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Analyzing and Strategizing the Emergency Language Landscape: A Case Study of Sanya City, China

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Abstract: The construction of language landscape for urban emergency services is an important part of public services. As a current city for the construction of Hainan Free Trade Port, Sanya City has a unique natural environment and is also a hotbed of various natural disasters in island cities. The challenges faced by emergency language services in Sanya City are not only how to effectively communicate emergency information to domestic citizens, but also how to cross language and cultural differences to ensure that all tourists can understand and follow emergency instructions. Against this background, it is of great significance to study the emergency language landscape of Sanya City.

Keywords: Sanya City; Emergency Language Landscape; Language Services; Hainan Free Trade Port

1. Introduction

The concept of the linguistic landscape, initially introduced by Canadian scholars Landry and Bourhis in 1997, "Linguistic landscape refers to the visibility and salience of languages on public and commercial signs in a given territory or region".[1] The first domestic discussion on language landscapes was published by Sun Li in 2009, titled "The Current Status of Language Landscape Translation and Its Communicative Translation Strategies." At present, there are two major types of research on language landscape in China: one is theoretical research, which focuses on the definition, research methods, research perspectives, theoretical construction, etc. of language landscape. Scholars such as Li Yuming, Shang Guowen, and Zhang Tianwei have conducted relevant explorations; the other is empirical research, which is mostly research on the language landscape of specific regional spaces. Large and medium-sized cities, tourist attractions, and national key economic zones are all important survey and research objects. Scholars such as Zhao Xueqing, Wang Kefei, Liu Chuqun, and Guan Yingming have conducted relevant research. The research on language landscape from the perspective of emergency services mainly focuses on the empirical investigation and phenomenological analysis of language landscapes and slogans related to the COVID-19 pandemic, which has been conducted by scholars such as Bao Lianqun, Dong Hongjie, Hong Jie, and others. Despite these comprehensive studies, research on linguistic landscapes tailored to emergency language services remains limited. Bao Lianqun's investigation into Japan's emergency linguistic landscape during the early stages of the COVID-19 pandemic highlighted its potential service functions, noting that emergency linguistic landscapes can feature monolingual, bilingual, and even trilingual or quadrilingual signs, including information on the pandemic, protective gear, precautions, and motivational messages. Other scholars like Sun Huili have examined the virtual linguistic landscapes of Xinhua Net and China Daily, exploring their unique characteristics. The above studies have shown that significant progress has been made in the research on language landscape, and its importance in urban cultural construction, urban image building, and emergency language services has become increasingly prominent. However, in terms of emergency language services, further research is still needed on language landscape, as there is room for improvement in modal presentation, language quantity, discourse strategy, and other aspects.

Emergency Linguistic Landscape refers to the crucial information conveyed through public space language signs,[2] information boards, broadcasting systems, and other media in emergency situations. These are designed to quickly and accurately deliver safety guidelines, emergency escape routes, warnings, and preventive measures to the public, ensuring timely reactions to minimize harm and loss. Emergency language landscape not only includes written and verbal information, but also encompasses graphics, symbols, and the dissemination of information using modern communication technologies such as numbers and social media. Emergency language landscape is crucial in emergency situations, as it is not only the key to improving response efficiency but also significantly reduces accident risks while enhancing social

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cohesion. Clear and precise emergency linguistic landscapes guide people to take correct actions, find safe exits and shelters, reducing chaos and panic, and increasing public trust in the government and rescue agencies.[3]

The construction of language landscape for urban emergency services is an important part of public services. Sanya City, a tropical coastal tourism city located on the coast of the South China Sea, is also a bright pearl in the construction of the Hainan Free Trade Port. While possessing a unique natural environment, it also serves as a breeding ground for various natural disasters typical of island cities. Additionally, as an international tourism destination, the challenges faced by Sanya extend beyond effectively communicating emergency information to its own citizens; it must also overcome language and cultural differences to ensure that all tourists can understand and follow emergency instructions. Against such a backdrop, studying the emergency language landscape of Sanya City holds significant importance. Firstly, it can assess the effectiveness of the current emergency language landscape and identify existing problems and deficiencies. Secondly, through in-depth analysis, it can provide strategies and recommendations for improving the effectiveness of public safety information dissemination, especially in a multi-lingual and multi-cultural context. This is crucial for protecting the lives and property safety of the people, enhancing public awareness and capabilities in responding to emergency situations, and maintaining social stability and the sustainable development of tourism.

