Nota: Este documento contiene imágenes en mal estado.

Tropical Storms

Causal phenomena

A weather system of cyclical, high speed (118 to over 300 kph) winds accompanied by heavy rain and sharp differences of atmospheric pressure, over an area usually of at least 100 kms in diameter. Originating from humid air twisting upwards from warm sea water into cooler air, tropical storms move erratically at forward speeds of 10-50 km/hour. In the northern hemisphere the wind circulates anti-clockwise, and the storm moves generally in a northwesterly direction; in the southern hemisphere, the wind circulates clockwise and moves generally in a southwesterly direction. Tropical storms usually continue to increase in strength until they pass over land or cooler water.

Predictability

Tropical storms occur in ocean areas at latitudes close to the equator where water temperature reaches 27°C. The storms are spotted as they form and are tracked and reported on by meteorological surveillance and internationally co-ordinated warning bodies.

Accurate landfall (point and time at which a storm will strike land) forecasts are generally possible for only a few hours beforehand, as storms can change direction unpredictably (especially as they approach coastlines). Estimates of broad areas of possible landfall can be made up to 1-2 days in advance.

Twin hurricanes Ione and Kirsten photographed from a satellite over the Pacific on 24 August 1974.
NOAA (US)

The chief problem is communicating the forecast to the threatened populations, and doing so in a manner that is credible and understood.

General characteristics

High winds, heavy rains and sharp pressure differentials within the weather system. Raised sea levels, partly due to decreased pressure, huge waves, or storm surge (popularly known as tidal wave).

Factors contributing to vulnerability

Location of human settlements in exposed, low-lying coastal areas and nearby hilly/mountainous areas prone to landslides.

Quality of structures, notably construction weight, stability, and connections between structural elements.

Typical adverse effects

Physical damage

Structures damaged and destroyed by wind force, and through collapse from pressure differentials, by flooding, storm surge, and landslides.

(In the humid tropics, traditional housing is usually of lightweight material, and allows the re-use of debris.)

Standing crops damaged and destroyed by flooding, storm surge, and sea-water salinity.

Trees (lumber, coconut, orchard) damaged and destroyed by wind force, flooding, storm surge.

Erosion from storm surge and flooding.

Salt deposit on agricultural lands, and possibly increased salinity of subsurface water table, from storm surge.

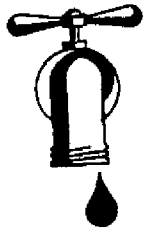
Casualties and public health

The destructive winds cause relatively few casualties—those that occur are chiefly due to flying debris.

Storm surges can cause much death, but relatively few severely injured.

In case of floods, possibility of malaria and other viral outbreaks eight to ten weeks after the flooding.

Water supplies

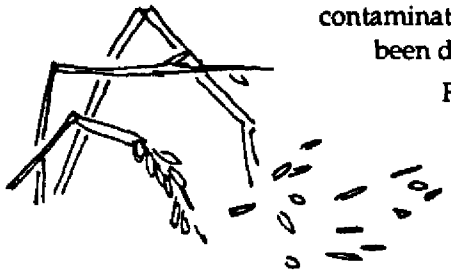


Open wells and other ground water supplies may be (temporarily) contaminated by flood waters and tidal waves. They will, however, only be contaminated by pathogenic organisms if bodies (of people or animals) are lying in the sources, or sewage is swept in.

Normal water sources may be unavailable for days.

