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Dear Sirs,

We are very pleased to present you with the current issue of topics, "Annual Review of Natural Catastrophes 2000".

It has again been our endeavour to produce a statistical analysis of the year's natural catastrophes on the basis of various criteria and to refresh the reader's memory of these events visually. For the first time our review also includes some important "technical" catastrophes (e.g. air crashes and major fires). As every year, we focus on a number of special themes in this issue, ranging from the growing loss potentials in megacities and the conclusions to be drawn from the series of winter storms at the end of 1999 to the failure of the climate summit in The Hague.

We hope we have thus produced a striking review of the year's catastrophes that will attract your interest. Any comments and questions you may have would be most welcome.

Yours faithfully,

Münchener Rückversicherungs-Gesellschaft

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Page 2	01 Natural catastrophes in 2000 Annual review The year in pictures Statistics
Page 10	02 Major engineering and fire catastrophes in 2000
Page 12	03 Great natural catastrophes Long-term statistics 1950–2000
Page 16	04 NatCatSERVICE information Economic losses from natural catastrophes – background information
Page 22	05 1999 winter storms Anatol, Lothar, and Martin Impact on markets and windstorm modelling
Page 28	06 Catastrophe portrait I Flooding and landslides in the Alps
Page 35	07 Catastrophe portrait II Autumn floods in Great Britain
Page 40	08 Climate summit in The Hague Are the climate negotiations at an end?
Page 46	09 Megacities Growing loss potentials?
Page 54	10 CD-ROM “World of Natural Hazards” A Munich Re service product of the new dimension Inserts World Map of Natural Catastrophes 2000 MRNatCatPOSTER Natural Catastrophes in 2000

Title page

01 Forest fire: Allambie Heights, Sydney, Australia, October 2000

Picture on the left

02 Fire damage following forest fire. Los Alamos, New Mexico, USA,
May 2000

Natural catastrophes in 2000

01

The year 2000 was a year of floods and a year that was by and large lacking in major earthquakes and storms. Never before had so many natural catastrophes been recorded in any one year, but fortunately the effects – in terms of both fatalities and economic and insured losses – remained within bounds.

As chance would have it, after the previous year had seen an extremely large number of major natural catastrophes throughout the world – including twelve great catastrophes –, there were no instances of heavily populated regions with elevated concentrations of values being really badly hit in the past year. The general lack of great catastrophes does not mean, however, that there has been a general decline in the frequency of loss events. On the contrary, more than 850 catastrophes were registered around the world, one hundred more than in the previous record year of 1999 and two hundred more than the average for the 1990s. Altogether some 10,000 people died as a result. In 1999 the figure was over 70,000, for which just three events (the Izmit earthquake, a cyclone in Orissa, India, and flash floods and landslides in Venezuela) were mainly to blame. In the year under review floods in Asia again submerged large areas of land and claimed about 4,000 lives.

As far as monetary losses are concerned, too, the year 2000 will go down as a year of comparatively low figures.

– Although economic losses came to more than US\$ 30bn, the figure in the previous year was no less than US\$ 100bn.

– Insured losses came to around US\$ 8.5bn, compared with US\$ 20bn in the previous year.

If we look at the overall balance by type of event, we will see the following:

- Altogether, 120 **earthquakes** were registered that caused damage, although fortunately there were no major earthquakes. Nevertheless there were 130 fatalities in July when numerous houses in Indonesia collapsed following strong earth shocks. In October, Japan was hit by a quake with a magnitude of 7.3, which caused substantial economic and insured losses (US\$ 150m and US\$ 20m respectively) in Tottori.

- As in previous years, **storms** clearly lead the field with more than 300 events. They also dominate the insurers' loss figures, accounting for 75% of insured losses.

- Tropical **cyclones** were particularly notable. Although activity was normal to high in the main cyclone areas, there were no direct hits in any of the threatened countries. The United States and the Caribbean, which had been in the headlines regularly in previous

years, did not report any major events.

– Central America was the only area hit by a strong hurricane: Keith, which reached peak wind speeds of 215 km/h, equivalent to stage 4 on the five-stage Saffir-Simpson Hurricane Scale, mainly affected Belize and parts of Mexico, Nicaragua, Honduras, and Guatemala.

– There were no major events in the western Pacific or the Indian Ocean either

- In August, Bilis, a super-typhoon that raged throughout the western Pacific, presented Taiwan with a bill of little more than US\$ 100m.
- Prapiroon, one of the most violent typhoons of recent years in South Korea, which swept over the peninsula in the last few days of August, failed to generate the floods that had been expected.
- In September, however, Typhoon Saomai caused economic losses in the northwestern Pacific – mainly Japan – amounting to US\$ 1.5bn, of which about US\$ 1bn was insured.