Therefore, this paper will take a perspective of emergency language landscape, using Sanya City as an example, to explore its application and effectiveness in public safety and information dissemination. The aim is to propose strategies for strengthening and optimizing emergency language landscape to better serve the public safety management of Sanya City and similar cities, as well as the development of the Hainan Free Trade Port.

2. Research Methodology

To objectively and comprehensively describe the emergency linguistic landscape in Sanya's public spaces, the following research design was established before the survey:

Combining qualitative and quantitative research methods, this study adopts a combination of field surveys and random interviews to comprehensively explore the current status, effectiveness, and improvement strategies of emergency language landscape in Sanya City.[4] The quantitative research section aims to collect specific data through questionnaires and on-site observations to assess the popularity, public awareness, and satisfaction of emergency language signs in Sanya City. The qualitative research section delves into the effectiveness of emergency language landscape in practical applications and existing issues through interviews and case studies, as well as understanding and feedback from tourists from different cultural backgrounds on emergency information. By combining the breadth of quantitative data with the depth of qualitative data, a more comprehensive evidence base is provided for proposing effective optimization strategies.

Firstly, organizing and training the survey team is the first step in studying the emergency language landscape of Sanya City. We selected 25 graduate and undergraduate students who have a strong interest in the fields of language services and emergency management, and provided them with instructions and training on the purpose, content, and methods of the survey. To ensure the accuracy and efficiency of the survey, all surveyors were led to conduct a field survey rehearsal at Dadonghai Square in Sanya City before the official start of the survey, to further clarify and strengthen the purpose, content, and techniques of the survey.

Secondly, in the selection of survey spaces, we focused on four administrative districts of Sanya City: Jiyang District, Tianya District, Yazhou District, and Haitang District. Typical public spaces such as beaches, squares, and parks were selected based on the method of equal distance distribution. To ensure the typicality of the public spaces, we established four criteria: high pedestrian flow, outdoor openness, free access, and frequent visits by tourists and residents. Finally, 96 representative public spaces were identified in each administrative district, including 28 in Jiyang District, 30 in Tianya District, 18 in Yazhou District, and 20 in Haitang District.[5]

Thirdly, the survey method is clearly defined. Surveyors take exhaustive photos within the selected survey spaces to record detailed information such as the types of language symbols, text content, production

departments, carrier materials, and more on the language landscape. Simultaneously, methods such as questionnaires and interviews are used to understand the cognition and needs of tourists and residents regarding emergency language landscapes.

After the survey is completed, the collected language landscape information is promptly transcribed and archived as text data. Then, the data is compared, integrated, and studied to analyze the layout, visibility, and presentation of multi-lingual information within public spaces, obtaining direct on-site information.

This paper will adopt a combination of content analysis and statistical analysis to process and analyze the collected data. Content analysis is mainly used to code, categorize, and extract qualitative data to reveal the main characteristics, problems, and influencing factors of emergency language landscapes. Statistical analysis is used for descriptive statistics, correlation analysis, and difference testing of quantitative data to quantify research results and reveal the relationships between variables.[6]

During the data analysis process, attention is paid to the authenticity, reliability, and validity of the data to ensure the accuracy and credibility of the research results. At the same time, the analysis methods and technical means are adjusted as needed to address new situations and problems that arise. Finally, a comprehensive analysis report is formed, providing scientific evidence and strategic suggestions for the optimization of emergency language landscapes in Sanya City.

3. Findings on the Emergency Linguistic Landscape in Sanya City

3.1 Regional Distribution

A detailed survey of the emergency linguistic landscape was conducted across the four main administrative districts of Sanya City: Jiyang District, Tianya District, Yazhou District, and Haitang District. Field observations and records yielded the data in Table 1:

Table 1 Distribution of Emergency Linguistic Landscape in Sanya City

District	Number of Surveyed Spaces	Number of Emergency Linguistic Landscapes	Average Number	Number of Spaces with Emergency Linguistic Landscapes	Presence Rate
Jiyang	28	1020	36	28	100%
Tianya	30	1184	39	30	100%
Yazhou	18	929	52	18	100%
Haitang	20	1285	64	20	100%

