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## Paper Tube Emergency Shelters

Shigeru Ban

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## Paper Tube Emergency Shelters

*Shigeru Ban*

In the 1990s, ethnic violence between the Hutu and Tutsi peoples broke out in Rwanda. As a result, more than two million people became refugees. The tragedy was raised in the public consciousness by constant media attention and even became the subject of the film *Hotel Rwanda*. Based on such notoriety, the crisis became the focus for a worldwide humanitarian relief efforts on the part of the United Nations and many government and non-governmental organizations (NGOs). While the presence of NGO doctors (such as the group Doctors Without Borders) was notable, practically no architects could be seen at all.

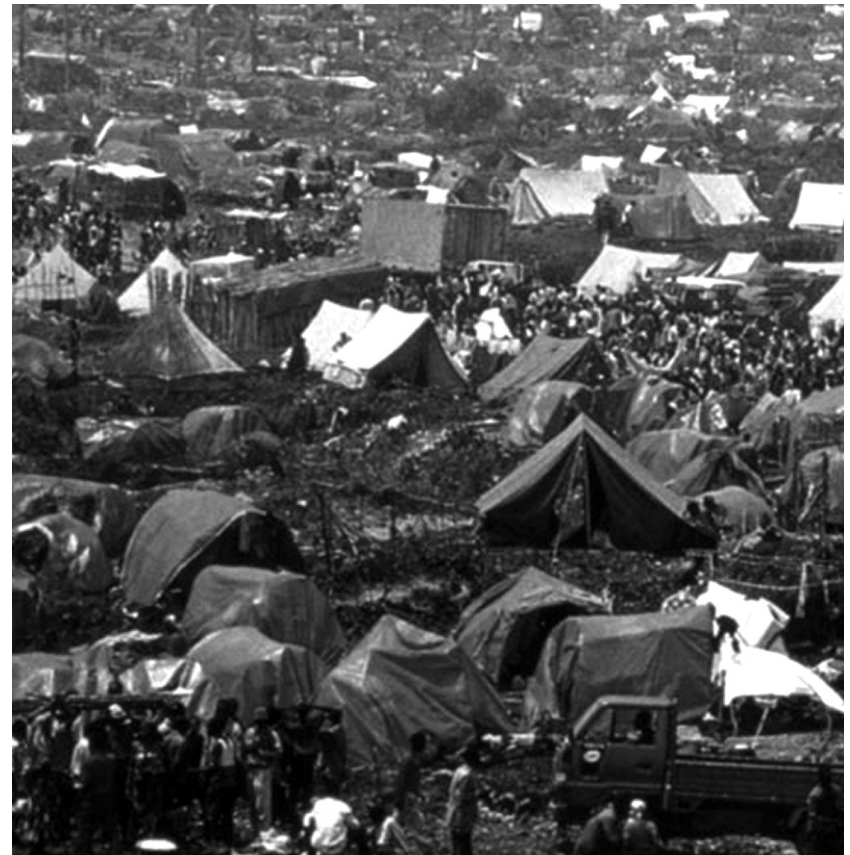
As part of the relief efforts the UNHCR (the United Nations Refugee Agency) began a program to distribute low-cost, makeshift shelter “kits.” The kits consisted of plastic sheeting together with hatchets. The idea was that refugees would use the hatchets to cut timber from the surrounding woods and, coupled with the plastic tarps, build their own shelters. Such temporary structures would protect people for much of the year. However, with more than two million refugees from Rwanda in neighboring countries, it became apparent that the cutting of scarcely-available wood on such a massive scale would quickly result in deforestation and environmental disaster.

As the rainy season approached, so did a period of extremely cold weather, bringing with it many cases of pneumonia.

Hearing of this, we thought about our paper tube construction—its insulating qualities, portability, low expense, and environmental friendliness all seemed appropriate responses to the Rwandan refugee situation. We approached the UNHCR in Geneva, sending some documents outlining our ideas.

Meanwhile, to counter the need for cutting wood, the UNHCR had stopped shipping hatchets and had begun shipping aluminum tent poles in the housing kits, in spite of the extra cost involved. Unfortunately, the aluminum was recognized as a source of income by the refugees, who quickly sold the poles for money and then returned to cutting and using wood for tent frames. The UN considered and rejected other materials: bamboo seemed a workable alternative, but the UN was uncomfortable that the necessary large-scale purchases from China would result in price distortion of the local markets there; PVC pipe was considered and rejected because it would necessitate later re-collection and because of its non-perishability and the gasses released if burnt. These and other economically and environmentally unfriendly solutions were unacceptable.

This eventually led the UNHCR to reconsider our idea for paper tubes as a good substitute for wood. In March of 1995, this plan became the official UNHCR policy and I was hired as a consultant. As a first step toward this policy, meetings were held with



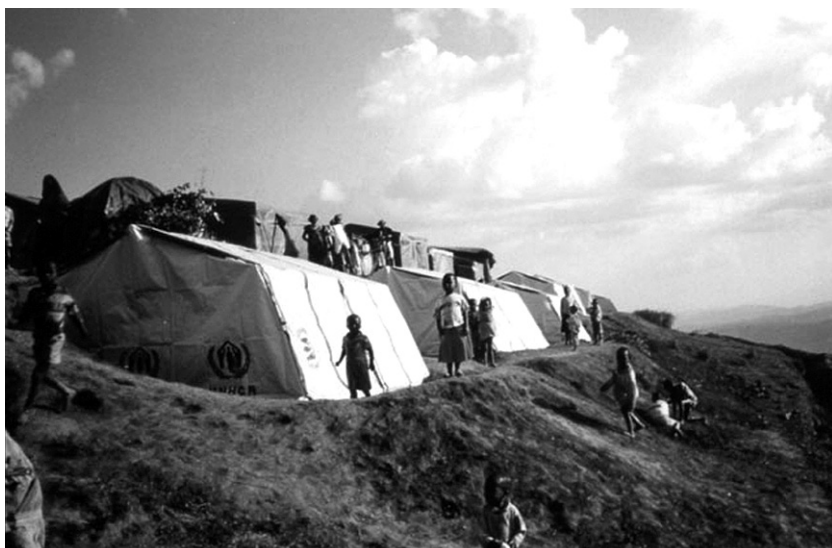
*View of existing conditions in a Rwandan refugee camp*

paper tube manufacturers in Europe. We quickly discovered that, although the paper tubes were lightweight, the cost of transporting them from Europe or other manufacturing centers was high. Ultimately, we discovered that shipping the machinery necessary to manufacture paper tubes to Africa provided a workable solution. The raw, recycled paper, donated from many countries and organizations,

was readily available as was the labor to manufacture the tubes.

Our architectural solution provided not only much-needed shelter; it was low in environmental impact, inexpensive with local economic benefits, had good thermal properties, and could be easily assembled by the refugees themselves.





*Top to bottom, constructing paper tube shelters and view of completed shelters*