



Center for Research  
on the Epidemiology  
of Disasters (CRED)



Integrated Health, Social and Economic Impacts of  
Extreme Events: Evidence, Methods and Tools



European Commission

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## *MICRODIS Integration Workshop*

Delhi, Thursday 21 February 2008  
Held at Voluntary Health Association of India  
in association with the MICRODIS Annual Meeting

***Deliverable D1.4.1***

***Report of workshop:***

***“Workshop Session report on integration of thematic conceptual models”***



## ***MICRODIS Integration Workshop***

Delhi, Thursday 21 February 2008

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## ***MICRODIS Integration Workshop report***

Delhi, Thursday 21 February 2008

### **Background**

MICRODIS is a research project that is analysing the integrated health, social and economic impacts of certain types of extreme natural hazards in four Asian and several European countries. Each of the health, social and economic topics has a specialist group (Thematic Group) responsible for the design of conceptual frameworks and survey approaches for investigations in a number of case study sites. Country teams are then responsible for conducting about 15 case studies in communities, using the quantitative and qualitative survey methods designed by and in conjunction with the Thematic Groups. There is an Integration Group whose main task is to look over the process and try to ensure that the conceptual frameworks, the research methodology and the survey results can be integrated into a coherent analysis.

### **Purpose and aim**

This workshop was held in order to support the development of the best possible integrated approach for MICRODIS, and the report of the workshop is Deliverable D1.4.1 "Workshop Session report on integration of thematic conceptual models". The workshop took place as a part of the MICRODIS Annual Conference. Because of the intensity of the work at the annual meeting, only two hours were allocated for this workshop. Therefore, this deliverable was delayed in order to be further supported by inputs and interactions at the MICRODIS Training Workshop held in Hanoi in May. This report is designed to capture the interactions between the different thematic areas of MICRODIS. It looks at their progress in bringing about a proper basis for the integration of the research process. In addition, it provides an analysis of the strengths and weaknesses of the conceptual frameworks in relation to the needs of integration. Although this is not strictly a part of the report of the workshop itself, it is a useful point at which to report on the integration requirements for the project.

The Integration Workshop involved representatives of all the relevant parts of MICRODIS: Integration Group members, leaders of the three Thematic Groups, representatives of the Asian country partners, and the authors of the Survey Guidelines (a document created to inform the implementing partners in the field survey methods). The European partners were present by virtue of being included among these constituents.

The workshop agenda was designed to focus on current progress in each of the Thematic work groups (Health, Social Factors, Economy) and identify the requirements for bringing about the integration needed in the project as it moves into the phase of site surveys.

The main issues requiring attention (and recorded in the numbered sections below) included:



1. Ensuring that the data needs of each thematic work group are fulfilled while maintaining the strongest potential for integrating the results across the whole of MICRODIS;
2. Supporting the development of surveys that capture the common information needs of each thematic group and identify potential overlaps and repetition;
3. Discussing the issues of how to deal with the different requirements for the European and Asian country surveys;
4. Assessing the problem of integration of survey results given that each site will have different time elapsed since the impact of the relevant disaster being assessed;
5. Supporting the country teams that implement the surveys, given that in some cases they are specialised in one thematic area and may need support to ensure integration with the other two themes.

Of these, there was limited time for discussion of items 3 to 5 in the Workshop itself. Some were discussed in the sessions of the Annual Meeting, and subsequently at the Hanoi Training Workshop. So for these items, the report below represents a synthesis of these different workshop discussions.

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### ***Review of Workshop discussions***

#### **1 & 2 Progress by Thematic Groups in developing their conceptual framework**

##### **Background**

There have been a number of initiatives in discussions between the three thematic groups and the Integration group in order to develop better integration of the conceptual frameworks. One of these has been the proposal for all the groups to use the so-called “crunch” or Pressure and Release (PAR) Model (adapted from Wisner et al 2004, and also used by many NGOs – see Figures 2 and 3 below). Another has been the use of an analytic matrix that generates research questions concerning the inter-relations between each of the thematic areas (Figure 1 below). More detail of these is given in the following paper, which also contains basic information about the conceptual models developed by each of the thematic groups.

Discussion at the workshop led to agreement to develop a table that summarizes the research questions, data requirements, related indices, methods of measurement and analysis requirements for each group. The Integration group could then identify needs for improved linkages.

	Research questions	Literature review	Conceptual model	Data requirements	Relevant indices & methods of measurement
Social					
Health					
Economic					



All this needs to be matched up with the next phase of the project, when main responsibility will be handed over to the country teams that will implement the surveys at each site. These teams are expected to include participants from outside to support the integration process, so that for instance a country team that is predominantly health oriented will be supported in terms of the content related to social and economic factors.

### **Health Working Group**

The group has presented their conceptual model, which has been adapted to the Pressure and Release model (see figures 2 and 3 below). At the time of this workshop it still needed to be refined so as to integrate with the other groups, as it still needs final agreement. Mainly this requires more consultation on the group's research questions, and how to integrate it with the conceptual model and the research questions. Some of this discussion has been stimulated by the development of concepts during the annual meeting of the last few days, which need to be incorporated.

### **Social Working Group**

The social factors group is in an advanced situation on the conceptual framework, and the research questions are done but need to be revised through further discussion in the next day. It has received inputs from CDRC (Philippines) and VHAJ (India) which need to be incorporated in the literature review and then into the conceptual model. The importance of communication with all others was reinforced for the drafting phase of the surveys.

### **Economic Working Group**

The group has compiled its research questions, but they need to be revised. The questionnaire for quantitative data is done but will continue to be revised. It has been designed in two parts, one for households and the other for secondary data: the first is drafted but they have to work on the second. The conceptual model is done, but the group has not looked so much at the causes of disasters but more at the variables that measure impacts. Other participants hoped that the Economics Group could examine how they could use the PAR model, so that there is greater compatibility of conceptual frameworks. At the moment the survey questions relate only to floods, and it needs to be adapted to different types of disasters. There is some overlap with health issues, through the use of the concept of Value of Statistical Life.

In discussion it was argued that it is important for the others to know about the economic issues involved in the economic group research topics, so these need to be shared with the other groups. For example, the economics survey will examine migration, but this is also a factor for the Social group (e.g. looking at what happened before the disaster, remittances, negative economic impacts on family members left behind, disruption of communities who receive migrants). But for this there would need to be a control group, to identify the degree that migration is 'normal' in comparison with a disaster.

Other challenges for the economics group involve issues of scale, and trying to assess what damages are counted at different levels.



## General discussion

Patrick Pigeon presented a framework for thinking about the relationships between the three thematic groups that challenges the PAR model and emphasizes the fact that hazards are not independent of social systems. He argues that the PAR model is too linear in conception, and that it is essential to consider the “political” factors that act as feedback mechanisms affecting the frequency, severity or mitigation of the hazards. These include climate change (which is crucial for MICRODIS in relation to tropical cyclones, storms, and floods), human settlement policies (or lack of them) that place people in danger, and flood prevention measures (that may transfer risk from one location to another). In other words, there are crucial political processes that affect the hazard side of the PAR diagram: the hazards themselves are not independent variables (Figure 4). Allowing for this complexity can enable MICRODIS to avoid a simple linear relationship between hazards and their impacts. Instead, there may be specific feedback loops that affect the behaviour of particular hazards such that their impacts on health, economic or social factors are different from those that are anticipated from the “pure” effects of a hazard unaffected by human action.

In discussion there was agreement that this approach would be effective in supporting efforts to look at forms of intervention to reduce vulnerability and increase resilience as well as mitigation. The approach using livelihoods analysis in the surveys was useful for this.

### Data needs and household surveys

Since there are basic demographic and socioeconomic data that will be needed by all thematic groups, the content of a common section of the questionnaires will be agreed between the three work groups. Concern was expressed over how to manage the size of the questionnaires, and what is a reasonable amount of time to expect a respondent to spend with the survey.

There followed a discussion of the sample size, based on the use of the “SHE model”, in which the data needs of each specialist theme must be maintained. The SHE model is a simple framework for enabling the data requirements of each Thematic Group while also making it possible for each of the specialist areas of data to be provided. This approach was elaborated at the Hanoi Training Workshop. The basic idea is that each questionnaire would contain a core content that was general information, followed by a core area (Social, Health, Economic: SHE) that would provide data required by each Thematic Group. In addition, each of the Thematic Groups would be able to carry out a more specialist *extended* survey to fulfil specific interests of their theme.

For the Health group this means that the sample needs to fulfil the needs of an epidemiological design in which the sample size depends on the prevalence of the disease/ injury/ condition. This raised the question whether there would need to be a different sample design process for each thematic group, depending on the situation and the population for each group. But this leads to problems with the integration of the results and comparability of data between the thematic groups. There was much more discussion of this at the Training Workshop in Hanoi, at which there was agreement to



use a common approach except for possible *extended* surveys or annex studies on particular specialist topics.

The Integration group is tasked with devising a comprehensive questionnaire and methods toolbox based on the needs of each thematic group. The country teams will decide which to use and which are appropriate for each site and what they are trying to find out.

