Rescue and restoration of paper archives damaged by disasters in China

——Case Study of Beichuan Earthquake

Cao Jiani

State Archives Administration of People's Republic of China

Framwork

Destruction of paper archives caused by various natural disasters and vandalism

Specific process and methods, innovative technologies and equipment of rescuing and restoring paper archives which were damaged in disasters in China (case study of Beichuan earthquake)

Technical difficulties and prospects for development of rescue and restoration work for the affected archives

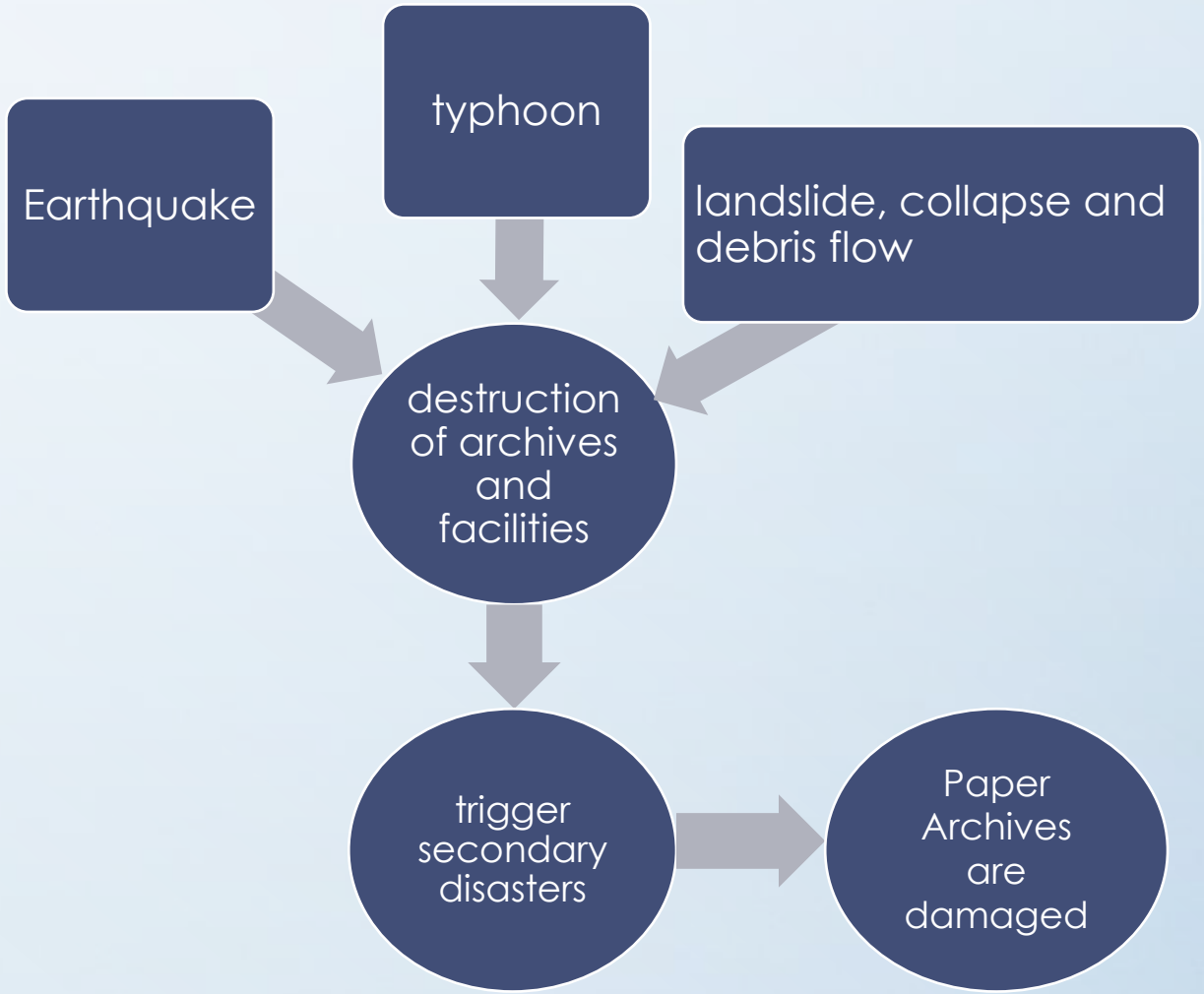
Part I:Destruction of paper archives caused by various natural disasters and vandalism

