% of them had never heard of it before answering this questionnaire.

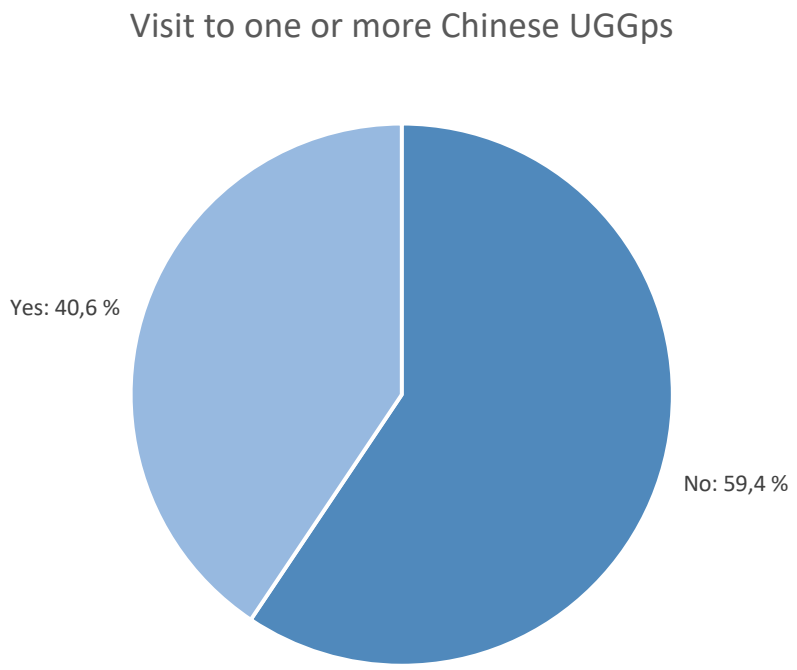


FIGURE 7. The proportion of university students in China who had visited a Chinese UGGp

The unfamiliarity with the Chinese UGGps to university students in China can also be found in their responses to the estimated number of UGGps that there are in China and regarding the locations of these UGGps in the country. Almost 60% of them were not able to provide a close estimation of the number of Chinese UGGps. Compared to the percentage of a close estimation of the number of Chinese UGGps in the answers to the questionnaire, that of the question about the area where most of the Chinese UGGps are located is even higher. About 76% of the responses give incorrect approximate locations.

It is reasonable that most of university students in China lacked knowledge about the Chinese UGGps. Responses show that almost 60% of them had never had a chance to visit one of these Chinese UNESCO Global Geoparks, as illustrated in Figure 7 above. The reasons these respondents have for being not able to visit one of these UGGps in China are varied. The major two reasons are having no time and having never heard of it, see Figure 8 below.

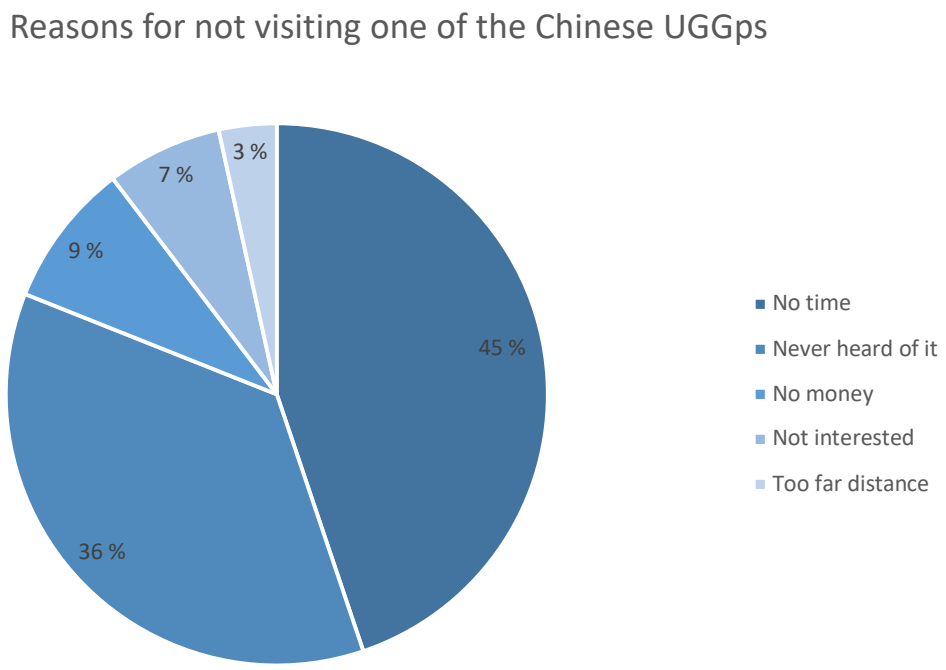


FIGURE 8. Reasons why university students in China had not visited a Chinese UGGp

The best known Chinese UGGps that attracted those university students who had the opportunities to visit them are the Zhangjiajie UNESCO Global Geopark and the Huangshan UNESCO Global Geopark. Both of these UGGps are well known by the geological

heritage in their territory as well as through the intangible heritage features in that area. Moreover, they both are located in the most well-developed south-east area of the country.

