THEMES TO BE ADDRESSED

Emerging from these problem areas, I want to identify nine priority themes that this workshop subject area may choose to address. These are obviously a personal choice that suffer from my cursary experience of improvement projects, as well as personal prejudices and 'hobby horses'. However, despite such limitations, I hope that they will assist in framing our discussions.

Theme No 1

How to reconcile the technical criteria with social/political dimensions?

The following eight themes embrace technical (or technological) issues as well as social, philosophical, even ethical dimensions. This underlines the width of the subject and the problem I want to isolate is the narrow emphasis of those of us who work in this field. Much past study of this subject has suffered from the classic technical/social culture gap, and hopefully this workshop will recognise that a marriage is long overdue between different (but totally linked) subjects or disciplines, which are essentially facets of the same problem. The need is so obvious that it barely merits restatement that those working in a technical sphere need to recognise the wider social dimensions of implementation. Then conversely those with social concerns must grasp the complex technical issues which relate to engineering seismology, which are essential for a full understanding of this subject.

Undoubtedly, this theme takes us squarely back into the structure of academic education with the intrinsic weakness where a blinkered and often highly specialised study of subjects occurs with narrow parameters which merely reflect the bias of a given academic discipline rather than the totality of what actually occurs at the field level.

Theme No 2

What can be done to bridge the vast gulf between the policy and research level of concern and the field level?

Having identified the science/social gap, we now move on to an even greater gap (or perhaps gulf would be a more accurate description). This is the familiar 'poverty barrier' that separates those with knowledge, power and influence from the poor, who in our study live in adobe houses.

The gap relates to all assisting groups, and it constitutes a major reason for the minimal attention that has been devoted to our workshop theme heretofore. Attempts to close the gap take us into the realm of attitudes, relationships and structures. Starting with the latter, one answer to this problem is for assisting groups to focus their energy skills and resources through the channel of local institutions (where such bodies exist). The advantage of these groups is that trust relationships are likely to exist with local families. Peter Berger and Richard John Neuhaus have written a perceptive analysis of the role of such bodies in their study To Empower People - The Role of Mediating Structures in Public Policy (26). They also identify another

factor which has contributed to the barrier - the issue of 'Professionalism' and the alienation it can bring to disadvantaged groups, rather than the service that they may well expect from such groups:

> 'Professional standards are of course important in some areas. But they must be viewed with robust scepticism when expertise claims jurisdiction, as it were, over the way people run their own lives. Again, ordinary people are the best experts on themselves... Lower income people are most effectively disfranchised by the successful establishment of expert monopolies.'

The issue of professionals retaining their power and authority is paralleled by the centralisation of control and finance by public authority as well as the centralisation of technology within the established building industry. John F C Turner has written about the consequences of the growth of 'ever-larger pyramid structures:

> 'Only the rich minority can be supplied in these centrally administered ways using centralizing technologies, and then only at the expense of an impoverished majority.' (27)

From the outset it is important to recognise that there will be no single panacea to resolve this gap, rather a wide strategy including new measures and attitudes. The devolution of power and finance to the local level is one prerequisite, another is the devolution of expertise. A new system is needed where the highest levels of technical knowledge need to reach some very humble levels. This suggests that the most positive way forward will be in the direction of developing (through training and resource allocations) the creation of the new breed of barefoot architects or engineers. Perhaps they will become the major 'gap-fillers' where relevant and appropriate expertise reaches its target alongside village builders and craftsmen. This leads on to my next theme, that of training.

Theme No 3

<u>How to facilitate training to occur for small builders and craftsmen?</u>

Authorities, agencies, professionals are normally 'product orientated' with a strong emphasis on a tangible result from their efforts. These physical solutions may be in the form of buildings completed or even in the passing of anti-seismic legislation. Therefore, the strategy of placing reliance on 'training' which was the strength of the OXFAM/World Neighbors program in Guatemala, is extremely rare, in fact almost non-existant in agency thinking or housing programs.

So the way to 'enable' this to occur must be some refocussing on the part of the audiences I have noted at the head of this theme. It is probable that we now know far more about the nature of seismicity, or the performance of adobe structures in earthquakes, than in how best to train people at local levels. As I have already identified in this paper the literature on this theme is very thin, as a result of the pervasive pressure to convert building construction from a localised activity, into a centralised skill best left to major contractors with the ear of governmental housing banks and ministries.