The relationship between qualitative and quantitative methods was also discussed, and whether or not quantitative data could give a false sense of precision without necessarily giving an accurate view of the factor being investigated. There was general agreement on the need to combine qualitative and quantitative data collection methods, and that was dealt with in much more detail at the Hanoi workshop. Qualitative methods (referred to here as PRA – Participatory Rapid Appraisals) are absolutely necessary, and should not just be seen as supplements to the quantitative data methods. It was considered that PRA is important for the beginning of the data collection (to engage with the people in the community and gain their participation and trust) and also at the end in order to follow up on issues that need further explanation. PRA is therefore not second best, but is crucial in combination with other types of data: each type of data reinforces the value and validity of the other. More importantly, because they can be open ended and enable people to relate impacts to the factors that caused them, PRA methods help to identify the causes of disasters.

In this way, the task of integration is also supported, because the combination of the PRA and qualitative methods improves the opportunities for finding relevant linkages between the three thematic areas and the causes of the impacts in each. This can also assist with the problem that in each survey location there will be a different period of time elapsed since the disasters being investigated. If the relations between the three themes can be analysed through the combined data methods, and tied up with patterns of causation, then the time differences will not be so significant.

All groups will need to collect secondary data as well. Since much of this will be shared by the thematic groups, there will be a need to co-ordinate the data requirements and avoid duplication.

### **3. Requirements for the European and Asian surveys**

The field surveys are intended to take place at the level of communities (in villages or urban neighbourhoods) in order to analyse the micro-level impacts of disasters. However, while this approach is able to generate quite significant data sets for the Asian countries, the much higher costs of surveys in Europe presents a problem for the integration of the results. The expected sample size in studies of floods or storms in communities in Europe may not enable comparisons with those in Asia.

It is intended to use common questionnaires and PRA tools in both Europe and Asia, but the depth of content required for the Asian communities will be considerably greater than for Europe. For example, detailed components of economic aspects in Asia will be required to assess household livelihoods, while in Europe the majority of people will be



in formal employment. Detailed medical data for assessment of health impacts (e.g. for communicable or water-borne disease) that are essential for Asia are likely to be irrelevant for Europe.

Not much attention has been given to resolving these issues, even at the Training Workshop in Hanoi in May 2008. There was still uncertainty about which partners would be conducting field work in Europe, and in which countries. The issues are likely to be resolved pragmatically when the survey sites have been finalised. It has been recognised by all partners at the Training Workshop that there will not be complete comparability of data between European and Asian case studies. An argument was made by the Integration Group at both the Integration Workshop and the Training Workshop that one positive outcome of the MICRODIS approach can be very significant learning in Europe from two aspects of the Asian surveys:

a. The great significance of a community based approach to the understanding of disaster impacts. In Europe and other rich countries, disaster impacts tend to be dealt with and responded to through official channels in a very top-down form, using a command and control approach in the emergency phase. In Asia, the growth of community based disaster preparedness (CBDP) approaches, and the MICRODIS surveys at community level can potentially highlight significant learning for European preparedness and response to disasters.

b. There is great potential benefit from the surveys of livelihood issues in Europe, especially in relation to economic impacts. In the Asian countries, livelihood analysis in relation to disasters has become a core aspect of understanding vulnerability to floods and storms, and to the impact of those disasters. In MICRODIS, this micro-level analysis of disaster impacts is at the core of the approach. However, in Europe, the economic impacts of disasters tend to be measured only at the macro-level, and very little attention is given to the problem of livelihoods at household or community level. For instance, the loss of employment, disruption of transport and its effects on workers and employers, products and raw materials, interruption of utilities at work places, all can have a temporary or even permanent impact on earnings. The MICRODIS surveys in Europe will take a livelihoods approach, and are likely to provide very valuable analysis of this little explored aspect. Comparisons between Asian and European surveys may demonstrate the benefits of this micro-approach to the understanding of economic (and health and social) impacts in richer countries.

#### **4. The problem of integration of survey results and time elapsed since disaster**

In each of the survey locations, the length of time elapsed since the disaster that is being studied will be different. This may have a number of impacts on the survey data in terms of its comparability and how it can be integrated. One issue is people's memories, and whether or not their responses (e.g. on financial matters, recollection of health effects) can be accurate. Another problem is that if a survey is done soon after a disaster has happened, all the impacts will not have yet taken effect: economic and social effects can last for months and even years after a particular disaster event. Thirdly, in some study locations, hazards are frequent or even annual or bi-annual (especially for floods). People are still being affected by the hazard impacts of the



previous year (or even before) at the time the survey is trying to assess the effects of the most recent disaster. Another aspect of this is that where floods are annual or very frequent events, the people themselves may not consider them to be disasters. Indeed in some circumstances, the floods are thought of as 'good' and 'bad' floods, and the good floods (e.g. shorter in duration, not so deep) are essential to the livelihoods of the people and are a significant part of why they live there (e.g. replenishing the soil fertility, enabling fish to breed in natural ponds).

This issue came up at other sessions in the Annual Meeting in Delhi (e.g. relating to pilot surveys done in India), and there was more time for discussion of it at the Training Workshop in Hanoi. It was agreed that there can be no standard time frame to be imposed across all the study locations. Each one is so specific to the local circumstances, and a great degree of flexibility and pragmatism has to be exercised in deciding how to deal with this issue. It does present problems for the compatibility and comparability of data between the locations, and therefore for the integration of the results. However, in each survey the implementing teams are well aware of this issue, and they will need to highlight the timeframe used, and indicate the potential impacts of this on their data. In the comparison and integration of results, there must be great care not to make inappropriate correlations or analysis that does not take into account the timeframe issue, e.g. in regard to health or livelihood impacts. There will also need to be clear analysis of the issue of frequent or annual floods, so that the impacts are properly assessed in relation to local perceptions of disaster.

### **5. Specialist country teams and integration of Themes**

In some of the Asian and European countries, there are MICRODIS partners who are specialised in one Theme (e.g. health) but who will be implementing studies that provide data for the other thematic areas. This may have significance for the integration of the results. The issue has been addressed through the Integration Workshop (Delhi) and the Training Workshop (Hanoi) by ensuring that all the country teams that implement the surveys are aware of and sensitised to the needs of all the Thematic groups and their data requirements. The SHE model for the survey process has taken this into account, and the core questionnaire surveys (generic and thematic) are designed to deal with this issue. At the Training workshop, discussion involved each country implementation team in becoming aware of the data needs of each theme, and how they could incorporate the analysis of these different themes after the surveys. In particular, this issue affects Indonesia, Vietnam and Netherlands (where there are only one partner, specialised in health issues).



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## Annex 1

### Workshop terms of reference and proposed agenda

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#### MICRODIS

#### Delhi Conference Thursday 21 February 2008

#### Integration Workshop 4-6pm, held at Voluntary Health Association of India

#### Goal

Provide adequate material from the three Thematic Groups to fulfil:  
Deliverable D1.4.1 "Workshop Session report on integration of thematic conceptual models". Deadline May 2008.

#### Background

We are not yet in a position to have the final conceptual models from each of the Thematic Groups. But there will not be an opportunity for all to meet again in time for the deadline in May.

So it is proposed to have a smaller scale workshop involving:

- **Integration Group members:** Alex, Ivan, Patrick, Shisir, Terry
- **Thematic Groups leaders:** Maureen, Valerie, (Alex)
- **Asian Country representatives:** to be decided, but at least one from each country
- **Authors of the Guidelines, to inform this output:** Olivier, Tim, (Terry, Ivan, Patrick)

#### Suggested Agenda

##### 1. Check up on progress so far for Conceptual framework by Thematic group

Report from Health, Social, Economics groups, supported by documentation that can be used by Integration Group to write the report.

Does the conceptual model allow for adequate identification of *causes* so that we can move on to suggestions for mitigation, preparedness and prevention (as per goal of MICRODIS)?

##### 2. Status of survey data needs:

research questions, data requirements, draft surveys

##### 3. Review and discussion on integrated survey approach – viewpoints of Thematic groups on the integrated questionnaire, the role of PRA methods and their linkages.

##### 4. Assessment of the specific needs of each specialist group in the separate sections of the questionnaire

##### 5. How to ensure comparability of surveys, e.g. how to cope with the need to adapt to local conditions while enabling integrated results, dealing with the differences in time passed since the disaster in each location (currently varies from 1999 to 2007), different scales, recurrent disasters (e.g. how to deal with surveys in areas that are affected every year, compared with single events)

##### 6. What is needed in the Guidelines document to support this process?



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## Annex 2 Minutes of the Workshop

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### Minutes of the INTEGRATION WORKSHOP February 21, 2008, at VHAI, Delhi, India

Agenda approved

Brief roundup of each thematic group, where they are and what they need

- highlights of what groups need to take into account

#### **Health Working Group**

- health group have presented their conceptual model which has been adapted to the pressure and release model
- they will need to refine to integrate with other groups because they have not come to a final agreement as of yet
- need to discuss within the group and come to an agreement about this revision, look at research questions and how to integrate these two
- the link which needs to be strengthened is between the conceptual model and the research questions (this is URGENT)
- reminder of work package 2.1 work from Maqo, the deadline is passed and others need to contribute their parts next week
- research questions are done, but the concepts from the last few days need to be incorporated

#### General Discussion

- research question, data and data analysis matrix for each group
- list of indicators, list of research questions, Ivan can create a template
- indicator, method of measurement, number of research question to which it applies (matching them up, which question provides the information for which indicators – making sure each links to one or another)
- UCL does progress matrix – show which group is where with regards to research questions, conceptual model, questionnaire building – once this information is given to them by the integration group (Terry – who is compiling all this information from the groups at the given deadlines)
- integration group can look at identifying needs for greater linkages
- in every country there will be some sites, the country team will decide on the final way on which the surveys will be conducted and that country team will have participation from outside members as the country team requests
- the country team will adapt these things
- we also need to look at all three groups questionnaires together to make sure nothing is missing

