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EMERGENCY SHELTER AND NATURAL DISASTERS

(Some Observations Based on Earthquakes in Skopje and Managua)

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By

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Professor Otto Koenigsberger, the director of the Development Planning Unit in London, has suggested that there are four categories of people with an interest in disasters (see Chart 1, Appendix):

The fascinated public,
The socially conscious,
The reformer/innovator,
The architect/planner.

The recent crop of disaster films -- "Towering Inferno", "Earthquake" -- are symptoms of the public's appetite for disasters. However, public interest can rapidly wane in an actual situation. When Lice in Turkey was destroyed on September 6, 1975, it received headline coverage on September 8th, but by September 12th it had totally departed from all national newspapers in Britain.

In the second category, there are the relief workers, or the public who subscribe to them.

The reformer seeks to capitalize on a disaster since it presents unique opportunities for urban reform. Christopher Wren unsuccessfully attempted to re-plan the city of London in the aftermath of the great fire, whilst in Lisbon following the earthquake of 1755, the city was given its new grid-iron urban center.

The fourth category is the architect and planner. The reasons for the architect's interest in emergency housing are significant and I will return to these. However, at this point we should note that the role of the architect relative to a disaster falls into three roles, in three fairly closely related time situations:

a) Pre-disaster planning, or mitigation with contingency planning;
b) Relief provision of shelter (Impact up to about three weeks);
c) Reconstruction (From about three weeks onwards).

The focus of most architects' (and certainly architectural students') concern is with (b), Relief provision, and to a certain extent it can be argued that this is a blinkered concern. Although this is a significant stage, it is probably true to say that the most vital stage for the allocation of resources and research effort is (a), Pre-disaster planning. This is not the subject I have been asked to speak on, but I would like to emphasize this priority.

Fred Krimgold, an American architect who trained in London but now lives in Sweden, writes:[1]

> "What can architects do about disasters? The first, most obvious area of concentration was on emergency shelter design. In studying the actual rehabilitation and permanent reconstruction phases it became evident that the problem of temporary shelter was subordinate to that of reconstruction. However, with further study it became apparent that the investment of effort and resources which gives the greatest return in both economic and human terms must be made in the pre-disaster phase. In the pre-disaster phase the skills of architects and planners are also of great importance. Plans must be developed to reduce disaster impact. Areas of high risk must be avoided for human settlement. Building techniques must be developed which are based on local materials and able to withstand disaster force."

Reasons why mitigation is such a vital area relate to the tremendous threat of our fast growing cities. They are growing at a much faster rate than mitigation measures, which include better by-law controls, better constructional techniques, and advice on the location of housing in an area. For earthquake-prone areas, in relating building locations to seismic data; for flood-prone areas, to flood expectation levels; and for hurricanes relative to expectation of direction.

We now face a situation where many of our major cities are extremely vulnerable. To name a few: Kingston, Jamaica; Guatemala City; Managua, Nicaragua; Lima, Peru; Santiago, Chile; Dacca, Bangladesh. Recent devastation at Darwin has shown that the developed world is not in any way immune; and Tokyo, Anchorage and San Francisco are not the only major developed cities that are at risk.

Recently there has been an extensive study of San Francisco, and attempts have been made to predict the consequences of an earthquake of similar intensity to the one of 1906 which destroyed the city.

Comparisons have been made by Professor Robert W. Kates of Clark University, Worcester, Mass., in a recent research project on reconstruction following disaster.[2]

	Earthquake of 1906	Estimated Consequences of earthquake in near future
Scale of Earthquake	8.3 (Richter)	8.3 (Richter)
Population:	400,000	3,100,000 (overall conurbation)
Deaths:	500	8,750 (22,000 injured)
Homeless:	220,000	500,000
Damage:	Entire commercial and industrial center destroyed. 55% of all housing units destroyed.	100,000 homes unusable

The scale of damage in disasters is often overlooked. It can be such that it may take up to 15-20 years for a place to recover. In Skopje, the earthquake was in 1963 and the total rebuilding will probably continue for about 4 years before the city will claim to have recovered - an elapsed period of sixteen years. In Managua, it may well take much longer.

In terms of the cost of damage, the United Nations Disaster Relief Organization (UNDRO) are at present completing a detailed study with the United Nations Environment Programme (UNEP) to try to ascertain the full value of damage after a disaster, relative to the G.N.P. of a given country.

In human terms the results are as to be expected. The U.S. Department of State estimated that between July 1st, 1970, and June 30th, 1971, over fifty-one disasters took place (none of which was man-made). These disasters affected sixty-eight million people and caused half a million deaths.[3]

If earthquakes alone are considered, it has been estimated by Professor Ambraseys of Imperial College[4] that over 800,000 people have died since 1900, an average of about 14,000 per annum.

