فصلنامه مدیریت شهری
(ویژه نامه لاتین)
Urban management
No.**42** Spring **2016**
101 - 118

Received *23 Sep 2015*; **Accepted** *3 Mar 2016*

Sustainable Disaster Risk Reduction(SDR) for Developing Countries with emphasis on land system Resilience (LSR); Case Study: Rural and Urban Settlement

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Abstract
With increasing frequency, the developing countries and the people living there are being affected by disasters. More and more often, development efforts are being destroyed. The reason for this trend is their growing vulnerability, which in turn is the result of economic and social development processes, such as the expansion of settlements and agricultural land in risk areas. The economic and social consequences of these disasters for the people in our partner countries last for years. To break and, if possible, reverse this trend, international organizations, governments and NGOs in the developing countries are increasingly upgrading the priority of disaster risk management for policy, and taking concrete preventive measures to reduce the risk to the population. This paper examined the concept of disaster and its management in the light of sustainable development with particular reference to Iran. It enumerated the different human and natural phenomena that could be characterized as disasters. It was discovered that, while hazard and/ or disasters possess anthropogenic origins, their consequences are felt on both human and the physical environments. In all cases, the human tolls have been significant. The paper highlighted the important elements of a typical Disaster Management Information System in Iran. After presenting a typology of disasters in Iran, the paper, advocated for a workable disaster management information system.

Key Words: *Disaster Management, Risk, Hazards, Vulnerability.*

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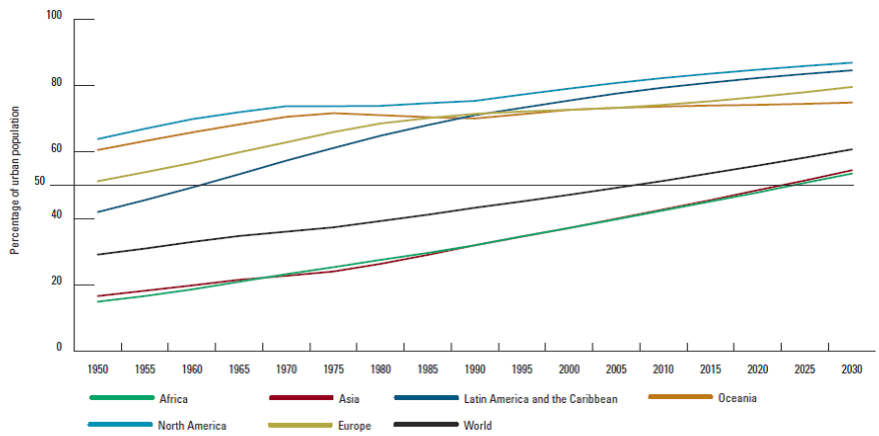
Introduction

Disaster refers to an emergency caused by natural hazards or human induced actions resulting in a significant change in circumstances over a relatively short time period. Typical examples are death, displacement, disease, and loss of crops, damage to physical and service infrastructure, depletion of natural and social capitals, institutional weakening and a general disruption of economic and social activity. A broad definition of disasters include the fact that they are dramatic, sudden, unscheduled events that are often accompanied by large losses of human life, suffering and affliction to a society or a significant part of it, and a temporary breakdown of prevailing lifelines and systems. Such events cause considerable material damages and interrupt the normal functioning of an economy and of society in general (Otero and Marti, 1995). Rural settlements in developing countries suffer significant social, economic and physical impacts as a result of natural disasters (Oster ling, 1979; Peacock, Killian and Bates, 198; Husain, 1993). While well-planned disaster recovery and development processes have the potential to improve the long-term stability of these communities, there are significant challenges. Resettlement, for example, is a common policy employed for post disaster development and planning in urban and rural areas of developed and developing countries (Tamakloe, 1994; Hall, 1994); Post-disaster development policies havemajor positive and negative consequences for communities, in both the short and long term (Afolayan, 1987). On the one hand, if properly managed, disasters provide considerable opportunities to initiate valuable new development initiatives. On the other hand, disasters can reverse large-scale development efforts (erasing years of work overnight). In addition, resettlements (and other development programmers) can increase the vulnerability of a region to disasters and have



Source: United Nations, World Urbanization Prospects: The 2003 Revision.

Fig 1: Proportion of Urban Population by Region, 1950-2030

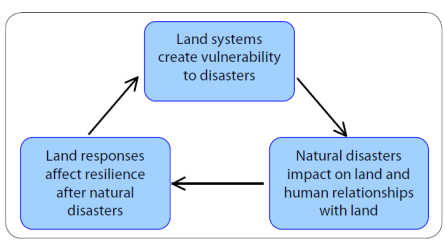
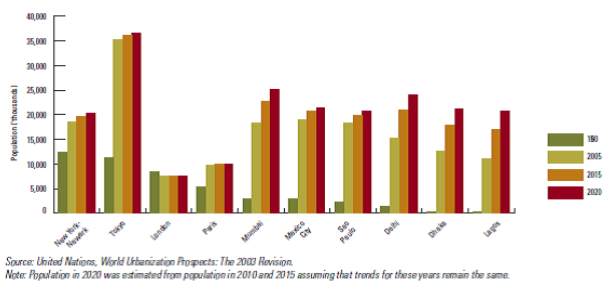


Fig 2: Understanding post-disaster land issues through vulnerability and resilience analysis



Source: United Nations, World Urbanization Prospects: The 2003 Revision.
Note: Population in 2020 was estimated from population in 2010 and 2015 assuming that trends for these years remain the same.

Fig 4: Urban Growth in The World's Largest Cities, 1950-2020

negative social and economic ramifications. However, development programmers can be designed to reduce adverse impacts and minimize susceptibility to future disasters (UNDP, 2004).

Lecturer review

A hazard is a natural physical phenomenon which can lead to a loss of life or damage to objects, buildings and the environment. The hazard is measured and defined by its nature (type of hazard), location and extent, scope and intensity (damage potential) and its probability of occurrence, duration and frequency (repetition cycles). Examples: floods, earthquakes, droughts, landslides, etc.

(*) Risk

Risk is usually associated with the inability of men to manage hazard events that may eventually lead to negative consequences like destruction of the environment, socio-economic activities, properties and losses of lives. Risk in terms of disaster management has a specific focus (UN, 1992). It can be defined as the probability of harmful consequences (ISDR, 2002), or expected losses (lives lost, persons injured, damage to property and/or the environment, livelihoods lost, disruption of economic activity or social systems) due to the interaction between humans, hazards and vulnerable conditions.