#### Deadlines:

- Health – revisit all and make a more detailed rough draft questionnaire



- 3 weeks is the deadline for the revised questionnaire, research questions and the conceptual model – **Saturday March 15<sup>th</sup>, 2008**

### **Social Working Group**

- advanced on the conceptual framework
- research questions are done but need to be revisited
- they will meet tomorrow to revisit these and pursue them further
- have received inputs from CDRC and VHA1 which need to be incorporated in the literature review and then into the conceptual model
- importance of groups to communicate with others in the draft phase, thematic groups and integrations group

### **Deadlines:**

- end of March for the questionnaire, research questions and conceptual model – **Monday March 31<sup>st</sup>, 2008**
- they may suggest another date at the meeting tomorrow, but will share after tomorrow

### **Economic Working Group**

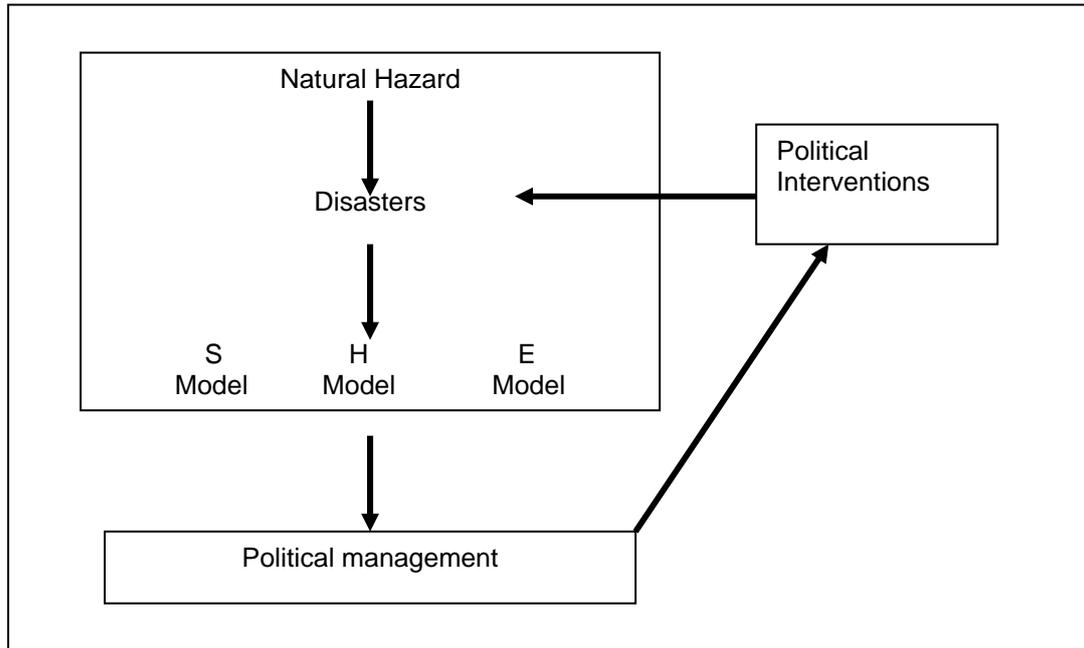
- research questions are done but need to be revised
- questionnaire is done but will continue to be revised, has been put into two parts
- questionnaire for households and for secondary data, but have finished the first and have to work on the second
- conceptual model is done
- They haven't looked so much at the causes and more on the impacts, looking at variables which are response linked
- Specific questions for floods and different types of disasters
- Value of statistical life, like Stale presented which relates to health

### **Deadlines:**

- questionnaire, research questions and conceptual model completed by **Saturday March 15<sup>th</sup>, 2008**

### **Discussion**

- Can the economics group work within the PAR model? They will discuss it.
- Can the integration group look at what the others have done and try to integrate those and see how they can change their conceptions based on what these groups have done? Yes, this will be discussed.
- EWG need to identify their research questions but up until now they have identified 5 research topics (i.e. Migration)
- it's important for the others to know what economic issues evolve around these research topics, so could the economics group share these with the other groups
- EWG gives example with migration – looking at what happened before, remittance, negative economic impacts for those who have deserted their families, how is the disaster positive or negative, disruption for local communities who receive migrants
- What is the control? – need for this in each group



- issues of scale, trying to assess what damages you can count – looking at the national level, local level and how that impacts in different ways

Patrick presented a diagram (above) to discuss problems of purpose – where the integration group are trying to integrate the three groups, in the context of uncertainty and when the hazards are subject to modification by political management and interventions as feedback mechanisms.

### Discussion

- looking at forms of intervention also, to reduce vulnerability and increase resilience
- it's not just mitigation at this point
- livelihood analysis from surveys was useful
- comparison is important (pre-disaster and post-disaster, control group and affected group)

Draft questionnaires, conceptual models and research questions will be given to the integration group (Terry). These will be distributed to everyone and they will have a week to discuss and revise, then it will be finalized and integrated by the IWG.

### ITEM THREE

#### **Household surveys**

Demographic data, socioeconomic data will be common to all (will be agreed)

From the surveys there will be one common survey for each country team

1. issue of length of each thematic area
2. issue of sample size and length of final survey

Terry presents example

Village A – 100 households



- common section to all 100
- 33, 33, 34 for each thematic group
- discussions of questionnaires after with integrated results

### Discussion

HWG – the sample size depends on the prevalence of the disease/injury/condition

- the sample size must be calculated
- it cannot be the same selection process for each thematic group, it depends on the situation and the population for each group

Debby – IWG pulls together exhaustive questionnaire and methods toolbox, then the country teams will get it and decide which to use and which are appropriate for where they are and what they are trying to find out

Maureen – difference between precision and accuracy

- health example is precise
- can have something precise but is not accurate, need qualitative data as well
- sampling for social can be different and so can economics
- how do we do the sampling? And how is using different sampling going to affect the total package and integration
- need experienced statisticians to work out the sample sizes and cluster sizes

Qualitative surveys are absolutely 100% necessary, NOT just supplements to the quantitative

How far do we go with the surveys because it is costly and takes a long time (do we have the budget for open questions)? This needs to be discussed further when the questionnaires are finished.

START the planning of the generic questionnaire and the methodological toolbox

### Deadlines

- Ensure all research questions, questionnaires by end of march and early April and give to Terry
- Then give time for revisions and handed to integration group by early April
- End of April the integrated questionnaire will be done along with the methodologies toolbox
- Beginning of May these will be out and all country teams will be established
- Support from Ivan and his group and the statisticians from Nhu's team and Shona (CDRC)

### **Recommendations on orders of questions**

PRA is important for the beginning of the data collection and also at the end

PRA is not second best, it is crucial – it is all data which is relevant

Each type of data reinforces the other

PRA help to identify the causes of the impacts (why they live in a vulnerable area)

These questions for the methodologies need to be written down.



In early April, very specifically say these are the PRA questions you should think about in the beginning and in the end of the empirical work

Guidelines – integration group should finalize it and send it out with the authors

#### Groups and country teams

- needs methodological approach to dealing with the variability of time since disaster has occurred
- will have to be sensitive on how we analyze the data
  
- tools and pre-test, then we revise it and apply it
- pre-testing of a questionnaire is done in each survey, adapt it and then do the survey
- then we will have results which will be analyzed and published
- then we will have a questionnaire which has been tested and then we do revisions
- then we can finalize this tool

Valerie – where should the mental health go?

This will need to be discussed between the social and health group

\*side note – HNI, who has expertise and has done work for the mental health aspect of things has officially transferred from the health group to the social group in the workpackages, therefore it may be appropriate for this to be included in the social working group instead of the health working group\*

#### **Secondary data**

All groups will need to collect secondary data as well

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## Annex 3 List of participants

(Some names appear more than once where they have a dual role at the meeting)

**Project staff:**

Debarati Guha-Sapir, Laura Irvine (minutes), Bernadette Dubus

**Integration Group members:**

Ivan Komproe, Patrick Pigeon, Terry Cannon, Alok Mukhopadhyay,

**Thematic Groups leaders:**

Maureen Fordham, Valerie Louis, Alex Borde

**Asian Country representatives:**

Sharon Linog (Philippines), Ha Van Nhu (Vietnam), Maqo Sudaryo (Indonesia), Shisir Dash (India)

**European Country representatives:**

Valerie Louis & Revati Phalkey (Germany/ EVAPLAN), Maureen Fordham & Supriya Akerkar (UK/ University of Northumbria), Patrick Pigeon (France/ UPS-Savioe University), Stale Navrud (Norway/ SWECO Groner) ???

**Authors of the Survey Guidelines:**

Olivier le Polain, Tim Wind, (Terry Cannon, Ivan Komproe, Patrick Pigeon)



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## Discussion Paper

# Integration frameworks for MICRODIS

Terry Cannon, University of Greenwich

The purpose of this paper is to go behind the activities of the Integration Workshop to examine the ways in which integration of separate and specialist project components can be achieved. The frameworks presented and discussed here have arisen during the first half of the project, as the Integration group has interacted with the Thematic groups, and as the project moved into the preparations for the site surveys. The frameworks also reflect the work by Thematic groups in coming to terms with the needs for integration of the results. The models and diagrams therefore reflect various iterations of discussion between the four component groups of MICRODIS. As many of the issues are of general interest to the understanding of disaster impacts and causation, the paper is intended to have wider appeal to an audience of those involved in disaster risk reduction (DRR).

