

Strategy Design and Policy Making for Extreme Weather Events as a Result of Climatic Changes

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The impacts from the expected changes in the occurrence of extreme weather hazards as a result of global climatic changes during the next 20-30 years, and their implications for human activities, require new approaches for strategy design and policy making. There is broad agreement amongst climate scientists that a warmer world would, on average, be a wetter world. Moreover it is expected that climate change will come with more intense local rainfall at the expense of gentler more persistent rainfall events (Vellinga; Tol, 1993), and probably increased drought occurrence over large areas of middle latitudes (Rowntree 1993). There seems to be no clear consensus view amongst climate and hurricane experts whether a warmer world would lead to less or more hurricanes and whether areas affected will increase or remain the same. Some more recent studies indicate that frequencies and intensities of hurricanes may somewhat increase in the Pacific region and

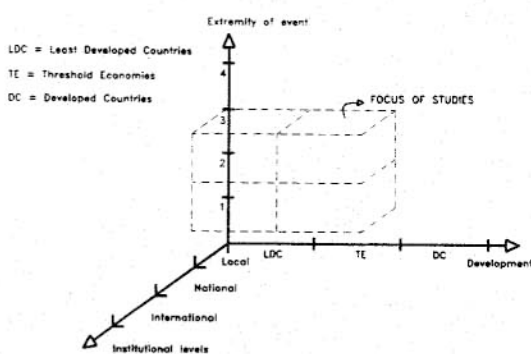


figure 1. Study dimensions

Computer graphics by Diana Dujillo

of population growth, the development of virgin and often marginal land, the uncontrolled exploitation of natural resources and the exaggerated modifications of the landscape. The impacts from changes in the occurrence of weather hazards and their implications for strategy design and policy-making can be studied in the context of the following main dimension: development, extremity of event, and institutional level (Figure 1).

Development dimension. For the least-developed countries which are also disaster-prone - and which may be faced with increased effects from disasters in frequency as well as intensity - the fragile economic position may only improve marginally during the next decades. The increasing effects from disasters in these countries are mainly of a humanitarian nature (see figure 2). Therefore the type of response for extreme events in these countries should continue to be focused on the protection of human lives and livestock, and on the structural and institutional improvement of their basic economic means. A structural approach to combine humanitarian and development aid will be needed to gradually decrease the relief costs in favour of development investments. Countries with threshold economies often lack the institutional, socio-economic and physical infrastructure, or the financial reserves, to absorb the effects from extreme events. The response options feasible for these countries should be focused on saving the existing socio-economic infrastructure, in order to avoid unnecessary losses in terms of indirect ('loss of employment') and secondary costs ('loss of markets and inflation') and a strengthening of the preparedness and evacuation structure. Insurance cooperatives, such as those already in existence for agricultural protection, in combination with modern re-insurance mechanisms, may help to flatten out the medium and longer term effects from disasters for these countries. For developed economies, the effects from extreme disasters in terms of human lives lost or injured are usually less severe. The economic costs, however, are enormous especially in terms of indirect losses (indirect effects from damage to public investments and economic facilities) and secondary losses (epidemics, inflation, increase in income disparities etc.). A rapid recovery of the socio-economic infrastructure - which is possible in case of strict application and control of zonation rules and special codes for (key) constructions and (key) public and private facilities - is of vital importance, in combination with a large and well developed insurance mechanism for those developments which are potentially affected. For development cooperation purposes, focus of studies should be on the least developed countries (LDC's) and countries with threshold economies (CTE's).

Extremity of events. The inter-relationship between 'level of development' and the 'relative importance of damage to loss of human life' - depending on the various levels of extremity of the (weather) event - has been illustrated in figure 2. The definition of "normal" (weather) events differs per region. What is considered "normal" in one society or area,

slightly decrease in the Caribbean region.

Governments of countries in the potentially affected regions should plan ahead for the expected increases of rainfall and hurricane incidence - irrespective of the scientific uncertainties regarding global climatic changes - in combination with the increasing vulnerability of developments as a result

may be an extreme event in the other.

