

THE 1982 URBAN LANDSLIDE DISASTER
AT ANCONA, ITALY

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SUMMARY

This study describes the landslide that occurred in the City of Ancona, in central Italy, on December 13, 1982. An integrated view of the disaster is obtained by examining its political, social, logistical, financial, geological and geotechnical aspects, with particular emphasis on interactions among these factors. The report describes the evolution of both physical events and human response (including the debate over responsibility and the struggle of local politicians to obtain relief and reconstruction funding from central government). Geotechnical site studies at Ancona are criticized and appraised with respect to the use made of them by local politicians and planners.

The Ancona landslide, which destroyed or damaged 785 homes and affected 11% of this city of 108,000 inhabitants, was one of the largest of such disasters to occur in recent European history. Herein, it is evaluated as a complex, multi-faceted phenomenon or train of events, and compared with both the contemporary Italian natural hazards situation and a smaller landslide disaster which occurred in central-southern Italy shortly afterwards. Italian hazard response is appraised in the light of these disasters.

ACKNOWLEDGEMENTS

The information contained herein is derived from a variety of scientific and technical articles, which are listed in the bibliography at the end. Much information has also been obtained from a total of 518 newspaper articles collected by myself, dott. Alessandro Montanari of the University of California at Berkeley, and the Ufficio Stampa della Regione Marche (Giunta Regionale delle Marche, 1983). I was able to gather further information during a brief visit to the disaster area in January 1983, which was partly financed by the International Disaster Institute (now the Relief and Development Institute), London, U.K. Major support for this work was provided by the Graduate School of the University of Massachusetts, under Faculty Research Grant, 1982 No. 2-03415 "Seismic and Non-Seismic Landslides." I would like to thank these agencies for their support and also dott. Emidio Massi, Presidente della Giunta Regionale delle Marche, for the help of his administration. I would also like to express my admiration for their strenuous work on behalf of the people rendered homeless or jobless by the disaster.

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PREFACE

This paper is one in a series on research in progress in the field of human adjustments to natural hazards. It is intended that these papers be used as working documents by those directly involved in hazard research, and as information papers by the larger circle of interested persons. The series was started with funds from the National Science Foundation to the University of Colorado and Clark University, but it is now on a self-supporting basis. Authorship of the papers is not necessarily confined to those working at these institutions.

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INTRODUCTION

Uno sfasciume geologico--the eminent nineteenth century writer Giustino Fortunato used in this term, literally "a pile of geological wreckage," to describe his native land. The phrase has been much used since to describe Italian natural disasters, which occur with what one might call "monotonous irregularity"--that is to say at irregular but frequent intervals. A natural disaster has been defined as the destructive interaction between adverse physical events and human socio-economic systems (White and Haas, 1975; Foster, 1980) and the seriousness of the damage caused in each new Italian calamity emphasizes the extreme vulnerability of the human social and economic systems in that country, where hardly a year passes without some major new catastrophe and a rash of minor ones. Besides being a physical event with socio-economic repercussions, the Ancona landslide disaster is clearly the result of misunderstanding, and even gross negligence, on the part of those who might have been able to recognize the warning signs and prevent the worst effects of catastrophe. Consequently, the short-term aftermath rapidly developed into something perilously close to a national scandal, with a welter of recriminations and counter-accusations. This report inevitably deals with these aspects of the disaster, although it is intended only to comment on the relevant aspects of hazard prediction, geotechnical science, and disaster management.

Italy can be fairly characterized as a land of steep slopes, mountainous river catchments and seismically active geological faults. The combined natural hazards of landslides, soil erosion, floods and earthquakes have taken a considerable toll on the national economy and life. Since 1945, natural hazards in Italy have left 11,000 people dead and caused 60,000

billion lire (U.S. \$38 billion*) of damage. Although Italian earthquake disasters happen on average once every 4.8 years (Ganse and Nelson, 1981), landslides play a significant and increasing part in the national losses from hazards. A study by the National Geological Association revealed a dramatic increase in the incidence of damaging landslides over the period 1957-1970, when the number of recorded slides in Italy rose from 1,987 to over 3,000.

The country's National Order of Geologists compiled questionnaire information from 4,021 comuni** (municipalities), representing 49.8% of Italy's townships, and recorded that 1,072 urban centers are menaced by landslide activity. In one year, 1971-2, landslides blocked highways for 2,476 road-days. Floods, which often go hand-in-hand with landslides, have occurred in 1,520 comuni since World War II, but only 5% of those municipalities who responded to the questionnaire had actually commissioned scientific or technical studies of landslide or other ground stability problems.

The central Italian region of Le Marche*** (Figure 1) is particularly vulnerable to natural hazards. Of its 246 comuni, 230 are classified as "seismic," or likely to be endangered by major earthquakes. A 1963 study reported that landslides are common throughout the region, and have seriously damaged 122 urban centers, including Corridonia, Mogliano, Montappone, Monte Lupone, Monte San Giusto, Recanati and San Leo. One of the most well-known landslides in the region occurred on the western outskirts of its capital Ancona. The original "Barducci landslide" was 16 hectares in size

* Monetary equivalents are given at the May 1986 exchange rate of U.S. \$1.00 = 1550 Italian lire.