In various ways, these models illustrate a great deal of creativity among the MICRODIS teams and partners in meeting the challenge of integration. They all demonstrate that the key aspect of integration – leading from the analysis of disaster impacts on health, social and economic factors – can be incorporated into the work of each thematic group and translated into survey methods that enable causal processes to be identified and preparedness and mitigation measures specified.

## Integration frameworks for MICRODIS

The MICRODIS project is focused on understanding the impacts of floods, severe storms/ tropical cyclones and earthquakes at the micro level. Micro means at the scale of community, and with the focus on the household. Surveys are being carried out in about fifteen mostly rural (with a few urban) locations, and involve detailed questionnaires and PRA tools being used in the selected communities and sampled households. Three specialist thematic groups have designed questionnaires that will provide data on health, economic and social factors for the surveys in the local investigations at the field sites.

The three thematic teams for MICRODIS (health, economic and social) have each devised their own research questions, and have specialist knowledge of their own theme. But the intention of MICRODIS is to produce an integrated understanding of the impacts of extreme events, so that these particular themes are not viewed in isolation, and so that their interactions are understood more fully. This is of vital importance in order to relate the project to the real world. The thematic teams represent the expertise from the different disciplines. But in reality, when investigating disaster impacts at community level, the people themselves are unlikely to make any significant distinction between health, social and economic impacts. For them, the disaster is a disaster, and the analytical value of distinguishing different types of impacts is likely to be irrelevant.

So for the MICRODIS analysis, it is essential to recombine the separate data, having benefited from the expertise of the thematic groups during the survey process. For



<b>Figure 1: Integrating Health, Social and Economic impacts of disasters</b>			
<b>Disaster impacts on:</b>	<b>Health</b>	<b>Social</b>	<b>Economic</b>
<b>Health 1 What are the impacts of disasters on health?</b>	2 Any effects of health factors on other aspects of health?	3 How do health impacts of disasters affect social issues?	4 How do the health impacts of disasters affect the economy?
<b>Social 5 What are the effects of disasters on social factors?</b>	6 What effect do the social impacts of disasters have on health issues?	7 Do some social impacts of disasters affect other social factors?	8 What impacts do social impacts of disasters have on the economy?
<b>Economic 9 What are the impacts of disasters on the economy?</b>	10 How do the economic impacts of disasters affect health?	11 What are the effects of the economic impacts of disasters on social factors?	12 How do some economic impacts of disasters affect other parts of the economy?

instance, health impacts of disasters can have significant effects on people’s ability to work, leading to economic (e.g. on household income) and social effects (e.g. the balance of work and stress between males and females). What is an integrated framework for the MICRODIS project – what should it try to achieve, what does it include? The basic requirement is that after specialised surveys have been carried out, a reintegration of the data needs to be possible in order to show how disaster impacts can be understood only through a holistic analysis that ensures that remedies for e.g. health issues are fully compatible with economic and social processes, and likewise for the others.

The Integration Matrix (Figure 1) was suggested by the Integration group, and discussed by a number of partners as a framework designed to capture the mutual effects of different types of impacts. This enables each thematic group to ensure that it considers the interactions with each other topic. The Yellow cells are the “core business” for each thematic group. Blue cells show how there may be feedback impacts within each topic – one health impact of a disaster may have another impact on a different health variable. The main discussion between partners was over the validity and necessity of these ‘feedback cells’: do they double count data that will appear in cells 1, 5 and 9? They have been retained here for this discussion, because they do actually enable different research questions and potential correlations to be explored. The Green cells show how one topic has an impact on the other topics – e.g. health problems have an effect on the economy.



This matrix can then be used to suggest research questions, and provide the basis for assessing correlations and testing associations from the data collected under each thematic topic. For instance, if a flood has an impact on availability of income and food intake, correlations from the economic data can be investigated in relation to the responses on various health variables. Taking each of the cells in turn, these are some examples of the inter-relations between the thematic areas that can be explored as possible correlations and causations.

**1. What are the impacts of disasters on health? (Core cell).** This is the 'core' cell for the Health thematic data collection, and involves mortality, morbidity (including variables such as duration, acute, chronic, potential for recovery, transmission and contagion, availability of treatment), physical trauma (injury types, persistence, disabling, potential for treatment, treatment available).

**2. Are there any effects of health factors on other aspects of health? ('Feedback cell').** For instance, ill-health may have an impact on the ability to work, and this may reduce access to food and therefore have a secondary impact on health through under or malnutrition. The mental health of those who have experienced someone they care about being killed may be impaired if the body has been disposed of in an insensitive way, for instance without proper identification and in a mass graves.

**3. How do health impacts of disasters affect social issues?** For instance, does injury, illness or death disrupt social networks? Do health impacts harm (or improve?) gender relations? An example might be the burden of caring that falls disproportionately on women.

**4. How do the health impacts of disasters affect the economy?** At the micro-level that is the main interest of MICRODIS, health impacts are likely to reduce the amount of person-power available to a household. Reduced numbers of working people (through death, illness or injury) is likely to reduce the ability to subsist and to earn income. In turn, this may have significant negative effects on others in the local economy, as spending is reduced on goods and services. At higher scales, if the disaster is large in its extent and severity, government revenues may be affected, export earnings reduced and foreign exchange in decline.

**5. What are the Social impacts of disasters? (Core cell).** For instance, is there increased tension between classes, castes, ethnic groups? What are the effects on gender relations?

**6. What effects do social factors have on health?** Does the disaster lead to increased social disruption (or the intensification of pre-existing tensions) that has a negative impact on the mental health of some groups? For instance, does stress increase arising from conflict (e.g. between classes or ethnic groups)? Does one group deny another access to a limited water supply, leading to increased risk of water-borne disease? Do some social groups suffer reduced access to emergency relief and/or reconstruction as a result of prejudice by the authorities or local dominant social groups? Do existing cultural patterns (e.g. male preference) affect access to health care for females in the aftermath of a disaster?

**7. Do some social impacts of disasters have impacts on other social factors? ('Feedback cell')** For instance, does demoralisation and stress after a disaster lead to



worsening gender relations (e.g. violence against women)? Does the effect of one social impact (e.g. cultural dislocation, the destruction of social networks) lead to an increase in family disintegration, selective or family migration?

**8. What are the impacts of social problems on the economy?** For example, does social disruption lead to disorder in markets, the interactions necessary for some livelihoods (e.g. sharecropping) or jobs? Is preference for jobs or emergency aid given to some people rather than others, making the economic recovery of the local economy more difficult?

**9. What are the impacts on the economy at the local level? (Core cell).** Given the significance of the micro-level for this project, a key to understanding economic impacts must be the effect of floods, storms and earthquakes on household livelihoods. This requires analysis of the patterns of household productive assets (e.g. land, fishing boats, house, stored outputs, tools, livestock), and the various ways that the hazard affects them (destruction, damage, interruption of farming or fishing, ability to get to employment, survival of the place of employment).

**10. How do the economic effects of a disaster affect health?** For example, do reduced incomes make it difficult for people to purchase medicine and see the doctor? When is the time frame for this: people may remain poor and unable to pay for medical care long after the relief teams have left.

**11. What impacts do the economic effects of a disaster have on social factors?** Do social relations break down when people have reduced or zero income? What happens to gender relations in the context of poverty and disrupted livelihoods? There is significant evidence that violence against women increases after some disasters. Are weddings delayed? Pregnancies delayed? Do people migrate more? Do migrants already abroad send back more remittances, and does this create tension between different groups in villages?

**12. Do some of the economic effects of a disaster have an impact on other economic aspects? ('Feedback cell')** In the longer term, if a disaster reduces income and prevents parents from sending children to school, this may have a negative effect on the family's earning capacity. Loss of natural capital (e.g. access to forest products or water for farming) may force people to engage in environmentally damaging activities that reduces the availability of productive assets and environmental services for the future. An example would be deforestation forced on a community in order to gain some income, leading to the risk of landslides or drop in the water table. Does the reduction in output of local commodities (e.g. coffee, fish) affect wages and employment in processing plants? At a higher scale, does reduced agricultural output affect the country's foreign exchange earnings and debt repayments?

The Integration Matrix therefore allows for the design of research questions (and indeed can stimulate the thinking process required to inter-relate the three themes. It allows for the interrogation of data in terms of correlations and potential causations in the linkages between the three themes.

### **Pressure and Release Model as an integrating framework**



However, there is another layer of analysis required at the household level, in order to identify what factors lead to the impacts of disasters on health, social and economic factors. A disastrous outcome from a hazard impact can be considered as the combined results of the failure of *self protection and social protection*. Self protection is what an individual or household is capable of doing, or willing to do, in order to improve their resilience to a known risk. Typically it may include living and working in a place that is safe from e.g. floods, in a house that is capable of withstanding anticipated floods, having adequate income and savings to recover from damage, and an adequate baseline status that includes good nutrition and health. Social protection involves the risk reduction and disaster management activities that other groups and organisations carry out at levels higher than the household. This might include enforcement of building codes, flood protection measures, control of deforestation, emergency planning.