(*) Vulnerability

Expresses the level of possible loss or injury or damage to humans, objects, buildings and the environment which can result from the natural hazard; Vulnerability expresses the susceptibility and predisposition to be affected or suffer injury or damage. It also captures people's inadequate options or ability to protect them against possible damage or recover from the consequences of natural phenomena without outside help. Vulnerability always relates to a concrete hazard. It arises out of the interaction of social, economic, physical and environmental factors. The level of vulnerability of a society to a specific extreme natural phenomenon (hazard) is determined by the potential damage caused by the natural phenomenon. There is just vulnerability which depends on and is influenced by various factors, and not specific sectorial vulnerabilities, such as economic, political or institutional vulnerability, as described in numerous publications. In addition to these "specific vulnerabilities", the specialist literature also often uses the term "ecological vulnerability". This refers to the vulnerability of the environ-

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Public Sector	Private Sector	Civil Society
Politicians Military (where appropriate) Disaster Management institutions (existing and specially created) Line Ministries: Land, Housing, Justice, Forestry, Agriculture, Planning, Finance Local Government	Land developers (formal/informal) Estate agents (formal/informal) Lawyers, notaries Surveyors, Planners, engineers, other professional groups/societies Construction industry Bankers, financiers Chamber of Commerce Small holders/ farmer groups	Civil society organisations (including NGOs and community-based organisations) Universities, research institutes, technical institutes Religious and faith-based organisations Media organisations
Traditional Authorities	**Households/Individuals**	**International Development Partners**
Traditional Chiefs, elders, councils Informal settlement leaders Conflict resolution mechanisms Influential persons (religious, etc)	Individuals disaggregated according to age, gender and social and economic classifications Households, groups and communities, whether organized on ethnic, religious or other basis Beneficiaries of land related programmes People affected by land management decisions Land owners and leaseholders Informal landholders Refugees and internally displaced people	UN Specialized Agencies World Bank IFAD Bilateral agencies Private Foundations International NGOs/ Charities

Table 1: Indicative list of potential land stakeholders

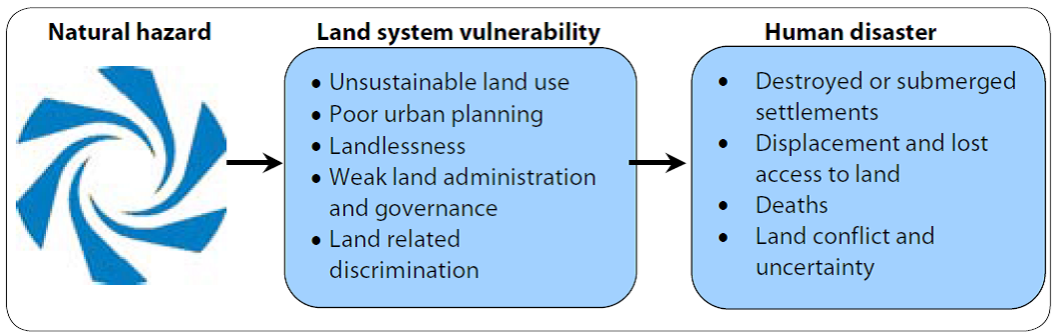
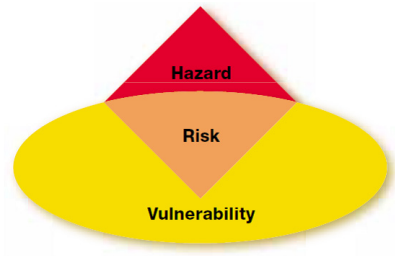
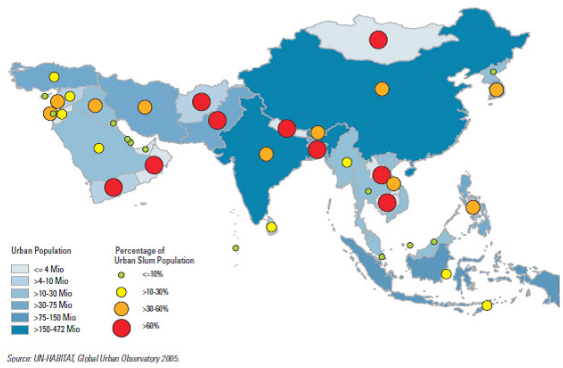


Fig 5: How land system vulnerability can create human disasters



Explanation of fig. 6: Locations and populations in the yellow region are characterized by certain types of vulnerability, those in the red and orange regions are threatened by natural events. However, risk only arises in the orange area, where hazard and vulnerability coexist.



Map 1: Urban Population and Slum Proportion in Asian Countries, 2001

ment (soil, water). However, "ecology" covers more than just the environment. Ecology in these guidelines is used to refer to the science dealing with the relationship between nature and society, and not just one of these two components.

(*)Vulnerability factors

Vulnerability and its severity depend on a range of factors. In these guidelines, vulnerability factors are allocated to the following four categories: physical, environmental, and economic and social. The vulnerability factors to be identified and researched depend on the particular hazard type and location. They are explained in detail in sections 3 and 7. Risk is defined as the product of hazard and vulnerability (R=HxV), or – to put it another way – risk as the probability of an encounter between a specific hazard and an element vulnerable to this is interpreted as the probability of occurrence of loss of life or damage to objects, buildings and the environment as the result of an extreme natural phenomenon with a specific strength or intensity.

(*) Disasters

A disaster is a serious disruption of the functioning of a society, causing or threatens to cause, widespread human, material, or environmental losses which exceed the ability of affected community to cope using only its own resources (South Africa, 2002). Disasters can be sudden (flash floods) or progressive (drought). Disasters are caused due to the interaction of humans with their environment. A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk (ISDR, 2002: 25). Extreme natural phenomena do not in themselves constitute hazards. It is only when such phenomena occur in an environment

where they pose a threat to human life, property, infrastructure or the environment that they can be classified as hazards. Similarly in the case of technological developments, it is only when such developments pose a danger e.g. industrial accidents, infrastructure failures. In essence, a disaster is the result of a hazard's impact on society. So the effects of a disaster are determined by the extent of a community's vulnerability to the hazard. Hazards in themselves do not constitute disasters. The magnitude of disaster is usually described in terms of the adverse effects which a disaster has had on lives, property and infrastructure; environmental damage; and the costs attached to post disaster recovery and rehabilitation. Simply out, therefore, disaster risk is the product of the combination of three elements – vulnerability, coping capacity and hazard (ISDR, 2004). This interaction is illustrated in the following formula.

Disaster risk (R) = Vulnerability (V) x Hazard (H)

Capacity (C)

Hazards are increasingly dynamic and with highly varying potential impacts. A wide range of geographical, meteorological hydrological, environmental, technological, biological and socio-political hazards can threaten livelihoods and sustainable development.

(*) Disaster risk management (DRM)

The terms disaster reduction (DR) and disaster risk management (DRM) are used as synonyms in the present guidelines. However, DRM is preferred, as this conveys a stronger sense of direct local initiative. In addition to risk analysis, DRM also includes prevention and preparedness for disaster. By contrast, disaster management (DM) consists of DRM as well as disaster response. Risk analysis is used here as a synonym for risk assessment. However, many authors and documents distinguish between these. Where this is done, risk assessment is taken as also including risk evaluation, socioeconomic cost-benefit analysis, prioritization of measures, establishing acceptable risk levels, developing scenarios and measures. Risk analysis (RA) is used in these guidelines to refer to a method of determining the quantitative or qualitative degree of risk. The term "risk analysis" has the underlying concept of "participative risk analysis" (P-RA); this means that the affected target population are involved in the various stages of a risk analysis, and adopt the DRM as their own.