** See Appendix I for definitions of the comune and other administrative divisions.

*** Total population 1,409,845, distributed over 9,694 km² at an average of 145 persons per km².

ANCONA AND LANDSLIDE : LOCATION MAP

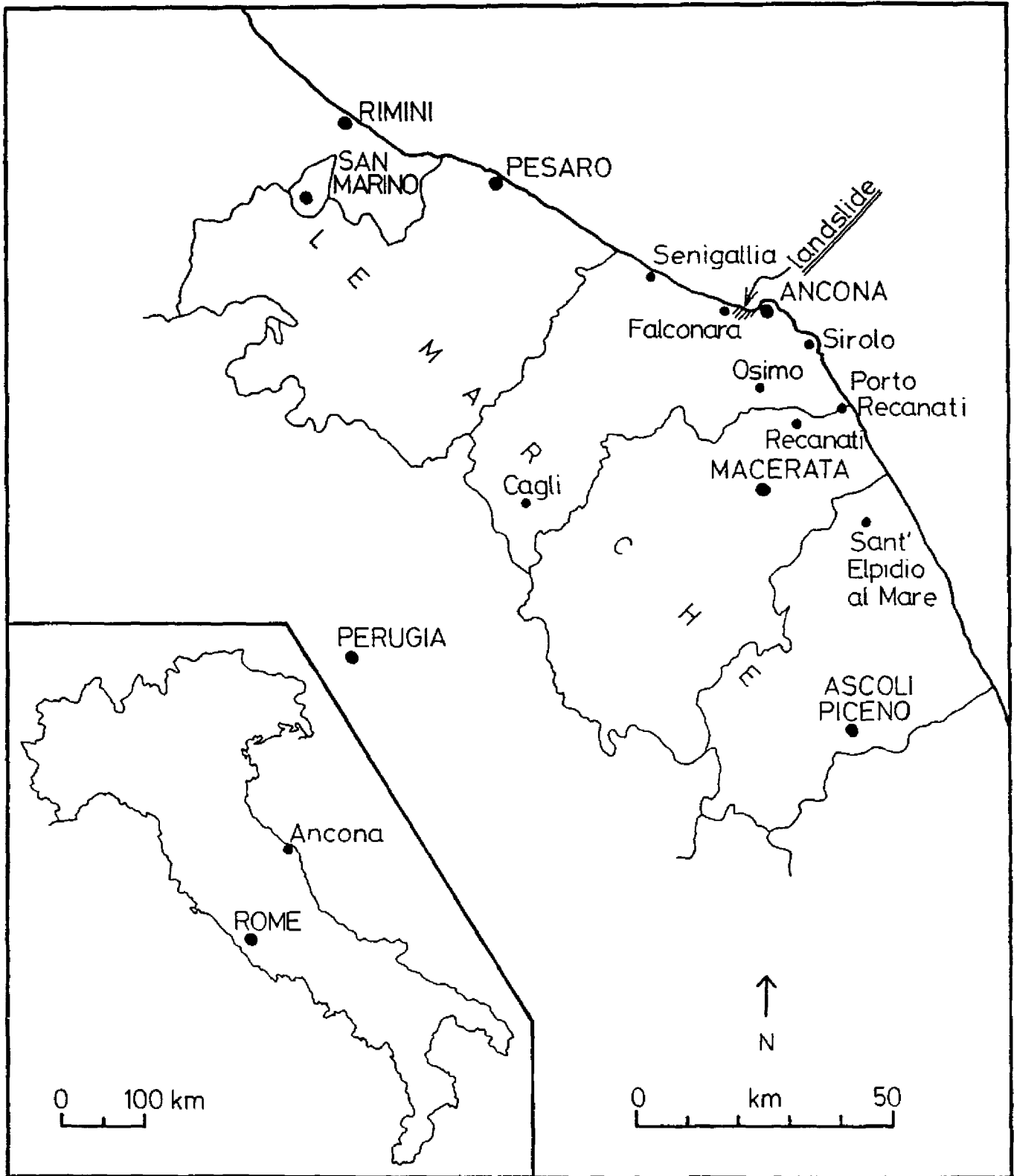


Figure 1

and constituted one of two rotational landslides on the Adriatic Sea flank of Monte Montagnolo (251 m). The slides were clearly of some antiquity and by no means stable: on July 23, 1962, the newspaper Il Giorno reported movement of the Barducci landslide under the stimulus of high pore water pressures in the saturated soil.

Evidently little was being done to ensure the stability of the slope--Il Giorno stated that the land was variously unmanaged, mismanaged or abandoned--and two decades later the entire slope slid abruptly towards the Adriatic Sea in a movement that involved 341 ha of land, 21 times the area of the original Barducci landslide. By this time a good proportion of the formerly neglected land had been urbanized and, although fortunately without a significant number of fatalities, the 1982 Ancona landslide caused very serious problems of damage and homelessness.