- 1、Fire——It might cause discoloration of paper archives, lead to folding strength and physical strength decline of papers, or even burn the archives up, and we can’t read the message on paper archives anymore.

- A survey carried out by SAAC shows that, only 5 from 31 provinces, municipalities and autonomous regions archives were not hit by fire accidents after the founding of PRC. The other 26 have suffered from fire. Fire occurrence rate is up to 84%.
- According to the survey, there were nearly 100 fires in the archives department after the founding of PRC. About 3 million archives were burned in fires.

- 2、Flood——It might cause deformation of paper, fading and diffusion of handwriting, folding strength and physical strength decline, paper will be soaked into mud, mildew and bacteria will grow on the paper. Paper archives can be turned into archives brick.

3、Earthquake, typhoon, landslide, collapse and debris flow——They mainly destroy paper archives through the destruction of archives and facilities，cause mechanical damage, which lead to tearing and deformation of paper archives, even trigger secondary disasters which destroy the paper archives.



Part II: Specific process and methods, innovative technologies and equipment of rescuing and restoring paper archives which were damaged in disasters in China（Case Study of Beichuan earthquake)

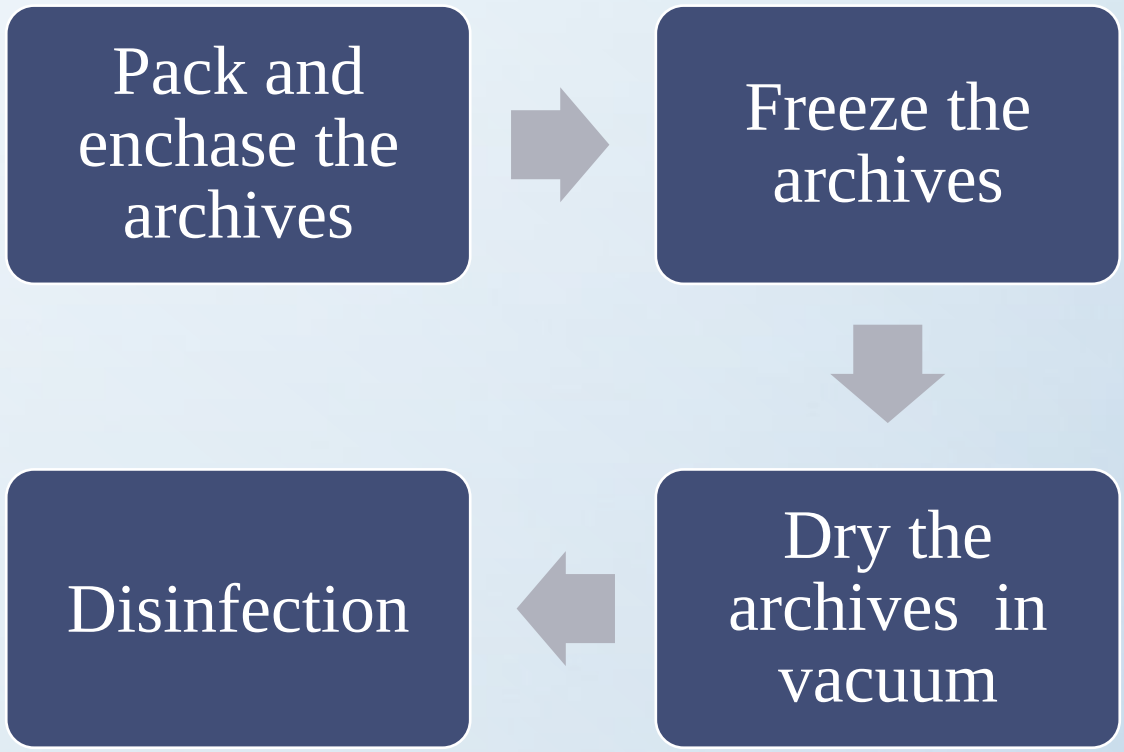
1.Situation of paper archives affected in Beichuan earthquake