What is needed, is for this workshop to come out unequivocally in favour of training as one of its primary recommendations for risk reduction with some positive steps having been taken as to who can finance, organise and equip the 'teachers of the teachers'. Allied to these questions there are the questions of what type of training aids must be developed and by whom. Major steps forward were made in Guatemala with the training aids developed by OXFAM/World Neighbors. These principles were then modified via INTERTECT's involvement for use in Andhra Pradesh, India (28), before being further adapted for use in Calcutta and Northern India by Jae Sen and his colleagues in UNNAYAN (29) for housing programs to resist cyclones and high winds.

All of these aids for housing facing diverse hazards need to be further studied to establish how far they were effective and what 'mixes' are necessary for their effective use, (i.e., on their own, with trainers, with expertise support and with training programs.)

In considering training programs and teaching aids for adobe structures, we nevertheless need to recognise that we may be watching a global movement towards 'modernised housing systems'. This introduces my fourth theme.

Theme No 4

Given the threat within some cultures to traditional building methods (such as adobe construction) from both within and without the societies in question, what attitude should authorities adopt to this demand for a change of building tradition?

Frequently societies have been observed in Central America, the Caribbean, the Middle East and India to reject their traditional buildings, along with many other traditions in favour of 'new' images that have been revealed by the media. As I have mentioned under the 'problems section' of this paper, this presents assisting groups with many dilemmas.

My hope is that this workshop will note this reality, and suggest that alongside our concern for the improvement of adobe structures we also see the need for a similar concern for the types of construction that are frequently replacing this form of construction. So often local families, after earthquakes, have switched their rebuilding to concrete block construction from adobe without recognising that it has little aseismic value unless built in a certain manner.

At a wider level, are we to remain neutral in this transition from adobe to concrete or whatever, or is the stance of assisting groups to either advocate adobe, or else to encourage rising aspirations for 'modern' construction? This issue may be one of the most problematic of all the workshop themes.

I now want to turn to a pair of technical themes:

Theme No 5

What are the outstanding technical issues that are still unsolved relative to the improvement in the seismic resistance of adobe structures?

It is essential that those attending this workshop from field contexts communicate the technical difficulties they face to those with the skills and resources to tackle these problems. The workshop will then hopefully identify these topics in some order of importance so that research groups can approach

specific practical questions. Going even further, field personnel need to advise on such matters as who they believe are the most effective bodies to make these studies, as well as suggesting the format for the advice that they need. For example, a housing extensionist does not have access to academic journals which are often the final resting place of important findings with potential field application.

Then relating these research findings to our theme, a strategy is also necessary for the implementation of new advances in aseismic adobe technology, and research groups need to discuss with field personnel appropriate ways to test their ideas.

One major technical/social issue is unresolved and it has accounted for the vast number of deaths and casualities in the Middle East and Central Asia - the heavy, flat earthen roof. This is my sixth theme.

Theme No 6

<u>What measures can be devised which are socially and economically viable to deal with the unsolved problems posed by the heavy flat roofs of adobe houses in Central Asia and the Middle East</u>?

I have already referred to the problem of modifying the flat Turkish earthen roof. In his report on the Iranian earthquake which destroyed Tabas-e-Golshan in 1978, Manuel Berberian made a very detailed damage survey (30). He described the context of Tabas where 98% of all houses were made from adobe, with flat or domed earthen roofs. Berberian described how the:

> 'High ratio of death to injuries emphasises that the traditional adobe houses of the region, with their weak walls and heavy earthen roofs, offer little resistance to shocks.'

He then went on to suggest that the houses needed to be redesigned to withstand future seismic forces. One proposal was for future construction to use a domed vault system with arched walls springing directly from the ground, rather than springing from supporting walls.

I hope that the workshop will identify the dry, arid zones of Central Asia and the Middle East with their severe climate and lack of timber for spanning purposes as a priority area requiring a solution to the heavy earthen roof problem. I also hope that any solution will not imply a major change in house construction or form so that people will continue to gain climatic protection from a fierce climate, and will still be able to sleep on their flat roofs on hot summer nights.

Manuel Berberian's hopes for a redesigned house for Tabas may have occurred for the post-earthquake reconstruction, but it is less likely to occur for <u>existing</u> vulnerable houses in Iran that have yet to experience an earthquake. For these families the picture is bleak, which is my seventh theme.