Crops and food supplies

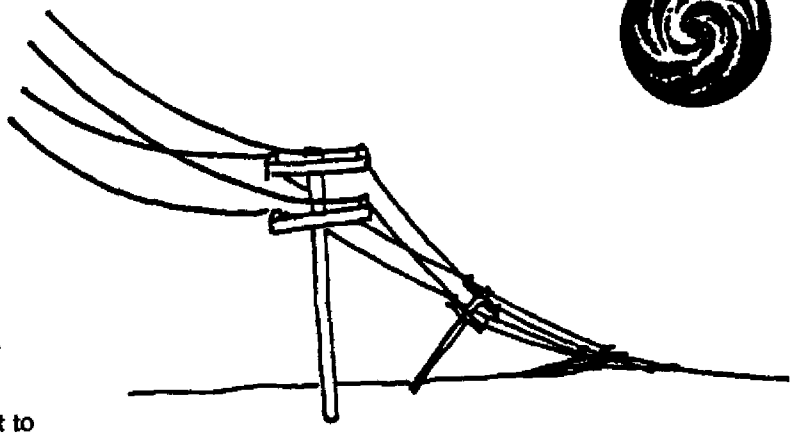
The combination of high winds and heavy rains—even without any flooding—can ruin standing crops and tree plantations. Food stocks may be lost or contaminated if the stores/structures in which they were held have been destroyed or innundated.



Food shortages—possibly very serious—are likely until the next crop can be planted and harvested.

In some areas food availability may, however, actually be increased in the very short term if tree crops are blown down and/or root crops are exposed/inundated and have to be harvested and consumed immediately (perhaps prematurely).

Communication and logistics



Both are likely to be disrupted and difficult:

Roads and rail lines may be blocked (by fallen trees, etc.), and heavy weather prevent any aircraft movements for at least 12-24 hours after the storm.

Communications may be severely disrupted as telephone lines and radio aerials are brought down.

Trucks, carts, rail wagons and small boats may all have been damaged as a result of the winds, with or without any flooding.

All this is likely to make information difficult to gather and create logistical problems in the short term (at least until means of transport can be brought in from outside the area).

Possible risk reduction measures

Siting of settlements and structures in the lee of hills. Planting of trees as wind breaks.

Design of structures—notably construction weight, stability, and connections between structural elements—to resist wind forces.

Construction of protective works (for example, dikes, embankments)

Specific preparedness measures

Establishment of public warning system, accompanied by training officials and the public on what different warnings mean and what they should do.

Telecommunications systems (including aerials) that will withstand wind and water forces and remain above flood levels.

Drawing up of plans for hazard areas, including evacuation procedures and routes; periodic exercises to test the plan.

Stockpiling of critical supplies.

On warning, cut crops to prevent roots from being torn out; evacuate people and animals; tie down roofs, aircraft, etc.