The following levels for extreme weather events (for floods and windstorms) are proposed:

1. Moderately above 'normal' hazardous weather events,

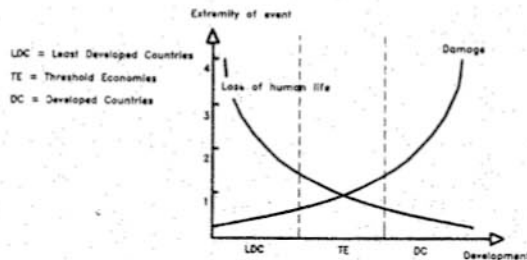


figure 2. Level of development and relative importance of damage to loss of life

corresponding with, for example, above Beaufort Scale number 9 and below 10. (structural damage).

2. Hazardous weather events significantly above the required level of strengthening for housing, daily facilities and functions, but still below the safety levels for 'key' - facilities and life lines, corresponding with, for example, above Beaufort Scale number 10 and below 11. (trees uprooted, considerable structural damage).
3. Extreme weather events well above the maximum 'design level' for key facilities and life lines, but still below the maximum level of insurance/re-insurance, corresponding with, for example, above Beaufort Scale number 11 and below 12. (the air at sea filled with foam and spray).
4. Extreme weather events above the maximum level for insurance, corresponding with, for example, above Beaufort Scale number 12. (total destruction of structures and infrastructures)

The levels of extremity 2 and 3 seem most important for further analysis and modelling as the marginal above 'normal' events (level 1) can possibly be absorbed within the present risk reduction facilities. The level 4 seems beyond the level for which one can provide sufficient protection for settlements and those regions should be excluded for certain vulnerable human occupations.

Institutional dimension. Vulnerability and risk assessments are, as opposed to hazard mapping, carried out at the 'human intervention scale'. Hazards can be identified at large scales, beyond the national boundaries. Although vulnerable regions at a national level can be identified, more detailed vulnerability and risk studies need to be carried out at human activities level, (1:1000 - 1:50000 scale) with the exception of major infrastructural lines (major roads, railway lines, power and communication). Therefore priority needs to be given to impacts and response options at the local level. (see figure 3). This does, however, not limit the importance of the national and international level. It is a function of the government system whether centralized or de-centralized.

Strategies and policies for response options for extreme events. Certain priorities and strategies must be set, through political choices, to initiate the process of national protection against the presumably increasing forces of climatic events. The impact will increase as the magnitude and duration of the events go up. Efficient allocation of resources, and comprehensive planning and decision making, combined with increased awareness for such extreme events, should be seen as the most important strategic measures to achieve this national protection against increasing disasters. Special attention should be paid to the inter-relationship between environmental degradation and disasters as exacerbated by industrialization, rapid rural and urban developments and population growth. Any governmental policies in social development planning and environmental protection must be reviewed in terms of protection against increasing disaster effects.

Particularly, greater attention has to be paid to the increasing effects of disasters in agricultural policies, building regulations, land use planning, infrastructure design, transportation policies, social security support services, forestry programmes and water resource management. In this context, relief aid is seen as the visible consequence of failure in development programming. The revision, however, needs interdisciplinary and international cooperation by sharing expertise and resources. Response options for extreme

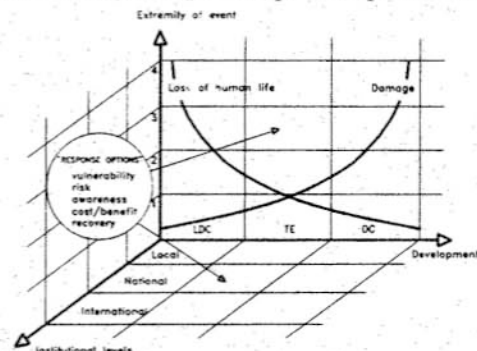


figure 3. Integration "levels of study" and "concepts"

(weather) events can be divided into: indirect responses in the form of interventions in climatic changes; direct responses in the form of increased risk reduction measures in proportion with the climatic changes; through retreat, giving up highly vulnerable occupied territories, considered unsuitable for (certain types of) human occupation; (re-)insurance measures; or accepting the increasing nature of hazardous events, without further interventions (Source IPCC report). Protection levels should be studied in line with the identified levels of extremity of (weather) events, with a focus on intensity/protection levels 2 and 3.

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