Theme No 7

<u>Given the difficulties in mounting improvement programs for existing buildings, what measures are appropriate for such families living at subsistence level</u>?

I have already touched on this issue in my review of problems associated

with objectives. The workshop may share my view that the modification of the existing housing of poor families is rarely a viable proposition due to economic and social constraints (see FIG 5). When this is the case, what are the alternative ways to protect the occupants of such homes? The only proposals that I have seen considered are that of the safe protected core which is built inside a house, particularly as a place for sleeping. If this existed the traditional main victims of earthquakes, small children, the elderly and sick may secure some protection. Another issue is whether advice can be given directly to the house occupants on simple and cheap measures that they can themselves adopt to make their houses safe.

If this type of cheap and grass roots solution is rejected, then what are the alternatives to an acceptance(given the scale of the existing housing stock) that casualities will continue to occur in vast numbers. If the preservation of life is the major aim of this workshop then this theme has a strong claim for priority attention.

The final pair of themes come right back to the issue of project implementation, what are the most effective policies, and how can we clarify their 'ends and means'.

Theme No 8

On the basis of past programmes of housing modification, is this workshop able to advise governments and voluntary agencies on effective implementation policies?

During the course of this workshop, various reports will be given on housing improvement programs. There is I believe a need to determine on the basis of our current knowledge which of these have been successful, and which have failed to meet their objectives. I hope that the workshop will identify the characteristics that have made up successful projects, whenever common denominators can be found. But in so doing it is also important that 'success' is defined, what makes it so, and what is a failure, and in whose terms?

Not only are we still unsure about how to modify adobe houses, these quite fundamental questions are still being debated.

Theme No 9

A consideration of the social and political presuppositions of modification programs. This theme will seek to define some prerequisites for successful improvement policies

I have referred in the discussion on problems that there is much confusion about 'ends' and 'means'. This theme requires an inventory of searching questions to be identified about objectives, patterns of authority and the development of accountable relationships between assisting groups and vulnerable families.

Frances Moore Lappe, Joseph Collins and David Kinley of the Institute for Food and Development Policy in San Francisco have written an important study in 1980 'Aid as Obstacle'. The book primarily concerns food aid, but is nevertheless relevant to our theme in many of their arguments. They list a set of 'Ten questions to ask about a Development Project' (31). These questions are all pertinent to any analysis of project objectives, but due to limitations of

space I would like to reinforce just four of their questions:

> 'Whose project is is? Is it the donor agency's or does it originate with the people involved?
>
> Does the project define the problem to be tackled as a technical or physical deficiency that can be overcome with the right technique or skill or does it address the underlying social, economic and political constraints that stand in the way of solving the physical or technical problem?
>
> Do new skills and information remain only with the leaders? Or does the project involve an ongoing educational process for all the participants?
>
> Does the project reinforce dependence on outside sources for material and skills or does it call forth local ingenuity, local labour and local materials, and can be maintained by local skills?'

Such questions are hardly new, the literature on development has persistently drawn attention to these matters. But there remains yet another gap between knowledge of what will or will not work in terms of an effective project and the application of these principles. One reason for the failure is pure ignorance, but at a deeper level it is currently not in the agencies interest to take note of these issues (unless it is a particularly altruistic body with minimal regard for its own needs). A project that is developed by (or with) the people to be ultimately housed will always take longer to instigate, it will become more open-ended and less tidy in any normal budgeting accounting system. It also may not deliver tangible objects very quickly that can be easily reproduced in agency magazines.

In the absence of any method of accountability between the agency and the recipients of their aid it is a great rarity for the questions quoted above to be taken note of. For example the final question on this list concerns evaluation:

> 'Is the evaluation a one-way process by which the donor judges the recipient's performance? Or is is a two-way dialogue in which the recipient also evaluates the donor and they together evaluate the project?'

To conclude this theme, can this workshop suggest any mechanism to improve the relationships between assisting groups and recipients so that a climate exists where the above process can take place?

CONCLUSION

These nine themes are a demanding agenda, and each delegate will doubtless have his own list of key topics which will expand the list into hundreds of themes. The themes we have been considering are so fundamental and far-reaching that it would be naive to expect solutions to emerge from this meeting. This could take a full decade of solid work given the early stage of our knowledge. However, rapid progress can be made when collective minds are concentrated, and our aim in the consideration of this subject area should be to establish dominant issues, rank them in order of importance, and explore their implications for the different levels of audience, ranging from agency field staff, active professionals, academics undertaking research and governmental policy makers.