These forms of protection are often inadequate – and the result is what we call a disaster. MICRODIS is investigating the failure of self and social protection by analysing the health, social and economic impacts of hazards. An integrating framework that can be used in this is the *Pressure and Release (PAR) Model* (also known sometimes as the ‘Crunch Model’). In this model, the integration is built in to the analysis, so that the impact of a hazard on health, the economy and social factors can be understood in an interdisciplinary and integrated manner. The Social Thematic Group proposed using this as an organising framework for all the thematic groups, and in order to enable the integration of the analysis and results. Each of the thematic groups has explored the potential of the PAR (Pressure and Release Model, also known as the “Crunch” model), and there has been general acceptance of its value.

The PAR approach is a simple conceptual and analytical framework that can assist in making connections between disaster impacts and the factors that generate people’s vulnerability to natural hazards. Basically, the PAR model considers that a disaster happens only when a vulnerable population is struck by a natural hazard. Their vulnerability is a function of their low scores in self and social protection measures. In many locations, some groups of people are more exposed to the risk than others, because different levels of vulnerability arise from their varying economic and social conditions. The degrees of self and social protection are in turn measured by five components of vulnerability that expose people to different levels of risk.

These five components of vulnerability are:

- the individual or household’s livelihoods (the income generated, and the level of resilience to hazards of the resources used in fulfilling the livelihoods);
- the base-line status, as measured by indices of health (physical and mental) and nutrition (base-line status is taken to be an indicator of someone’s capacity to resist disturbance, to cope with infection, and survive a temporary drop in food intake);
- self-protection – the type of house, workplace (are they safe from floods, storms, earthquakes), its location (is it safe in the face of anticipated hazards). Self protection is a function of two key indicators: first, the level of income (is it sufficient to build safely and/or to buy or rent to live in a safe location or building), and second, the willingness to spend adequate income on self-protection measures (a

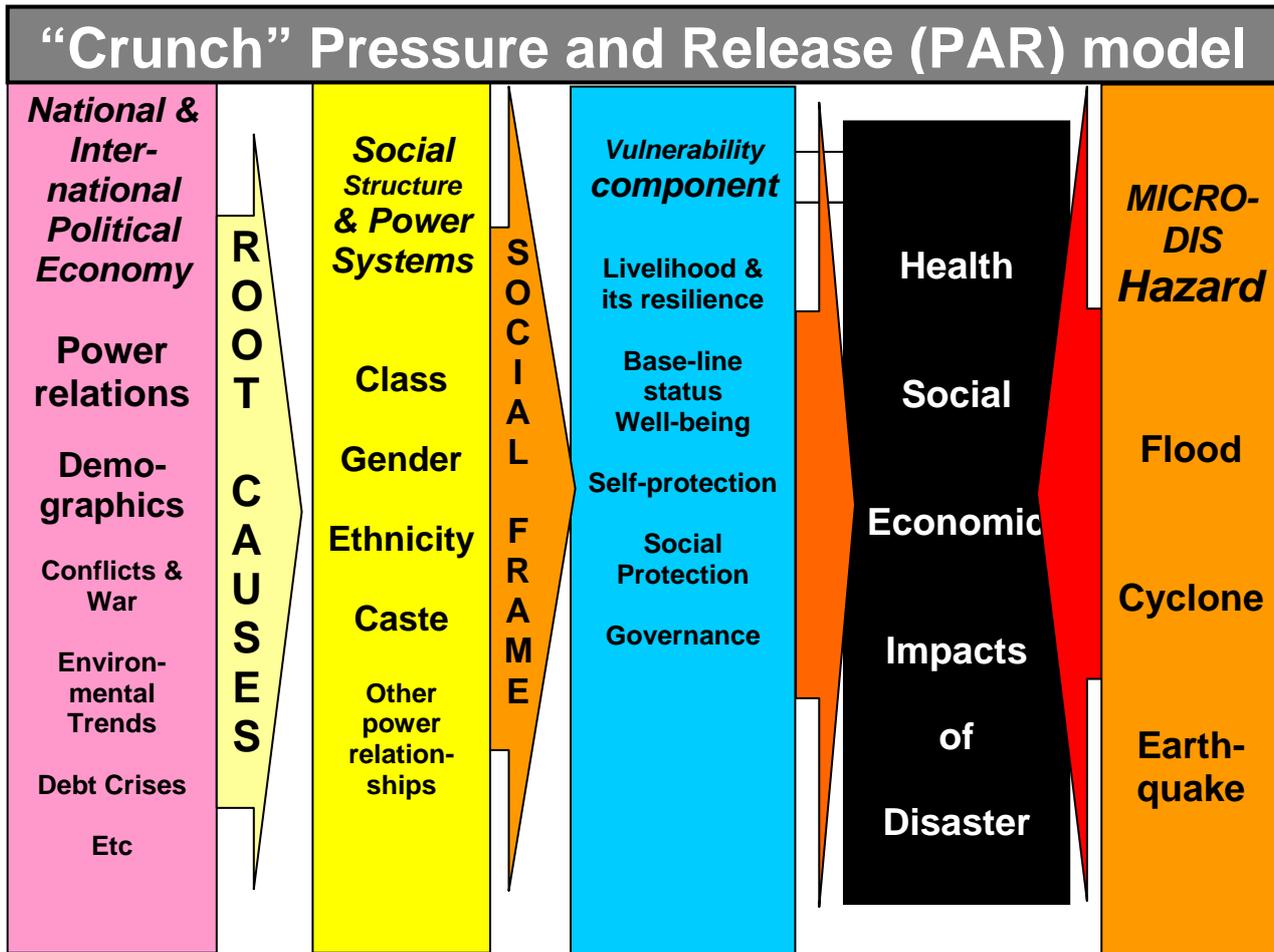


Figure 2: adapted from Cannon 2008, modified from Wisner et al 2004

factor that is often a function of culture and other behavioural characteristics that affect people's attitude to risk.);

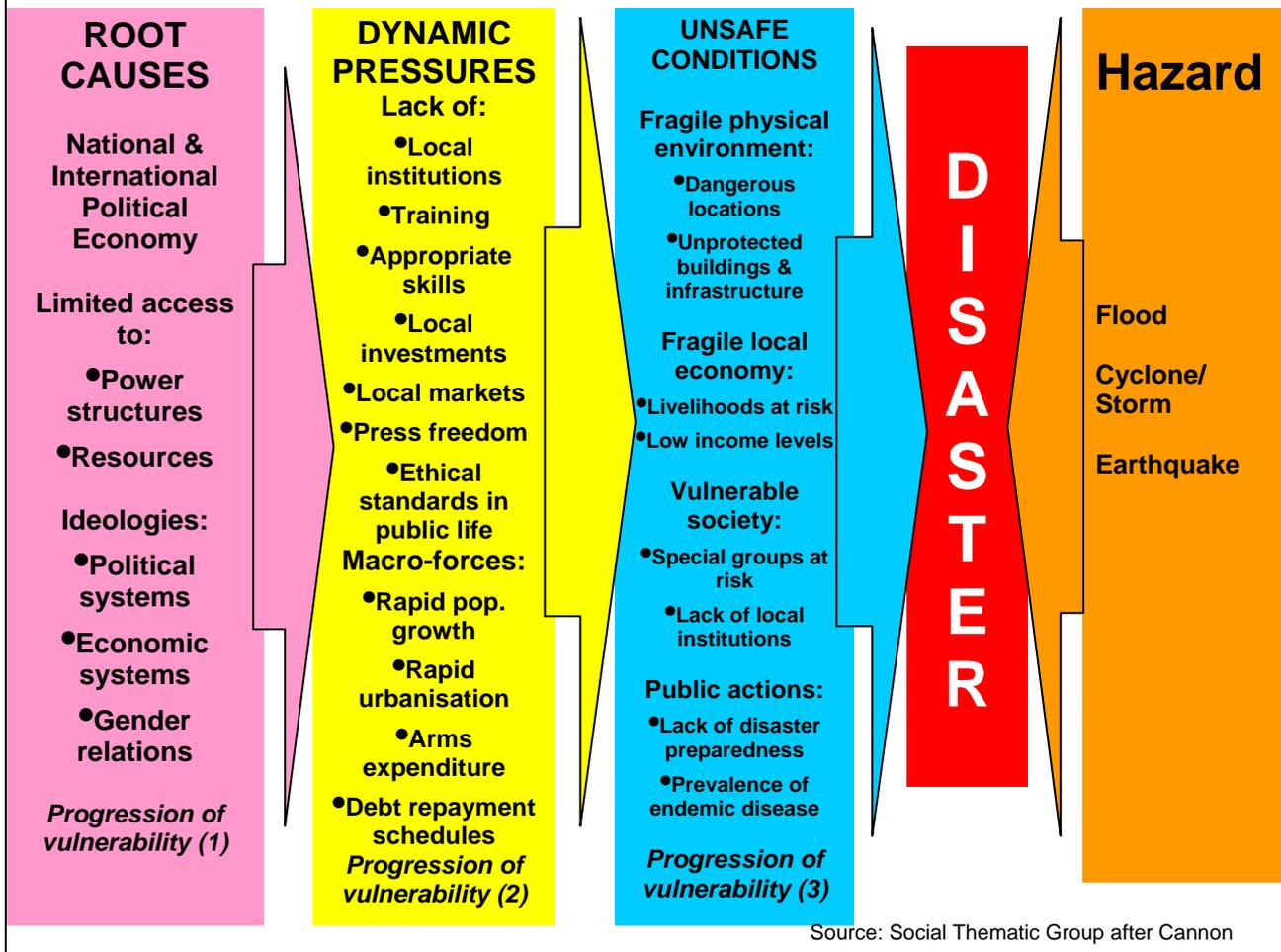
- social protection – the additional or substitute preparedness and mitigation of hazards by organisations above the level of the household. This might include extended family, an NGO, local or national government.
- governance – the power systems that are affecting the way that risk reduction is organised for social protection.