Although far more than half of the respondents agree that conservation should be covered for both geological heritage and other cultural and intangible heritage, only about 11% of them tend to support strengthening cultural heritage conservation as the most important goal for the Chinese UGGps, as indicated in Figure 9 below.

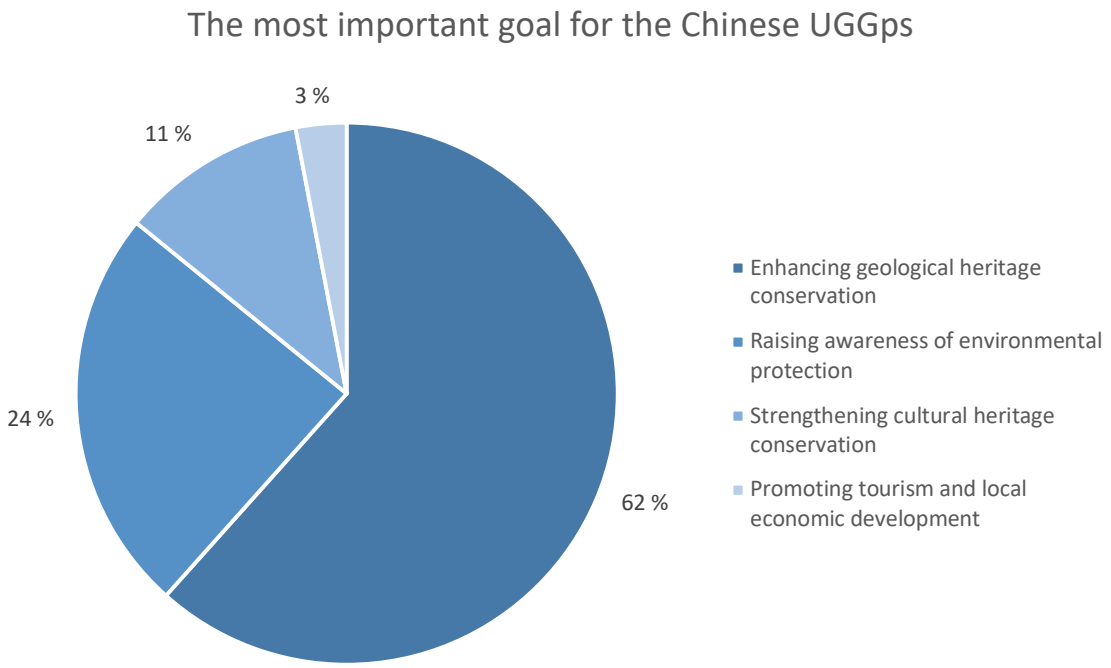


FIGURE 9. University students' responses on the most important goal for the Chinese UGGps

Figure 9 above also illustrates that more university students in China regard raising public awareness of environmental protection, rather than promoting tourism and local economic development, as the most important goal for a Chinese UGGp.

Providing a question with a list of different Chinese UGGps located in four different directions in China, the difference between university students' preference for each UGGp are not significant, however, the reasons for the preference given are highly distinct. Most of the respondents tend to express curiosity and interest in the places they have never been to and want to know more about it. The number of university students who pay attention to

the geological significances are almost the same as those who take the location of the Chinese UGGp as a primary consideration. In addition, the popularity of these Chinese UGGps in many different aspects is also one important reason for some respondents, as can be seen in Figure 10 below.