But at the very centre of the issue of implementation there is another audience for our discussions. Rather like the missing small builders that didn't hear Professor Ambraseys, they are also missing from this meeting. The 'proof of the pudding is in the eating', and the ultimate test of our work is whether we produce ideas which are relevant, appropriate, understandable and acceptable to the small builders of Turkey, Iran, Peru and Guatemala. I hope that it will be accepted that this group are the main target of our collective concern.

A final note of warning. Whenever we recognise the 'early stage in our knowledge', the next paragraph of the report normally starts to develop a research agenda (often directed to the same group that defined the gaps in a self-serving posture). The assumption that answers to vital questions are a prerequisite for action must be resisted. In his excellent study of Urban Planning in Rich and Poor Countries, Hugh Stretton faces this issue:

> 'There is a pervasive dilemma which recurs in research, in planning and in politics. How much can you afford to know before you act? How much time can you afford to spend making sure that you will all act together? How far can people share power without destroying the power they share?'

Stretton then comes to the issue of knowledge being required before action:

> 'The less you know before you act the riskier the action is likely to be. But the more you insist on knowing the longer it may be before you act at all, and the staler a lot of the information may be before you act on it. It is never possible to know about the conditions and likely consequences of action... Most information has costs, so the more you spend on knowing, the less you may have left to spend on doing.' (32)

Clearly the need in the sector we are discussing in this conference is what Otto Koenigsberger has described as 'action planning' where swift decisions are made and implemented on the basis of available evidence. This policy requires 'feed-back' mechanisms from continual evaluation and monitoring of success or failure to enable projects to adapt in a responsive manner to emerging evidence. In effect, a need for research work and project implementation to proceed in parallel, each informing the other, but of course there is the proviso that the gap is closed between the two sectors to enable this to happen.

This paper began with a 250 year old case study of improved construction. I quoted this example since it is a source of encouragement to all those in this workshop with a concern to see things happen on the ground, not just within the pages of conference proceedings. As we have seen there are some massive obstacles preventing the effective implementation of aseismic modification programs. However, whenever a situation is fortunate enough to combine official 'will', local concern and involvement, appropriate skills and financial resources (all of which appeared to come together in Lisbon), we can be confident that good projects can occur, and at our next meeting we can review their effectiveness.

References

1. Stephen Tobriner, Earthquakes and Planning in the 17th and 18th Centuries, Journal of Architectural Education, Vol. XXXIII, No 4, Summer 1980, pp 13-15, Association of Collegiate Schools of Architecture, Washington D.C., U.S.A. (Tobriner's information on Lisbon is based on J. A. Franca Lisboa Pombalina, Lisbon, 1965)

2. I. R. Davis (Ed), Disasters and the Small Dwelling, the full proceedings of the 1978 Oxford Conference, Pergamon, Oxford, U.K. (1981)
(The proceedings include papers on housing modification programs in Guatemala following the 1976 earthquake, as well as several studies of the Housing Improvement Program following the Andhra Pradesh, India, cyclone of November 1977.)

3. Ian Davis, Stuart Lewis and Peter Winchester, The Modification of Unsafe Housing following Disasters, Architectural Design, No 7, pp 193-198 (1979)

4. ARTIC, Seminar Report: Problems and Lessons from the Andhra Pradesh Cyclone, 12-14 August 1978, Appropriate Reconstruction Training and Information Centre (ARTIC), Vijayawada, India (1978)

5. Allan Cain, Farroakh Afshar and John Norton, Indigenous Building and the Third World, Architectural Design, No 4, pp 207-224 (1975)

6. Derek Miles, A Manual on Building Maintenance, Vol. 1 Management, Vol 2 Methods, Intermediate Technology Publications Ltd, London (1976)

7. Scott Wilson Kirkpatrick and Partners, Labour Intensive Rural Building in Developing Countries, Report to World Bank, Basingstoke (1979)

8. Robert Muir Wood, Hard Times in the Mountains, New Scientist, Vol. 90, No 1253, pp 414-417 (14 May 1981)
(Review of tentative findings of Housing and Natural Hazards Group - Karakoram 1980)