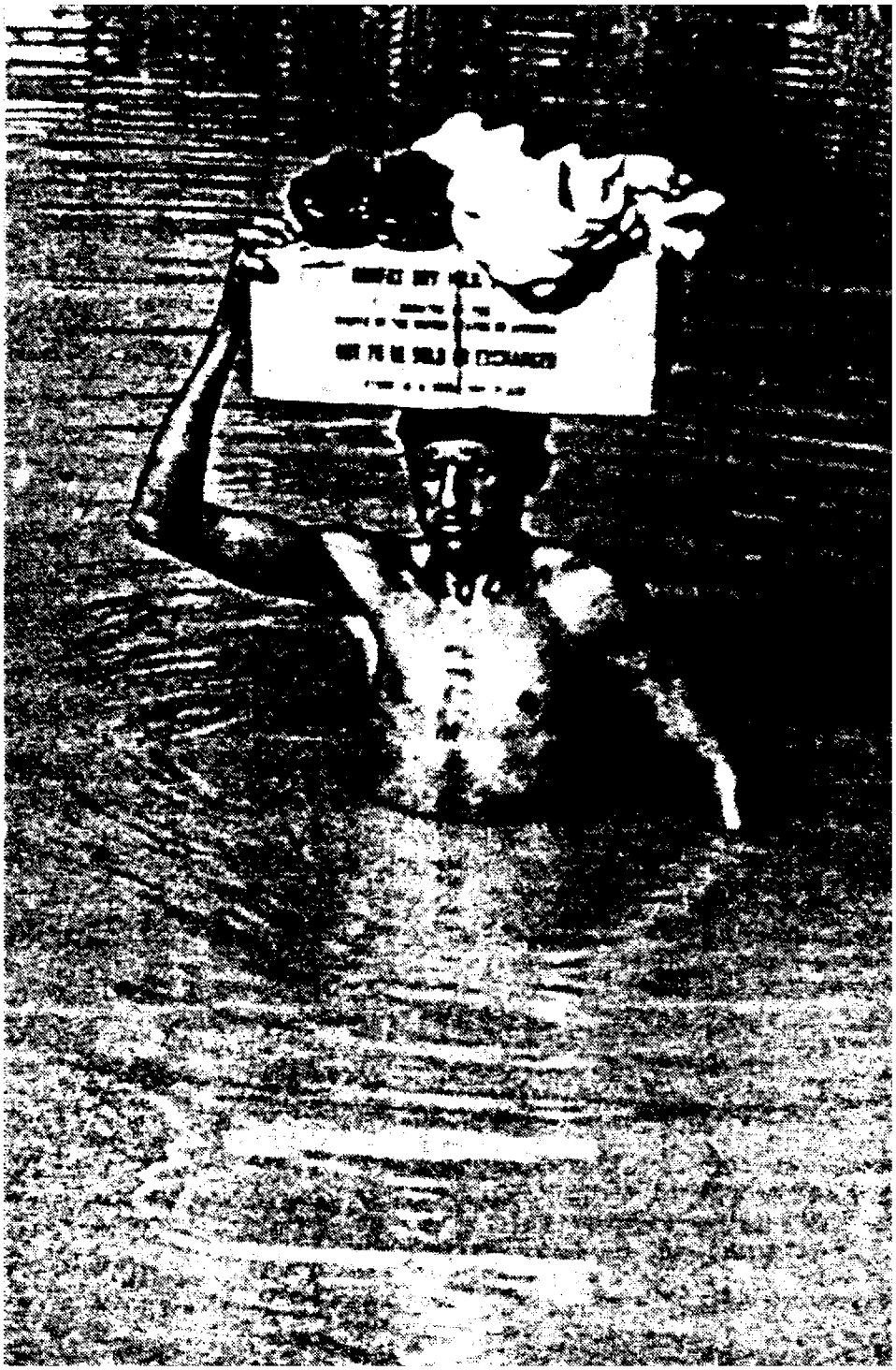
Typical post-disaster assistance needs

Assistance in evacuation, search and rescue, medical assistance, short-term food and water; local varieties of seeds (for food and cash crops which can be planted immediately); water purification; epidemiological surveillance, temporary lodging, reopening of roads, reestablishing communications, contact with remote areas.

Typically *needed* from foreign sources:

Support, especially in the form of cash, to national authorities in the foregoing where lacking or insufficient.

Typically *not needed* from foreign sources:



Bengal

Bengali farmer wading floodwaters of 1974 flood.

Christian Aid

Floods and Storm Surges

Causal phenomena

FLOODS The main types of floods are river floods, flash floods, and coastal floods. Dam-breaks also cause floods. River floods are chiefly due to heavy rains and/or snow-melt in up-stream catchment areas. Flash floods generally result from isolated and localized intense rainstorms on small catchment slopes that are insufficiently porous to attenuate the run-off. Coastal floods are caused by incursions of sea water along exposed coast. In all cases the topographic relief is a critical factor in the occurrence, extent, force, depth and duration of the flooding. Natural and man-made obstacles in waterways will exacerbate or even create flooding.

Environmental degradation in catchment areas increases flooding. Contributory causes include poor farm techniques, overgrazing and deforestation—which reduce upper ground cover and increase rainwater run-off —and urbanization which reduces ground absorption.

Floods may also provide benefits including much needed sources for irrigation, water supply, and deposits of fertile silt.

STORM SURGE Storm surges—rises in sea water level accompanied by high waves—are associated with tropical storms. Reduced atmospheric pressure at the centre of the depression causes the sea surface to rise (by up to one meter). The effect is increased as the high winds build up waves and swells, adding to normal tidal patterns. Gradual slopes from the shore line to the sea-bed slow drainage back to sea and add to the "piling-up" effect of water on-shore. The effect is particularly catastrophic if the surge coincides with a spring tide. Water levels can rise by up to eight meters.

