Architectural Heritage under Threat:
Disaster and the Conservation Difficulty, Using Kinmen Island as a Case Study

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1. Introduction
2. Built Heritage and Natural Disasters
3. Destruction Resulting from Typhoon Meranti and Disaster Restoration
4. Challenges of Disaster Prevention and Maintenance for Built Heritage on Kinmen Island
5. Conclusion
Taiwan’s Kinmen Island lies outside of Xiamen in southern Fujian, China.

In 1949, China split into two political camps, the Nationalists and the Communists.

Kinmen was controlled by the Nationalist and under tight military control for 43 years until 1992.
Introduction

Kinmen (Quemoy)

Taiwan

Taiwan Strait

China
Introduction
Introduction

- By 2018, the small island has 227 architectural heritage sites.
- In the event of typhoon, traditional architecture are under threat.
- In September 2016, a strong typhoon hit Kinmen and damaged nearly half of these heritage.
Kinmen, is met with frequent typhoons between July and October each year.
Typhoons that follow the path north along the west coast of carry a great amount of humidity with them.
They are usually extremely solid if their structures are not broken by higher terrains.
Typhoons and Storms

- Typhoon Dan in 1999 and Typhoon Meranti in 2016, are categorised as Pattern Seven.
- Both infrastructure and traditional houses were gravely harmed.
Kinmen’s traditional architecture is characterised by red tile roofing and wooden structural frames.

The walls are made of bricks or blocks that combine.

Without sufficient maintenance, leakage and termite infestation become a common sight.
Traditional Kinmen architecture and villages are typically built on flat.

Typhoon represents the most impactful disaster among all, and related preventative work is critical.

There is a large number of uninhabited or collapsed buildings in Kinmen.
Destruction Resulting from Typhoon Meranti and Disaster Restoration

The Typhoon and its Damage

- In 2016, Typhoon Meranti was a strong typhoon in recent years.
- Level 7 storm in the Beaufort scale was 220 km, and Level 10 storm 80 km.
- With the highest wind speed reaching 60 m/s, qualifying it as Level 17.
Under the **Level 17** gale, historic buildings experienced severe destruction.

- Take the **225 historic buildings** in Kinmen’s five townships. This study categorises the degrees of damage of these buildings into four levels.
- **107 buildings** fall under damage levels **B through D**, constituting **48%** of all.
- **Damage degree D** alone found **40 examples**

### Number of Damaged Historic Buildings by Location

<table>
<thead>
<tr>
<th>Level</th>
<th>Jincheng</th>
<th>Jinning</th>
<th>Jinsha</th>
<th>Jinhu</th>
<th>Lieyu</th>
<th>Subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (no damage)</td>
<td>46</td>
<td>5</td>
<td>39</td>
<td>21</td>
<td>7</td>
<td>118</td>
</tr>
<tr>
<td>B (light damage)</td>
<td>15</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td>C (moderate damage)</td>
<td>14</td>
<td>4</td>
<td>15</td>
<td>4</td>
<td>2</td>
<td>39</td>
</tr>
<tr>
<td>D (severe damage)</td>
<td>10</td>
<td>3</td>
<td>17</td>
<td>5</td>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>14</td>
<td>77</td>
<td>33</td>
<td>16</td>
<td>225</td>
</tr>
</tbody>
</table>
The types of destruction include:

- **Loosened or fractured tiles:**
  Red clay tiles will loosen up or break, causing rain water to enter the structure.

- **Roof collapse:**
  A roof may collapse when it is hit by trees that are uprooted by the typhoon.

- **Disintegration of walls:**
  Brick and clay walls are likely to disintegrate when exposed to strong winds.

![Loosened roof tiles caused by windstorm](image1)
![Fallen banyan crashed the roof](image2)
![Disintegration of wall](image3)
Destruction Resulting from Typhoon Meranti and Disaster Restoration

The types of destruction include:

- **Deterioration of plaster walls**: The strong wind of Typhoon Meranti caused the surface of many buildings to peel, exposing the internal structure to rain.
- **Damage to decorative and architectural elements**
- **Doors, windows, and lighting fixtures.**
- **Environmental damage**: This includes damage to the surroundings of historical buildings, for instance if a giant banyan tree next to a historic building were to collapse.
The Kinmen Cultural Affairs Bureau undertook the following three phases of damage review:

- **Phase I**: Preliminary Review, quick review in three days.
Disaster Restoration

- **Phase II**: Second Review, advanced damage evaluation of the 107 heritage structures classified as Levels B through D.
- **Phase III**: Repair or Conservation Plans.
Lack of Disaster Prevention Awareness amongst the Public

- Most people failed to take preventative measures to avoid potential damage.
- Measures that could have been taken include reinforcement of weaker parts of the building, such as doors, windows, roofs, and other weak spots.
Authority in Charge Lacked Disaster Management System

- The Cultural Affairs Bureau is yet to accumulate enough experience in disaster prevention.
- The Bureau was not conscious of the possibility of damage.
Insufficient preparation of conservation funds

❖ The high technical difficulty and relative low profit margin of historic conservation presented low incentive for traditional architecture craftsmen to take part.
❖ Most would rather stay with the regular traditional house rebuilding projects.

Before Typhoon Meranti  After Typhoon Meranti
The Frequency of Natural Disasters

❖ The absence of natural barriers and the rising of sea levels present challenges of ever-greater stringency.
❖ The growing frequency and intensity of typhoons are expected to become a common issue.
Challenges of Disaster Prevention and Maintenance for Built Heritage on Kinmen Island

Growing Number of Designated Built Heritage

- Kinmen has also faced the pressure of development.
- The number of architectural heritage has increased rapidly in recent years.
- Conservation resources have been insufficient.
Conclusion

- Many damaged heritage buildings remain unrepaired today.
- This accentuates the issues:
  1. Inadequate education about disaster prevention for architectural heritage
  2. Predicaments in heritage risk preparedness, disaster prevention, and post-disaster recovery
  3. Restoration under limited resources of the island
Wise use of heritage

❖ Risk analysis and mitigation ensure best use of valuable resources.
❖ Risk analyses and preparedness need to be conducted.
❖ Four phases of work: prevention, response, rescue, and recovery.
❖ It is essential for setting the correct direction for the future of cultural heritage protection and sustainable development.
Thank You!