– Europe was also spared major winter storms – in contrast to the year before, when in late December Anatol, Lothar, and Martin brought about losses of historical dimensions (totalling US\$ 17.7bn, of which US\$ 10.4bn was insured).

- Tornadoes, which regularly generate major losses in the American Midwest, hit again last year. On 28th/29th March Fort Worth in Texas received a heavy thrashing. This resulted in losses amounting to US\$ 650m, of which US\$ 520m was insured.

- As in previous years, **floods** played an important role, causing around 50% of the economic losses and 21% of the insured losses. They also generated the year's one and only great catastrophe:

- In Mozambique floods lasting several weeks made half a million people homeless in the spring and attracted attention throughout the world. Altogether, five million people were immediately affected by the torrents.

All other parts of the world also recorded severe floods that will find a place in the history of natural catastrophes:

- Floods in northern and northeastern India from August to October caused about 1,450 fatalities and economic losses amounting to US\$ 1.2bn

- Massive floods in Vietnam, Laos, Cambodia, Malaysia, and Thailand in the autumn put hundreds of thousands of houses under water

- Flash floods, mudflows, and landslides in the Swiss and Italian Alps (Valais, Aosta Valley) in mid-October generated economic losses of about US\$ 8 5bn Insured losses will probably total

roughly US\$ 420m (see the extensive report "Catastrophe portrait – Flooding and landslides in the Alps").

- For weeks on end, from mid-October to November, there were floods of historical proportions in many regions of Britain, causing property damage amounting to about US\$ 1.5bn, 50% of which is likely to have been insured (around US\$ 700m). A special report on this has also been written: "Catastrophe portrait – Floods in Britain in October and November".

- At the end of November the media presented dramatic pictures from southeastern Australia. Massive floods in New South Wales are said to have swamped two-thirds of the state, covering an area as big as France. The flooded areas were largely in sparsely populated regions so that, considering the size of the area affected, there was only a comparatively moderate loss of about US\$ 250m.

- As far as the **other natural catastrophes** are concerned – including winter damage, droughts, and forest fires – the devastating conflagration in the United States caused great concern.

- After an extended period of drought, thousands of square kilometres of forest stood in flames for weeks on end. The western states of Idaho and Montana had their worst fires of recent decades. Hundreds of families had to be evacuated, altogether 850 houses went up in flames, resulting in

losses far exceeding US\$ 1bn. The main damage was in New Mexico, where houses and laboratories were burnt down at the Los Alamos nuclear research centre. A fire, which had been laid to burn off the undergrowth, had got out of control, resulting in an insured loss of US\$ 140m. Almost 85,000 separate forest fires occurred in the United States last year. Taken together, these fires were equivalent to an inferno measuring 28,000 km² and had to be fought by over 30,000 fire-fighters, including international fire services. The cost of this battle is estimated to be some US\$ 870m.

- Forests in southern Europe stood in flames for weeks too. The Greek islands were severely affected, the most devastating fires raging on Samos. It was not only holidaymakers that suffered, however. The harvest and special crops were also devoured by the flames.

- Dry weather and drought were a problem in other European countries too. In May and June an exceptionally long heat wave destroyed harvests in Romania and neighbouring countries. The economic losses are estimated to exceed US\$ 300m.

No all-clear

In spite of the overall balance being favourable in 2000, there is no justification for speaking of a weakening, let alone change, in the trend. Once before, in 1997, the trend towards more frequent and more substantial natural catastrophes appeared to be interrupted for a short time by a year with comparatively little loss or damage, only to continue with unbroken force in subsequent years. On account of the growth in the world's population, which in the highly exposed areas of the world and in the major conurbations in particular is even increasing at an over-proportionate rate, and the rise in the concentration of property values, the losses generated by natural catastrophes must be expected to continue increasing in the future (more details on this may be found in the statistics section).