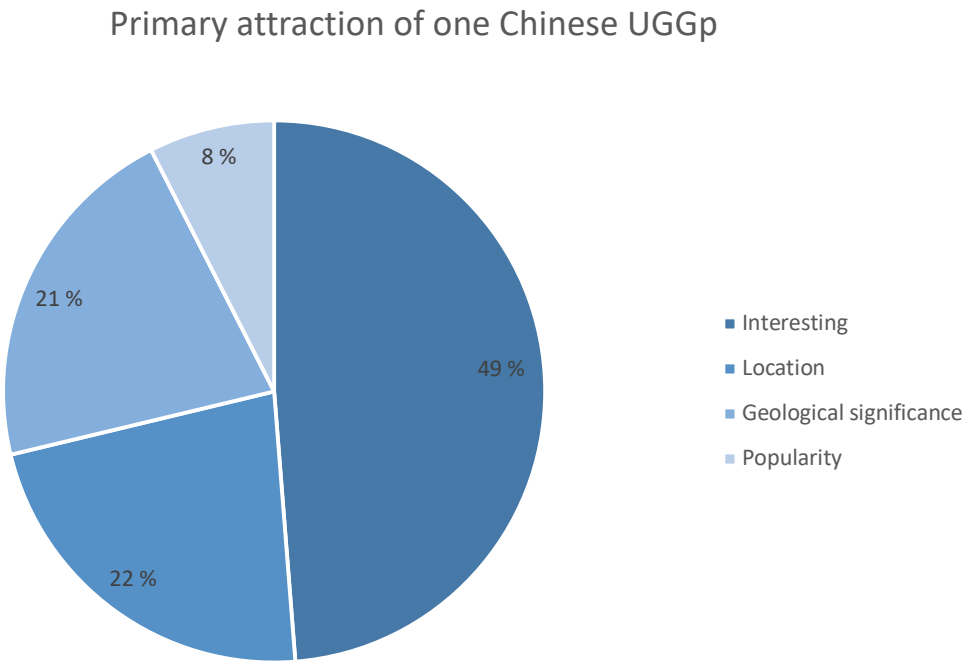


FIGURE 10. Primary attraction of one Chinese UGGp to university students in China

Most university students in China reveal worries about the damage that the development of the UGGps can bring to its territory alongside with the increase in the number of visitors coming to an unspoiled nature area. Therefore, they believe that the conservation and protection of the geological heritage and other cultural and intangible heritage can be one of the largest challenges for the Chinese UGGps. One response to the question regarding the largest challenge a Chinese UGGp might face in the questionnaire for university students in China stated:

> *"The largest challenge to a Chinese UNESCO Global Geopark would be how to keep a balance between heritage conservation and tourism development in local economics, avoid any unnecessary pollution and harmful risks to its territory.*

Promoting with correct guides and raising public awareness of environmental protection among the visitors to the UNESCO Global Geopark is also very important…" (translated freely from Chinese to English by the author)

Furthermore, they indicate that there are conflicts between heritage conservation and local development and keeping a balance can be one severe problem. In order to minimize the impacts people would bring to the natural environment, it is of vital importance to raise public awareness in environmental protection and deliver the correct message to the general public, to the stakeholders in the UGGps and to the visitors to the UGGps, that it is also their responsibility to take actions in environmental protection locally in order to achieve certain of the Global Sustainable Development Goals together.

7 DISCUSSION

On the one hand, UNESCO Global Geoparks are effective tools in achieving certain of the Global Sustainable Development Goals, as they aim to manage themselves by combining conservation, education and sustainable development all together. On the other hand, they represent bottom-up community-led approaches, which require proper and high-quality actions locally. Thus, UNESCO Global Geoparks are an indispensable part of the whole sustainable development movement. The evolution of the UNESCO Global Geopark label has brought great value and clear benefits to the world, especially to developing countries, through the conservation of geological and other intangible heritage, through education and local economic development. It has also introduced a couple of terms which can be confusing for the public and need to be clarified. Furthermore, the Global Sustainable Development Goals consist of five dimensions that are all of importance (UNITED NATIONS 2015). These five dimensions are people, planet, prosperity, peace and partnership. In this paper, the first three dimensions are more concerned as “planet” would be interpreted as the heritage conservation aspect of UNESCO Global Geoparks, while “prosperity” represents the local economic development and “people” involves the educational aspect in the development of UGGps. While global understanding of the pursuit of sustainable development in all aspects matters, it is more important for public awareness of this to be raised and for more appropriate local actions to be conducted. With this knowledge and these concerns in mind, this research is limited to the study of the case of UGGps in China, future research is highly recommended on several other relevant topics as stated later in this chapter.

7.1 Confusing terms

A few terms were found to be confusing during the earlier observation and exploration of this study by the author. The author thus believes it is important to clarify the terminology in the field with explanations.

7.1.1 Global Geoparks Network vs. UNESCO Global Geoparks

The terms “Global Geoparks Network” and “UNESCO Global Geoparks” can somehow be confusing. They both may appear like just a group of geoparks that is under the guidance and assistance of UNESCO. However, there are significant differences between them: 1) The Global Geoparks Network is a legally constituted not-for-profit organization, of which all UNESCO Global Geoparks are obliged to be the members by paying an annual membership fee. UNESCO Global Geoparks, however, are those single and unified

geographical territories where sites and landscapes are of international geological significance, and protection and conservation of geological heritage, education and sustainable development are promoted. 2) The GGN is devoted to building a dynamic network where members are committed to working together, exchanging ideas of best practices, etc. UNESCO Global Geoparks, however, are bottom-up approaches to combining geological heritage conservation together with sustainable development of local communities.