The disaster came hard on the heels of previous natural catastrophes. While the Italian Mezzogiorno was still heavily involved in the reconstruction of areas damaged by the November, 1980 earthquake (Alexander, 1982a), further tremors had occurred on March 21, 1982 with damaging consequences at Maratea in Basilicata (Alexander, 1985) and, closer to the Marche, at Assisi and Gubbio in Umbria Region on October 23, 1982. At the end of November, 1982, riverine floods caused damage near Lucca in Tuscany and in the Marche. Flash flooding occurred with disastrous consequences on the River Taro in Emilia Romagna, and the winter saw notable damage by new and reactivated landslides in eastern-central Italy.

The following report will therefore deal with the Ancona landslide as both a catastrophe in its own right and as a component of the national natural hazards problem, for which comprehensive legislation and measures are required. The report is divided into five chapters dealing respectively

with logistical, political, physical and architectural factors, and the regional background of geological hazards. The first section describes the disaster as it affected the City of Ancona, the response of local and national government to the need for special powers and finance, and the evolving problem of mass homelessness caused by the landslide's destruction of housing. The second chapter describes the debate over who should be held responsible for the disaster, which rapidly burgeoned into a lively polemic and was referred to in the press as "a war between geologists and administrators." The reason for presenting this debate is neither to seek a final judgement on whose responsibility the landslide was nor to make further recriminations, but the debate is interesting and useful in that it throws light on the practice of decision making at several levels of government, and exposes weak points and inadequacies in that process. Similar reasons justify the analysis of relations between central and local government, which I present below, and which involved a complex process of bargaining for limited relief funds.

The third section of the report deals with geological and geomorphological (land form and process) aspects of the disaster. The main purposes of this part are to explain the physical conditions of the landslide zone, to give some indication of why the disaster occurred at the time and on the scale that it did, and to examine whether it could have been predicted. Architectural observations made on site after the disaster are presented in the fourth section, and in the final section the 1982 Ancona landslide is compared with other, contemporary natural hazard problems in Italy, in terms of both physical aspects and competing demands for relief.

SOCIAL, ECONOMIC, AND LOGISTICAL ASPECTS

Previous Disasters at Ancona

Like many settlements in Italy, Ancona has an ancient and complex history of natural disasters. It is situated on a small coastal peninsula (Figure 1), bounded on the inland side by soft Quaternary and Tertiary sediments that have been incised by streams and faulted and tilted by tectonic movements often associated with earthquakes. As a result, the city and its environs are variously susceptible to erosion, surge flooding and storm damage along the coast, stream erosion, landslides and river flooding on the coastal footslopes, and earthquake damage. Early records show that several churches on the Anconetan peninsula were destroyed by landsliding during the period 1600-1650 (the church of San Clemente ending up in the sea); in 1679 a church and leper hospital were damaged in the collapse of a slope at Capodimonte, in the historical center of the city. Further damage was caused by a severe storm and gale that occurred in the Adriatic basin on September 14-15, 1733, and by the earthquake of March 12, 1873 (Enciclopedia Italiana, 1933-42).

Yet, despite the seriousness of the threat from natural hazards, greater destruction took place during the Allied bombardments, of November 1, 1943, and thereafter, when 140 separate instances of damage were reported and the form of the city was irrevocably altered. Catastrophic flooding on September 5, 1956, claimed several lives, and the earthquake of January 25, 1972 (R 4.5), caused \$300 million in damage and initiated a series of dangerous aftershocks that persisted until the following December. Although there were only two fatalities during the 1972 earthquakes, damage had not

been fully repaired--and rebuilding was still in full swing--at the time of the 1982 landslide disaster.

The Event and Damages

At 22:35 on December 13, 1982 landsliding affected about 3.41 km² of the Adriatic coastlands on which the Anconetan suburbs of Posatora and Palombella, the hamlet of Borghetto, and part of the frazione of Torrette are situated. This area is located on the northern flank of Montagnolo and is sometimes known as the "frana Barducci" (Barducci landslide) area, after the principal buildings to be affected by long-term slope instability, the Villa Barducci, and a leather tanning factory of the same name. The successive rupture of water mains, which was recorded by pressure-monitoring instruments at a nearby pumping station, indicated that movement of the ground was sporadic, with surges occurring at 22:35, 22:40 and 22:50.

Eyewitness reports state that the sliding continued slowly until halting temporarily at 03:00 the following morning. Between 22:30 and 23:00 there were scenes of some confusion as about 4,000 people left their shattered homes, or the buildings in which they had been working, and sought shelter from the rain that was steadily falling. The preliminary evacuation was accompanied by a certain measure of panic, principally because the disaster was entirely unforeseen by those who were caught on the landslide, most of whom had little experience or conception of what was going on, and some of whom believed that an earthquake was either imminent or had occurred.

Housing

Two hundred and eighty dwellings were damaged, most of them multiple occupancy blocks so that the total number of homes affected was 785. Ini-

tially all of these were evacuated, although it took some days to impose and enforce evacuation orders.