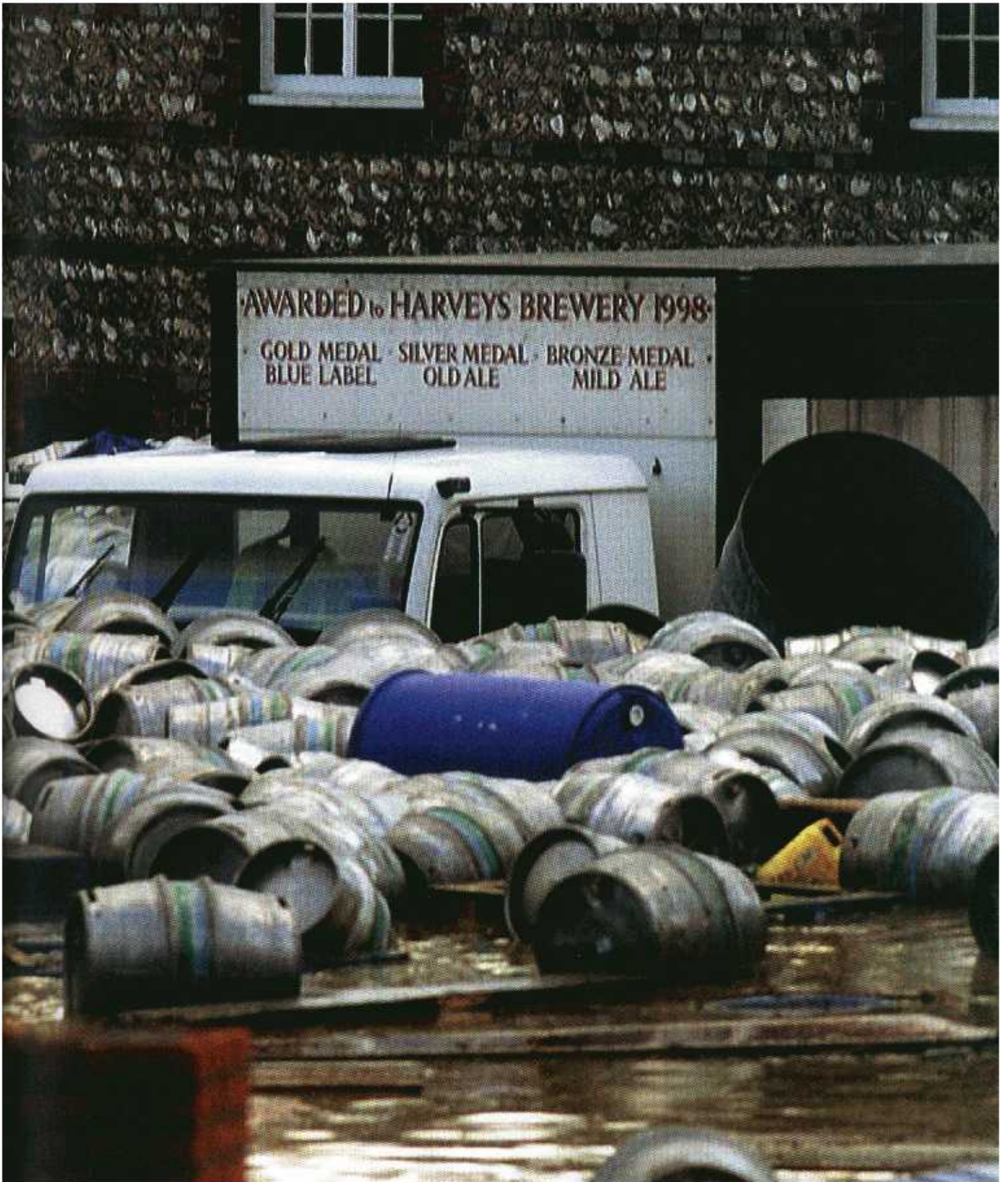
The latest forecasts of the Intergovernmental Panel on Climate Change (IPCC), which have been published in the Panel's third report in 2001, show that the subject of climate change must also be taken more seriously than ever. Neither in terms of the expected rises in temperature nor in terms of other important aspects like, for instance, the rise in sea levels, is there any justification for sounding the all-clear. On the contrary, the rise in temperature is now expected to be even more pronounced than hitherto supposed. Against this backdrop, the failure of the climate summit in The Hague in November 2000 is to be seen as a major setback. It is to be hoped that the renegotiations in the summer of 2001 will at

least bring about a constructive agreement (see the separate article in this issue).

Manmade climate change must be curbed at all cost. Otherwise it is to be feared that for insurers too the risk situation will deteriorate even further in many regions of the earth. At any rate a distinct increase in weather-related and climate-related natural catastrophes must be expected. Already today, these are responsible for the lion's share of insured catastrophe losses, as demonstrated by the year just ended

Picture on the right:
03 Autumn floods in the United Kingdom in October and November 2000. Severe damage at a brewery in Lewes in the south of England

The year in pictures





04
After heavy rainfalls in June the infrastructure in Guatemala was severely affected. As roads were washed away and bridges destroyed, the road connection between the capital and the Pacific coast was broken in many places

05
Year after year India is inundated after heavy monsoon rains. However desperate the situation may appear, life goes on in the flooded village of Ramnagar near Calcutta. At the end of September more than 500 people were killed in floods in this region

06
A forest fire in October even came dangerously close to the Olympic Stadium in Sydney. Fortunately, the fire was extinguished just in time. Several hundred forest fires raged on the east coast of Australia between March and October.

07
In October, floods, landslides, and mudflows claimed 38 lives in Italy and Switzerland. This is a photo of the raging torrents in the town of Ivrea in Piedmont, northern Italy (cf. the catastrophe portrait beginning on page 28)

08
In March several tornadoes with wind speeds of up to 250 km/h cut a trail of destruction through Texas and Louisiana, hitting large cities like Fort Worth. The final balance of the catastrophe: five people killed, more than one hundred injured, hundreds of buildings, cars, and mobile homes destroyed. Economic losses amounted to US\$ 650m, of which US\$ 520m was insured.