In spite of these significant differences between the terminology of “Global Geoparks Network” and “UNESCO Global Geoparks”, it is also of importance to present the interconnected relations between them. The existence of the GGN was not formal in its early 10 years after the foundation. It turned into a legally constituted non-for-profit organization in 2014 and started to take part in the general administration of UNESCO Global Geoparks a couple of years later (Henriques & Brilha 2017). In 2015 all the members of the GGN were automatically entitled to the UNESCO Global Geopark label when the label was created. Since then, every new UNESCO Global Geopark is obliged to be a member of the GGN by paying membership fee annually. Additionally, the GGN encourages its members to work together and exchange experiences and best practices, so that the quality standards of the UNESCO Global Geoparks can be raised even higher.

7.1.2 National Geopark vs. Global Geopark

The co-existing of National Geoparks and UNESCO Global Geoparks can lead to confusion and misunderstanding among the public, the media and even the community in the geoscience field (Henriques & Brilha 2017). As mentioned earlier, in China there are much more National Geoparks than there are UNESCO Global Geoparks in the whole world. Since the Chinese UGGps have all been upgraded from Chinese National Geoparks and all of them are still promoting themselves with these two labels, more confusion is added into the context. Henriques & Brilha (2017) take China and Germany as two examples and indicate that National Geoparks differ from UNESCO Global Geoparks mainly through having no need to comply with the IGGP (The International Geoscience and Geoparks Programme of UNESCO) guidelines and having no need to guarantee the same high-quality standards. In China there are 219 approved National Geoparks by 2019, and 39 of them are UNESCO Global Geoparks. National Geoparks in China are supervised by the National Forestry and Grassland Administration, while UNESCO Global Geoparks in China are approved and revalidated by the UNESCO Excutive Board. National Geoparks in China are in continuous development towards reaching the high-quality standards that UNESCO Global Geoparks represent.

7.2 Sustainable development and the global understanding

The sustainable development concept, as embedded in the 17 Global Sustainable Development Goals to be achieved by 2030, which are defined by the United Nations and were already adopted by all Member States of the UN in 2015 (The United Nations 2019), consists of five general dimensions or aspects which are: social, economic, environmental, partnership-based and the aspect of world peace. Social, economic and environmental aspects are the three core aspects in sustainable development. Applying this to the concept of UNESCO Global Geoparks, education in the UGGp approach represents the social aspect of sustainable development in the area of a UGGp, while local economic development deals with the economic aspect and heritage conservation in turn deals with the environmental aspect. The results obtained in this study indicate that keeping a balance between heritage conservation and local economic development is difficult from both the geopark's point of view and university students' opinions, while raising public awareness with education and other means can help to minimize the gap between these two dimensions. Thus, a global understanding of the concept and purpose of the UNESCO Global Geopark by the public people in China is needed, and it should be achieved by putting more efforts into raising public awareness in the development of the Chinese UNESCO Global Geoparks.

7.3 Further research

Research about UNESCO Global Geoparks in China in general is conducted in this study, the primary aim of this study was to find out whether the establishment and development of the UGGps in China tend to pay more attention to one or more aspects among the three main focuses a UGGp should equally concern. The results illustrate that more contributions on raising public awareness in the development of the Chinese UGGps are needed. The work of this study stops here as it reaches the boundaries of its scope, but further research on the topic of how UNESCO Global Geoparks in China can improve regarding the education aspect is recommended.

In addition to the answer to the research question of this study, the results in this study also indicate that there is a shortage of professionals working in the UGGps, but due to the limitations of this study, this finding is not covered in more detail. Thus, it is recommended for research to be carried out on the education level and professional level of people working in the UGGps in China.

Moreover, since geotourism is becoming more popular internationally and its significance can be seen in the increase of the number of visitors to the Chinese UGGps as shown in

the results of this study, a more detailed future study on the topic of the profile of the visitors, and perhaps the willingness of the visitors to pay for visiting these geoparks can be carried out in the future.

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APPENDIX I. Tabular list of UNESCO Global Geoparks in China

#	Name	GGN Member From	UGG Awarded In	Province	Area (km2)
1	Danxiashan UNESCO Global Geopark	2004	2015	Guangdong	292
2	Zhangjiajie UNESCO Global Geopark	2004	2015	Hunan	398
3	Yuntaishan UNESCO Global Geopark	2004	2015	Henan	556
4	Wudalianchi UNESCO Global Geopark	2004	2015	Heilongjiang	720
5	Songshan UNESCO Global Geopark	2004	2015	Henan	464
6	Shilin UNESCO Global Geopark	2004	2015	Yunnan	350
7	Huangshan UNESCO Global Geopark	2004	2015	Anhui	1200
8	Lushan UNESCO Global Geopark	2004	2015	Jiangxi	500
9	Hexigten UNESCO Global Geopark	2005	2015	Inner Mongolia	1750
10	Taining UNESCO Global Geopark	2005	2015	Fujian	492.5
11	Xingwen UNESCO Global Geopark	2005	2015	Sichuan	156
12	Yandangshan UNESCO Global Geopark	2005	2015	Zhejiang	298.8
13	Jingpohu UNESCO Global Geopark	2006	2015	Heilongjiang	1400