Although there are important differences, tsunamis should also be referenced and compared with storm surges. The physical impact of the two have much in common.

General characteristics

FLOODS In large river basins, the flooding is typically seasonal, and the water levels generally rise and fall gradually.

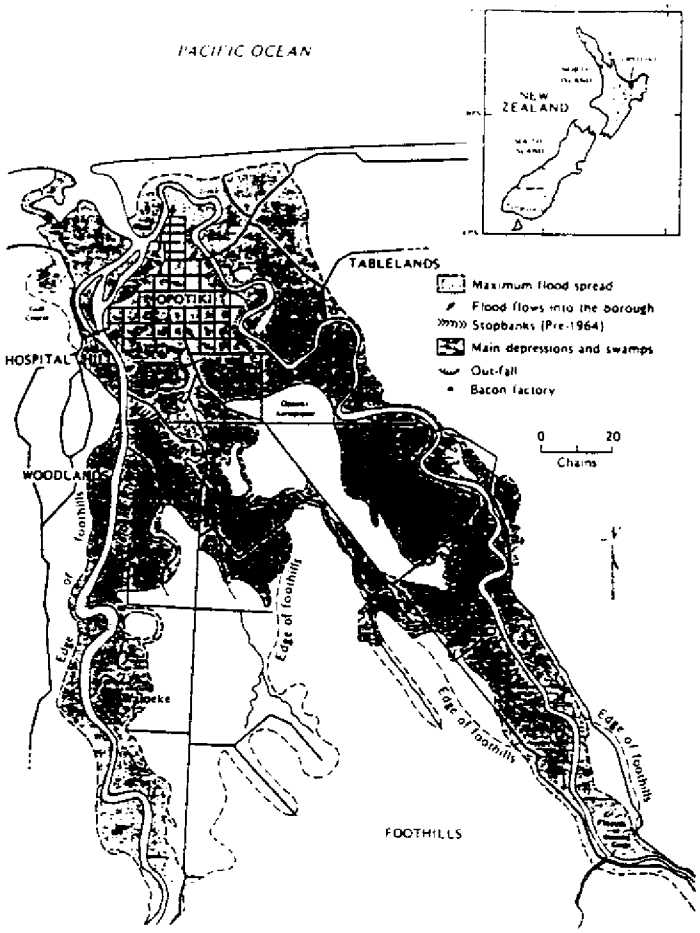
Flash floods are sudden and fast, and usually associated with small catchments.

STORM SURGE As a tropical storm approaches a coastline, the sea level rises (as described above) crossing the coast and flooding large areas of the interior. The force of the flow back to the ocean can be as dangerous as the incoming impact—especially when the slope from the shore to the seabed is steep.

Predictability

Many floods are predictable—a day or so ahead if caused by storm surges or rains accompanying tropical storms; several days (or even weeks) ahead if the result of heavy rains or melting snows upstream in the catchment areas of major rivers. This *may* give communities time to move people, livestock and some property (including food stocks) to higher ground.

Floods caused by intense rainfall on localized areas are more difficult to predict. Any warning will depend on the efficiency of local weather forecasts.



New Zealand

Maximum flood spread on the Opotiki floodplain.

Poverty Bay Catchment Board

Factors contributing to vulnerability

Siting of settlements, buildings, industrial and agricultural activities, infrastructure etc., in flood plains. Resistance of structures to water force and of building materials to the effects of immersion in water.

Typical effects

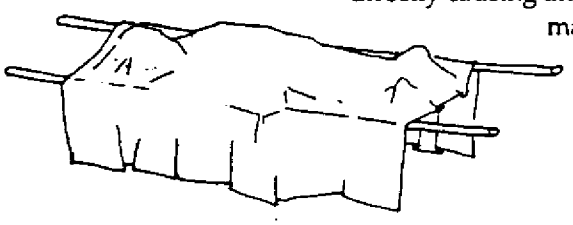
Narrow valleys within flood-affected zones may be particularly badly affected on account of the increased force of water: "flash floods" may strike causing great destruction (including the erosion of river banks, the breaching of dykes, etc.) and depositing debris over a large area. Storm surges can be similarly destructive in coastal areas.