The data reveals regional differences and characteristics in the distribution of Sanya's emergency linguistic landscape. Jiyang District, a residential area, had 1,020 emergency linguistic landscapes identified across 28 public spaces, primarily in commercial districts, transportation hubs, and high-traffic areas, indicating a lower number of emergency linguistic signs in the city's core areas. Tianya District, being a popular tourist area, had a total of 1,184 emergency language landscapes discovered in the 30 public spaces surveyed. These landscapes are mainly concentrated in beach squares, parks, and tourist attractions, with an average of 39 emergency language signs per space, indicating that Tianya District has relatively complete emergency language services in tourist areas, able to provide timely and effective emergency information to tourists. Yazhou District, being an emerging technological district, had a total of 929 emergency language landscapes discovered in the 18 newly developed public spaces surveyed. These landscapes are mainly distributed in commercial areas, technological parks, and around public facilities, with an average of 52 emergency language signs per space, indicating that emerging development areas have significantly increased their emphasis on the establishment of emergency language landscapes. Haitang District, characterized by high-end resorts and international conference centers, had a total of 1,285 emergency language landscapes discovered in the 20 high-end venues surveyed. These landscapes are mainly distributed in high-end hotels, resorts, and international convention centers, with an average of 64 emergency language signs per space, indicating that Haitang District has relatively excellent international emergency services, able to meet the emergency language service needs of international tourists and business people.

All four districts had a 100% presence rate of emergency linguistic landscapes, meaning every surveyed space featured language landscapes serving emergency situations, yet the specific construction varied significantly. The following sections will analyze the construction of various landscapes in detail.

3.2 Emergency Language Landscape Type Analysis

Emergency language landscapes play a crucial role in cities, especially in urgent situations, as they can quickly convey key information and guide the public to take the correct actions. In Sanya, these emergency language landscapes can be categorized into three different types based on their functions, locations, and designs: directive, warning, and informational. Each type carries different thematic content.

The first type of directive emergency language landscapes is an important part of urban emergency language services. Their primary function is to provide the public with clear and accurate directions and guidance in emergency situations, helping people quickly find key locations such as safe exits, shelters, and rescue facilities, thereby effectively responding to crises and reducing casualties and property loss.

In Sanya, the setup of directive emergency language landscapes is extensive and detailed, covering various public places and key areas. These directive signs typically use eye-catching colors, concise text, and intuitive graphic design to ensure that information can be quickly conveyed and understood, as shown in Figure 1:

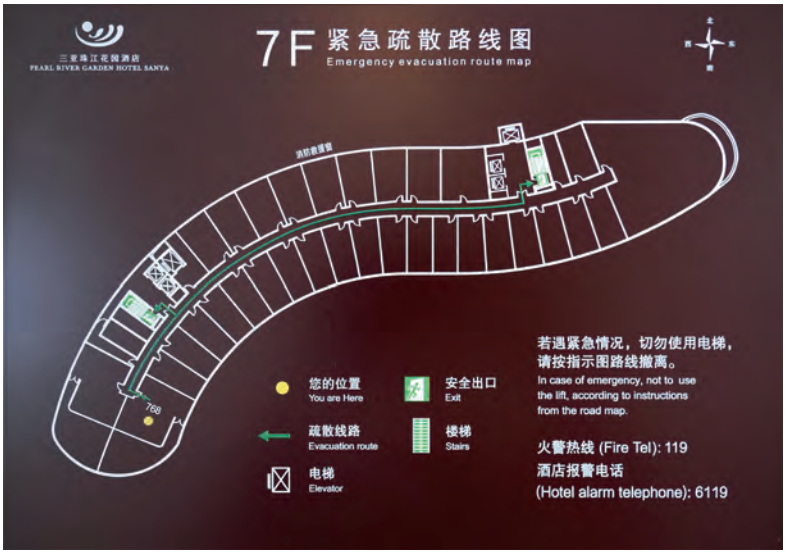

Figure 1 Emergency Evacuation Route Map on a Hotel Floor in Sanya

The directive emergency language landscapes in Sanya mainly include the following categories. The first one is safety exit indications.[7] These signs are usually set inside buildings, such as corridors and stairwells in malls, hotels, hospitals, and other public places. They clearly indicate the direction and distance to safety exits, guiding people to evacuate quickly in emergencies like fires. The second one is shelter indications. In the event of natural disasters such as earthquakes and typhoons, shelters are important refuges for the public. In Sanya, shelter indication signs are usually set near open spaces like parks, squares, and schools, with clear text and graphics indicating the location and entrance routes to shelters. The third one is rescue facility indications. These signs are mainly used to indicate the locations of fire hydrants, fire extinguishers, first aid kits, and other rescue facilities. In emergencies, these facilities are crucial for controlling fires and assisting the injured. Therefore, rescue facility indication signs are usually set in prominent and accessible locations so that the public can quickly find and use them when needed. The fourth one is traffic guidance indications. At transportation hubs and major road intersections, directive emergency language landscapes also include traffic guidance indications. They use text and graphics to indicate evacuation routes, temporary parking areas, and other information, helping the public to evacuate and relocate orderly in emergencies.[8]