Medical Facilities

The disaster area contained five medical facilities, all of them located in the suburb of Posatora: the Geriatric Hospital and the Oncological Hospital of Ancona, the Faculty of Medicine of the Università degli Studi di Ancona, and two clinics, one a geriatric clinic with residential facilities. A total of 310 patients was immediately transferred to local hospitals at Torrette, Camerano, Jesi and Ancona Center. This operation involved the only fatality provoked by the disaster, when an elderly patient died of a heart attack while being evacuated from an intensive care ward. One hundred and fifteen patients were evacuated to the nearby Umberto I Hospital at Ancona center, and 42 were dispersed among locations in Ancona Province.

Evacuation took two hours and was necessarily rapid, as two wings of the Oncological Hospital showed signs of imminent collapse. Special problems were posed by 145 patients at this hospital, who were undergoing cobalt therapy and eventually had to be transferred to distant medical facilities at Ferrara, Florence and Bologna. Neuro-surgery patients from the geriatric hospital had to be removed to Bologna, Perugia, Teramo and Pescara. The Faculty of Medicine housed University Institutes of Anatomy, Biochemistry, Chemistry, Pharmacology, Hygiene, Medical Physics, Microbiology and Pathology. Many experiments were destroyed when the controlled conditions on which they depended were interrupted, and 3,000 students of surgery, biology and general medicine (including 400 foreign students) had their study terms prolonged and examinations set back.

Other Buildings

The list of other types of buildings damaged or destroyed in the disaster includes two gasoline stations, an automobile showroom, four factories (at one of which--a pharmaceutical factory--140 workers had to be laid off), a police station, two rows of shops, schools, a large hotel and conference center, and five churches. The cemetery at Posatora was also severely damaged, as it is located astride one of the main surface fracture lineaments crossing the landslide area.

Roads

The disaster area is crossed by two main highways and numerous minor roads, tracks and access roads. A section of the former strada statale No. 16, the "Adriatica" or "Via Flaminia," runs across the foot of the landslide, parallel and close to the Adriatic seashore and about 4 m above mean sea level. This road was pushed about 3-5 m above its pre-existing level as the toe of the landslide advanced; it rapidly became impassable and was not reopened until late January. Damage was also sustained by the strada postale, or post road, that runs across the landslide at about 870 m above sea level.

Railroad Lines

The landslide severely damaged 1,280 m of the main Bologna-Bari (Adriatic coast) railroad line. The damage occurred about 400 m west of Ancona station and, as the railroad traverses the foot of the landslide on the seaward side of the ex-Flaminia road, the length of track that was damaged effectively defines the basal width of the landslide. However, the road had partially arrested the advance of the debris toe and the railroad tracks were only lifted about 50 cm. This was, of course, sufficient to

close the line (and narrowly miss derailing a train that was about to leave Ancona station for Bologna); and, as passengers then had to disembark and be transported by road on a detour of the landslide, trains on the following day were arriving at Bari from Milan and Turin an average of ten hours late (Il Giornale d'Italia, December 15, 1982).

However, the railroad line was less damaged than the road; after working around the clock, engineers were able to reopen one of the two tracks at 8:12 on Wednesday, December 15, subject to a 10 km/hr speed limit. On that day, 55 of 133 scheduled trains were able to pass over the damaged tracks. Although delays remained inevitable, rail traffic was 60 percent normalized by Thursday, December 16, only three days after the disaster. This prompt response on the part of the Ferrovie dello Stato was greatly applauded by the nation's newspapers, who contrasted it with the stultifying welter of political recriminations and machinations taking place in the centers of government.

Utilities

There is little information on the damage to electricity supplies, and it is almost certain that the effect here was limited to the landslide zone itself. The situation with respect to water and methane gas supplies was different. Water supplies were lost to Ancona, Candia, Varano, Massignano and part of Falconara. The following day schools throughout these places were closed, and they remained so until water supplies could be restored and tested for purity, which took several days. Although 60-70% of supply to Ancona City was restored within 24 hours, outlying frazioni were without water for a much longer period of time. A navy water transporter, the Basento, was drafted into Ancona harbor on December 17 and began pumping

1,200 tons of fresh water ashore to refill the serbatoio comunale (local reservoir) of Ancona. Water supplies were restored to 80% of houses by December 18.

Gas mains were ruptured under the Faculty of Medicine at Posatora and supplies to the city of Ancona had still not been restored on the Friday (December 17) after the disaster. Schools that had gas-fired central heating had to be closed and, as the date for reopening them receded with each new setback, the Christmas vacation intervened and many did not reopen until January 7. SIP, the national telephone corporation, reported that inter-urban calls could not be connected for some 19,000 Anconetan subscribers, who were also having difficulty making local calls which involved lines across the disaster area.