Casualties and public health

Major floods may result in large numbers of deaths (from drowning)—particularly among the young and weak—but generally few serious injuries requiring hospital treatment.

Slow flooding causes few deaths or injuries, but increases of snake-bites.

Although endemic diseases will continue, there is little evidence of floods directly causing any large-scale additional health problems apart from malaria and other viral outbreaks eight to ten weeks following the flooding.

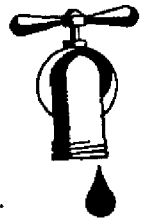


Buildings and infrastructure

Depending on the depth of the flood waters, the number of days it remains and the rapidity of its flow, there will be damage—possibly extensive—to housing (depending on the type of construction), roads and other infrastructure.

Damage is likely to be much greater in valleys than in open, low-lying areas. Flash floods may sweep away literally everything in their paths. In coastal areas, storm surges are destructive both on their inward travel and again on the outward return to the sea.

Water supplies



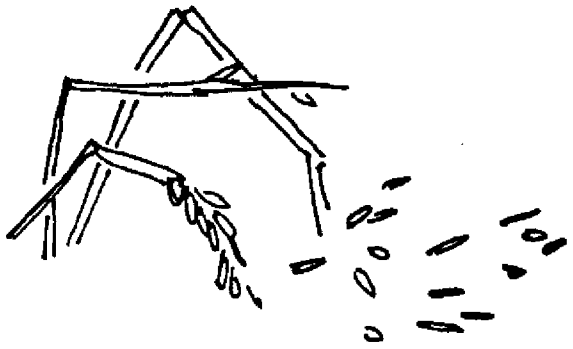
Open wells and other groundwater supplies may be (temporarily) contaminated by flood waters and storm surges. They will, however, only be contaminated by pathogenic organisms if bodies (of people or animals) are lying in the sources, or sewage is swept in.

Normal water sources may, however, be inaccessible for some days.

Crops and food supplies

Depending on the time of year, an entire harvest may be lost together with the crops which normally provide animal fodder. Long-term food shortages often result, lasting until the next main harvest perhaps more than a year later.

(In some cases land may be rendered infertile for several years following a flood: this can arise especially following a storm surge which brings salt water inland. Heavy silting of land following flash floods may be similarly adverse although in some delta areas the silt brought down from upstream may significantly increase fertility.)



Unless food stocks were on high ground—or able to be moved there in time—stocks will be lost or contaminated and immediate food shortages will also be experienced.

Large numbers of *animals*—including draught animals—may also be lost, if they were not able to be moved to higher ground. This may seriously reduce not only the availability of milk and other animal products but also the tilling capacity making the preparation of the land for future planting more difficult. Farm implements may also be lost.

Subject to the above, it may be possible to re-plant crops, or to plant alternative crops as soon as flood waters recede if the right kind of seeds are available and are delivered in time and implements etc. are available.

Especially in coastal areas but also inland, fish may be an available source of (protein-rich) food after floods and storm surges. Boats and fishing nets, etc., may however have been lost or damaged.

Possible risk reduction measures

In some cases, protective measures *may* prevent floods from reaching settlements. In the case of riverine floods the river may be kept from spilling over the flood plain either by channel improvements to increase discharge, or by the construction of dikes/flood embankments. When floods frequently result from local heavy rainfall, there is need to increase drainage capacity (including pumps) and construct diversion channels. Protection from coastal flooding is mainly achieved from the construction of dikes.

The vulnerability of buildings, etc., can be reduced by siting them on high ground, or by elevating the exisiting structure and preventing its erosion by protective embankments and diversion channels.

Damage to built structures can be limited by: designing to resist water forces to determined levels; using materials that will not lose their strength when immersed in water, or applying strengthening measures on those that do (e.g. cement plinths to reduce the vulnerability of mud houses); and preventing scouring at the foundations.