Therefore, it is encouraging that pre-disaster planning is proceeding very extensively throughout the world; but since there are few vested commercial interests, it is mostly being sponsored by governmental or academic institutions.

The other, possibly neglected area of concern is the (c) stage, Reconstruction. Another word for this is simply "low-cost housing".

In Britain there are 20,000 registered architects for a population of fifty-five million -- one architect for every 2,750 people.

In the U.S.A. there are 60,000 registered architects for a population of 209,000,000 -- one architect per every 3,500 people.

There is a very real need for architects to concern themselves with the needs of the underprivileged, the poor, the mentally ill, the elderly -- and within this category we have the problems of reconstruction, in what might be described as a continual disaster situation. Buckminster Fuller made the remark in one of his epic six-hour lectures, "As an architect you have to make a decision, do you want to make money or make sense." This is not to say that they are incompatible aims; but we all know of architects wasting their energies on useless buildings that society may have little need of. So this is a small cry to consider third world problems as a focus of your careers.

Now to return to the issue why the architect has this acute interest in disasters, as a colleague put it: "surely this is a rather unhealthy pre-occupation!" The reasons are fairly obvious, since an opportunity is apparently offered which coalesces no less than six perennial concerns of most architects, particularly during their student careers (see Chart 1, Appendix). These are escapism; a social concern; an interest in geometry; a desire for innovation; an interest in the mobile, temporary form of dwelling; and finally, the very obvious opportunity for work following the collapse of a great many buildings. It is perhaps useful to look at these pre-occupations since they are at the root of the situation which causes the continual flood of emergency shelter ideas that bombard the various relief agencies.

On the issue of escapism, it is interesting that most designs for emergency shelter emanate from countries far away from areas of high risk. Disasters are mercifully rare in Britain, and this remoteness heightens their fascination for the designer.

The social concern is, of course, praiseworthy, but it can have patronizing elements within it -- a concern of what good "we" can do for "them".

"Close packing truncated cuboctohedrons" is a technical description of a series of inter-related volumes. They find few outlets in conventional architecture and the disaster shelter is apparently an obvious application for clever geometrical configurations.

The basic concern of every architect is to innovate by developing new forms and using new technologies.

The interest in mobility is more complex, and probably relates to various aesthetic movements in the 1960's. The emphasis here is "drop the shelter" (perhaps by parachute) to "move it", "float it", or "pump it up". All of these techniques being used in various designs of the past decade. Perhaps the love of the "temporary" has its roots in the boy scout summer camp!

Finally, the very obvious fact that disasters offer opportunities for work for both designers and contractors. A friend of mine, an English architect, was working in the States in the early 1960's when a tornado wiped out a town. Like many others, he was unemployed at the time and decided to visit the town in question in the hope of picking up some work. He got off the train and as he walked down the platform saw a lot of other men with large tee-squares projecting from their briefcases (rather like vultures descending for what they could collect).

To return to the ingenious designs that get produced every year -- what actually happens to them. One answer is that they bulge out of the filing cabinets of virtually every relief agency in the world; but despite this, very few of these designs have actually been used in a disaster situation. Two systems that have been used are: first, the West German Red Cross Bayer Polyurethane igloo -- used initially in Peru, Turkey and Nicaragua[5]; and second, the continuing experimentation by OXFAM into polyurethane igloos and more recently hexagonal polyurethane igloos that have been field-tested in Bangladesh[6]. These units will have their first field use in Lice, Turkey. This urgent provision is an attempt to meet the exposure problem of homeless people as the winter of 1975 advances. In fact, next week, forty-five days after the earthquake, they will be used. Note that date, forty-five days after the earthquake.

So we have seen why architects have a concern; the next question is again reasonably obvious, why do contractors have a concern?

Firstly and unashamedly to make money. They assume that there is a lot of profit in them. They also may (like Bayer Chemicals of W. Germany, and OXFAM in England) go into the venture with a view to getting very good publicity -- and the more novel the building shape or erection process, the more attention from the media. Finally, contractors may go into this sphere like anyone else for humanitarian reasons, a genuine concern for the homeless.

Why then, if there is pressure from the designers to implement the shelters and pressure from industry, are so very few used? Perhaps the answer is an amalgam of these factors:

a) They often cost a great deal. Mr. Dalton, Acting Chief of Disaster Relief with A.I.D. in Washington, told me that in his rule of thumb, they must end up costing about the same as a good tent. That is to say under $300.

b) A suspicion of them by both affected countries and donor groups, relief agencies and their staff.