The PAR model (Figure 2) places these five components of vulnerability in the blue column. The impact of a hazard (right hand column) in causing a disaster is dependent on whether the people affected have a high or low score in the five aspects of vulnerability (and these scores can be high for some and low for others). The disaster impacts (in terms of health, economic and social factors) are therefore assessed not only in relation to the natural phenomenon, but also the causal processes that expose people to risk in various ways.

One of the key benefits of the PAR model is that it highlights the need to analyse the *chain of causation* that leads to people being vulnerable to the hazards. From the disaster impacts in the black column, each step to the left leads to a further layer of



**Figure 3: Modified Pressure and Release (PAR) model**



causes that generate the vulnerability in the blue column. These five vulnerability components (blue column) are themselves a product of social variables such as class and gender that are embedded in the power relationships of the locality. The MICRODIS survey methodology, with its combination of questionnaire and PRA approaches to data collection, can uncover information that enables the analysis to track back from the impacts to the causal factors. The Social group has modified the columns to reflect Social Theme research questions, showing that it can be adapted to the research process (Figure 3). In the blue column, the factors shown are those that relate to the generation of different levels of vulnerability in terms of the five components shown in Figure 2.

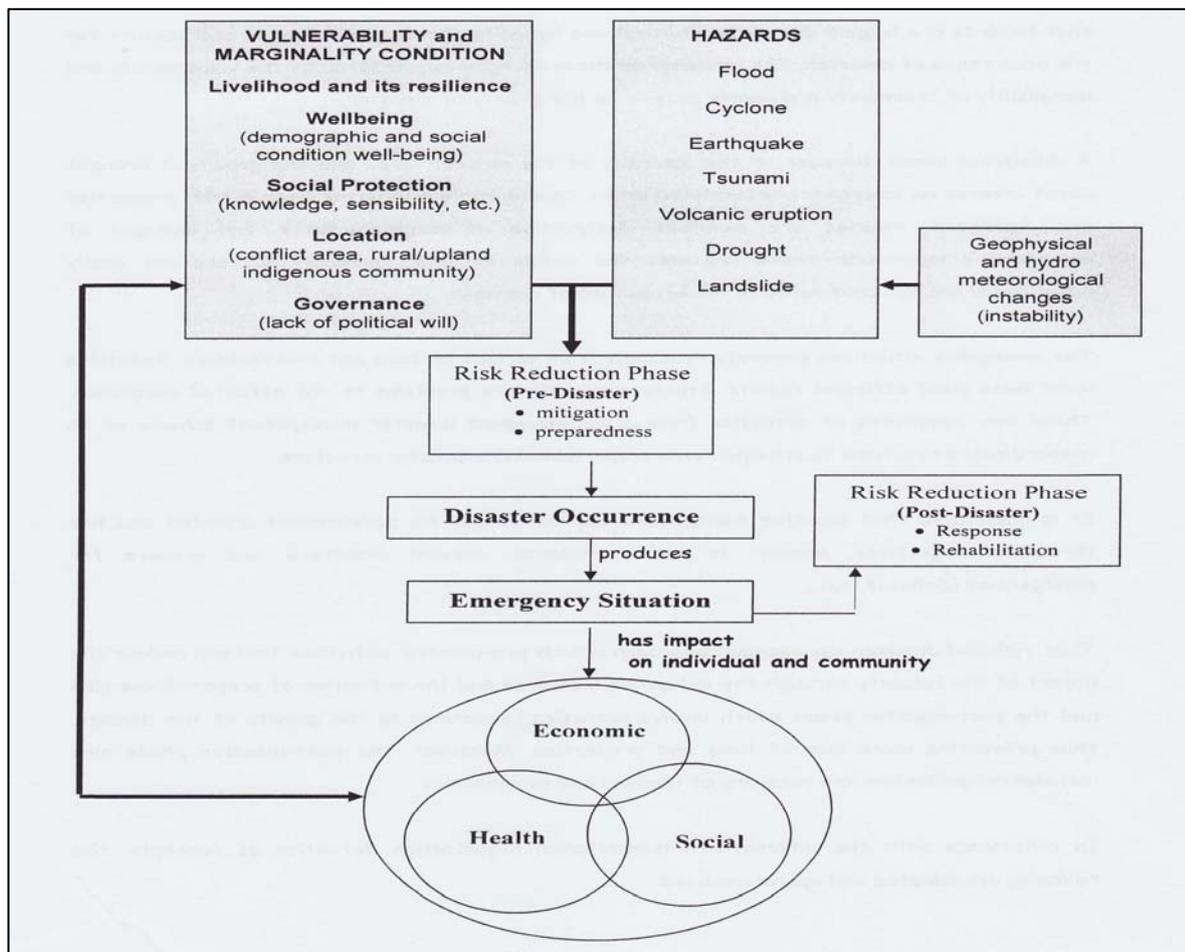
If each of the Thematic groups maps their own research questions into the blue column, these can be cross-linked to the five components of vulnerability (as in Figure 2) so that the impact of the hazards (represented in the orange column on the right) is linked to the specific conditions of vulnerability in health, social and economic terms. Data collected and analysed in the site surveys can therefore provide the means to specify what component of vulnerability has led to particular health, social or economic impacts: did the health impact of the flood result from the already low base line conditions of the affected groups? Did the failure of governance lead to the inadequate maintenance of



flood protection measures? Were people too poor to implement earthquake preventive measures and provide for their self protection? Were social factors involving class and power responsible for the inadequate supply of water to the community after the disaster?

In this way, the PAR model enables the Thematic Groups to identify the linkages between the hazards and the vulnerability factors that lead to a disaster. It permits the analysis of the chain of causation that links back from the five vulnerability components to the problems of self and social protection and the social factors and power relations that affect and determine them. This provides the basis for increased integration of the results from the three Thematic areas, since they are all related to the five components of vulnerability, and all are further related to the causation that is traced to the left (yellow and pink columns) in the 'progression of vulnerability'. In fact, using the quantitative and qualitative surveys, relevant data can be attached to each of the five components of vulnerability in order to make a quantitative assessment of the levels of disaster impact in each study site.

Discussion by Patrick Pigeon at the Integration Workshop highlighted a conceptual



**Figure 4: From paper prepared by the RIMCU-XU team:  
The conceptual framework for integrated health, social and economic impacts of extreme events**



problem with the PAR approach. This arises from the lack of feedback loops in the PAR model from social factors and power relations leading to effects on the hazards themselves. The hazards should not be seen as entirely “natural” – they are themselves modified by human action (and inaction) – not least from climate change, but also environmental damage that increases flooding, and potentially worsens landslides in earthquakes.

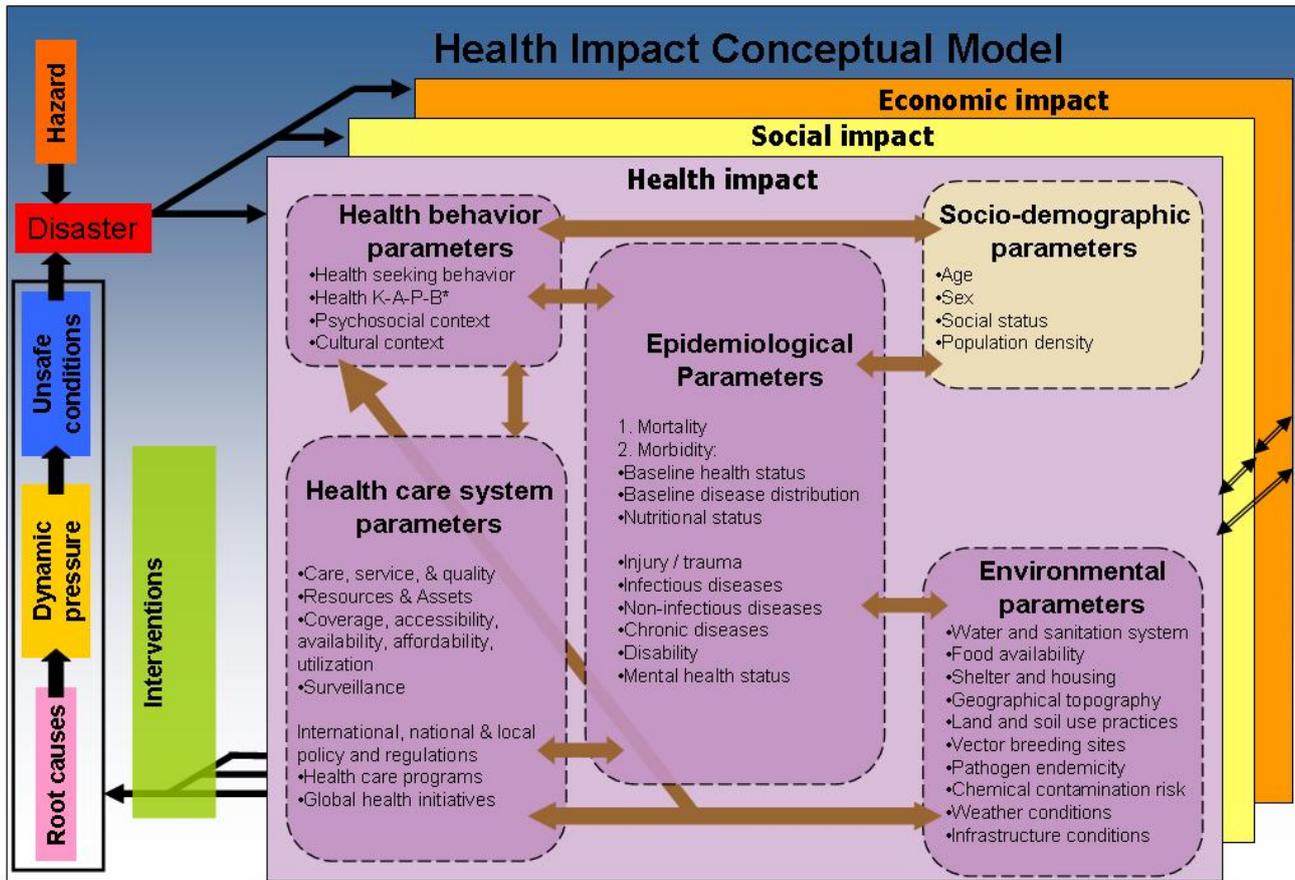
The implications of this for MICRODIS work is that the hazards can only be fully understood by including the effects that human systems have on those hazards. But so long as the survey methodology (especially through the participatory research tools) is able to uncover the factors that may affect the particular hazards being investigated, and the feedback systems that are modifying them, then the PAR framework is not going to be a handicap to the overall goal. It is in any case intended as a simplified framework that is capable of being enhanced through additional analysis.