09
In July several large hailstorms hit Upper Austria, Styria, and Salzburg Land, causing severe damage to many roofs, greenhouses, and four car depots; the harvest crops of many agricultural establishments were also destroyed. The insurance industry paid claims amounting to some US\$ 85m, making this the most costly hail season on record; economic losses came to some US\$ 150m.





10
In spite of 2000 being a calm hurricane season, the population of Central America were plunged into a state of shock and fear when Hurricane Keith reached the mainland with wind speeds of 215 km/h. In Belize, Mexico, Nicaragua, Honduras, and Guatemala 6,000 people were injured and 21 killed. Economic losses were in the region of US\$ 300m

13
The autumn produced unusually high levels of rainfall and caused floods in many European countries. This photo was taken in Marseilles, where a raging stream forged its way through the city on 19th September

11
The tornado that hit a camp site in Red Deer in the state of Alberta, Canada, on 14th July, left a scene of chaos. The trail of destruction was 500 metres wide and one kilometre long.

14
In India more than 20 million people were hit by the worst monsoon storms of recent decades. From August to October large parts of the country were submerged, thousands of villages cut off from the outside world. There was an overall loss of some US\$ 170m, mainly in the agricultural and livestock sectors

12
On 5th February there was a landslide on a densely populated slope in Guacuntos in the Peruvian province of Chimorazo after torrential rainfalls. Numerous houses and roads plunged into the abyss. 50 families lost their entire wealth and possessions

15
Record precipitation and Typhoon Saoma, which passed over Japan in September, caused severe damage to the infrastructure. Besides Central Japan, Guam, Korea, and Russia were affected. This was the year's costliest event for the insurance industry with insured losses of more than US\$ 1bn. Economic losses exceeded US\$ 1.5bn.



Statistics of natural catastrophes in 2000

Number of loss events



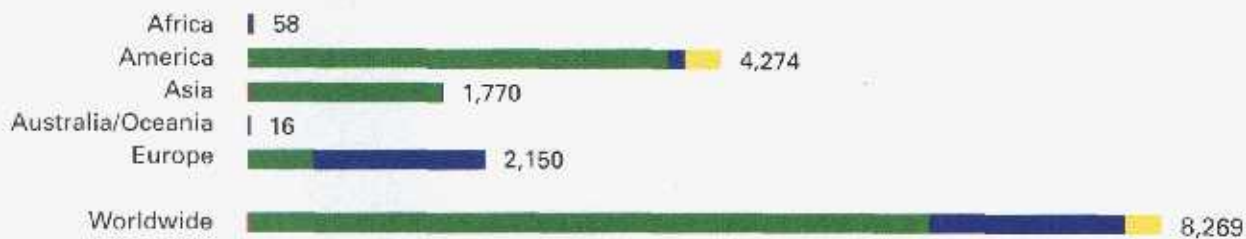
Number of fatalities



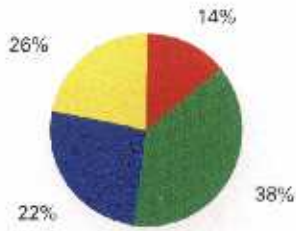
Economic losses (US\$ m)



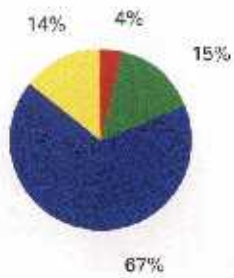
Insured losses (US\$ m)



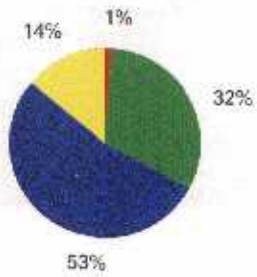
851 loss events (percentage distribution worldwide)



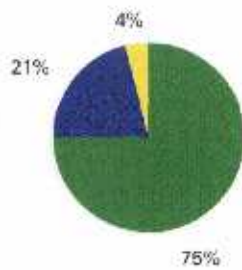
9,270 fatalities (percentage distribution worldwide)



Economic losses: US\$ 31bn (percentage distribution worldwide)



Insured losses: US\$ 8.3bn (percentage distribution worldwide)



- Earthquake, volcanic eruption
- Windstorm
- Flood
- Others

Major engineering and fire catastrophes in 2000

02

Engineering and fire catastrophes reached an extraordinarily high level in the year 2000. We have therefore decided to present some of the outstanding events in brief:



30th January, Ivory Coast
Airbus A-310 crashes near Abidjan



12th March, Pacific
Satellite destroyed during launch



13th May, Netherlands
Explosion in a fireworks factory



25th June, Kuwait
Fire in an oil refinery



11th July, Nigeria
Pipeline fire



25th July, France
Concorde crashes near Paris



27th August, Space
Loss of the satellite Solidaridad 1



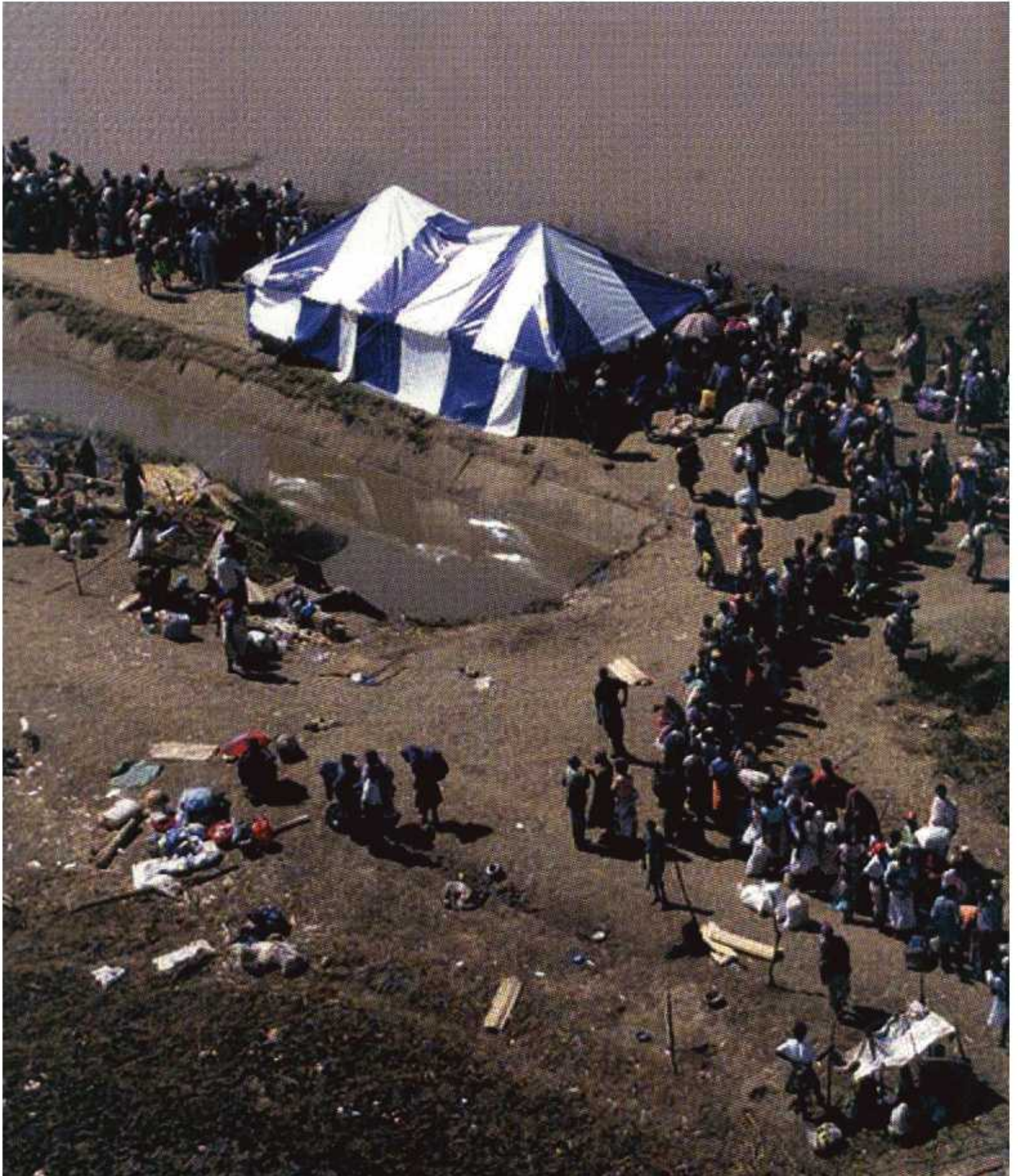
17th November, Austria
Fire in a glacier railway tunnel