9. Frederick C. Cuny, Scenario for a Housing Improvement Program in Disaster Prone Areas, Disasters, Vol 3, No 3, pp 253-257 (1979)
(Also included in Disasters and the Small Dwelling, Ian Davis (Ed), Pergamon, Oxford, U.K., 1981)

10. Robin Spence, The Vulnerability to Earthquakes of Low Strength Masonry Buildings, Paper contributed to Workshop on Earthen Buildings in Seismic Areas, Albuquerque, May 1981

11. Reggie Norton, Disasters and Settlements, Disasters, Vol 4, No 3, pp 339-347 (1980)

12. OXFAM (America), The OXFAM/World Neighbors Housing Reconstruction Programme Guatemala, OXFAM America, U.S.A. (1977)

13. Mary MacKay, The OXFAM/World Neighbors Housing Education Programme in Guatemala, Disasters, Vol 2, No 2/3, pp 152-158 (1978)
(Also included in Disasters and the Small Dwelling, Pergamon, Oxford, U.K., 1981)

14. Frederick C. Cuny, op. cit. (1979)

15. Carnegie/Mellon University/INTERTECT, Indigenous Building Techniques of Peru and the Potential for Improvement to Better Withstand Earthquakes, Report to USAID and Oficina de Investigacion y Normalizacion, Ministerio de Vivienda y Construccion, Lima, Peru (1979)

16. Charles Abrams, Housing in the Modern World: Man's Struggle for Shelter in an Urbanizing World, M.I.T. Press 1964, Faber and Faber, London, U.K., p 62 (1966)

17. Ian R Davis and John F C Turner, Report of Italian Visit in April 1981 to Study Emergency and Long Term Policies following Earthquakes in Friuli (May 1976) and Campania/Basilicata (November 1980), Disasters and Settlements Unit, Dept of Architecture, Oxford Polytechnic, Oxford U.K., (1981)

18. Adolf Ciborowski, Post-Disaster Reconstruction, UNDRO News, pp 3-7 (May 1981)

19. Reza Razani, Seismic Protection of Unreinforced Masonry and Adobe Low-Cost Housing in Less Developed Countries: Policy Issues and Design Criteria, Disasters, Vol 2, No 2/3, pp 137-147 (1979)
(Also included in Disasters and the Small Dwelling, Ian Davis (Ed), Pergamon, Oxford, U.K., 1981)

20. Aldo Norsa, Lessons from Recent Earthquakes in Southern Italy and Observations about the Performance of Buildings of Traditional Construction in these Events, Paper contributed to Workshop on Earthen Buildings in Seismic Areas, Albuquerque, May 1981

21. Charles Abrams, op. cit., p 62 (1964)

22. Ian Davis, View over the Fence, Disasters, Vol 3, No 2, pp 121-122 (1979)

23. Paul Oliver, The Cultural Context of Earthen Houses in Seismic Areas, Paper contributed to Workshop on Earthen Buildings in Seismic Areas, Albuquerque, May 1981

24. OXFAM/World Neighbors, Como Hacer una Casa Segura, Free Instruction Guidelines on how to build a Safe House, OXFAM/World Neighbors, Guatemala (1976)

25. Robert Muir Wood, op. cit. (1981)

26. Peter L Berger and Richard John Newhaus, To Empower People: The Role of Mediating Structures in Public Policy, American Enterprise Institute for Public Policy Research, Washington D.C., p 36 (1979)

27. John F C Turner, Housing by People,Towards Autonomy in Building Environments, Marion Boyars, London, U.K., p 13

28. Everett M. Ressler, Observations on the Development of Educational Materials following the Andhra Pradesh Cyclone 1977, Disasters, Vol 3, No 3, pp 283-285 (1979)

29. UNNAYAN, Sun, Rain, Wind, Flood: Protect your House from their Hands, Manuals for Self Help Housing in Villages in West Bengal: 1. Building a House; 2. Bamboo Structures; 3. Mud Walls; 4. Guidelines for Housing Reconstruction; 5. Traditional Housing Research, Pre-Flood Rural Housing in West Bengal, UNNAYAN, 36/1A Garcha Road, Calcutta 700 019, India (1979)

30. Manuel Berberian, Tabas-e-Golshan (Iran) Catastrophic Earthquake of 16 September 1978; A Preliminary Field Report, Disasters, Vol 2, No 4, pp 207-219 (1978)

31. Frances Moore Lappé, Joseph Collins and David Kinley, Aid as Obstacle: Twenty Questions about our Foreign Aid and the Hungry, Institute for Food and Development Policy, San Francisco, U.S.A., pp 139-140 (1980)

32. Hugh Stretton, Urban Planning in Rich and Poor Countries, Oxford University Press, Oxford, U.K., p 209 (1978)

THE REDUCTION OF RISKS FROM NATURAL HAZARDS IN THE KARAKORAM. APPENDIX 1.