Special Equipment

A number of expensive pieces of equipment were damaged by the landslide. The University Faculty of Medicine building contained three electron microscopes, values at 1 billion lire (\$645,000), which required specialist technical help to retrieve. A greater problem was posed at the Oncological Hospital, where a 600 million lire (\$387,000) concrete vault contained two radioactive isotopes of ^{60}Co , rated at 1200 and 3200 Curies, which had been used for cancer therapy. Fears of emission of radioactivity were soon allayed, but it took a delicate operation, starting on the evening of Thursday, December 16, to remove the cobalt isotopes to safety in a vault of the military marines outside the disaster area. On December 18 a 60 m high mast owned by PTT and RAI (the national post and television corporations) was dismantled as it had suffered irremediable damage to its foundations. Finally, a number of expensive machines and other pieces of capital equip-

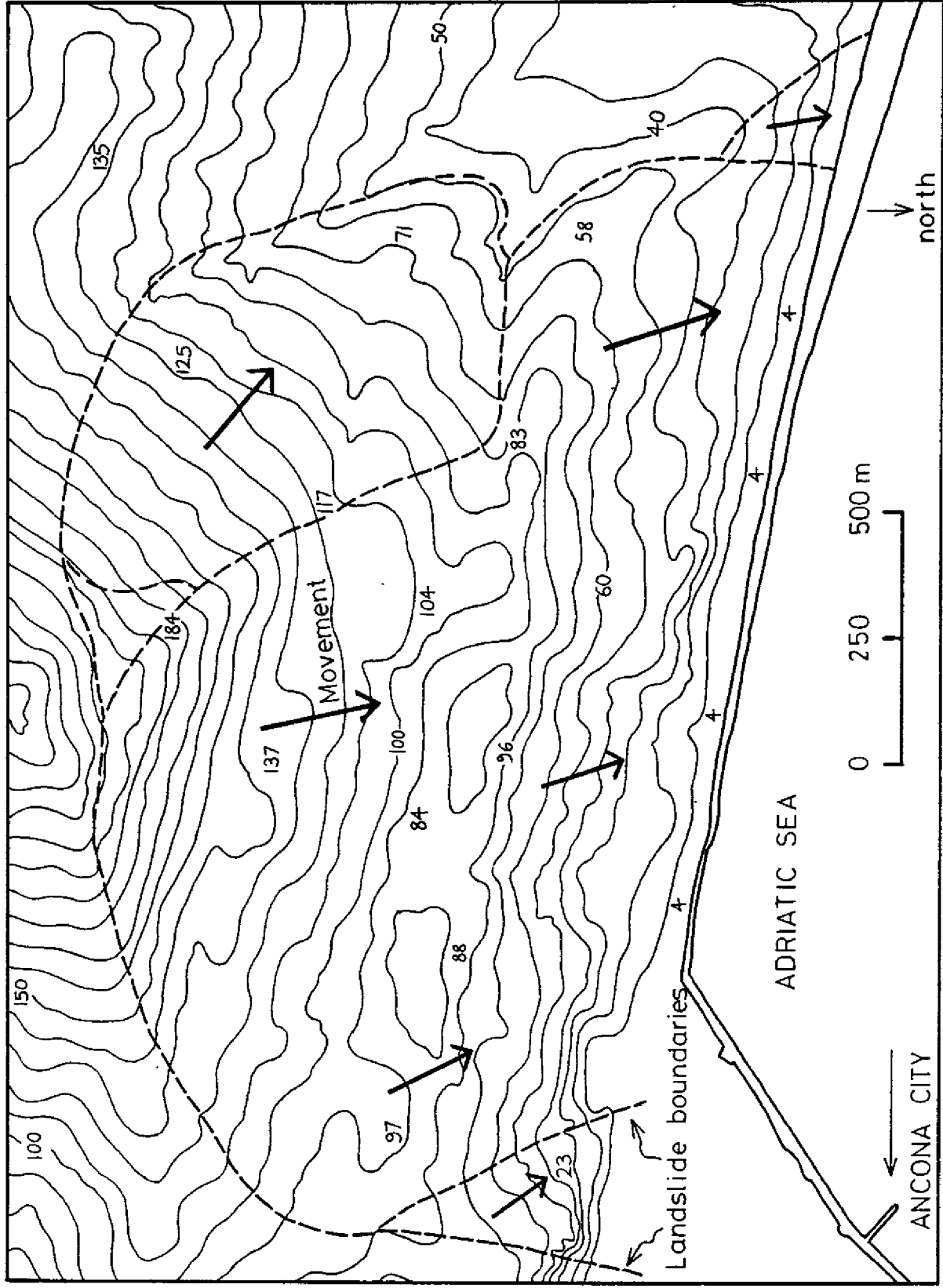
ment were rendered unusable in the manufacturing and pharmaceutical factories located on the landslide. By December 16, newspapers were widely reporting that damage and all associated costs were estimated at 1,000 billion lire (\$645 million), a doubling or trebling of the previous day's estimates.

Dimensions of the Landslide

Physical aspects of the catastrophe will be discussed later in this report, but any picture of the disaster would not be complete without some indication of the physical extent and rate of the landsliding. As shown in Figure 2, there were two main directions of movement, in conformity with local topography. Although initial estimates put the area involved at 700 hectares, this was later reduced to 250-300 and finally established at 341. Slight lateral expansion at the base and along the sides of the landslide increased its width from c. 2,000 to 2,180 m by December 15, and retrogressive slumping brought the final headscarp-to-toe length to about 1,350 m. The mass of the landslide was probably nearer to 600 million tons than the 100 million suggested by one geologist when interviewed by the Corriere Adriatica, the main Anconetan newspaper.