According to the survey, the data on directive emergency language landscapes in Sanya is shown in Table 2:

Table 2 Data Table of Directive Emergency Language Landscapes in Sanya

District/ Instruction Type	Safety Exit Indication	Shelter Indication	Rescue Facility Indication	Traffic Guidance Indication	Total Number of Areas	Number of Surveyed Spaces	Average Number
Jiyang	147 (27%)	22 (4%)	233 (44%)	132 (25%)	534	28	19
Tianya	183 (28%)	31 (5%)	274 (42%)	167 (25%)	655	30	22
Yazhou	154 (25%)	53 (9%)	242 (40%)	163 (26%)	612	18	34
Haitang	239 (28%)	68 (8%)	325 (38%)	221 (26%)	853	20	43

From the data, it can be seen that the overall proportion of indicative emergency language landscapes in Sanya City is similar, with rescue facility indication landscapes accounting for the highest proportion and evacuation shelter indication landscapes accounting for the lowest proportion. However, there are certain regional differences and characteristics in the specific numbers. Jiyang District, as a densely populated residential area, has a low level of attention to the construction of emergency language landscapes, with few evacuation shelter indication landscapes, which cannot meet the service needs of residents in emergency situations. Tianya District, as a popular tourist area, has a relatively large number of emergency language landscapes that are relatively balanced, basically serving both local residents and tourists. Yazhou District, as a newly developed district, has a much higher number than Jiyang District and Tianya District, indicating that emerging development areas are exhibiting good planning and development momentum in the establishment of emergency language landscapes. Haitang District, as a high-end resort area, attaches great importance to the construction of emergency language landscapes and invests the most, with a leading number of various indication landscapes to meet the needs of tourists from different countries and regions, demonstrating its international service level.

The second type of directive emergency language landscapes has its own unique characteristics.[9] The main function of warning emergency language landscapes is to convey potential danger information to the public, reminding people to be cautious and avoid accidental incidents. In Sanya, such landscape signs are commonly found in places with potential safety risks such as beaches, swimming pools, and construction sites. They use eye-catching signs and serious text to constantly remind citizens and tourists to stay alert. See Figure 2.

Figure 2 Warning Sign at a Public Beach in Haitang District, Sanya

Specifically, the warning emergency language landscapes in Sanya mainly include the following categories. The first one is danger zone warnings. Near bodies of water such as beaches, swimming pools, and reservoirs, warning signs like “Deep water, no swimming” or “Be careful to prevent drowning” are usually set up to remind people of the potential dangers of the water and avoid drowning incidents. Similarly, in dangerous areas such as construction sites and near high-voltage electrical equipment, corresponding warning signs are set to ensure public safety. The second one is prohibited behavior warnings. To maintain order and

safety in public places, Sanya's warning emergency language landscapes also include a series of prohibited behavior warning signs. For example, "No climbing," "No smoking," "No carrying dangerous items," etc. These signs inform the public of behaviors that are not allowed, thus effectively preventing potential safety hazards. The third one is safety operation reminders. In some public places where specific operations or precautions are needed, such as elevators and amusement facilities, warning emergency language landscapes will also provide safety operation reminders. For example, "Please use the safety belt correctly," "Please operate under the guidance of professionals," etc. These signs aim to guide the public to follow specified procedures and safety requirements, ensuring their own and others' safety.

According to the survey, the data on warning emergency language landscapes in Sanya is shown in Table 3:

Table 3 Data Table of Warning Emergency Language Landscapes in Sanya

District/Warning Type	Danger Zone Warning	Prohibited Behavior Warning	Safety Operation Reminder	Total Number of Areas	Number of Surveyed Spaces	Average Number
Jiyang	42 (10%)	109 (25%)	279 (65%)	430	28	15
Tianya	67 (15%)	153 (34%)	231 (51%)	451	30	15
Yazhou	98 (38%)	57 (22%)	104 (40%)	259	18	14
Haitang	78 (22%)	132 (38%)	201 (40%)	351	20	17

The regional differences in the construction of warning emergency language landscapes in Sanya are reflected in the number of public attractions, with Tianya District and Haitang District having more public attractions and, therefore, a wider range of warning signs; Jiyang District's residential nature leads to a dominance of safety operation reminder landscapes; Yazhou District, being under development, has more danger zone warnings at construction sites. Overall, Sanya's warning emergency language landscapes have been designed and set up with thorough consideration of the public's safety needs and cognitive characteristics.