What are the reasons for their suspicion? Here are some possible ones, I might suggest, a purely personal choice of factors. The problem of cultural acceptance of a standard house type, by varying societies; the time it takes to transport and erect such systems; the mistaken idea of "temporary housing" (our World War I pre-fabs are still in use); and the need for a society to use its unemployed men to reconstruct in accustomed ways as a moral and economic boost.

But perhaps at a fundamental level it highlights the mistaken idea in our society, that the distinction we draw between the temporary and permanent is similar to rural society in say Turkey or Latin America. We all know the difference between our symbol of permanence, the surburban "semi-d" and the wooden beach house or holiday hut. Perhaps subconsciously it is assumed that similar distinctions exist elsewhere. In actual fact, most "permanent" housing in many Third World situations (which admirably meets the occupants' needs) is probably by our definition "temporary" (see Charts 2 and 3).

Perhaps I can now turn to the two places where I have a little knowledge, Skopje in Yugoslavia and Managua in Nicaragua. I will first show a few slides of each and then make some comparisons relative to the provision of shelter (see Chart 4).

The salient points of the comparison are that we are comparing two situations with two basic points of contrast:

1) In a socialist republic with a totally different land policy and social and administrative organization to the other, which is of course a capitalist situation;
2) One has a disaster in a fairly developed situation, whereas Managua is in a developing country;

and basic points of similarity:

3) Similar size;
4) Both regional capitals;
5) Both virtually to be rebuilt;
6) Both maximum aid situations.

At this point slides were shown.

It is the emphasis of my own research that it is possible to rebuild permanent as opposed to temporary houses in these large urban areas rapidly if at all possible by the occupants using their normal vernacular style. Where this is unsafe, they may need to modify the design. The classic example of rapid rebuilding of homes after a disaster is Skopje where 14,000 pre-fabricated homes were built in a period of eight months[7]. One further vital issue is for countries to rebuild all schools, churches, all public buildings so that there is no likelihood of their being destroyed in any future disaster. They can then form temporary shelters, dispensaries, morgues and food distribution centers if and when a future disaster strikes. This is, however, merely a by-product of ensuring that all public buildings housing large numbers of people are totally safe. In Managua, 900 schools and four hospitals collapsed in the disaster.

Despite helpful medicine, "prevention is always better than cure" in the housing sector of all vulnerable settlements. It is the hopeful expectation of many that within the coming decade, the vulnerable villages, towns and cities of our world will be able to apply simple preventative "medicine" in the design and siting of homes, and that these measures will mitigate the future ravages of nature.

APPENDIX

CHART 1

Groups with Interests in Disasters

1. (The public	(Escapism
2. (The socially conscious	(Social Concern
3. (The reformer/innovator	(Geometry
4. (The architect/planner	(Desire to Innovate
	(Interest in Mobility/Temporary
	(Desire for Work

CHART 2

Housing/Shelter Criteria

Post Disaster Period	Housing Type	Housing Goals	Desirable Delivery/ Erection Time	Minimum Utility Requirements	Site Requirements	Approx. Period of use
Life Sustaining	Emergency	Group Living	48 hours	Subsistence level	Any Avail.	10 days
Situation Stabilizing	Temporary	Semi-Family Living	10 days	Communal Rationed	Planned Temp.	6 wks.
Recovery	Semi-Permanent	Family Living	6 wks.	Private Rationed	Conversion	1 year

Taken from Housing Technology Alternatives for use in planning post-disaster programmes, page 13, pub. by National Academy of Science, Washington, 1972.

CHART 3

Problems With Western Solutions to Shelter

1) Cost -- often too expensive (add freight costs);
2) Cultural Acceptance by differing societies;
3) Time - often too slow for use as emergency shelter;
4) Not Temporary;
5) Generate Little Local Economic Growth;
6) Climate Problems.

CHART 4

	MANAGUA	SKOPJE
Date	December 22, 1972	July 26, 1963
Pre-disaster population	430,000	200,000
Present population	500,000 approx.	420,000
Casualties dead	4,000 - 8,000	1,400
Population homeless	250,000	130,000
Houses - damaged - destroyed	24,000 50,000	9,217 25,281
Evacuation Policy	Cordon center distribute food in outlying areas	Compulsory for 120,000 for three months
Damage to Property	$300 million	$1,400 million
Value of total aid	$14.3 million	$16.8 million
Value total reconstruction	?	$39.2 million
Tents provided	4,191	14,044
Total used	approx. 1,800	approx. 2,000
Types of emergency shelter, Year 1	wooden huts igloos tents existing buildings	nissen huts tents existing buildings
Types of permanent housing, 2	asbestos cement concrete block stack-sack	basic housing complete by Year 1

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