The initial maximum velocity, during the first few hours of landsliding is estimated to have been 6 m/hr, which is in the middle of the "rapid" category of Varnes (1978). During the subsequent day, movement was of the order of centimeters or millimeters and the total movement over the period December 13-18 was about 50 cm, generally taking place at less than 1 cm/hr. Despite the slight tendency for the sides of the landslide to enlarge, most of thy movement in this zone took place in areas of pre-existent landsliding, particularly the area of the well-established "Barducci" landslide

Figure 2
1982 ANCONA LANDSLIDE: TOPOGRAPHY AND DIRECTIONS OF MOVEMENT



(Segre, 1919). On December 18, after mild rainstorms, the toe of the landslide moved forward 9 cm and retrogressive slumping caused two lateral fractures at the headwall, with small scarps respectively 6 cm and 50 cm in height.

Over the period December 16-21, the central zone, or ancient "Barducci" landslide area, moved forward 64 cm (including 20-25 cm on December 17 and 18), but after the initial convulsion no serious changes took place in the conditions of Posatora and Palombella, the two main urban areas affected by the disaster. On Monday, December 20, the landslide toe advanced 15 cm and its flanks enlarged slightly. Further surges took place at the end of the year, involving a maximum of 7 cm in 24 hours, which falls into the slower part of Varnes's "moderate speed" class of movement. Retrogressive enlargement of the headscarp area took place at this time on a minor scale and was accompanied by slight settling of the body of the slide. On January 4 further cracking was reported sub-parallel to contours at 120-130 m above sea level (i.e., towards the center of the landslide). Further movements of 1-2 cm at the head and 2 cm at the base of the slide were also reported on this day.

Evacuation and Special Measures

The initial process of evacuating damaged homes and other buildings was in no sense planned or managed. It is, however, clear that about 4,000 people spontaneously evacuated nearly 1,000 residences in or close to the disaster area.

On the day after the disaster, 200 beds were available in an evacuation center that had been set up at Ostra, in the Anconetan area, following the 1972 earthquake. By December 15, 180 people had been temporarily accommo-

dated in the gymnasium of a nearby school, but most evacuees were being moved into hotels at the expense of the comune. The situation developed as follows:

<u>Dates</u>	<u>In Hotels</u>	<u>Total Number of Evacuees</u>
December 14		3,500 o
December 15	610 o	3,500 - 4,000 e
December 16	906 o	
	1,193 o	2,850 o
December 18	1,600 e	
December 19	1,900 e	
	1,562 o	3,661 o

o = official total (comune)

e = estimated total (newspaper)

The growth in the number accommodated in hotels masks a certain state of flux. On December 16, 259 people were evacuated by order of the Comune (municipality) of Ancona from the periphery of the landslide at Palombella; and on December 17, 265 people were evacuated from 182 buildings on the periphery at Posatora, while 125 people were allowed to return home after structural surveys had certified the houses safe for occupancy. A total of 434 families was evacuated from the suburbs of Posatora and Palombella, of which 31 left Posatora and 27 left Palombella as late as December 19. Finally, on December 20, the Civil Defense Office of the Ancona Prefecture issued the following complete list of evacuations and other consequences of the disaster (which was printed in the Ancona newspaper Corriere Adriatico, and elsewhere):

Evacuees from "Zone A"--the disaster area	2,346 (760 families)
Evacuees from "Zone B"--the periphery	1,305 (310 families)
Total Evacuees	3,661 (1,070 families)

Number of evacuees lodged in hotels	1,562
Number of evacuees lodged with relatives	323
Number of evacuees returned home	125 (30 families)

Number of residential buildings damaged: 280, comprising 875 homes.

<u>Premises Destroyed:</u>		<u>Workers Affected:</u>
Artisans	101	200
Commercial	42	129
Wholesale	3	118
Industrial	3	200
Various	5	18
Farms	<u>31</u>	<u>45</u>
Total:	185	710

The total cost of the catastrophe ran at 30-40 million lire per day during the first week of the aftermath, and the eventual cost of maintaining the homeless--which will be borne by the Comune of Ancona--is projected at 17 billion lire (\$11 billion).

As in previous Italian disasters, much useful clean-up and rescue work was carried out by firemen, 200 of whom worked around the clock during the week after the disaster, principally to evacuate damaged buildings. These men were drawn from brigades in the Province of Ancona and also from Ascoli Piceno, Bologna, Chieti, Forlì, Macerata, Pesaro and Ravenna. The Comune of Ancona provided evacuation transport at no cost to those in need of it, so that people could remove belongings from their damaged homes, and local factories opened their workers' canteens in order to feed the homeless. In addition to firemen, about 1,000 police and military personnel were drafted into the area, such that, when road and rail gangs, demolition crews, firemen, technicians and scientists are considered, about 2,500 people were involved in the clean-up operation. Access to the disaster zone was care-

fully controlled by setting up barriers on the access roads, and in this way people did not put themselves unnecessarily at risk from falling masonry. Also, during the first five days there was only one arrest for attempted looting, while, the disaster-stricken neighborhoods remained perfectly quiet. By January, a total of nine people had been expelled from the disaster zone and six of them had been charged with looting. Such figures indicate that looting was a fairly insignificant factor in this disaster.