14	Leiqiong UNESCO Global Geopark	2006	2015	Hainan, Guangdong	3050 *
15	Taishan UNESCO Global Geopark	2006	2015	Shandong	158.63
16	Wangwushan-Daimeishan UNESCO Global Geopark	2006	2015	Henan	986
17	Fangshan UNESCO Global Geopark	2006	2015	Beijing, Hebei	954
18	Funiushan UNESCO Global Geopark	2006	2015	Henan	1522
19	Zigong UNESCO Global Geopark	2008	2015	Sichuan	1630.46 *
20	Longhushan UNESCO Global Geopark	2008	2015	Jiangxi	996.63
21	Alxa Desert UNESCO Global Geopark	2009	2015	Inner Mongolia	630.37
22	Qinling Zhongnanshan UNESCO Global Geopark	2009	2015	Shaanxi	1074.85
23	Ningde UNESCO Global Geopark	2010	2015	Fujian	2660.34
24	Leye Fengshan UNESCO Global Geopark	2010	2015	Guangxi	930
25	Tianzhushan UNESCO Global Geopark	2011	2015	Anhui	413.14
26	Hong Kong UNESCO Global Geopark	2011	2015	Hongkong	150
27	Sanqingshan UNESCO Global Geopark	2012	2015	Jiangxi	229.5
28	Shennongjia UNESCO Global Geopark	2013	2015	Hubei	1022.72

29	Yanqing UNESCO Global Geopark	2013	2015	Beijing	620.38
30	Mount Kunlun UNESCO Global Geopark	2014	2015	Qinghai	7033
31	Dali-Cangshan UNESCO Global Geopark	2014	2015	Yunnan	933
32	Dunhuang UNESCO Global Geopark	2015	2015	Gansu	2067
33	Zhijindong Cave UNESCO Global Geopark	2015	2015	Guizhou	170
34	Arxan UNESCO Global Geopark	2017	2017	Inner Mongolia	3653.21
35	Keketuohai UNESCO Global Geopark	2017	2017	Xinjiang	2337.9
36	Guangwushan-Nuoshuihe UNESCO Global Geopark	2018	2018	Sichuan	1818
37	Huanggang Dabieshan UNESCO Global Geopark	2018	2018	Hubei	2625.54
38	Jiuhuashan UNESCO Global Geopark	2019	2019	Anhui	139.7
39	Yimengshan UNESCO Global Geopark	2019	2019	Shandong	1804.76

(Area value suffixed with *: Area Extension more than 10% in 2017)

APPENDIX II. Classification of UNESCO Global Geoparks in China – modified from source table in an article by Luan et al. (2016)

Category		**UNESCO Global Geopark**	**Major geological features**
Geological Sections (body and formation)		Songshan	Late Archean–Early Proterozoic stratigraphic unit, “the text book of geological history”
		Wangwushan-Daimeishan	Rift valley structure profiles, red cliffs and long walls, valleys, unconformity and ancient strata, ancient and modern water conservancy projects. Stepped valleys, stratigraphic section, peak clusters, water landforms, shallow sedimentary structures
Geological Structure		Funiushan	Centralised dinosaur egg fossils, Qinling orogenic belt
		Qinling Zhongnanshan	The orogenic geological heritage and the Quaternary geoheritage which includes landslides and Quaternary glacial relics.
		Alxa Desert	Deserts and embedded lakes; aeolian landforms
Paleontology		Zigong	Various dinosaur fossils, complete dinosaur skeletons, dinosaur skins
		Yanqing	Clusters of in situ buried silicified wood
Mineral and ore deposits		Keketuohai	Altai orogenic belt and magma intrusion, Altay granitic geomorphologic landscape, non-renewable geological resources, geomorphologic, seismologic and mineralogical resources
	Danxia landform	Danxiashan	Danxia landform, where this typical landform is named

Geomorpho-logical land-scape		Taining	Danxia, volcanic and granite tectonic landforms, various peak, pillars, prisms, precipices, and overhanging rocked mirrored on lake, queer rocks, caves, valleys
		Longhushan	Danxia landform with grotesquely shaped rocks and hills
	Karst landform	Fangshan	Rich geological remains, a complete series of rock formations developed over 3500 million years, metamorphic rocks, granite formed from solidi-fied lava, karst peak clusters and caves.
		Zhangjiajie	Quartz sandstone landforms with mesa, square mountain, peak clusters and forests, pillars, valleys, karst caves
		Yuntaishan	Canyons, valleys, gorges, red cliffs and long walls, residual hills, water-falls, karst caves
		Shilin	Karst hoodoos, sword-shaped pinnacles, peak clusters, caves, waterfalls
		Xingwen	Karst peak clusters, hoodoos, huge cavities, big deep dolines, valleys, waterfalls
		Leye Fengshan	Funnels, valleys, peak clusters, natural bridges, underground streams, cave deposits. Karst landforms with high peak forests and deep depres-sions
		Zhijindong	Karst clusters and forests, buttes, canyons, karst lakes, cave deposits