After the disaster, the Archives Department of Sichuan province took emergency measures to rescue more than 65 thousands volumes of archives from the ruins. Among them, more than 12 thousands volumes have been flooded and soaked for a long time, they were damaged heavily。

Polluted by waste	Mildow and spores grow and breed	Archives pests	Comprehensive damage
• Mud • Rubbish • Industrial waste • and so on	• Aspergillus flavus, Aspergillus niger and variegated fungus, from about 10 kinds of 8 genera	• Ctenolepisma villosa • Lice • Parasites • and so on	• Handwriting diffusion • Handwriting fading • Adhering of papers • Hydrolysis of papers

2、 Specific process of rescue and restoration of paper archives which were destroyed in the Beichuan earthquake

First aid：



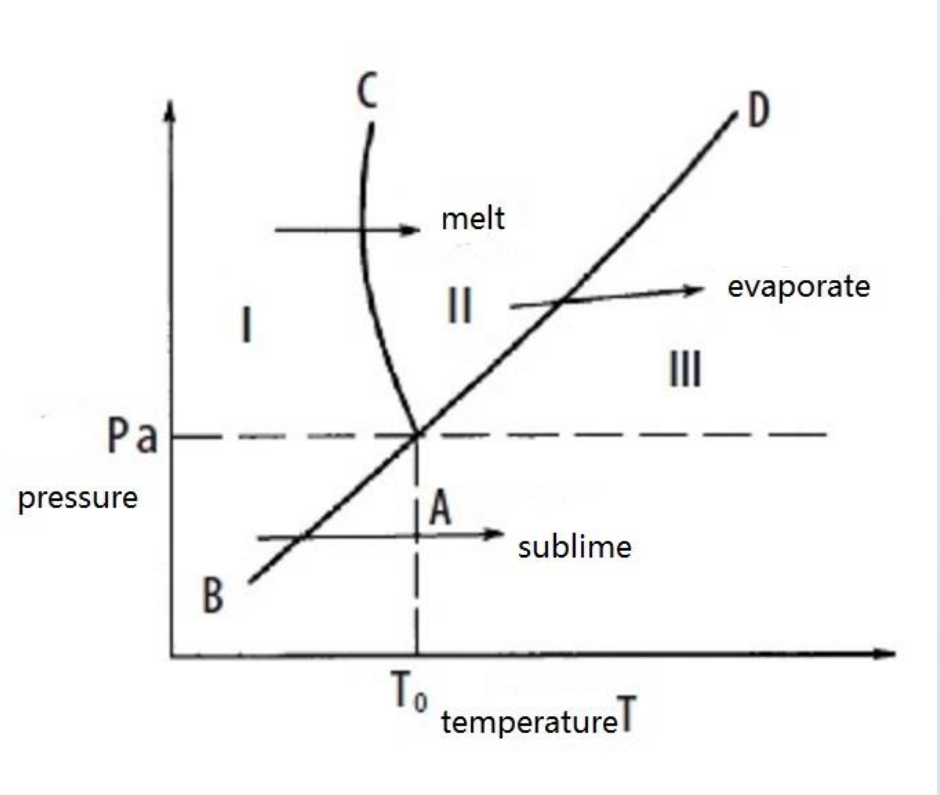
Pack and enchase the affected paper archives