Adjustments to the Landslide: Costs and Financial Considerations

In a comprehensive five-volume report published in 1970, the government's De Marchis Commission argued that 9,822 billion lire (\$6,340 million) needed to be spent on ameliorating national erosional hazards including landslides (at 1966 prices). Since then the figure has been raised by 400%, but the probable cost of landslide damage by the year 2000 will, if the hazard is not treated, be 90,000 billion lire (\$58 billion) indicating a cost:benefit ratio of 1:2.25. The following account of adjustments to the Ancona disaster will show that they were both necessarily complex and extremely expensive. They also involved a number of assumptions that, curiously, seem never to have been questioned or debated. The principal one of these is that the Comune of Ancona should assume primary responsibility for the plight of individual people and businesses affected by the disaster, while the national government should provide subsidies, as far as its financial position allows. How these assumptions were acted upon, will now be described in detail and then both the assumptions and actions will be evaluated.

On December 15, 1982, the Comune of Ancona made an initial grant of 300 million lire (\$193,500) for temporarily lodging the homeless, chiefly in

hotels, and the task of requisitioning large numbers of hotel rooms began. By this time it was clear that a much greater program of disaster relief was required, and the Regione and Comune decided to have recourse to the Ministry of Civil Protection. This ministry had recently been created out of the disbanded "Extraordinary Commissariat for the Earthquake-affected Zones," an ad hoc group set up to coordinate national disaster relief and expenditure immediately after the southern Italian earthquake of November 23, 1980. The new leader visited Ancona on December 14, 1982, the day after the landslide. The seriousness of the disaster and the size of expenditure requested of central government by the Ancona and Marche administrations, brought further visits by the Minister of the Interior (December 17), and the Minister of Public Works (December 20).

When, on December 15, it became clear that the Ministry of Civil Protection was prepared to finance disaster relief, local government formulated the following package of requests, which was immediately sent to the Minister:

- 1) An immediate grant of 3 billion lire (\$1.94 million) was required to finance the first month's lodgings for about 3,000 homeless people. The construction of 300-600 replacement homes should eventually be financed.
- 2) Indemnities should be given to victims who had lost their homes or personal effects in the disaster, and to businesses for the loss or suspension of production.
- 3) The government should finance the immediate repair of the damaged Bologna-Ancona railroad and the repair and succeeding stabilization of embankments on the "Flaminia" ex-state road.
- 4) Financial provision should immediately be made for a new hospital, clinic and University Faculty of Medicine to replace the medical facilities lost in the disaster.
- 5) The Posatora cemetery should be removed from the landslide, and money was also required to finance the building of by-pass water and gas mains that avoided the landslide area.

- 6) There should be financial aid for schools that were forced to close or increase their number of pupils as a result of the disaster.

No explicit information was given at this time on how it was expected that such funds would be obtained by the Exchequer or under what government program they could be disbursed, but the Marche Regional Council also asked the Minister for Civil Protection to declare Ancona a natural disaster zone using Law No. 50/52 of 1982, so that funds could be made more freely available, and secondly that the government promulgate a special law for disaster relief at Ancona. Senator Paolo Guerrini (PCI, Marche Region) also asked the Cabinet to declare the Ancona landslide area a full-scale disaster zone.

As a result of the October earthquakes in Umbria and November floods in Emilia-Romagna, such a law was, in fact, being debated at that time in the Italian Upper House. On December 15, 1982, the Senate approved Decree-Law No. 829 of November 12, 1982, which set aside 180 billion lire (\$116 million), from the 1983 budget for natural disaster relief. It was immediately suggested that 80 billion lire (\$51.6 million) be granted to Ancona (and the balance granted to Emilia-Romagna and Umbria), while the Comune of Ancona specifically requested the government to allot 110 billion lire (\$71 million) for relief, repairs and emergency housing in the city.

In the knowledge that funds would almost certainly be forthcoming in some degree from central government, on December 16, the Comune of Ancona voted into approval a substantial package which dealt with the virtually complete reconstruction of damage (in situ or elsewhere), land stabilization and welfare of victims, all at the Comune's expense. The proposed measures can be summarized as follows:

- 1) Accommodation of the homeless in hotels, pensions, lodgings and evacuation centers.

- 2) A short-term feeding program for the homeless, and help with evacuation and storage of their belongings.
- 3) Evacuation and re-establishment of artisans', commercial and industrial investments.
- 4) Indemnity for the loss of homes, goods or commercial investments.
- 5) The suspension of mortgage and loan repayments during the emergency phase of the disaster aftermath.
- 6) Local and fiscal tax relief, plus special payment facilities to indebted victims.
- 7) Credit an mortgage facilities on capital owned or lost by businesses, plus once-off grants to cover loss of productivity and the payment of wages and salaries during the period of lost production.
- 8) Finally, the Comune voted to seek "disaster status" from the government, on a level with the 1980 Irpinian (southern Italian) earthquake-devastated townships.