		Guangwushan-Nuoshuihe	Most typical karst landform transition zone from Northern and Southern China
	Volcanic landform	Wudalianchi	Volcanic landforms, volcanic lakes, volcanic lavas
		Jingpohu	Volcanic landforms, lava tunnels, volcanic craters, water and granite landforms
		Arxan	Volcanic landforms, warm springs, granite peak forests, rock mortars
		Yandangshan	Early Cretaceous huge calderas, volcanic eruption remains, caldera collapse, resurgence and recruption, volcanic peaks and canyons, waterfalls
		Leiqiong	Basic volcanic rocks, Holocene dormant volcanoes, more than 40 volcanic cones, lava tunnel, mineral springs
		Ningde	Volcanic rocks, the Late Jurassic to Early Cretaceous dacitic-rhyolitic igneous rocks, miarolite landform, volcanic landform, erosion riverbed landform, and erosion coastal landform
		Hong Kong	Acidic volcanic hexagonal rock columns, comprehensive sedimentary rock formations formed from the Devonian to the Paleogene
	Tectonic landform	Huangshan	Granite peak forest, rock pillars, grotesque peaks, queer rocks, deep and secluded canyons, warm springs, spectacular pines
		Hexigten	Granites with horizontal joints, man-like and objective-like granite pillars

		Tianzhushan	Granite peak clusters, ultra-high-pressure metamorphic belt, Quaternary mammal fossils
		Sanqingshan	Granite peak forests and clusters, stacked caves
		Huanggang Dabieshan	Granite rock geology and geomorphology Landforms
		Jiuhuashan	Granite rock, fold and fault structures
		Yimengshan	Granite peak clusters and forests, gems and jades
	Glacial landform	Lushan	Birth place of Quaternary glacial research in China, integrated sections, glacial relics and nominated places, cirques, horns and U-shaped valleys, glacial striate and boulders, Jiangnan ancient stratigraphic section, fault-block mountain
		Taishan	Stratigraphic sections of Neoarcheozoic to PaleoPreterozoic, Cambrian and Early Ordovician, Early Paleozoic fossils, neotectonic landforms
		Shennongjia	Folded metamorphic basement, Pleistocene palaeoanthropic relics, mountainous glacial, fluvial and karst landforms
		Dali-Cangshan	Quaternary glacial relics, horns and cirques, precipitous fault depressions, tectonic orogeny
	Yardang	Dunhuang	Grotesquely shaped landforms

Water land-scape	N/A	
Environmental geoheritage landscape	Mount Kunlun	Mud-volcanic ice hummocks, palaeoglacial remnants, tectonic earth-quake relics

APPENDIX III. Questionnaire for representatives of UGGps in China (translated freely from Chinese to English by the author)

Questionnaire about UNESCO Global Geoparks in China

Target group: Representatives of UNESCO Global Geoparks in China

---

1. Which other labels does this geopark also have?
   - ☐ National Geopark
   - ☐ National Nature Reserve
   - ☐ Others? Please specify which: _____
2. Which is the most important goal for this geopark?
   - ☐ Raising awareness of environmental protection
   - ☐ Enhancing geological heritage conservation
   - ☐ Strengthening cultural heritage conservation
   - ☐ Promoting tourism and local economic development
   - ☐ Something else? Please specify what: _____
3. How does this geopark manage itself?
   - ☐ By an independent management team
   - ☐ By another organization? Please specify which: _____
4. How many local people work in this geopark?
   - ☐ 1 – 5
   - ☐ 5 – 10
   - ☐ 10 +
5. Does this geopark cooperate with other geoparks?
   - ☐ Yes. Please specify how many and which: _____
   - ☐ No. Please specify why not: _____

6. Who are the visitors to this geopark? (Multiple choices)

   ☐ Tourists

   ☐ Researchers

   ☐ Students

   ☐ Others? Please specify: _____

   _____

7. What is the origin of visitors to this geopark?

   ☐ Domestic visitors

   ☐ Foreign visitors

   ☐ Both of the above

8. Does this geopark charge an entrance fee for visiting?

   ☐ Yes

   ☐ No

9. After becoming a UNESCO Global Geopark, what changes have happened to the number of visitors to this geopark?

   a) Domestic visitors

      ☐ Increased

      ☐ Decreased

      ☐ Remain the same

   b) Foreign visitors

      ☐ Increased

      ☐ Decreased

      ☐ Remain the same

10. What is the biggest challenge being a UNESCO Global Geopark?

    _____

    _____

    _____

APPENDIX IV. Questionnaire for university students in China (translated freely from Chinese to English by the author)

Questionnaire about UNESCO Global Geoparks in China

Target group: University students in China

---

1. How familiar are you with the UNESCO Global Geoparks in China?

   ☐ Never heard of them

   ☐ Heard of them

   ☐ Know them very well

2. As of April 2018, there are in total 140 UNESCO Global Geoparks all over the world. Among them, approximately how many do you think are located in China?