The third type is informational emergency language landscapes, whose main function is to provide the public with detailed emergency information and guidance, helping people understand how to respond to various emergency situations, thereby reducing potential risks and losses. In Sanya, such signs are usually placed in prominent locations in public places, such as squares, shopping malls, hospitals, and schools. They offer information on how to respond to common emergencies like fires, earthquakes, tsunamis, as well as emergency contact methods and rescue resources information. With their rich content and clear expression, they provide timely and accurate information support to citizens and tourists, as shown in Figure 3.

Figure 3 Information Sign at Dadonghai Square in Sanya

Specifically, the informational emergency language landscapes in Sanya mainly include the following categories. The first one is emergency evacuation instructions. In densely populated areas such as large buildings and public places, emergency evacuation instruction signs are usually set up. These signs, through clear text and graphics, indicate evacuation routes, safe exits, and assembly points, helping people quickly evacuate to safe areas in case of fires, earthquakes, and other emergencies. The second one is emergency

rescue information. Informational emergency language landscapes also include a series of emergency rescue information signs, such as the location of firefighting equipment, instructions for using first aid kits, emergency contact numbers, etc.[10] This information is vital for public self-rescue and mutual aid in emergencies, helping people quickly find rescue resources and improve their response capability. The third one is disaster prevention knowledge. To enhance the public's disaster prevention awareness and capability, Sanya's informational emergency language landscapes also include disaster prevention knowledge bulletin boards. These boards, through vivid illustrations and text, teach the public prevention knowledge and response skills for common disasters such as earthquakes, typhoons, floods, etc., helping people better cope with the threats of natural disasters.

According to the survey, the data on informational emergency language landscapes in Sanya is shown in Table 4:

Table 4 Data Table of Informational Emergency Language Landscapes in Sanya

District/ Information Type	Emergency Evacuation Instructions	Emergency Rescue Information	Disaster Prevention Knowledge	Total Number of Areas	Number of Surveyed Spaces	Average Number
Jiyang	15 (27%)	33 (59%)	8 (14%)	56	28	2
Tianya	22 (28%)	41 (53%)	15 (19%)	78	30	3
Yazhou	26 (45%)	27 (47%)	5 (8%)	58	18	3
Haitang	24 (30%)	47 (58%)	10 (12%)	81	20	4

Overall, in the construction of informational emergency language landscapes, Jiyang District and Tianya District perform well in providing emergency rescue information, Yazhou District stands out in emergency evacuation instructions, and Haitang District leads in the overall number. However, all districts need to strengthen the dissemination of disaster prevention knowledge.

3.3 Multilingual Emergency Language Landscape Analysis

Given that Sanya is an international tourist city, the establishment of multilingual emergency language landscapes is of particular importance. These signs provide key information in several languages (such as Chinese, English, Russian, Korean, etc.) to ensure that tourists and residents of different nationalities can understand and take appropriate actions, as illustrated in Figure 4.

Figure 4 Multilingual Sign at the Betel Nut Valley Scenic Area in Sanya

Ideally, all types of emergency language landscapes mentioned above should be presented in multiple languages. However, the survey indicates that the situation of multilingual emergency language landscapes

in Sanya is not promising.

Table 5 Data Table of Multilingual Emergency Language Landscapes in Sanya

District/ Language	Chinese	Chinese + Pinyin	Chinese + English	Chinese + Russian	Chinese + English + Pinyin	Chinese + Russian + Pinyin	Chinese + English + Russian	Chinese + English + Korean	Chinese + English + Russian + Korean	Total Landscapes
Jiyang	216	231	372	0	118	0	56	21	6	1020
Tianya	89	83	260	177	284	159	122	0	10	1184
Yazhou	34	140	148	0	337	0	26	235	9	929
Haitang	51	63	469	0	324	0	121	224	33	1285

The data shows that there are significant differences in the current situation of multilingual emergency language landscapes in Sanya City. The multilingual emergency language landscapes in Jiyang District are mainly conventional settings of Chinese, Chinese + English, and Chinese + Pinyin, while the landscapes in other languages are relatively low, which is not conducive to the internationalization of emergency services. The Tianya District's multilingual emergency language landscapes exhibit a richer combination of languages. Since there are around 100,000 Russian residents in Tianya District, there are a large number of combinations with Russian in addition to the common combinations of Chinese, Chinese + English, and Chinese + Pinyin. The emerging technology park in Yazhou District has attracted investors from various countries. Therefore, in addition to the higher proportion of combinations of Chinese + Pinyin and Chinese + English + Pinyin compared to other regions, there are also many combinations of Chinese + Korean (235 locations), showing special attention to diverse tourists. The multilingual emergency language landscapes in Haitang District are mainly Chinese + English, with 469 locations, indicating the importance of bilingual services in Chinese and English and a high degree of internationalization in this area. Overall, Sanya City's indicators for multilingual settings in emergency language landscapes are relatively low, which has become a weakness in shaping an international environment for emergency services.

