

The Ideal Way to Structure Multipurpose Shelters in Rural Bangladesh: Combining Storm Shelters and On-site Electricity Generations

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1. Introduction

Bangladesh

70% of annual precipitation falls during June and September

Ranked fifth out of 171 countries at risk of natural disaster

Occurrence of cyclones and flooding

Lack of shelter

Need of fund



Source: Yachiyo Engineering CO.,LTD.

Hypothesis Necessity of multi-purpose shelters

2. Basic Information

Table 1 Past Disasters
Source:Asian Disaster Reduction Center

Year	Death toll	Total Damage
1970	300,000~500,000	\$46 billions
2007	4,232	\$16 billions
2009 May	190	\$2.7 billions

• Shapla Neer



• Médecins Sans Frontières



• International Committee of the Red Cross



Aid from overseas

3. Cyclone Shelter

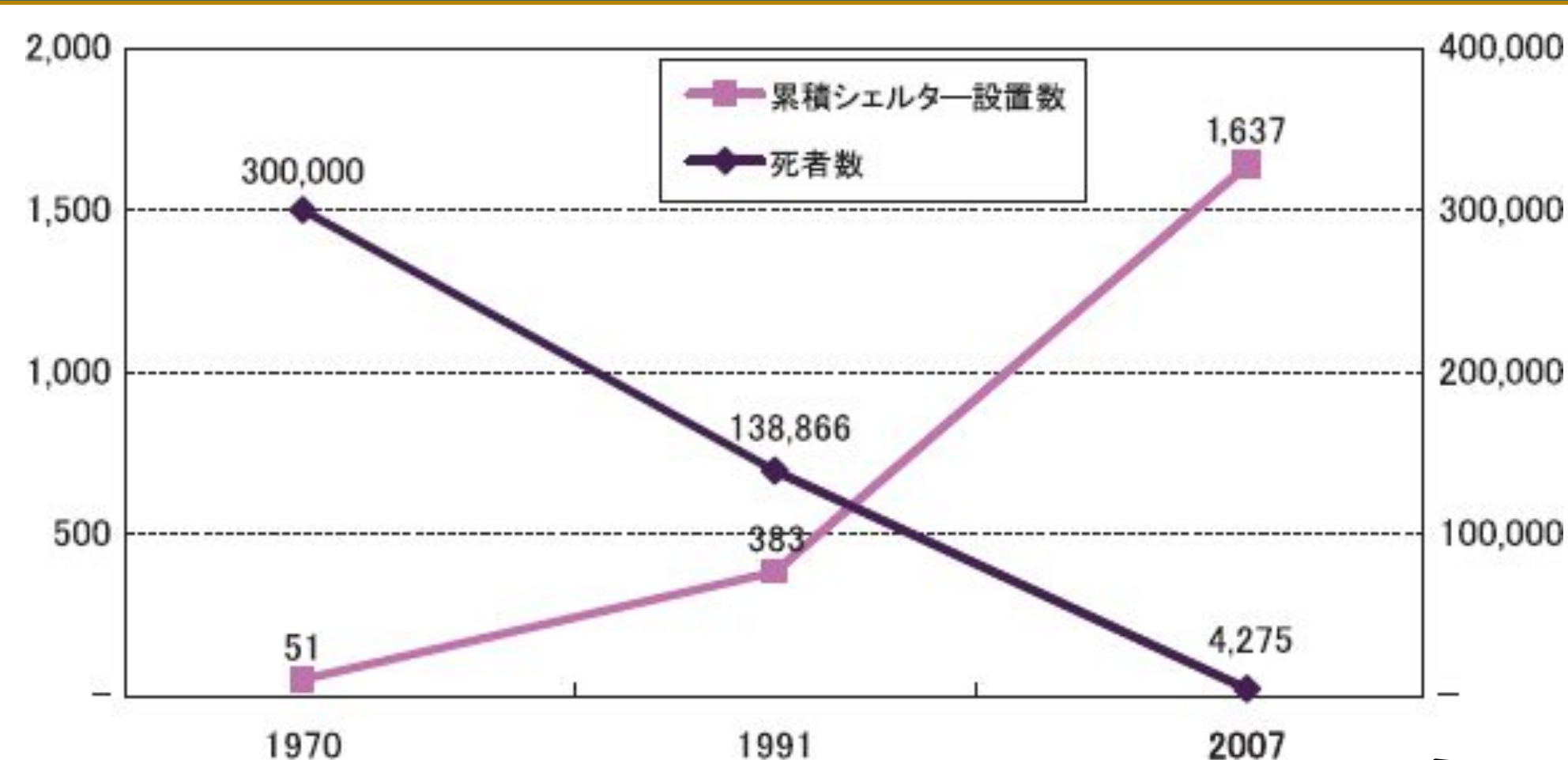


Fig. 1 Availability of Shelters and Death Rates
Source:Figure made by Cabinet Office original data from World Food Program