   ☐ 0 – 20

   ☐ 20 – 40

   ☐ 40 – 60

   ☐ 60 +

3. Where do you think most of these UNESCO Global Geoparks are located in China?

   ☐ Northeast ☐ Southeast

   ☐ Northwest ☐ Southwest

   ☐ Others? Please specify: _____

   _____

4. Zhangjiajie is one of the most famous places of interest in China, which of the following labels do you think it possesses? (Multiple choices)

   ☐ UNESCO Global Geopark ☐ National Geopark

   ☐ UNESCO Global Forest Park ☐ National Forest Park

   ☐ UNESCO World Heritage ☐ National Nature Reserve

5. Have you visited one or more of these UNESCO Global Geoparks in China before?

   ☐ Yes. Please specify how many and which ones: _____

   _____

   ☐ No. Please specify why not: _____

   _____

6. For which of the following heritage conservation purposes are the UNESCO Global Geopark label helpful, in your opinion?

   ☐ Natural heritage conservation

   ☐ Cultural heritage conservation

   ☐ Both of the above

7. What is the most important objective do you think a UNESCO Global Geopark should fulfill?

   ☐ Raising awareness of environmental protection

   ☐ Enhancing geological heritage conservation

   ☐ Strengthening cultural heritage conservation

   ☐ Promoting tourism and local economic development

   ☐ Something else? Please specify: _____

   _____

8. Do you think an UNESCO Global Geopark should charge an entrance fee for visiting?

   ☐ Yes

   ☐ No

9. Imagine you win a chance to go to one of the following UNESCO Global Geopark, which one would you pick?

   ☐ Huangshan UNESCO Global Geopark (in Anhui Province)

   ☐ Keketuohai UNESCO Global Geopark (in Xinjiang Province)

   ☐ Wudalianchi UNESCO Global Geopark (in Heilongjiang Province)

   ☐ Danxiashan UNESCO Global Geopark (in Guangdong Province)

   ☐ Hongkong UNESCO Global Geopark (in Hongkong)

   and explain why you chose it please: _____

   _____

10. What do you think is the biggest challenge a UNESCO Global Geopark faces?

    _____

    _____

    _____

APPENDIX V. Questionnaire for representatives of UGGps in China (in Chinese)

关于中国世界地质公园的调查研究

调查对象：中国世界地质公园代表

---

1. 除了世界地质公园这个荣誉称号，本地质公园是否还有其他荣誉称号？

   ☐ 国家地质公园　　☐ 国家级自然保护区

   ☐ 其他？请注明有哪些：_____

   _____

2. 本地质公园最为重要的目标是什么？

   ☐ 普及环保知识，提高环保意识

   ☐ 加强地质遗产的保护

   ☐ 加强相关非物质文化遗产的保护

   ☐ 促进当地旅游业及经济发展

   ☐ 其他？请注明是什么：_____

   _____

3. 本地质公园的管理工作是如何开展的？

   ☐ 有独立的管理组织机构

   ☐ 隶属其他机构？请注明该机构名称：_____

   _____

4. 有多少当地人在本地质公园工作？

   ☐ 1 – 5　　☐ 5 – 10

   ☐ 10 +

5. 本地质公园是否与其他地质公园有过合作？

   ☐ 有。请注明合作过的地质公园共有哪些：_____

   _____

   ☐ 没有。请注明为什么没有：_____

   _____

6. 来参观本地质公园的访客都是哪类人群？（可多选）

☐ 游客

☐ 学者，专家及其他研究人员

☐ 学生

☐ 其他？请注明都有哪些：_____

_____

7. 来参观本地质公园的访客都来自哪里？

☐ 国内访客

☐ 国外访客

☐ 国内外访客都有

8. 本地质公园是否收取门票？

☐ 是

☐ 否

9. 成为世界地质公园之后，来参观本地质公园的访客数量有何变化？

a) 国内访客

☐ 有所增长

☐ 有所减少

☐ 没有显著变化

b) 国外访客

☐ 有所增长

☐ 有所减少

☐ 没有显著变化

10. 作为一个世界地质公园，最大的挑战是什么？

_____

_____

_____

APPENDIX VI. Questionnaire for university students in China (in Chinese)