NATURAL HAZARDS EXPERIENCED IN THE KARAKORAM*	FREQUENCY OF HAZARD OCCURRANCE	WARNING OF HAZARD	IMPACT ON LOCAL COMMUNITY							CAUSE OF DEATHS OR INJURIES	RELATIONSHIP OF DEATHS/INJURIES TO BUILDING COLLAPSE OR FLOOD	THE NATURE OF THE VULNERABILITY OF HOUSES AND SETTLEMENTS TO SPECIFIC HAZARDS	RISK/REDUCTION OF RISK			
			Loss or damage to artericulture crops	and animals	Loss or damage to buildings/possessions	Physical hardship	Damage to health (illness malnutrition)	Physical injuries	Death				Possible Solution	Difficulties in Implementing this solution	Feasible mitigation measures in this context	Difficulties in Implementing these measures
Failure of water supply (for both drinking and field irrigation)	Can occur every winter in some areas	1-2 months	✓	✓		✓	✓		Only in extreme situations	No evidence of deaths	No relationship	If failure is total, results in the eventual abandonment of settlements	Build more water channels Reduce the local population by relocation	Excessive cost and in some instances the supply is fully used. No obvious alternative.	Inject finance to improve water supply as a priority issue	Cost and lack of expertise
Erosion of land by action of water, wind and frost)	Likely to be a continuing process	Local knowledge exists of where it is occurring except from flood action	✓		Very rarely	✓				No evidence of deaths	No relationship	Can result in the abandonment of settlements adjacent to cliff sides	Build protective river walls/ channels	Excessive cost	Rural reclamation for farmers to protect their own lands with simple measures; improve siting of all new buildings.	Lack of expertise
Flooding: Slow Impact Flash Floods	Generalisations impossible but communities living beside rivers are likely to have experienced flooding within the past 4-5 years	24-36 hours for slow impact No warning for flash floods	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓	No evidence of deaths Stemming from injuries caused by impact of debris	Marginal relationships	Location of settlement in low lying ground adjacent to rivers or on the banks of steep narrow river valleys	Flood control measures/ relocate homes/ settlements at risk	Social upheaval; excessive cost	In some instances low investment flood control measures may be feasible; protective walls can be built.	Lack of expertise; cost
Rockfalls Landslips Mudslides (all could be induced by earthquakes)	A continuous process for small scale rockfalls, but very silent warning. Major landslides occur less frequently, say 10 year intervals	No warning for rockfalls, but very silent warning (under 2 mins) following the sound of landslide in distance	✓	✓	✓	✓		✓	✓	From the collapse of houses or asphyxiation from being buried	Marginal relationship	Location of settlements at the base of steep slopes particularly below alluvial slopes	Relocate homes/ settlements at risk	Social upheaval; excessive cost	Improve the siting of all new buildings; encourage the relocation of the most vulnerable houses in each community	Cost
Earthquakes	Major tremors occur frequently but major earthquakes occur approx at 5-10 year intervals	No warning other than earthquake fore-shocks (under 1 minute)	✓	✓	✓	✓		✓	✓	Asphyxiation and injuries sustained from the collapse of buildings	Primary cause of casualties/ deaths	Lack of resistance in the construction or shape of houses relative to earthquake forces; dangerous siting on steep slopes subject to earthquake induced landslides or rockfalls	Relocate homes/ settlements at risk; modify houses where they are vulnerable	Social upheaval; excessive cost	Improve the siting of all new buildings; encourage by education and cash incentives the building of aseismic houses	The strength of local building traditions; lack of expertise; cost

* This is set in descending order of importance as perceived by the local population. But such order of priority clearly relates to the specific location of a community. Therefore, this list must only be regarded as an approximation since not all communities in the area are at risk from all these hazards.