Still more than 4,000 deaths in November of 2007

5 Reasons people don't go to shelters

Not believing in warning

Fear of looting

Risk of damage on the way

Distance from shelter

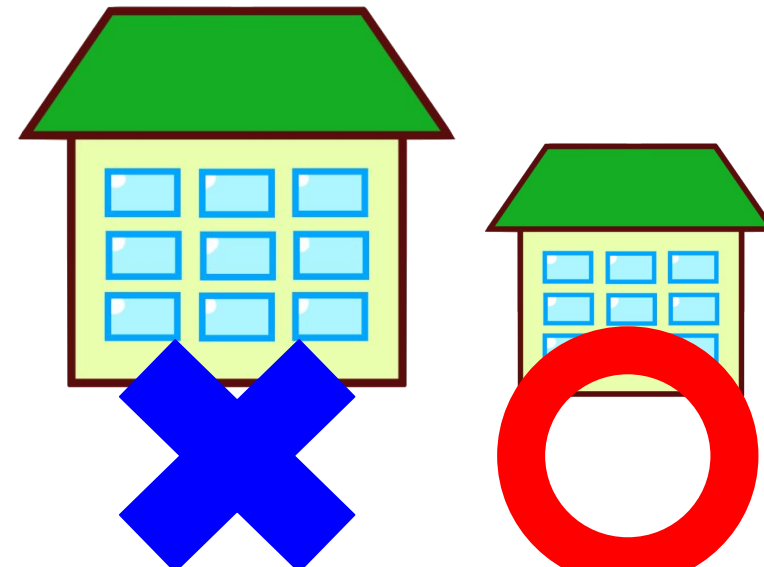
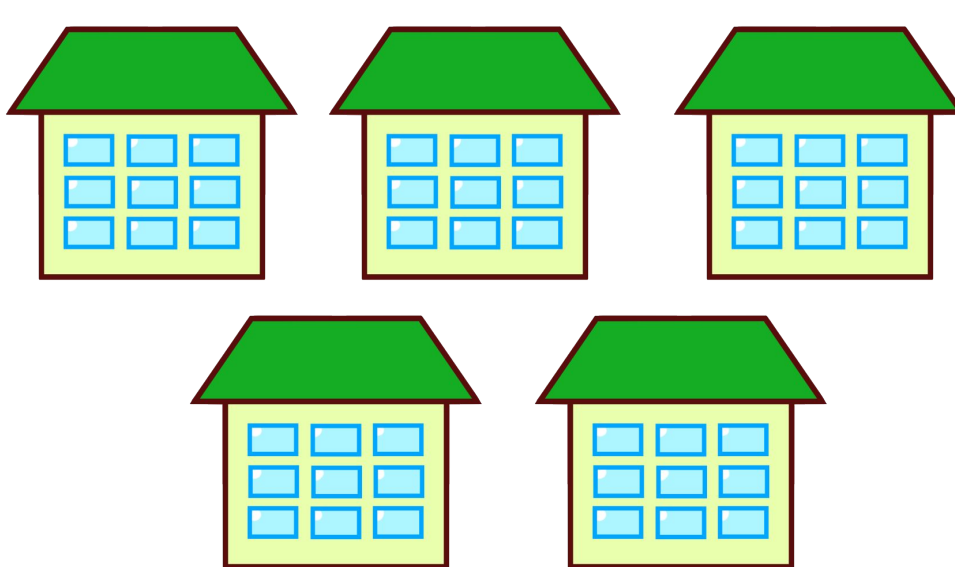
Lack of road maintenance

Limitation in funding

Multiobjective function

Increase in number

Decrease in scale



1. Form a strong bond between people in a region
2. Enhance education on disaster prevention

4. Combining On-site Electrical Generation

Emergency: Use it as a shelter

Establishment of on-site generation

Usually: Provide electricity to homes

People without electricity: 20% of population = 42 million
Non-electrification rate: City 1% Rural 34%

5. Project Finance

Way to collect funds

Benefits

Borrower : Large-scale of fund raising

No requirement of payment when in arrears

Lender : High interest

Chance of extending business field

JICA started project finance for the first time in Bangladesh in 2017

6. Conclusion

Occurrence of cyclones and flooding
Lack of shelter

Lack of electricity in rural areas

Establishment of combination of shelter and on-site electrical generation

Accomplishments

- Offer of electricity to households
- Cost reduction of the production of electricity
- Convenience of shelter
- Maintenance of safety in shelter
- Guarantee the way to protect themselves

Limitations

- Risk of not getting fund as it is planned
- Lack of expertise like the structure of generation

Further research

- Necessity of coming up with alternative plan of fund raising
- Acquisition of expertise

7. Citation

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