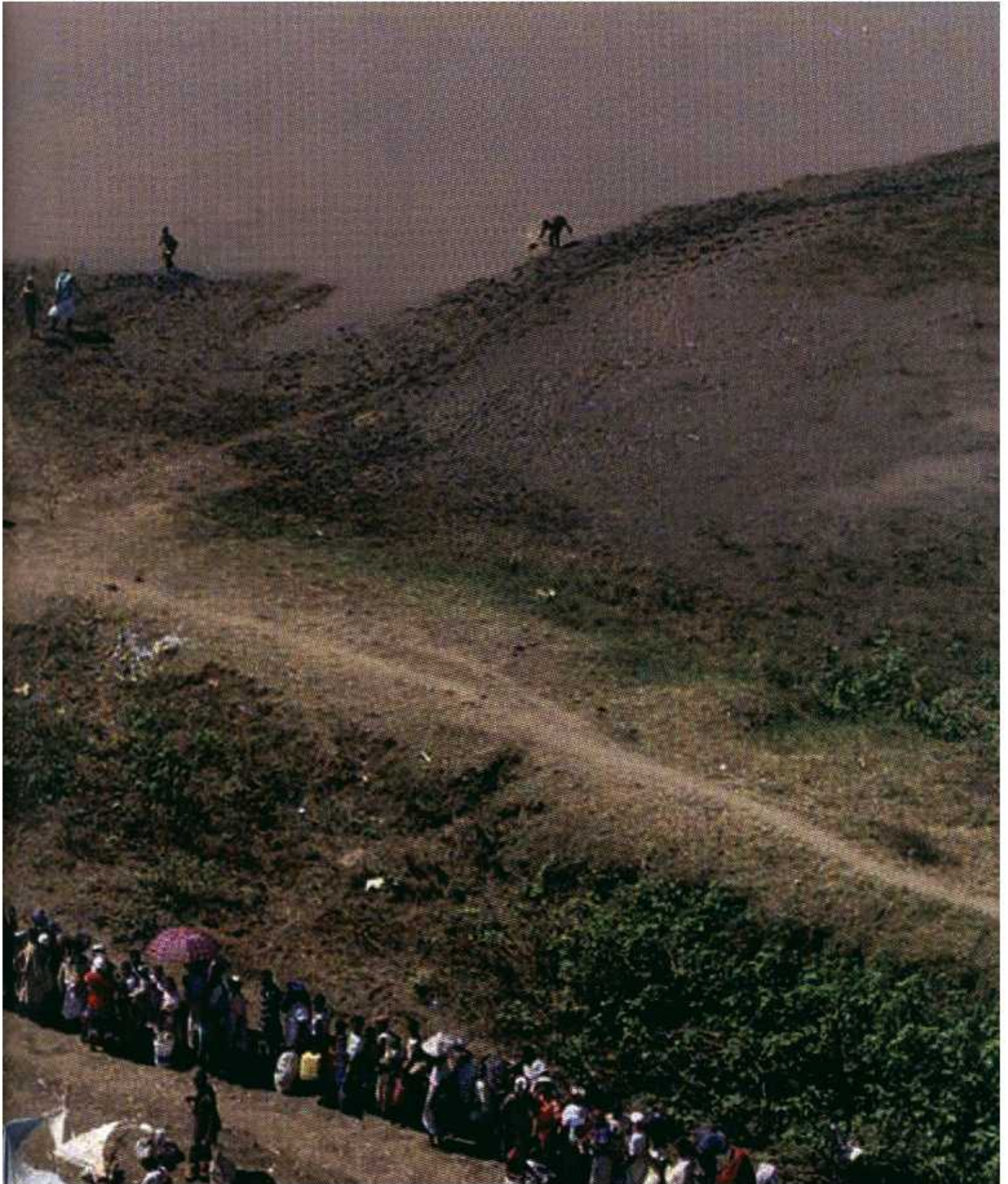


25th December, China
Fire in a discotheque

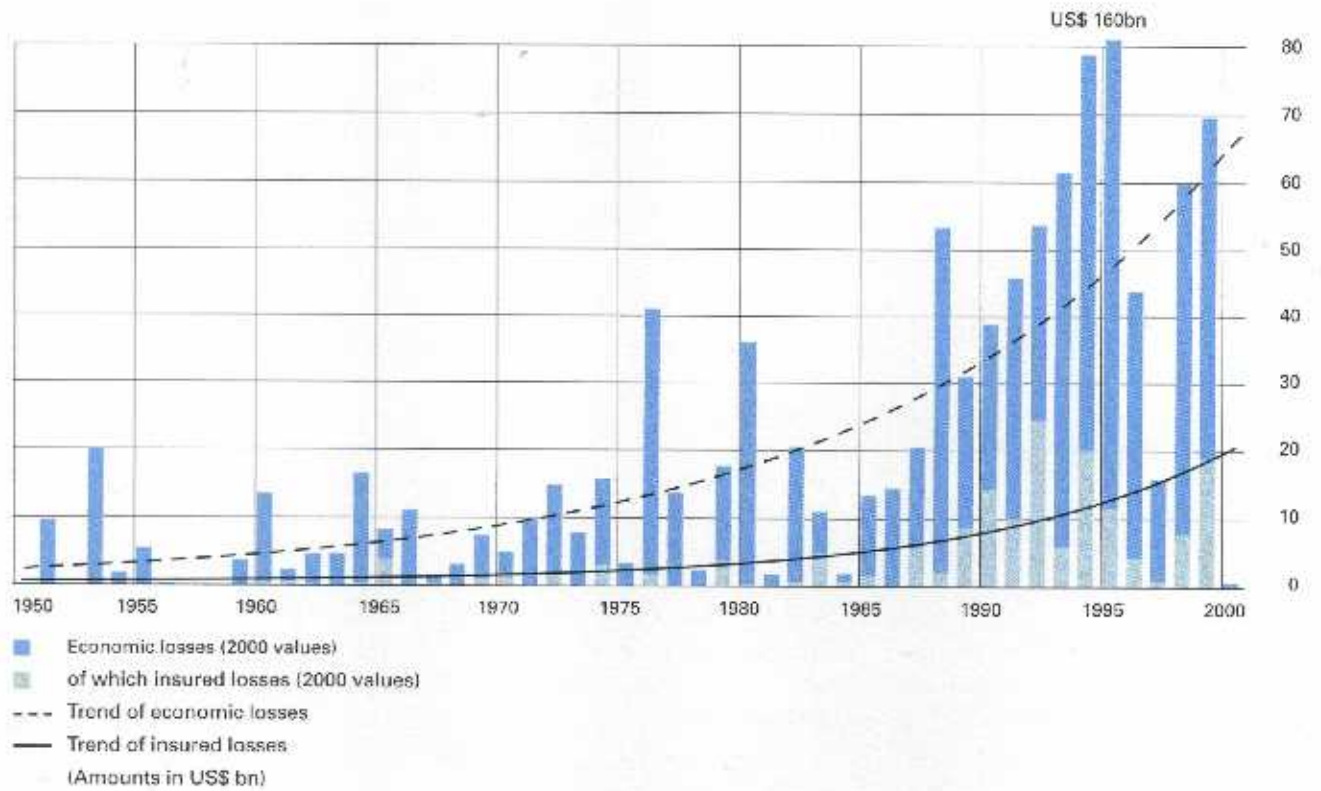
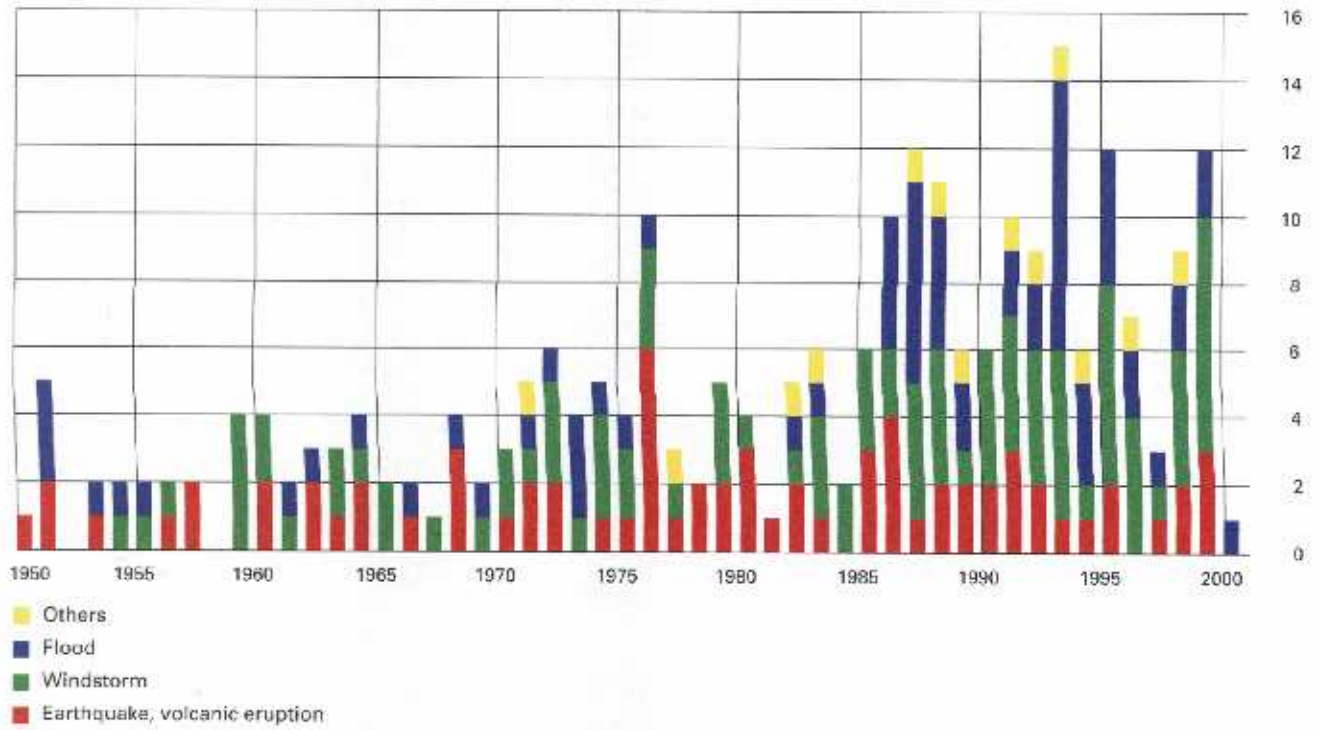
Date	Region	Description
30.1	Ivory Coast, near Abidjan	Airbus A 310 crashes near Abidjan The airbus with 179 people on board was unable to gain height after take-off and plunged into the sea. Only ten of those on board survived. The hull loss was US\$ 40m, the liability loss is estimated to be US\$ 40m
12.3	Pacific	Satellite destroyed during launch On account of a software error (a line of code was inadvertently deleted when editing the orbit parameters) one of the fuel valves on the Sea Launch rocket was not closed prior to the launch; as a result the vehicle could not be steered and eventually the engines shut down prematurely. The vehicle and the ICO F1 satellite it was carrying plunged into the Pacific. Insured loss: US\$ 225m.
13.5	Netherlands, Enschede	Explosion in a fireworks factory After an explosion in a fireworks factory in Enschede, a suburb of this Dutch city burnt down completely. The catastrophe had been caused by a fire in one of the factory's warehouses. 500 people were injured and at least fifteen killed. Insured loss: approx. US\$ 285m.
25.6	Kuwait, Mina al-Ahmedi	Fire in an oil refinery A leaking gas pipe triggered an explosion and caused the largest fire to date in a Kuwaiti oil refinery. Production had to be stopped. Four people died in the accident, 49 were injured. Insured loss: approx. US\$ 400m.