Crop diversification, and where floods are seasonal, selection of varieties which are planted and harvested outside the main flood season.

Flood risk can also be reduced through land-use regulations which, to be respected, must take realistic account of local socio-economic conditions. Other actions which can help reduce vulnerability include the reduction of population densities on flood-prone land, the prohibition of certain high-risk establishments, such as hospitals, in favour of low-risk functions, such as sports and parks.

Specific preparedness measures

Public education programmes for populations at risk. Evacuation plans including the identification of safe, high ground and escape routes to reach it. Warning and communications systems that are reliable, tested, and effective with respect to the populations at risk. Escape routes and communications systems protected against the effects of flooding.

Typical post-disaster needs

Search and rescue personnel and craft. Emergency food, shelter and electrical power. Vector control. Basic sanitation.

When the floods recede: seeds and other agricultural inputs.

In coastal areas, the replacement of fishing boats, nets, etc., or the provision of tools and materials to repair them.

Typically *needed* from foreign sources . . .

Typically *not needed* from foreign sources . . .

Senegal

Dead cattle of the Sahel, 1973.

Gamma/The John Hillelson Agency

Droughts

Causal phenomena

Irregular and inadequate rainfall and inadequate (or unexploited) groundwater or water storage and irrigation possibilities.

General characteristics

Droughts are slowly developing events which may extend over one or many seasons. The consequences are felt slowly and can be predicted in terms of general nature and evolution—the lack of water leading to crop failures, lowering of groundwater table (drying up of wells), loss of animals, etc.

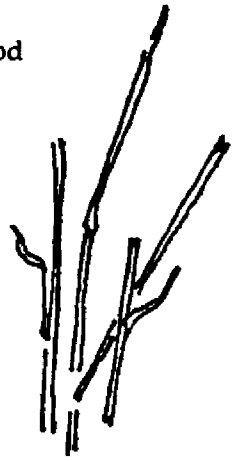
Predictability

Droughts tend to recur in particular areas although not following any strict cycles which would permit long-range predictions. Monitoring of certain key indicators will normally provide clear warnings of impending and possibly long-term problems. Although little can yet be done to influence rainfall, much may be possible to mitigate the effects of irregular rainfall.

Typical effects

Agriculture, food supplies and income

Reduction/destruction of harvests, losses of livestock and agricultural-based *income*. Likely serious food shortages. Steady deterioration in health conditions. Large scale population movements are likely.



A single harvest may be lost or seriously reduced, possibly resulting in a food shortage until the next harvest, or harvests may fail progressively over a number of years resulting in long-term famine.

Droughts, especially short-term ones, rarely affect all districts of a country/region or all strata of society equally, however. Conditions may even vary from village to village. In such cases, some internal redistribution may be feasible—at least in theory and if resources/purchasing power are available to those in need.

Whether there is an absolute shortage of food in any area will depend on stocks on hand from previous harvests, but these will be rapidly exhausted in cases of progressive, long-term drought. Whether people go hungry depends on the other resources available to them, and on socio-economic relationships in general.

Seed stocks are likely to be eaten, retarding the possibility of agricultural regeneration, and income-earning possibilities for farm laborers and rural artisans diminish greatly.

Livestock

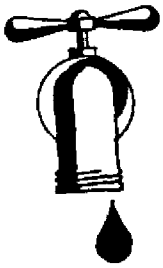
Livestock may be decimated by the shortage of water and of fodder. This can have serious nutritional implications in areas where livestock are a main source of food, and be catastrophic for nomadic people in semi-arid zones for whom livestock is also the main form of wealth (which is exchanged for grain and other commodities). It can also seriously reduce tilling capacity in regions when animal traction is used for ploughing. Sales of livestock at considerably lower prices than the vendor would normally expect and the sale of other assets, including jewelry, even housing material, all reflect the types of impacts that droughts can eventually have upon communities.