The concept of disaster risk as the product of hazard and vulnerability

Natural disasters are the result of the impact of an extreme natural event on people and their vulnerable goods and infrastructure, and cause loss of life and damage to goods and the environment. A disaster is the disruption of the functioning of a society to an extent which exceeds the ability of the society to cope with it from its own resources. The extent of the disaster depends on both the intensity of the event and the degree of vulnerability of the society6. A natural disaster always consists of two elements, an (external) event (the hazard) and the impacts of this hazard on a vulnerable social group exposed to this hazard. A powerful earthquake in an unpopulated area is not a disaster, while a weak earthquake which hits an urban area with buildings not constructed to withstand earthquakes, can cause great misery. Extreme natural events only become disasters if they impact vulnerable people, who often expose themselves to natural hazards through carelessness or poverty, or who contribute to or aggravate the events by intervening in nature. Although reducing the risk of disaster can be done by both restricting the hazard and reducing vulnerability, DC mainly tries to reduce vulnerability, since reducing the hazard is usually very difficult or even impossible. Vulnerability, by contrast, is easier to influence by strengthening human response, planning and protective capabilities. Disasters can be seen differently in other cultures. Whether those affected see an event as a risk or as a disaster, or whether they assess the risk as high or low

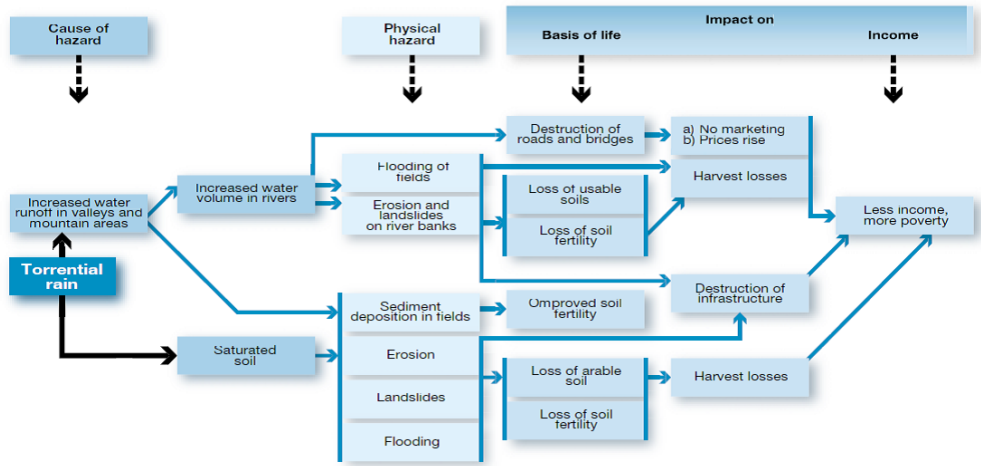


Figure 7: Impact chain for agriculture and income of torrential rain

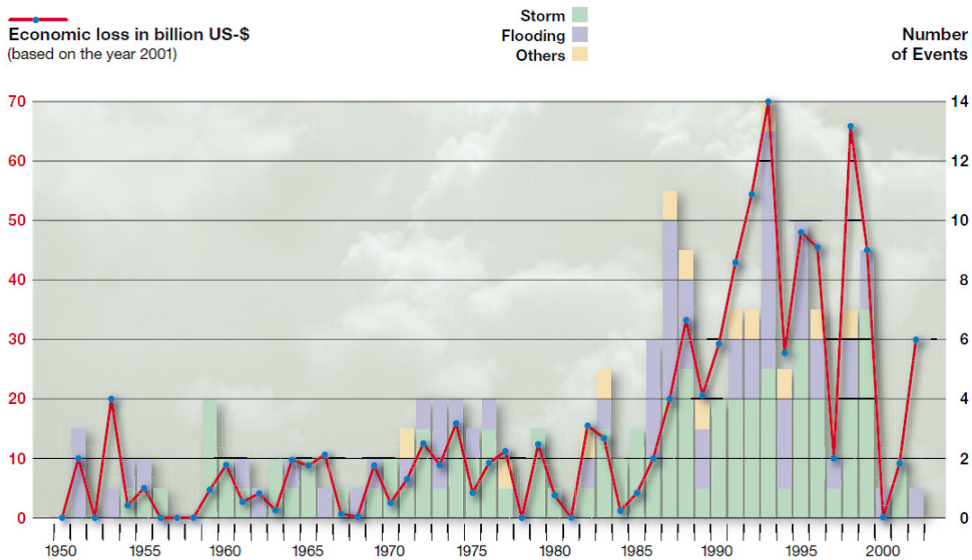


Fig 8: Major weather-induced natural disasters, 1950 – 2002 (source: Münchener Rück)

depend on the value system they feel bound by. Perception of risk – or, more accurately, lack of perception of risk – is the most important factor in vulnerability.

Developing nations in particular, experience pervasive risk of devastation, human and property loss resulting from human and natural disasters. According to Henderson (2004), this level of risk was attributable to socio-economic stress, aging and inadequate physical infrastructure, weak education and preparedness for disaster and insufficient fiscal and economic resources to carefully implement the preparedness, response, mitigation and recovery components of integrated emergency management. Disasters are clearly a development problem. First, because certain natural phenomena, including those of hydro-meteorological, geodesic and origin tend to have greater effects on developing countries than on developed countries. Second, because several factors associated with a low level of development exacerbate such effects. Third, because the impact of natural phenomena on the prospects for long term development is considerably greater in less developed coun-

tries (BID, CEPAL, 2000).

Finding and results

Although, differing somewhat in the trigger, scope, duration and requisite actions, most disasters – both natural and human-driven generally result in widespread physical damage, death, disability and displacement, as well as the disruption of economic and social activities (Coletta, 2004, Olokesusi, 2004). Disaster specialists focus on two kinds of vulnerability. The first is peoples' vulnerability to disasters – the extent to which they are at risk (living on a flood plain, having a house unable to withstand floods) and the extent to which they can cope with the impacts (through such provisions as health care and property insurance). The second is the vulnerability of key institutions or systems such as power supplies, water supplies, and hospitals and emergency response networks to disasters. December, 2004, tsunami disaster in South Asia is an example which led to an immense loss of over 270,000 lives in addition to several million dollars' worth of property and infrastructure destroyed.