By January 11, 1983, under the initiative of Ancona's Communist Vice-Mayor, the Comune had started to ask for 350 billion lire (\$226 million), in two nearly equal draughts, for 37 separate repair, relief and reconstruction projects associated with the landslide. There was some justification for the large sums of money requested: by then evacuation and storage of goods and belongings (which involved some highly specialized removal of equipment) alone had cost 20 billion lire (\$12.9 million).

The Comune of Ancona proposed the following plan of disbursements relating to reconstruction. Those people who lost their homes in the disaster would receive new ones, to a maximum floor size of 100m², plus grants of up to 40% of the cost of furnishings that had been destroyed. These grants would not exceed 40 million lire (\$25,800) for a first home and 15 million lire (\$9,670) for a second or other house. People who were able to repair their damaged homes would receive a capital advance covering the entire cost of the work. Building societies and banks could be given special inducements to grant mortgages for reconstruction, with a ceiling of 11% of their

reconstruction costs (with a maximum of 150,000 lire (\$97) per m² for all premises except warehouses, where the maximum would be 70,000 (\$45) lire/m²; otherwise, they would receive up to 80% of repair costs (not exceeding 100,000 lire/m² [\$64.50], or 40,000 lire/m² [\$25.00] for warehouses).

There were three main problems over the proposed expenditures described above. First, the use of hotels for temporary lodging was vigorously questioned in terms of its superiority to other viable solutions; secondly, there was some difficulty in selecting a zone for reconstruction; and thirdly, the people rendered homeless by the disaster were not particularly sympathetic to the plans for rehousing them.

Evaluation

One of the most striking things about the Ancona landslide is that many victims had no insurance on which to draw. Indeed, there is no comprehensive scheme of natural hazard insurance in Italy, and it would be fair to say that the matter has never been seriously debated in the public forum. Instead, it is implicitly assumed that the state will indemnify victims against their losses and that local government will bargain with regional government, who will in turn negotiate with central government for the best possible deal on behalf of those affected by natural catastrophe. It did not happen quite this way at Ancona, as the city is also a seat of regional government, so that the Regional Giunta was rather more directly involved than usual, but the brunt of negotiations on behalf of the homeless and others who suffered loss was borne by the Comune of Ancona.

In such cases, the money eventually comes from a variety of sources, including tax revenues managed by the State Exchequer and regional development funds of the European Economic Community. Demand for oil products in

Italy is relatively inelastic, such that one of the most convenient ways of raising extra revenue is by raising the price of gasoline at the pumps. The cost to the nation of the November 1980 earthquake was partly absorbed in a series of rises in the value added tax on gasoline, such that, at the end of 1982, gasoline in Italy cost more than three times as much as in parts of the USA (at the then current exchange rate). Following the Ancona landslide (and other contemporary disasters) the government's so-called serbatoio (reservoir) of natural hazard funds was replenished by a 21 lire/litre (1.35 cents) rise in the pump prices of gasoline, although a world fall in crude oil prices absorbed this increase in its entirety.

Although the Italian way of buffering poorer people against devastating losses from natural hazards by distributing those losses among the entire community is relatively humane, it is not without drawbacks. Indiscriminate taxation--such as that on gasoline--mitigates against lower income groups who have no direct responsibility for the disaster for which they are indirectly paying. Full-scale state aid can encourage a dangerous condition of dependence among the aided--a condition which Italian commentators have dubbed "assistentialism." Such a dependence became widespread after the 1980 earthquake and could easily delay recovery from the 1982 landslide, by relieving individuals of the need to exercise initiative. In Italy, suspicion of the motives and abilities of the state is almost hereditary, but there is thus a tendency to over-react and insist that the state compensate all victims of natural disaster, regardless of how they have put themselves at risk from the hazard.

The main criticism of the Italian method of coping with natural disaster is that it does not sufficiently encourage preparation against the inevitable disasters of the future. Potential victims (including agencies of the state who are concerned with constructing or maintaining buildings or

structures) are not told that the availability of aid in the future will be governed by the preparations made at the present to mitigate hazards. Such preparations are implicitly assumed to be the responsibility of the state, yet there is no concerted national policy for disaster avoidance. The European Economic Community has prepared a directive to member states requiring them to carry out environmental impact analyses before major environmental modification schemes are put into effect. At present in Italy there is no such thing as an environmental impact analysis. The national policy for disaster relief is fundamentally an ad hoc one of handing out aid when and where it is required.

What is instead required is a full re-evaluation of the level of individual and corporate responsibility, and therefore the extent to which government funds may justifiably be used as disaster compensation. Banks and mortgage societies should require their collateral to be more comprehensively insured against hazards and, if the cost is too great to be borne by private insurance companies and individual insurers, the government should divert some of the "reservoir" of disaster relief funds to setting up a national hazard insurance scheme, like the National Flood Insurance Program of the USA. In the national economy less emphasis should be given to consumer goods (the Turin newspaper La Stampa reported on December 23, 1982, that Italians had spend 100 billion lire (\$64.5 million) solely on video games during the Christmas shopping period), and more emphasis given to consolidating land, buildings and structures, including incentives for soil conservation and anti-seismic modifications to the built environment. Above all, there should be some explicit discussion of how far an individual is responsible for the safety and stability of his or her own property, and what the corresponding level of government accountability should be.