11.7	Nigeria, Adedje, Niger Delta	Pipeline fire An explosion occurred on a leaking pipeline. This leak had probably been caused by inhabitants of the area intending to tap oil from the pipeline illegally. The fire spread to settlements, fields, and woods. 250 people were killed in this accident.
25.7	France, near Paris	Concorde crashes near Paris Two minutes after taking off at Roissy Charles de Gaulle Airport, the supersonic aircraft lost altitude and plunged into a hotel. On board were one hundred passengers and eight crew, all of whom were killed. Four people in the hotel also died. The plane itself had a hull value of US\$ 30m, the liability loss is estimated to be approx US\$ 150m
27.8	Space	Loss of the satellite Solidaridad 1 The failure of the second spacecraft control processor led to a total loss of the satellite while in orbit. Insured loss US\$ 270m
17.11	Austria, Kaprun, Kitzsteinhorn	Fire in a glacier railway tunnel 159 skiers from all over the world were killed in this fire in an Austrian mountain railway. The fire was fanned by winds in the tunnel, which acted like a chimney. Only fifteen passengers managed to escape.
25.12	China, Luoyang	Fire in a discotheque A fire in a six-storey department store and entertainment complex killed 309 people. Most of the victims were in a discotheque at the time of the catastrophe. The fire probably started during refurbishment work on one of the floors of the department store.