3.4 Survey and Interview Results Analysis

To understand the awareness and needs of tourists and residents towards emergency language landscapes in Sanya, we collected 374 valid questionnaire responses through designed surveys and arranged interviews, covering both international tourists and local residents. Additionally, we conducted 20 in-depth interviews, including 10 with tourists and 10 with residents.

After integrating and sorting out the data, it was found that many tourists and residents have a low level of awareness of the existing emergency language landscapes. Reasons include the lack of language diversity, complex and difficult-to-understand information content, and the landscapes' locations not being conspicuous or reasonable enough. The specific questionnaire and interview results are as follows:

In terms of awareness of emergency language landscapes, 67% of the respondents indicated that they had noticed emergency language landscapes, among which 48% of respondents only noticed directive emergency language landscapes such as "Safety Exit"; regarding understanding, 72% of Chinese respondents stated they could fully understand the content of the landscapes, but only 31% of foreign respondents said the same; for the visibility and readability of the landscapes, 75% of respondents think that emergency signs at tourist attractions and transportation hubs are visible enough, 61% of respondents believe that emergency signs in commercial areas are not conspicuous enough and need improvement, and 53% think the readability of emergency signs should be enhanced, especially during nighttime or adverse weather conditions; concerning the need for multilingual settings, 87% of tourists expressed the need for multilingual emergency signs, and 74% of residents believe that multilingual settings are necessary for shaping Sanya's international environment; regarding the update and accuracy of emergency information, 62% of respondents reported encountering outdated or misleading emergency information, and 85% believe that emergency information should be regularly updated and kept in sync with actual situations; on cultural sensitivity and inclusiveness, 68% of respondents think that the design of emergency signs should consider the needs of different cultural backgrounds and language habits. 45% of respondents reported experiencing misunderstandings or confusion due to cultural differences.

During the in-depth interviews, most interviewees expressed that in emergency situations, they would first look for emergency signs to obtain information and guidance. Some tourists mentioned that in some cases, due to language barriers, they were unable to fully understand the content of emergency signs. Most interviewees believe that Sanya's emergency language landscapes are effective overall, but there are still some shortcomings, such as signs not being conspicuous enough and information not being updated timely. Some residents mentioned that in some remote areas or places with less foot traffic, the setup and maintenance of emergency signs are not sufficient.

Based on the survey data, we analyzed the regional distribution, landscape classification, type distribution, questionnaire survey and interview results of the emergency language landscape in Sanya City. The above results will be discussed below.

4. Discussion of Survey Results

Starting from the theory, and compared with the construction of emergency language landscape in Japan, which is also an island region, we conducted an in-depth analysis and explanation of the above research results on emergency language landscape in Sanya City:

4.1 Three Theories Related to the Survey Results

The first one is emergency management theory and urban regional planning.The study findings indicate significant differences in emergency language landscapes across different districts in Sanya: Jiyang District, as a residential area, has relatively fewer emergency language landscapes, potentially making it difficult for residents to access effective emergency information promptly; Tianya District, a tourist hotspot, has a relatively larger number of emergency language landscapes, but may still face a demand-supply gap for emergency services during peak tourist seasons; Yazhou District, an emerging development area, shows good momentum in the planning and construction of emergency language landscapes but still needs to address the emergency service demands matching regional development. Haitang District, characterized by high-end tourism and resorts, demands higher standards for emergency language landscapes to meet the diverse needs of international tourists.

The results demonstrate significant variations in emergency language landscape needs across different functional areas, echoing the "risk-based regional management" emphasized in emergency management theory and the "functional zoning" in urban planning. The regional differences highlighted in the study underscore the need to consider local characteristics and specific demands of target populations in emergency management and urban planning.

The second one is cross-cultural communication theory and nultilingual service environment. The study identified a shortfall in multilingual emergency language landscapes as a bottleneck in Sanya's international development. This is manifested in the lack of multilingual signage, language barriers, and cultural differences. This finding emphasizes the application of cross-cultural communication theory in emergency management practices, especially under the backdrop of Hainan Free Trade Port construction, on how cities can meet the needs of tourists with diverse cultural backgrounds through inclusive design—making multilingual services a crucial indicator. Thus, enhancing the level of multilingual emergency services not only meets the needs of diverse tourists but is also a vital measure to promote urban internationalization. Additionally, considering cultural sensitivity and inclusiveness in the design of emergency language landscapes helps reduce misunderstandings and confusion due to cultural differences, which is significant for enhancing the city's international image and attractiveness.