Disasters and those prone to it increase human vulnerability. In the last millennium, and even now, the world has witnessed a range of natural hazards (environmental emergencies), in greater and more frequent in some areas than in others, slow-acting in some cases and catastrophic in others. The Munich Re-insurance estimated that economic losses due to environmental emergencies have increased three-fold from the 1960s to the 1990s, and in the first few years of this decade, are running about US $50 billion per year. The majority of these enormous economic losses are incurred in industrially developed parts of the world including Japan, USA and Canada. But the relative impact is much greater in countries with lower per capital incomes, where their effects on such human and economic factors as employment, balance of trade, indebtedness from reconstruction and loss of capital continued to be felt for many years after the event (CERD, 2000; Mac Entire, 2001).

Risk analyses also help with project identification, providing information on whether under certain circumstances short-term activities under emergency aid measures are more efficient and effective, whether aid measures should be aimed more at longer term structural (TC) measures, or whether a combination of the two is needed. In regions threatened by disasters, disaster risk management measures are often integrated into TC measures (programmers or projects) as cross-cutting themes, e.g. in projects of rural regional development, rural development, resource and water catchment area management or decentralization and community promotion. Risk analysis is then part of project preparedness and planning, and is carried out in the framework of

Figure 2: **Project types and their focus**

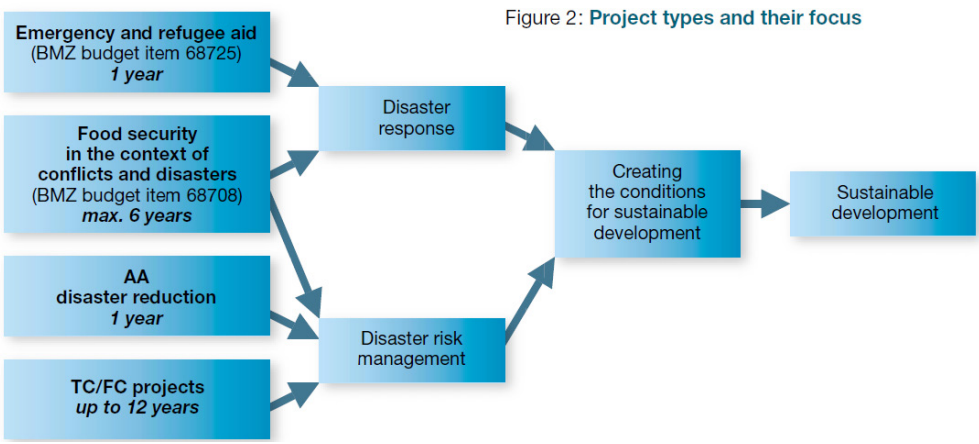


Fig 9: Project types and their focus

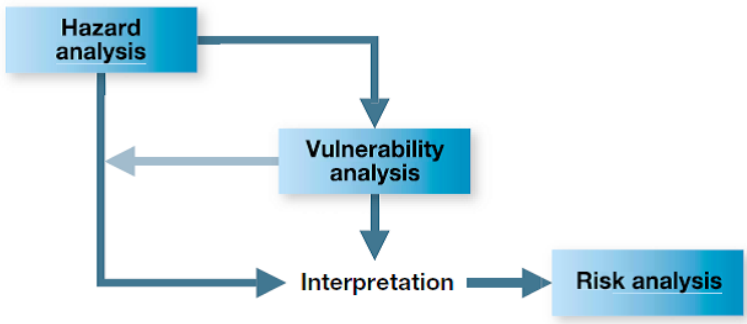


Figure 10: The concept of risk analysis

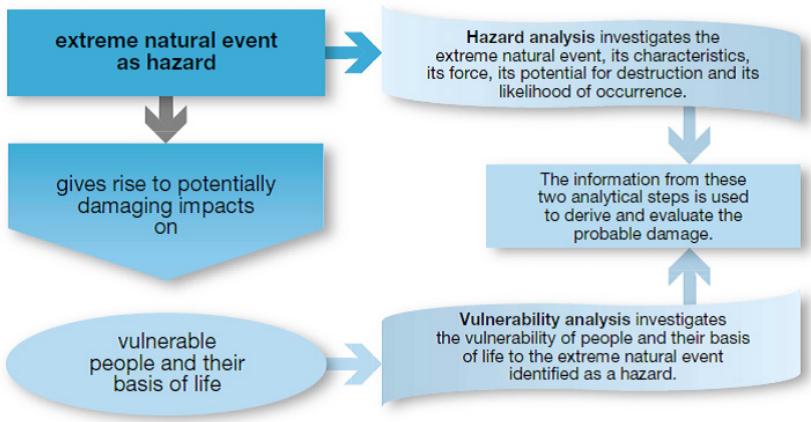


Figure 11: Assessment of impacts as the goal of risk analysis

instruments such as problem analysis, organization or potential analysis, ROPP (Regionally Oriented Programmed Planning) or land use planning.

Social Risk Management and Disasters

Post-disaster housing assistance by government is an example of a public arrangement for social protection or social risk management. Social risk management arrangements are generally categorized as follows:

(1) Informal arrangements, such as sale of personal assets or community self-help;

(2) market-based arrangements, such as property insurance; and

(3) Public arrangements, such as assistance grants or other social safety nets. All families will use informal arrangements in their recovery and reconstruction, but they are unlikely to be sufficient. Only a select group will generally have access to market-based arrangements. The expectation after a disaster is that public arrangements, in this case housing assistance, will fill the gap that remains when informal arrangements and market-based arrangements are inadequate.

Land and vulnerability to natural disasters

Low capacity to access and use resources and vulnerability to natural hazards are closely linked and mutually reinforcing. Marginalized groups are usually more vulnerable to hazards because they enjoy fewer options to diversify their livelihood sources or because they live in more hazardous locations. Increasing the sustainability of land systems will result in lower damages in case of a natural disaster, more stable access to resources, lower vulnerability and shorter recovery time.

Predictors of land system vulnerability

While there is considerable variety across systems for governing land worldwide, a number

of characteristics of poor land governance are commonly observed and can help to identify vulnerability to natural disasters. They may be summarized as follows.

1. Unsustainable land use. In many developing countries, choices of housing location and building materials are restricted. Poor settlements tend to be located on steep hillsides, flood plains, water catchments or seismically unstable areas. Natural protections such as forests and mangrove swamps may be destroyed or damaged through unsustainable resource exploitation. Poverty, hunger and settlement on hazardous land are induced by the exhaustion of water sources, soil fertility and natural resources.

2. Poor urban planning. City boundaries in developing countries rarely correspond with actual settlement patterns. Zoning bye-laws, building codes and construction standards tend to be unaffordable and unrealistic from the perspective of the poor. Informal settlements tend to proliferate on hazardous land without access to basic services and infrastructure or the benefit of disaster risk reduction planning. Land use plans tend to be incomplete, out-of-date and uncoordinated with land administration systems across different institutions and levels of government.