A related type of additional analysis, which also ties in with the PAR model, is shown in Figure 4. This model brings in disaster mitigation and preparedness as a stage before the disaster happens. This framework (from Xavier University, Philippines) includes boxes that replicate the Hazard (orange) and Vulnerability (blue) columns from the PAR model. The key element of this framework is that it shows where preparedness and mitigation can fit in before a disaster happens at the interface of the hazard and vulnerable conditions.

For the integration of MICRODIS results, this highlights that the disaster risk reduction measures (whether implemented by government, NGO or the community itself) for an expected hazard need to be understood in relation to the three thematic areas (health, social and economic factors) shown at the bottom of the diagram. The feedback loop (left hand side) back to the vulnerability and marginality conditions box suggests that action to reduce vulnerability in one area is unlikely to succeed unless it properly takes into account the mutual effects on other areas.

In other words, when MICRODIS analyses the effects of a disaster on health, working back to reduce vulnerability to health problems will not work if social and economic aspects are not taken into account (e.g. reducing vulnerability to health needs to take account of social and economic factors like gender and livelihood): the effects of a disaster are experienced by people and in communities in an ‘integrated’ way, and so the necessary processes of vulnerability reduction must be based on the integrated character of the impacts, whether they are initially identified in terms of health, economy or social factors.

The Health group diagram (Figure 5) also takes this process a step further by its focus on some of the actual variables that represent the health impacts of a disaster. From the PAR boxes on the left (the chain of causation) it links in to the impact of the disaster on health with a summary of the variables that need to be measured in the health impact context. The three topic areas are shown (as they are also in Figure 6) as being inter-related (underneath health we find the economic and social factors, linked by interactive arrows). As the feedback links proceed from the three areas of impact and into the green Interventions box (bottom left corner), the health, economy and social aspects are re-combined to feed into the PAR progression of causation.



\* K-A-P-B: knowledge, attitude, practice, belief, behavior

**Figure 5: Health Group impact conceptual model**

### Real world integration and community perception

Most people affected by disasters are unlikely to make the neat distinction between the economic, social and health effects that is required by MICRODIS. The analysis of disaster impacts on health, social and economic factors requires specialist knowledge to design research questions, collect data and interpret results of the surveys at community level. For this reason, it is necessary to make use of the specialist Thematic groups in the survey design process and data analysis. But during this process, all partners and members of the Thematic groups have become sensitised to the needs of integrated results. In the final analysis, the results of the surveys need to be taken back to the real world perceptions of disasters in which people are not likely to separate the impacts into different categories.

For this reason, it is useful to return to the PAR model and see how the perceptions of people in the surveyed communities can be matched up with the MICRODIS categories in a way that supports integration. This also helps with another issue: in many cases people in developing countries do not perceive disasters in the same way as outsiders. Even where they are aware of a risk, for instance of earthquake or tropical cyclone, people may consider that other factors affecting their lives are of much greater significance. Everyday living often takes priority: the struggle to feed self and family, to



find school fees and medicine, work and income all have much greater significance than concerns about potential disaster. In hundreds of vulnerability assessments carried out around the world (by NGOs and Red Cross/Crescent societies) people's 'risk hierarchies' have been found to give much greater significance to the problems of everyday living.<sup>1</sup> The PAR model is of relevance to this, because it does not seek to isolate the everyday (what might be called the livelihood, poverty-reduction and development context) from the issue of risk and disaster.

Another aspect of people's 'real-world' attitudes to 'disasters' is also relevant. In many parts of the world, floods are frequent – often annual – events. Outsiders may find these deserve to be called disasters even when the people themselves consider that the events are normal and often beneficial. In some cases (as in Bangladesh) there are local words to distinguish between 'good' and 'bad' floods, depending on the duration or depth and extent of the harm. This issue is relevant to some of the study locations for MICRODIS. For example, a pilot study in a West Bengal rural community has found that many of the people are perpetually impoverished by the annual floods, but see little alternative to their current livelihoods. The floods are not perceived as disasters in the same way as outsiders, but it is also clear that the floods do not permit an 'escape from poverty'. This is typical of many similarly affected rural communities in Asian countries. The livelihood alternatives are limited: no other land is available for farming, education levels are often low, and one of the few possible income diversifications is for a household member to migrate, seasonally or semi-permanently, with the remittances providing the means of survival back in the village.

Underlying the PAR model is this understanding that the key issues are related to the everyday needs of survival and livelihoods. As far as 'disasters' are concerned, many households do not attempt much by way of investment in self protection, and are reliant on social protection (which is often inadequate) and emergency relief when disaster does strike. In this perspective, disasters are not exceptional events, but a part of the range of difficulties that many – especially poorer people – face in everyday life. By analysing 'disasters' in regard to livelihoods and household activities and the 'normal' situation, it becomes much more meaningful.

In this way it is also possible to understand how disasters can be 'managed', in the sense that people's behaviour has to change in order for them to give higher priority to hazards. Changes in behaviour are more likely to happen in the context of community-based risk reduction activities, where people join together. Local action on disaster risk reduction is much less likely to happen when people perceive that their individual action is unlikely to have much effect on its own: it is only when there is collective action that individuals act because they can 'join in'.

This can be explored more by using the vulnerability components section of the PAR model (blue column in Figure 2). Earlier in this paper these five components were listed and some relation to their MICRODIS counterparts indicated. These five components embody all aspects of potential risk to the individual and household in relation to hazards, but also are founded in everyday existence in relation to livelihoods:

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<sup>1</sup> One of the characters in a short story by Anton Chekhov says "Any idiot can face a crisis. It is day-to-day living that wears you out."



- Livelihood strength and its resilience to hazards
- Baseline status in health and nutrition
- Self protection in regard to hazards
- Social protection for hazards
- Governance and the operation of power relations

At the root of everything is the livelihood and the income and welfare that it can generate. This may involve subsistence agriculture (in poor rural communities), or waged employment (rural or urban), or a combination of both. The livelihood activities are enabled by the bundle of 'assets' available to each member of the household. These assets (sometimes called 'capitals', as in the DFID sustainable livelihoods framework) consist of physical assets (land, water supply, tools, livestock, savings) and intangible assets (e.g. health, qualifications and skills, social networks). In the rural context in poor countries, people are highly dependent on 'natural assets', and it is this that correlates strongly with disasters: these assets are much more exposed to flood, cyclone, earthquake, landslide and so on. Since many of these assets are non-transferable and non-replaceable, recovery is very difficult. But even when hazards are frequent and 'normal', people are willing to endure the floods to benefit from the good floods. Flood-prone areas such as much of Bangladesh, the Mekong delta are among the most densely populated parts of the world.

The livelihood can therefore be measured in terms of how resilient it is to different types of hazard of different intensities. How much destruction to assets arises from a flood of so many weeks duration and depth? What is the recovery period for the livelihood (e.g. to get back to average earnings) after a disaster? The economic impacts need to be measured in terms of damage to assets, current outputs (e.g. harvest in field, crops in store), and the cost of replacement (including costs of borrowing). Disasters often lead to 'distress sales' of remaining assets, and/or having to take loans at high interest rates (leading in some cases to 'debt bondage' which can never be escaped).

Livelihoods also provide the basis for living – purchases of food and other daily requirements, medicine and medical care when necessary, school fees, taxes and so on. This can be measured in terms of people's baseline status – their nutritional level, health (both physical and mental – to the extent that mental health may be affected by stress of low income or high borrowing), access to water and sanitation. This baseline status is likely to be a significant predictor of how vulnerable people are when a hazard strikes: poor, undernourished and unhealthy households are likely to be less able to resist the health and nutrition problems that come with a disaster. It is this strong connection between livelihoods and its economic aspect, and the dependent health and nutritional status, that must be understood in the integration of the MICRODIS results.