Affected archives in the cold storage

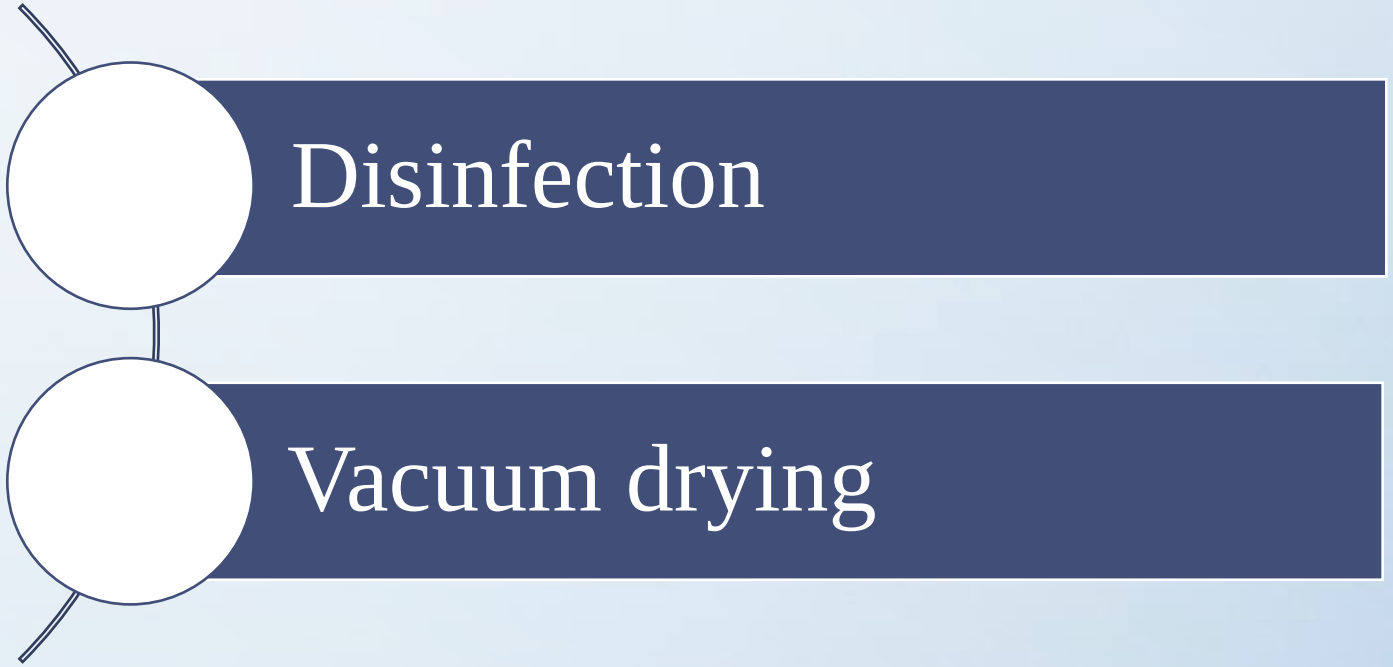
Disinfection

Vacuum drying

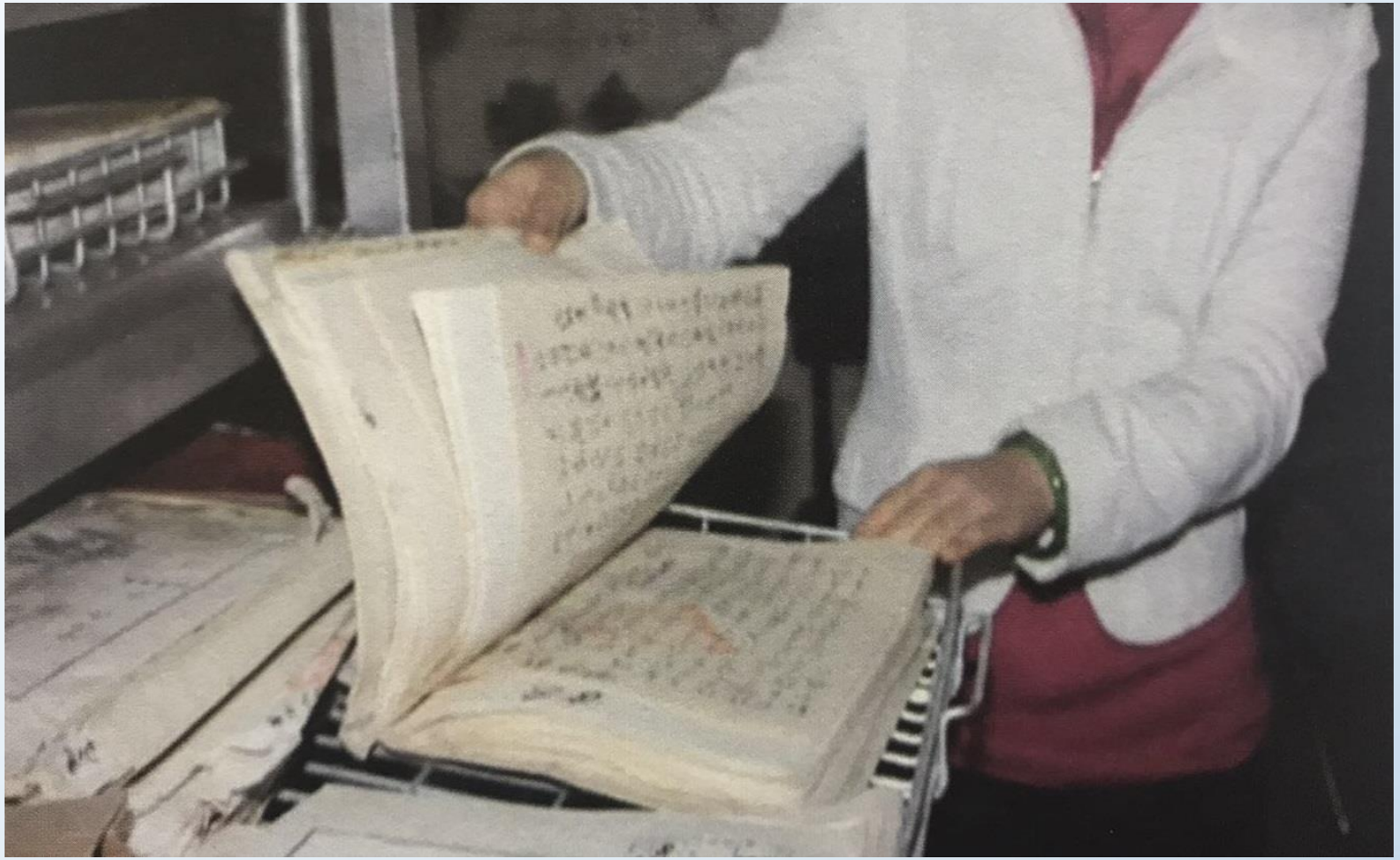
- Vacuum drying technology



Ethylene oxide sterilizer



Multifunctional vacuum drying sterilizer



Paper archives after vacuum drying

Restoration ：

Uncover the archives brick → Decontamination → Restore the archives page by page

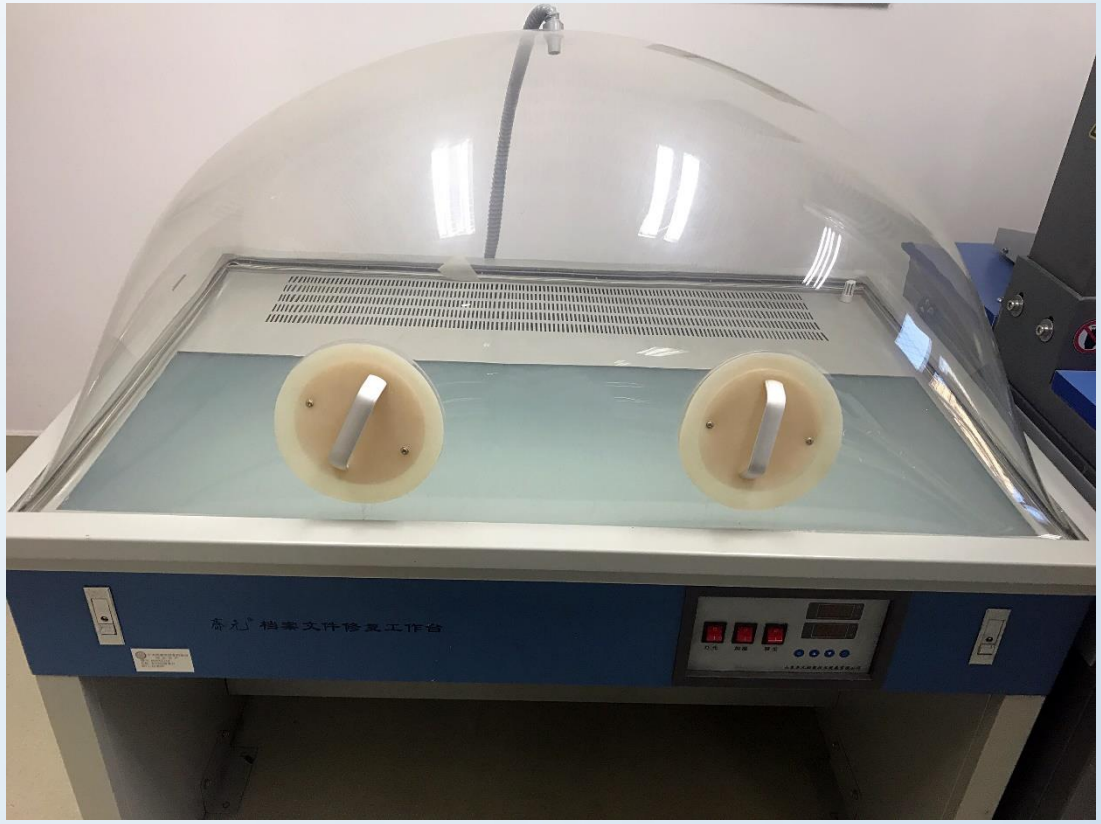
Clean the archives brick

Loosen the archives brick

Repair the affected paper archives

Uncover the archives brick by bamboo knife

Multifunctional archives repairing desk



Flattening and drying machine

Archives brick before restoration

Archives brick after restoration

Part III: Technical difficulties and prospects for development of rescue and restoration work for affected paper archives

1.Uncover the archives brick:

Technical difficulties	Prospects for development
• Physical strength of the paper archives decline • Secretion of mildew lead to adhesion and hydrolysis of papers	• Biological uncovering agent • Handwriting restoration agent • Handwriting protection agent

- **Biological uncovering agent:**
- Invented by Cultural Relics Protection And Restoration Center of Capital Museum

advantage	disadvantage
• It can uncover papers much faster than water • It won’t hurt the paper while uncovering normally	• It might cause handwriting diffusion while uncovering the papers with water soluble handwriting

The real painting of the Ming Dynasty uncovered by biological uncovering agent

- **Handwriting restoration agent and handwriting protection agent:**
- **Invented by Professor Li Yuhu from Shaanxi Normal University,** handwriting restoration agent can restore diffused handwriting, handwriting protection agent can protect handwriting from diffusion.

- **2.Deacidification:**

Technical difficulties	Prospects for development
• Batch processing • Be safe both to the handwriting and the paper archives itself • Low-cost	• Fluorocarbons Magnesium Oxide suspension

- Thank you for listening!

Email:
connie_4321@163.com