3. Landlessness. In development settings, many people either own land that is insufficient for agricultural livelihoods or have no access to land at all. Unequal land distribution patterns typically prevail, often due to a history of social conflict over land. Holders of secondary rights (e.g. tenants, sharecroppers, pastoralists, etc.) to lease, use or occupy land are not sufficiently protected against eviction, or are excluded from land information systems.

4. Weak land administration. Key land actors typically lack both technical skills and incentives for efficient, transparent and accountable land management and may not serve the needs of all members of the population. Responsibilities for land tend to be fragmented between various ministries and agencies, blocking coordinated approaches. Significant amounts of land are not covered by land information systems; indeed, globally, only some thirty percent of land is formally registered. Data on registered parcels may be poorly recorded, limited to urban or other high-value areas or may simply be out-of-date. The boundaries between different types of land, including land claimed by the state, may not be surveyed or defined with sufficient precision. Land-related disputes tend to proliferate and, in contexts characterized by legal and institutional pluralism, 'forum shopping' (claimants pursuing grievances in multiple decision-making forums) may be common.

5. Land-related discrimination. Many landholders' rights are deemed illegal or unrecognized despite being based on systems with considerable social or traditional legitimacy. These systems may be based on customary, religious or informal practice. There is often a weak interaction between statutory and customary laws and adjudication mechanisms, with statutory systems bearing little relation to the social practices of poor landholders or the landless. Rules for adjudicating rights to land may be unclear, and subject to excessive discretion by key land decision-makers. Vulnerable groups such as women, children and minority groups may face discrimination on the basis of property, including barriers to accessing, inheriting and enforcing rights to land.

Government as Insurer

In many countries, government acts as the principal insurer of housing after a disaster. This is common when there is an inadequate property insurance system; an insurance market that is unaffordable to some households, no sanctions against being uninsured or underinsured, or disaster damage exceeds whatever insurance coverage people may have had. But when government plays this role, the "insurance terms" are not defined until after the disaster, which creates uncertainty for those affected, and the expectation that govern-

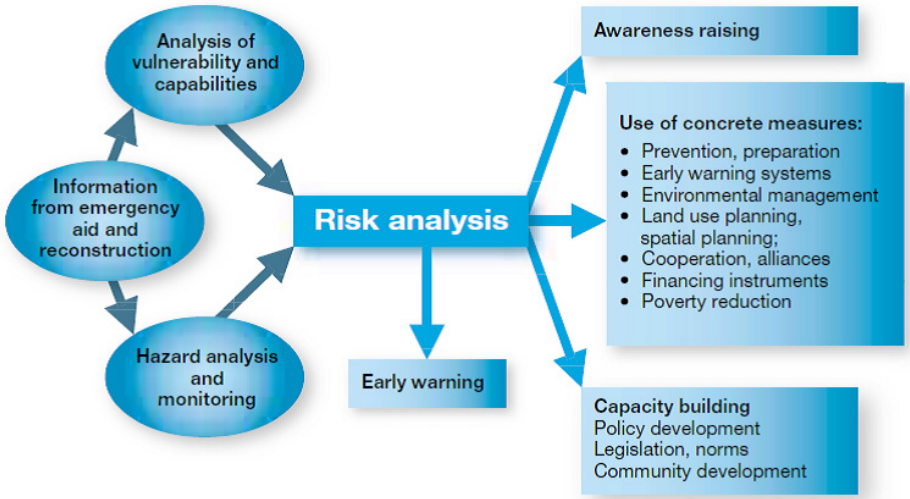


Figure 12: "Inputs" and "outputs" in risk analysis

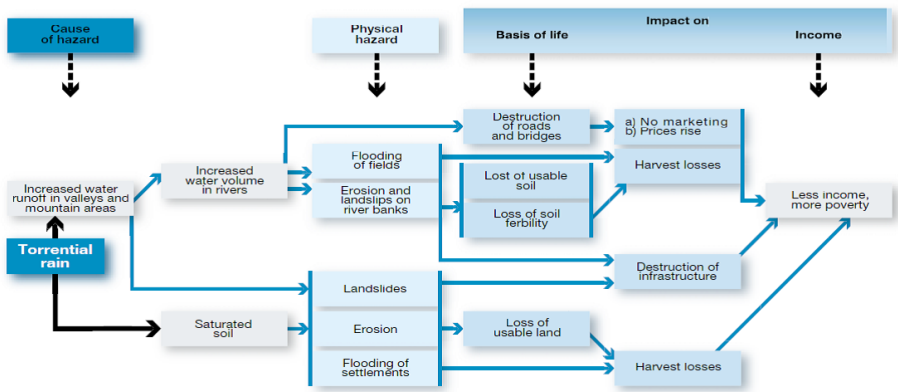


Figure 13: Impact chain to identify the direct physical hazard and its causes and impacts

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ment will provide assistance creates political and economic burdens for government.

Reconstruction as Opportunity to Resolve Long-Standing Problems

As part of reconstruction policy, government must decide the degree to which construction will be used to accomplish longer-term development objectives. A disaster is often viewed as opportunity to resolve long-standing development shortcomings and, with a significant flow of external assistance, the potential for correcting inadequacies in pre-disaster housing and community services obviously increases. It is clearly sound policy to rebuild houses and infrastructure that is less vulnerable to future disasters ("built back better"). A more complex decision in development terms is whether to move disaster-affected communities "to the "head of the line" of all those waiting to have their basic needs met (e.g., providing sewerage systems or updated road configurations), thereby favoring affected communities with a standard of living higher than that in similar, but unaffected, communities. The savings of taking a comprehensive approach to reconstruction may justify it, even at the risk of political fallout, Assessing Damage and Setting Reconstruction Policy. It explains how strengthening of housing not damaged by the disaster was defined in the reconstruction policy as an integral part of the reconstruction effort.

Key Principles underpinning land system resilience

These guidelines will outline steps to address vulnerability and promote resilience in a land

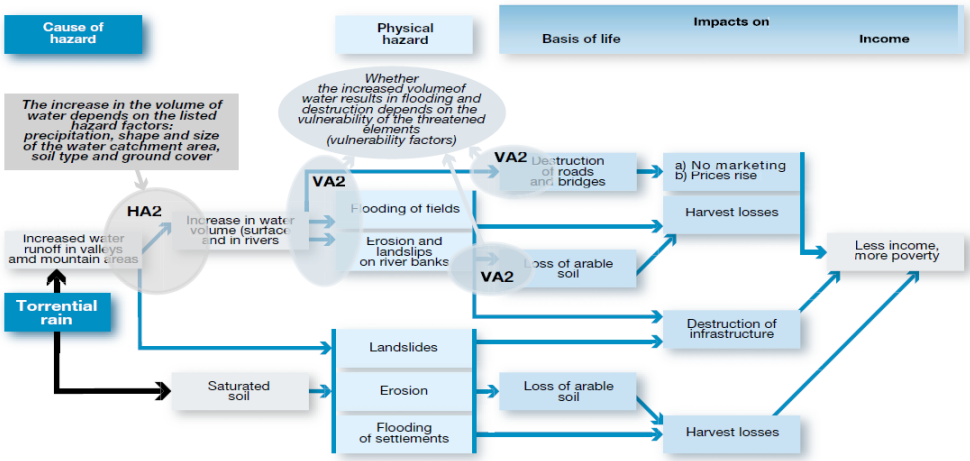

Fig 14: Dependence of the scale of flooding and damage on hazard and vulnerability factors