Public health

Although drought does not in itself cause outbreaks of disease, the physical resistance of human (and animal) populations is progressively weakened by undernutrition so that individuals are more prone to endemic disease than previously. Measles often becomes a major threat to the lives of children.

Apart from dehydration, there may in particular be increases in water-borne diseases if populations are forced to turn to more polluted sources than were used before.

Water supplies



. . . . are obviously short. In some situations it may be possible to alleviate the situation by exploiting previously untapped ground-water—but a rapid increase in pumping rates may cause a significant fall in the level of the water table with further adverse consequences.

(In general, response to droughts should concentrate on developing facilities and community/organizational structures to conserve available resources as much as possible, to prevent over-exploitation, to introduce—with necessary specialist advice—new crops/varieties, etc.)

Infrastructure and ecology

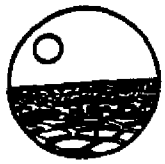
Buildings and infrastructure are not directly affected but:

- Personal property may be progressively sold to buy food.
- Any services which depend on local effort or contributions may wither away.

Long-term droughts can cause apparently irreversible ecological damage both in terms of the growing potential of arable land and in the destruction of trees and shrubs—both by animals and by people seeking fuel—which do not then regenerate.

Characteristic popular reactions

Where food and water cannot be found/supplied in the area in time, large-scale migrations are likely. Traditional family and community structures may disintegrate.



Possible risk reduction measures

Efficient water management (e.g. water storage, canal systems, irrigation).

Crop diversification—in favour of crops which need little water (e.g. sorghum, millet, cassava, pulses).

Increasing water supplies through foraging, deepening wells, increased pumping (within the limits of the available groundwater reserves).

Conservation of seed supplies.

Ensuring the survival of livestock—especially through livestock centres that can ensure adequate supplies of drinking water and foodstuffs.

Specific preparedness measures

Famine early warning system that will provide collated and analyzed information on weather conditions, areas planted to food crops, periodic variations in crop conditions, pest and insect infestation, estimated production, variations in prices of foodstuffs and animal feed, supplies of drinking water, evidence of abnormal economic stress, migration and health problems.

Pre-planned remedial measures (especially employment projects) which can be activated when the signs of deteriorating conditions are detected.

Typical post-disaster needs

Typically *needed* from foreign sources:

.....

Typically *not needed* from foreign sources:

.....

Honduras

Salvadoran refugees in La Virtud Camp, 1982.

UNHCR/CEDEN

Population Displacements *(caused by war and other hazards)*

Causes and characteristics

Climatic and ecological changes (brought about by natural processes or human error/unawareness), economic crises, war, political disturbances (including tribal/communal intolerance), can all have serious consequences for human populations. Means of livelihood may be lost/denied; forced or voluntary population movements be precipitated with communities being separated from any services previously provided and, probably, from sources of supply and income/subsistence.

In such situations, traditional coping and self-support mechanisms within the community may be undermined and, for the duration of the displacement, the populations be dependent on outside (although not necessary foreign) assistance—at least until a degree of resettlement in another environment makes them self-sufficient.

Displaced populations may or may not be able to receive assistance through official channels within their own country, or from neighbouring countries. They are only considered to be "refugees" if they deliberately cross a frontier into a country other than their own, seeking protection.

Possible effects

The variety of possible situations/scenarios makes generalizations more or less impossible but the following may be experienced in varying degrees:

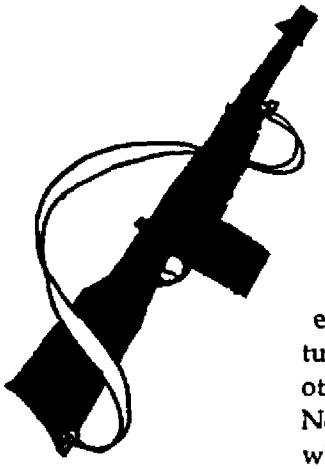
- Crisis-induced migration
- Loss of normal sources of food (both own production and market and other supplies)
- Lack of shelter and household necessities
- Lack of fuel for cooking
- Lack of potable water: insufficiency of sources for the inflated population
- Communicable diseases and over-crowding (particularly measles, whooping cough and meningitis)
- Additional burdens particularly for women heads of households
- Possibly large numbers of unaccompanied children
- Loss of land tenure
- Disruption and/or inadequacy of health and other services in the area now occupied
- Possible communication and logistics problems
- Insecurity due to tensions/military activities (internal or external to the country), possible hostility from the local, "host" population.