The third one is social cognitive theory and emergency response efficiency. The questionnaire survey and in-depth interviews revealed a low level of public awareness of emergency language landscapes and instances of outdated or misleading emergency information. This reflects the public's varying levels of awareness and understanding of emergency language landscapes, as well as the demand for visibility, readability, and cultural sensitivity of the signs, consistent with the impact of information processing, cognitive differences, and cultural background on information understanding emphasized in social cognitive theory. Designing emergency language services with more consideration for the target audience's cognitive characteristics and cultural differences can effectively shorten emergency response times and improve rescue efficiency.

4.2 Comparison with Japan's Emergency Language Landscape Construction

Japan, as a country with frequent natural disasters, multiculturalism, and multilingualism, has long embarked on the research and development of language emergency services, boasting a comprehensive emergency management system and experience. The construction of emergency language landscapes is also relatively mature. This paper attempts to compare the current situation of emergency language landscape construction in Sanya with that in Japan, aiming to gain more inspiration and lessons from it.

Similarities between Sanya and Japan in emergency language landscape settings include that both Sanya and Japan are located in island regions, facing similar natural disaster threats, such as typhoons and tsunamis, necessitating a focus on emergency language landscapes to enhance public safety awareness and response capabilities. Sanya is a famous tourist city in China, while Japan is a world-class tourist destination. Both need to provide clear and accurate emergency information for a large number of domestic and international tourists to ensure tourism safety. Due to hosting a large number of international tourists, both Sanya and Japan recognize the importance of providing emergency instructions in multiple languages to meet the needs of tourists of different nationalities and ensure effective communication of information.

Differences lie in the following aspects. Japan has a more mature and comprehensive emergency management system and experience due to its unique geographic location and history of frequent natural disasters. In comparison, Sanya is far behind in disaster warning, public education, and post-disaster recovery. Japan does better in the widespread use and standardization of emergency signs, adopting a unified signage system nationwide, whereas Sanya might have regional variations, with the prevalence and consistency of signs needing enhancement. Japan is more advanced in using technology and innovative means, such as mobile apps, social media, and other digital platforms to disseminate emergency information. Sanya has significant room for growth in this area to improve the efficiency and coverage of emergency information dissemination. Japan has invested substantial resources in enhancing public disaster prevention awareness, knowledge, and skills, including school education, community training, and regular drills. Sanya may need to increase efforts in public education and participation, especially in enhancing the self-protection capabilities of residents and tourists.

In summary, although Sanya and Japan share common concerns in setting emergency language landscapes, the construction levels are vastly different due to historical background, culture, technology application, and disaster management experience differences. Sanya should learn from Japan's experiences, especially in standardizing emergency signs, using technological means to enhance information dissemination efficiency, and strengthening public education and participation, to build a more effective and comprehensive emergency management system.

5. Strategies and Recommendations

In light of the above issues, we propose the following specific strategies and recommendations for the construction of emergency language landscapes in Sanya:

5.1 Optimization of Emergency Language Landscape Settings

Develop differentiated emergency language landscape planning strategies according to the functions and characteristics of different districts. For example, enhance the setting of emergency signs in residential areas of Jiyang District to improve residents' awareness of emergency information; in Tianya District, increase multilingual emergency signs in tourist hotspots to meet the needs of international tourists. Establish an emergency language landscape management system that matches the urban functional zoning. In emerging development areas like Yazhou District, consider emergency service needs in planning to ensure that emergency language landscapes keep pace with regional development. Strengthen cross-regional coordination to ensure the coherence and consistency of emergency information. Establish unified emergency language landscape standards to promote information sharing and resource integration between districts.

Enhance warning effects using conspicuous colors and fonts: Use high-contrast color combinations and clear, readable fonts to attract attention; introduce dynamic elements, such as flashing lights or animations, to enhance visual impact; set up audio prompts in key areas, like sound alarms or verbal prompts, especially for visually impaired individuals. Expand functional types, integrate multimedia technology, utilize touch screens, QR codes, etc., to provide interactive information, such as real-time weather, traffic conditions, etc.; offer personalized services based on tourists' nationality, language preferences to provide customized emergency information; add emergency communication facilities, such as emergency phone booths, Wi-Fi

hotspots, for rapid contact with rescue services.