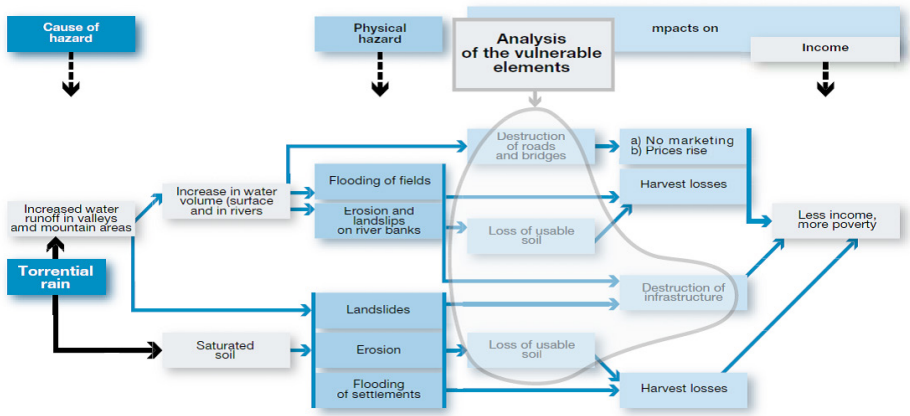

Fig 15: Study of the impacts on vulnerable elements

governance system based on the following key principles:

1. Build on community-based initiatives. Understanding and supporting community response strategies is critical to improving resilience in the long-term, particularly where they serve to strengthen land rights documentation and land use planning, and can be integrated into the broader land governance system.

2. Take a flexible tenure approach. Promoting a range of tenure options, including short-term use rights, can reduce the risk of eviction and promote recovery. Flexible hierarchies of evidence can ensure that people without legal documentation are not excluded from shelter, livelihoods or other assistance programs. Adopt strategic and flexible planning, land-use and construction policies. Flexible land use planning standards can facilitate reconstruction aimed at building back better and mitigating the risk of future disasters. Housing standards should aim to reduce the risk of hazards by building on existing skills and practice, rather than promoting unaffordable or inappropriate techniques and materials.

3. Focus on vulnerable groups. Secure rights and access to land are crucial for the vulnerable groups most affected by a disaster, including renters, informal landholders, widows and orphans. At the same time it should be recognized that vulnerable groups often depend on less vulnerable groups for access and use

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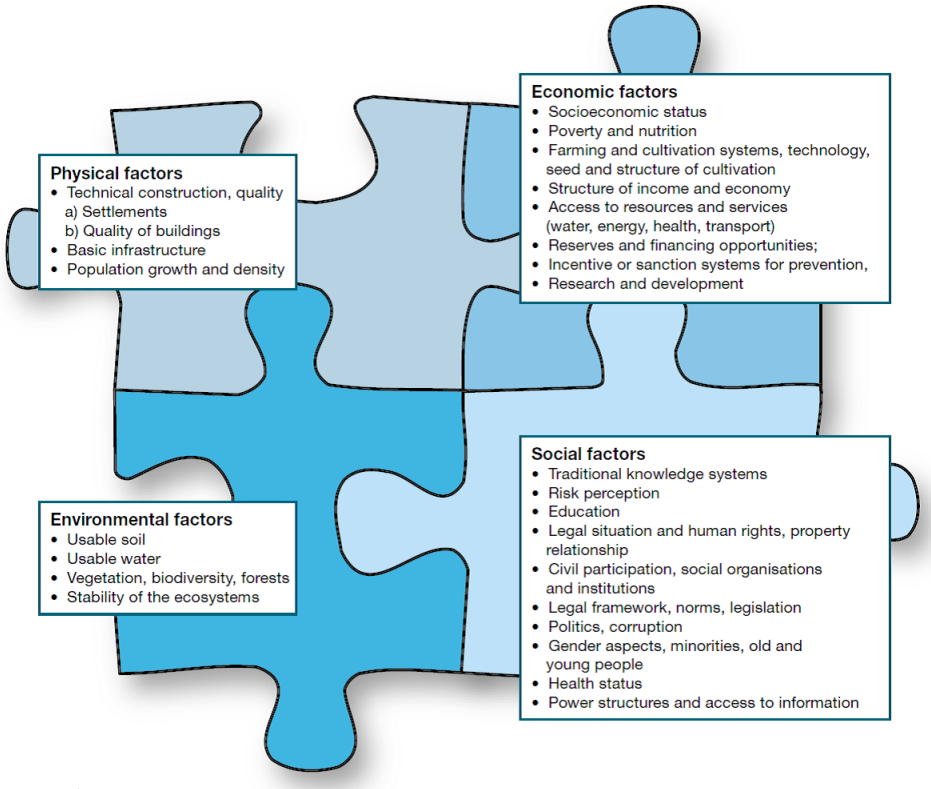

Fig 16: Classification of vulnerability factors

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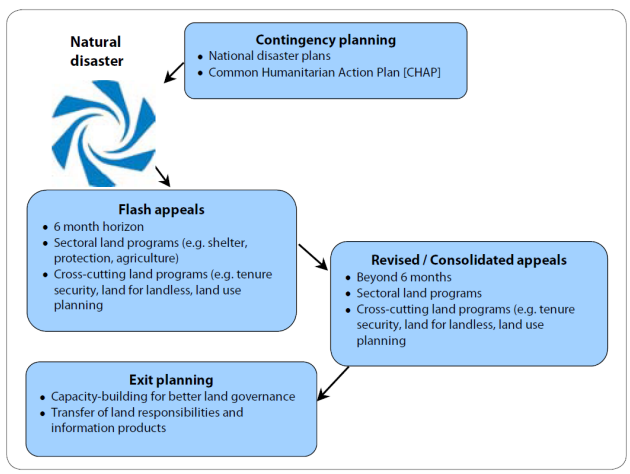

Fig 17: Planning land responses through humanitarian action

of land, and that exclusive focus on vulnerable groups can be perceived as threatening to those less vulnerable, creating incentives for them to limit access and use rights. Mutually beneficial arrangements that promote access to land without arbitrarily destabilizing ownership relations should be promoted.

4. Take a pro-poor approach to land administration. Land administration systems should be pro-poor; they should not require levels of education, wealth, influence and technical capacity beyond the reach of poor individuals or Government capacity.