Population Displacements *(caused by complex emergencies)*

Causes and characteristics

The causes of complex emergencies are many, but fundamentally a complex emergency describes the consequences of the failure of political institutions within a country to respond to natural or human-made disasters or emergencies. The failure of such political institutions may be a willful act or may be due to an inability to act, but in either case, to address the consequences of a complex emergency normally requires an intermediary to overcome political constraints.

A complex emergency usually results from civil conflict in which the lives of noncombatants are directly or indirectly threatened. In combat areas, noncombatants might be trapped between hostile forces. Assistance to noncombatants may well be prevented by one or both contending parties. Indirectly, conflict might lead to the mass movements of people from areas of combat to more secure areas. In such instances, political authorities may view such displaced persons in various ways. They may regard portions of the displaced with suspicion, as a potential threat, if the latter come directly from areas held by opposing forces. Since such displaced may have moved into areas already occupied, the displaced — in the minds of political authorities — may have lower priority than indigenous peoples.



Yet, a complex emergency need not necessarily start with conflict. The trigger for a complex emergency can be precipitated by a natural disaster, for example. A drought-led famine may lead to mass movements of people that in turn lead to conflict between civil authorities and the famine-affected. Conflict, in other words, may be the result of grievances stirred by natural disasters. Nevertheless, the fundamental principle of a complex emergency remains: to what extent do political authorities have either the interest or capability to respond to the needs of the affected peoples?

The affected in complex emergencies find themselves in at least one of three situations. They either are trapped in combat areas where assistance is not accessible; or they are forced to cross international borders and become refugees; or they have to move to safety within the confines of their own country and are regarded as displaced. In all three situations, traditional coping and self-support mechanisms within the affected communities may be undermined for significant periods of time. While the actual time periods in which the affected may require support are not always easy to forecast, in the vast majority of cases a complex emergency is also a "protracted" emergency in which assistance has to be measured in terms of many months, if not over several years.

Predictability

In one sense, a complex emergency is only as predictable as the overall political context in which the emergency takes place. It can readily be assumed that conflict situations will normally lead to some form of "out-migration," and that such migration will result in large numbers of displaced people or refugees. What perhaps is more difficult to predict are the consequences of events such as famines that might trigger discontent resulting in civil strife, or, alternatively the kinds of disasters, such as famines, that might be the direct or indirect result of civil conflict. Yet a starting point for these sorts of predictions is two-fold:

1. an assessment of the political fragility in which a disaster event might occur
2. an assessment of the consequences of civil conflict upon noncombatants.

Possible risk reduction measures

By definition, complex emergencies present those seeking to assist with an extremely sensitive political situation. Essential to any risk reduction measure is an intermediary to persuade combatants to allow assistance to be provided to innocent victims caught up in the turmoil of civil strife. The International Committee of the Red Cross has over the years developed an "even-handed" approach that guarantees to all parties to a conflict that non-partisan assistance will be provided to affected noncombatants. The United Nations also has shown increasing interest in playing an intermediary role without infringing upon the unique role of the ICRC. To that extent a major risk reduction measure begins with steps to persuade combatants to allow assistance to be given for strictly humanitarian purposes. Such steps inevitably lead to extremely difficult and often frustrating negotiations; but in the final analysis, conflicting parties need to be persuaded that allowing for humanitarian assistance ultimately serves the interests of all.

When it comes to providing for the well-being of displaced people or refugees — all too often the major manifestations of conflict — there are certain general risk reduction measures that can be taken. One is to attempt to ensure that the displaced can settle in areas where economic competition and differing social and cultural mores will not result in further strife between the displaced and indigenous peoples.