25 Floods in Mozambique in
February/March 2000: Caring for the victims





Great natural catastrophes with trends



Comparison of decades 1950–2000

Decade	1950–1959	1960–1969	1970–1979	1980–1989	1990–1999	1991–2000
Number	20	27	47	63	89	84
Economic losses	40.7	73.1	131.5	204.2	629.2	591.0
Insured losses	unknown	7.0	12.0	25.5	118.8	104.4

Factor	80s:60s	90s:60s	last 10:60s
Number	2.3	3.3	3.1
Economic losses	2.8	8.6	8.1
Insured losses	3.6	16.9	14.9

Loss in US\$ bn (2000 values)

Definition of great natural catastrophes: Natural catastrophes are classed as great if the ability of the region to help itself is distinctly overtaxed, making interregional or international assistance necessary. This is usually the case when thousands of people are killed, hundreds of thousands are made homeless, or when a country suffers substantial economic losses, depending on the economic circumstances generally prevailing in that country.

The two charts on the left present the losses caused by great natural catastrophes since 1950. More than 850 loss events due to natural hazards were registered last year and from these we have selected the “great” natural catastrophes on the basis of the above definition. Last year only one event met these criteria, the floods in Mozambique.

The upper chart shows for each year the number of events defined as great natural catastrophes, divided up by type of event. The lower chart presents the economic losses and insured losses – adjusted to present values. The trend curves verify the alarming increase in catastrophe losses in the past fifty years.

The tables allow a comparison of the aggregate loss figures of recent decades. Comparing the last ten years with the 1960s makes the dramatic increase in natural catastrophes particularly clear. This applies both to the number of events and to the extent of the losses incurred.