Range of Futurist Views and Perspectives

Within the Futures field, there have always been a wide range of views and perspectives from people who have come from a very wide range of different disciplines and back-

grounds and interests. Futurists run a whole gamut of views between the following two poles, and everything in between:

• "Doom and Gloom" Futurists: so-called because they tend to focus on current real world problems, without easy solutions (such as the nuclear danger during the Cold War, or the continuing population explosion, world hunger, depletion of fossil fuels and other nonrenewable resources, and environmental preservation and pollution) and project these trends into the future, showing that if current trends continue,...then the future will be much worse than the present.

It is important to note that even "Doom and Gloom" Futurists are not totally pessimistic, however. Indeed, no futurist would dedicate their whole life to studying change and the future if they were totally pessimistic. The major reason for pointing out negative trends and scenarios for the future is to alert people to the potential problems ahead, so that we humans can be informed and change our current policies so that a more desirable future can be created.

• Futurists who create different scenarios of the future--from negative, "doom and gloom" views, to most probable or likely views, to positive, visionary views (an in between perspective, that acknowledges all these possibilities for the world future, and which points out that our actions and policies NOW will help to determine which of these scenarios actually transpires in the future).

• Positive, Visionary, and Evolutionary Futurists: they focus more on positively imaging the more desirable futures that we would like to create; articulating the positive values that we would like a future world to be based on; focusing on technological, societal, and human potentials; tracking groups that are actually trying to create such preferable futures in the world today; and generally empowering people to see that we always have choices (in what we think & feel, and in how we behave in the world), and that we DO have the power to create a more desirable future world by committing in the present to change what we are doing NOW.

Methodologies for Studying Change and the Future

Since the future has not yet happened, futurists have had to develop a number of different methodologies for studying the future and change that are different from traditional scientific methodologies for studying the present and the past--on which data already exists or can be generated. These methodologies

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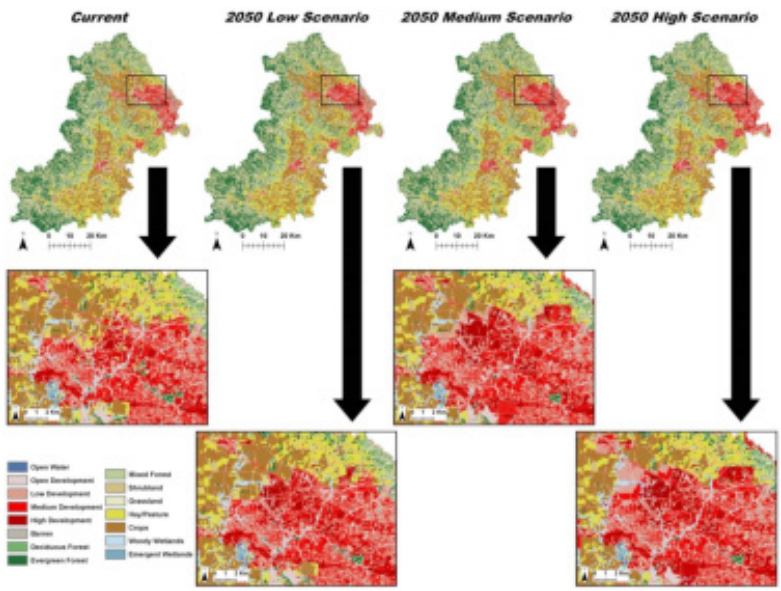
Urban Management
No.42 Spring 2016



range from quantitative, left brain methods to visionary, creative, intuitive right brain methods, and various combinations in between. It is important to remember here that futurists believe in many alternative futures--including probable, possible, and preferable futures. Futurists are thus not only interested in looking at probable futures (based on extending past trends and developments into the future), but also at designing preferable alternative futures, and showing how one can plan to get from the present state to this more desirable future. A wide range of methodologies must thus be employed to cover these very diverse different views of the future. Some of the more prominent futures methodologies include the following:

• Trend Extrapolation: Projects past trends into the future, for some given period of time. Assumes that the future will in some way be an extension of past trends.

• Dynamic Systems Analysis and Computer Modeling: Shows how various variables in different areas interact with each other, within a whole systems context, over time.

• Simulations and Games: An attempt to take certain variables from "reality" in some area and create a computer model or game situation in which one can see how those variables might interact with each other over time. Computers or humans (as role players) or both can be involved. With computers, humans can play "what if" games, where by making certain choices, they can then, see the consequences (in terms of policy) that follow from those choices.

• Cross Impact Analysis: Shows how choices concerning one variable interact with choices concerning another variable, providing a table of all possible combinations of choices for each variable, and showing which combinations are viable and which not.

• Technological Forecasting: An attempt to forecast what technological breakthroughs and developments are most likely to occur in future and when they are likely to occur. In an age in which technology is a major driving force for change, such as today, keeping on top of the latest developments in technology is essential--especially if one works in the high technology area today.

• Technological Impact Assessment: Looks at how new technologies are likely to impact on society or the environment.

• Environmental Impact Assessment: Looks at how new developments in some area will impact on the environment. Often required today, before new building plans can be approved.

• Social Impact Assessment: Looks at how new developments in some area will impact on society or on some community.

• Delphi Polls of Experts--on Either Probable or Preferable Futures: Poll experts in some area on what events they think are most probable (or preferable) and when they are most likely to occur; also the reasons for their answers. Summarize results; give to experts; ask them to take poll again. If they think other people's reasons for their answers are better, they 'can' change their answer the second time; or the third time they take the poll. Gives good results re: expert's views of what's likely to occur in future.

• Futures Wheels: A group brainstorming technique to quickly determine what some of the first, second, and third order consequences might be, 'if' some event were to occur in the future--either for the first time, or if something were to either decrease or increase in value in future. Everything follows from this event put in the center of the futures wheel.

• Scenarios: A possible sequence of events that 'could' happen in the future, based on certain initial conditions or assumptions and what could follow from that. Futurists often construct at least two or three different scenarios about the future in some area, believing that different alternative futures are possible. Examples include: best case, worst case, most probable case, and other type scenarios.

• Science Fiction: A possible story of what could happen in some future social or world situation. Based on a scenario of some kind (i.e., a possible sequence of events that 'could' happen in the future) to which characters (with their own personalities, even representing different alien species in some cases) interact with that sequence of events over time. Science Fiction has replaced cowboy movies as an important genre of films today. Both dystopian and utopian science fiction stories are possible. Science fiction does not claim to predict the future, but sometimes good scientists (who know their topic well) intuitively write about something in science fiction that later becomes a reality. The most famous case is Arthur C. Clark and the communications satellite, which first appeared in a science fiction story.