关于中国世界地质公园的调查研究

调查对象：中国高校学生

---

1. 你对中国世界地质公园了解有多少？

   ☐ 从未听说过

   ☐ 听说过，知道一些

   ☐ 十分了解

2. 截止 2018 年 4 月，全世界共有 140 个世界地质公园。据你所知，大概有多少个在中国？

   ☐ 0 – 20　　☐ 20 – 40

   ☐ 40 – 60　　☐ 60 +

3. 你认为，大部分中国世界地质公园都分布在中国的哪些地方？

   ☐ 东北　　☐ 东南

   ☐ 西北　　☐ 西南

   ☐ 其他地方？请注明方位：_____

   _____

4. 张家界是我国著名风景名胜区之一。你认为，该景区曾经评选过并且成功挂名了以下哪些荣誉称号？（可多选）

   ☐ 世界地质公园　　☐ 国家地质公园

   ☐ 世界森林公园　　☐ 国家森林公园

   ☐ 世界自然遗产　　☐ 国家自然保护区

5. 你是否曾经参观过一个或者多个中国世界地质公园？

   ☐ 参观过。请注明分别是哪几个：_____

   _____

   ☐ 没有参观过。请注明具体原因是什么：_____

   _____

6. 在你看来，获取世界地质公园这个荣誉称号主要是为了哪个方面的遗产保护？

☐ 自然遗产（地质遗产）的保护

☐ 地质区非物质文化遗产的保护

☐ 以上都有

7. 你认为，世界地质公园最为重要的目标应该是什么？

☐ 普及环保知识，提高环保意识

☐ 加强地质遗产的保护

☐ 加强相关非物质文化遗产的保护

☐ 促进当地旅游业及经济发展

☐ 其他？请注明是什么：_____

_____

8. 你认为，世界地质公园是否应该收取门票？

☐ 是

☐ 否

9. 假设你赢取了一个机会，可以去参观以下世界地质公园中的其中一个，你会选择去哪一个？

☐ 黄山世界地质公园（安徽省境内）

☐ 可可托海世界地质公园（新疆维吾尔自治区境内）

☐ 五大连池世界地质公园（黑龙江省境内）

☐ 丹霞山世界地质公园（广东省境内）

☐ 香港世界地质公园（香港特区境内）

并请注明你选择它的具体原因：_____

_____

10. 你认为，一个世界地质公园所面临的最大挑战是什么？

_____

_____

_____

APPENDIX VII. Python script for sending email to a group of addresses listed in a CSV file

```
import os
import smtplib

import pandas as pd
from email.message import EmailMessage

# load configs from .env environment file with dotenv
from dotenv import load_dotenv, find_dotenv
load_dotenv()

MAIL_SERVER = os.getenv("MAIL_SERVER")
MAIL_PORT = os.getenv("MAIL_PORT")
MAIL_SENDER = os.getenv("MAIL_SENDER")
MAIL_PASSWORD = os.getenv("MAIL_PASSWORD") # input('Enter your password
 here...')

MAIL_SUBJECT = os.getenv("MAIL_SUBJECT")
MAIL_CONTENT_FILE_NAME = os.getenv("MAIL_CONTENT_FILE_NAME")
MAIL_REPLACE_TEXT = os.getenv("MAIL_REPLACE_TEXT")

CONTACT_LIST_CSV = os.getenv("CONTACT_LIST_CSV")
CSV_DELIMITER = os.getenv("CSV_DELIMITER")

# refactor send_mail into a function
def send_mail(to_address, to_name):
  # open mail content file and set mail content with the file content
  textfile = MAIL_CONTENT_FILE_NAME

  with open(textfile) as fp:
    file_data = fp.read()
    mail_content = file_data.replace(MAIL_REPLACE_TEXT, to_name)

  # start to compose message and send it out
  msg = EmailMessage()
  msg.set_content(mail_content)

  msg['Subject'] = MAIL_SUBJECT
  msg['From'] = MAIL_SENDER
  msg['To'] = to_address

  try:
    s = smtplib.SMTP(MAIL_SERVER, MAIL_PORT)

    s.ehlo()
    s.starttls()
    s.ehlo()

    s.login(MAIL_SENDER, MAIL_PASSWORD)
    s.send_message(msg)

    print('message delivered!')
  except Exception as e:
    print(e)
  finally:
    s.quit()
```

```
# load contacts from csv file with pandas
contact_list = pd.read_csv(CONTACT_LIST_CSV, sep=CSV_DELIMITER).fillna('')

for contact in contact_list.itertuples():
  to_name = str(contact.geopark_name_cn) + '园区代表'

  # if contact.representative:
  #   to_name = to_name + ' ' + contact.representative

  send_mail(contact.email, to_name)
```