The next aspect of vulnerability is the self protection component. How much income is generated by the livelihood, and is this sufficient for the household to build a safe home in a safe location? A safe house and place is a primary determinant of whether or not people are safe from some types of hazard (though of course this depends on time of day, who is home). A robust dwelling is also significant in order to avoid rebuilding costs after a disaster (and replacement costs of items that are damaged or swept away). Self



protection and the robustness of a house are clearly highly dependent on income from the livelihood. In many parts of the world that are exposed to hazards, poor people tend to be more at risk because they cannot afford to build adequate houses or live in safe locations. But there is a significant additional aspect to this: in many cases people do not spend income that they do in fact have on safety. This arena of risk-taking behaviour needs to be much better understood, and is related to cultural and psychological factors (how many intelligent people drive around in cars without putting on the seat belt). As mentioned above, it is also an area where community-based interventions can shift the risk-taking mentality into different forms of behaviour: people may change their behaviour when they see that it is not eccentric or un-macho to take precautions (both factors that have been identified in some risk taking behaviour).

The fourth component of vulnerability is social protection. This is hazard preparedness that is provided by actors/ organisation above the level of the household. These actors might include the extended family, or an NGO, or the local or national government. Social protection can range from preparedness and mitigation measures through to emergency relief and reconstruction. It has two aspects: firstly, some hazards cannot be dealt with by individual households or even communities. Action to prevent deforestation and associated landslides, or to enforce building codes (for earthquakes or storms), or provide river-basin flood measures cannot be undertaken by households. The effectiveness of such social protection measures are strongly related to the quality of governance, as will be discussed next.

But social protection is also essential to mitigate disasters for households that cannot *afford* self protection, or are *unwilling* to take protective measures (for cultural or risk-behavioural reasons, or where they believe that the government will act as insurer of last resort).<sup>2</sup> Being unwilling to self protect is also strongly bound up with issues concerning the return period of a hazard and comparing the utility of an investment for the hazard with the opportunity cost – for instance to build a better kitchen or buy a scooter that will increase access to jobs. This is another reason why community based preparedness actions are beneficial in changing people's risk-taking behaviour: where social protection can operate at the local level, it may be able to shift people away from being unwilling to self-protect. In effect, social protection becomes the means by which people are encouraged to self protect. Clearly these processes are highly related to social factors and risk behaviour, so the MICRODIS surveys can integrate the social aspects with key areas that reduce mortality and injury and may help to preserve livelihood assets.

The final component of vulnerability relates to governance: how power is exercised by various agencies (not only national and local government, but also private actors such

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<sup>2</sup> Clearly a moral hazard issue arises here: if social protection has to be provided as a public good, should it be extended to those households who could afford to take more precautions themselves through self protection? One response to this is that emergency relief is unlikely to be withheld from people who have not protected themselves adequately, and so it makes some sense to assist people by providing social protection even to those who can afford it, so that the burden of emergency relief is reduced. This is similar to the debate about whether people should be forced to take out disaster insurance. In the UK there is a similar argument about whether insurance companies can refuse flood insurance to those who have been encouraged by government policy to live in flood plains. Related discussions could extend to Florida or California (where people migrate from other parts of the USA without adequate risk precautions for hurricanes).



as corporations, landowners, class or caste groups and so on). Governance affects vulnerability in at least two key ways. Firstly, power relations have a profound effect on the distribution of income, assets and welfare in a country, so that at the household level people's ability to protect themselves from hazards is affected by their access to productive assets and employment, and welfare (health, education, social insurance – the 'social wage').

Secondly, the type and effectiveness of governance affects the quality of social protection. For instance, if government building regulations are properly designed for earthquake risks, and are implemented properly without corruption and poor building quality, people will be much safer. After a disaster, the quality of organised emergency assistance and reconstruction will depend to a large extent on the quality of governance. Whether or not the government allows NGOs to operate (e.g. on environmental matters) and the media to monitor hazard problems can have great significance for social protection: if independent organisations and media cannot operate freely, then disaster preparedness may be weak or missing. Again, these are variables that are crucial to the MICRODIS surveys, and the way in which these social processes and factors relate to the health and economic themes is clearly identifiable from the linkages between governance, social protection and the determination of livelihoods and welfare by power structures.

These linkages are illustrated in figure 6, which 'animates' the blue column of vulnerability components shown in figures 2 and 3. The text panel gives more information on these boxes and the linkages.

## Conclusion

The main issue for integration of the MICRODIS survey results is to bring together data required for thematic specialists in the areas of health, economy and social factors, and to enable the analysis of interrelations between these thematic data. This task is assisted through the development of a number of conceptual frameworks that have arisen from the Integration and Thematic groups as they have confronted the needs of the overall project. Starting with the Integration Matrix (figure 1) and through to the use of the PAR model and the five components of vulnerability, this is being addressed in a very positive way. The results of this integration process should lead to a valuable methodology that can be made available to other researchers in the field of disaster analysis and risk reduction. A rich of understanding of the inter-linkages between health, economic and social impacts of disasters should emerge from the case studies, leading to an integrated understanding of disaster impacts at the micro level.



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## Text panel

### Household and community vulnerability components – linking economy, health and social factors through the PAR model

To explain people's risk-taking behaviour, we can start at the level of individuals and their households. Diagram 3 'animates' the vulnerability section (blue) of the crunch (PAR) model shown in Figures 2 and 3 by showing the crucial linkages between them.

The starting point is the livelihood (Box 1). These are the activities that make use of the various assets available to the household. They form the basis for a household's level of income and subsistence. The livelihood activities will have varying resilience to different types of hazard – some will be more at risk in a flood compared with an earthquake. In general, those with poor levels of assets are likely to be more vulnerable in regard to most hazards.

From the livelihood (Arrow A) comes the next component of vulnerability: how well fed and healthy the people are in the household (Box 2). If people have low levels of subsistence and cash income, they are likely to be malnourished and unhealthy, to have poor access to clean water and safe sanitation. Their baseline status will be low, and this is a key aspect of their vulnerability – they are less able to resist the health and nutritional challenges that often arise in a disaster. So the linkage (Arrow A) is the first line of defence against disasters, and is clearly linked to poverty reduction and MDG 1 on poverty and hunger reduction.

A second link from livelihoods (Arrow B) indicates whether the household is able to provide itself with much "self-protection" (Box 3). With an adequate livelihood and income, the house is more likely to be safe in a storm, flood or earthquake. Income can be used to construct the home properly, and to live in a safe location. For this the crucial link – Arrow B represents the effect of livelihood on people's *ability* to spend on their own safety. (However, being able to pay for a safe house or location is not the same as being *willing* to do it.)

Understanding livelihoods and the assets (sometimes called "capitals" – financial, natural, physical, human, social – in the Sustainable Livelihoods framework) on which they are based is therefore crucial to understanding vulnerability and its links with poverty. If people have low levels of these livelihood assets and income opportunities, their level of vulnerability to hazards is much higher. Here there are clear links with the MDGs, and especially on poverty and hunger.

In most countries, women have less access to and ownership of the assets and less access to the income generated in households. This may help to explain the common observation that women appear to suffer disproportionately in many disasters. Greater gender equality in nutrition and access to medical care may bring a significant reduction in female vulnerability: in many parts of the world, women and girls experience such discrimination within households. This and other aspects of gender relations that affect women in disasters are discussed in part 2 under MDG3.

Governance (Box 4a) is a crucial aspect in the provision of social protection (Arrow C). Where the people themselves do not have adequate self-protection because they are unable (through poverty) or unwilling (through having different priorities), DRR can be



achieved only through social protection (Box 5). This can be defined as the actions of any institution above the level of the household. Social protection can be provided by a local social network (e.g. a religious group, a self-help group or CBO), NGOs, Red Cross/ Crescent, local or central government. The linkage through Arrow C is crucial: the level and quality of social protection will depend on whether there is good governance or not. The quality of governance (which includes not only *government*, but all actors capable of exercising authority, including the private sector) depends on how power is used in relation to the interests of the various sections of society – how equitable, rights-base and fair it is. This can involve problems of commitment (“political will”), corruption (e.g. involving poor adherence to or regulation of building regulations for earthquake-proof construction), inadequate resources, freedom of the media (e.g. to highlight risks, expose corruption and advocate for better government action).

Social protection is also crucial in the unequal exposure to risk for males and females. Even for something as “simple” as girls being able or allowed to learn to swim can have an important impact in reducing the higher levels of female mortality in floods and tropical cyclones. Warning information and evacuation plans (e.g. for cyclones in Bangladesh and India) must also take account of the cultural and social patterns that affect women. There is also a crucial need for social protection to take account of vulnerable groups such as ethnic and religious minorities, the elderly and disabled, who may not otherwise be cared for.

The political system (and the global economy) also governs the way that wealth, resources and income are distributed in a country (Box 4b). Arrow D indicates that the level of assets available at the household level is dependent on the way that the economic and political system allocates assets, income and welfare to different social groups. This can have a very significant impact on vulnerability, by affecting different levels of disaster prevention from the household level upwards. Arrow D also represents the policy interventions that are linked with poverty reduction and the MDGs. The effects of governments and donors in redistributing income, resources and welfare in poverty reduction and the other MDGs should reduce people’s exposure to disasters.

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## References

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