• Intuition & Intuitive Forecasting: A right brain experience, in which you suddenly 'know' something to be true, or you suddenly see patterns and relationships between things that you didn't see before. Intuition is another way of knowing, a "sixth sense," beyond our five senses. Intuition is important in future studies because in a world in which change is occurring so fast, and one does not always have time to get all the information that one would like before one must make a decision about what to do, one must often rely on one's intuition to fill in the missing pieces and make a decision. Intuition is also the source of creativity and new ideas--in whatever type of work one is in. Good artists, scientists, corporate executives, and leaders in any area all tend to be intuitive. Our Western culture has not always valued intuition, but its importance to creativity (a key skill in the information age) is increasingly recognized, and training programs seek to develop this skill in many people today.

• Experiments in Alternative Lifestyles: One of the best ways to find out if alternative values can work is to try them out in practice. Those new "fads" or alternative lifestyles that work, and respond to some social need, often see themselves becoming more mainstream with time.

• Social Action to Change the Future: People willing to join together with others to educate people on some issue and to work for meaningful change often find that their efforts 'can' effect and help to change the future.

• Short, Medium, and Long Range Planning: Futurists look at planning in short, medium, and long range terms. [See Earl Joseph's five different time periods for looking at change and the future.]

• Relevance Trees: A way to map out the sequence of events, and in what order, that are necessary to get from where you are now to where you want to be as your end goal by some future date.

• CERT/CPM Analysis: A method for doing complex planning of great numbers of people and subcontractors working on some large project, such as the space program. Indeed, this methodology was first developed for use by NASA in planning how to get to the moon. One begins with a relevance tree, and then adds layers of additional information. A way to map all the different pathways that must be completed between where one begins and the end goal one plans to achieve. One also calculates, from all these pathways, what is the "critical path" (which will take the longest and which one must not get behind on, or the whole project will be delayed). Between any two events along any given pathway, one usually adds estimates of: time needed number of people needed, budget needed, etc. One can then calculate dates for the completion of each event along a pathway; plug this all into a computer and print all the pathways out, and use this to monitor a project, once it begins; to be sure it stays on time, on budget, etc. If a particular pathway--especially the "critical path"--starts getting behind, one can then move additional resources to that pathway, to correct the problem, so the whole project stays on time.

Conclusion

When placed in the context of sustainable development, disaster management represents an important aspect of socio-economic and national security, therefore facilitating a continuous development process. Disaster reduction policies and measures need be implemented with a two-fold aim; to enable societies to be resilient to natural hazard while ensuring that development efforts do not increase vulnerability to these hazards. Although, differing somewhat in the trigger, scope, duration and requisite actions, most disasters – both natural and human-driven generally result in widespread physical damage, death, disability and displacement, as well as the disruption of economic and social activities. Disaster specialists focus on two kinds of vulnerability. The first is peoples' vulnerability to disasters – the extent to which they are at risk (living on a flood plain, having a house unable to withstand floods) and the extent to which they can cope with the impacts (through such provisions as health care and property insurance). The second is the vulnerability of key institutions or systems such as power supplies, water supplies, and hospitals and emergency response networks to disasters. Post-disaster programming must take into account the underlying issues that create vulnerability to natural disasters. It is essential that short-term reconstruction efforts include planning for early recovery land programs to reduce vulnerability and build resilience to future disasters. These land programs should include measures to:

1. Build on community-based measures to ensure tenure security after a natural disaster, with a goal of securing land tenures for all those affected (including women, tenants and informal landholders).
2. Undertake rapid hazard and risk assessments. Promote return to safe land and housing where possible. Where safe return is not feasible, promote public consultation mechanisms to ensure public awareness of reconstruction restrictions on and, where required relocation from hazardous land.
3. Target the shelter and livelihoods needs of vulnerable groups who have lost access to land after a disaster, including women, the landless and customary landholders.
4. Apply flexible participatory community planning techniques to all disaster-affected settlements, including customary and informal settlements, so as to improve long-term

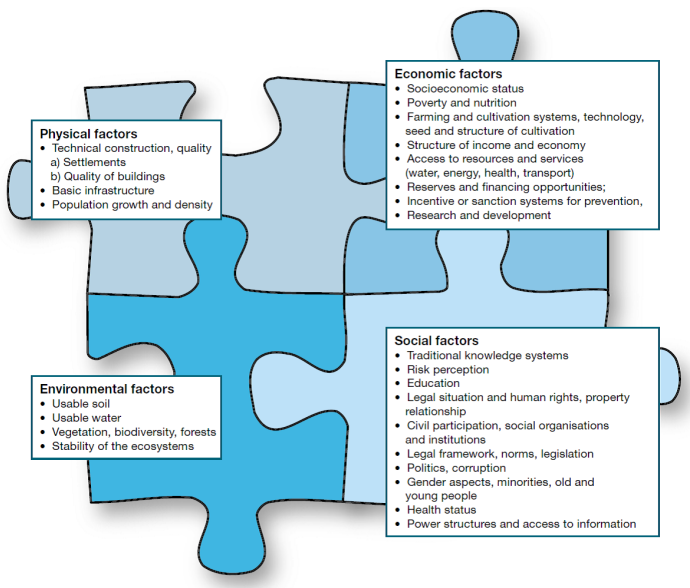


Fig 18: Classification of vulnerability factors

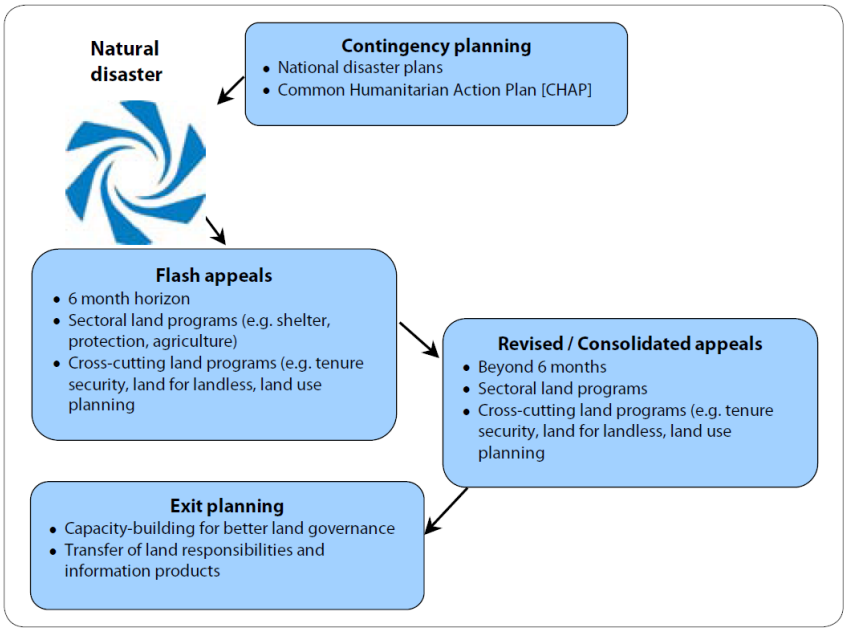


Fig 19: Planning land responses through humanitarian action

sustainability and mitigate the risk of future disasters.

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