5.2 Increasing Multilingual Emergency Signs and Enhancing Public Awareness

Increase the setting of multilingual emergency signs, especially in tourist hotspots and public service areas, to ensure information is accurately conveyed to tourists from different cultural backgrounds. Incorporate cultural sensitivity and inclusiveness in the design of emergency language landscapes to avoid symbols or images that may cause cultural misunderstandings, ensuring information is correctly understood across different cultural contexts. Establish unified standards for the design, layout, and maintenance of emergency language landscapes to ensure the accuracy and consistency of information; encourage the use of internationally recognized symbols and icons to enhance the international recognizability of information. Strengthen cooperation with international organizations, drawing on the successful experiences of other countries and regions. For example, consider Japan's practices in emergency language landscape construction, adapting and innovating based on Sanya's actual conditions.

Utilizing modern technological means to enhance the intelligence level of emergency language landscapes. For example, emergency information can be disseminated through digital platforms such as mobile applications and social media to improve the efficiency and coverage of information dissemination; utilizing technological innovations such as Augmented Reality (AR), Artificial Intelligence (AI), and big data to improve the efficiency and personalization of emergency information dissemination; introducing dynamic display technologies such as electronic display screens and LED screens to update emergency information in real time. At the same time, consider using auxiliary means such as voice prompts and touch interactions to enhance the readability and understandability of emergency information; strengthening cooperation with universities, research institutions, and promoting technological innovation and applied research in the field of emergency language landscapes. By continuously introducing new technologies and concepts, we can promote the sustainable development of emergency language landscape construction in Sanya City.

5.3 Policy and Regulatory Support

Develop and improve relevant regulations and policies to provide legal guarantees for the construction and management of emergency language landscapes. Clarify the responsibilities and authorities of various departments and units to ensure the smooth development of emergency language landscape work. Increase financial investment to provide necessary funding support for the construction and maintenance of emergency language landscapes. At the same time, encourage enterprises and social organizations to participate in the construction of emergency language landscapes, forming a diversified investment mechanism. Establish and improve supervision mechanisms and evaluation systems to regularly evaluate and supervise the implementation effects of emergency language landscapes. Through continuous improvement and optimization of strategies and suggestions, ensure the effectiveness and sustainability of emergency language landscape construction in Sanya City.

Develop and refine relevant regulations and policies to provide legal backing for the construction and management of emergency language landscapes. Define the responsibilities and authorities of various departments and organizations to ensure the smooth progress of emergency language landscape work. Increase financial investment to provide necessary funding support for the construction and maintenance of emergency language landscapes. Simultaneously, encourage the participation of enterprises and social organizations in the construction of emergency language landscapes to establish a diversified investment mechanism. Establish a robust monitoring mechanism and evaluation system to periodically assess and monitor the effectiveness of emergency language landscapes' implementation. Through continuous improvement and optimization of strategies and recommendations, ensure the effectiveness and sustainability of emergency language landscape construction in Sanya City.

6. Conclusion

As globalization accelerates and urbanization levels continue to rise, public safety and information dissemination have become indispensable components of modern urban management. Against this backdrop, emergency language landscapes, as an intuitive and effective means of information transfer, play an increasingly prominent role in enhancing a city's ability to respond to emergencies, ensuring public safety and property, and promoting multicultural exchanges.

This study, taking Sanya as a case, employs both qualitative and quantitative research methods to delve into the application and effectiveness of emergency language landscapes in public safety and information dissemination. The findings reveal that despite certain achievements in the construction of emergency language landscapes in Sanya, there are still many issues and challenges, such as imbalanced regional landscape construction, insufficient dissemination of emergency signs, lack of multilingual services, and low public awareness. These problems not only affect the effective transmission of emergency information but also restrict the improvement of urban public safety management and service levels.

Therefore, it is particularly important and urgent to strengthen and optimize the construction of emergency language landscapes. Through developing differentiated regional management strategies, optimizing emergency language landscape settings, providing multilingual services and culturally sensitive designs, enhancing public awareness and participation, promoting technological innovation and application, and seeking policy and regulatory support, the service efficiency and internationalization level of Sanya's emergency language landscapes can be effectively improved. This will not only help enhance the city's disaster prevention and mitigation capabilities and crisis response capacity but also provide solid public safety guarantees and cultural exchange support for the development of the Hainan Free Trade Port.

The construction of emergency language landscapes is a systematic project that requires the joint efforts of governments, enterprises, and all sectors of society.[11] Only by continuously strengthening theoretical research and practical exploration, and constantly improving the relevant legal and policy systems, can we promote the sustained and healthy development of the emergency language landscape industry, contributing positively to the construction of a safe, harmonious, and livable urban environment.

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