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DISASTER RISKS IN THE MEDITERRANEAN REGION

Note prepared by the Office of the Disaster Relief Co-ordinator (UNDRO)

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OFFICE OF THE DISASTER RELIEF CO-ORDINATOR

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1. The Problem

1. Disasters - both natural and man-made - occur relatively often in the Mediterranean region. The main risks relate to floods which affect all Mediterranean countries; earthquakes which in the recent past struck Italy, Yugoslavia, Greece, Turkey, Algeria and Morocco; forest fires, landslides and soil erosion which affect the whole region; volcanic eruptions in Italy; oil spills in the whole Mediterranean.

2. Most of the disasters resulting from these phenomena or accidents directly affect the development of the countries concerned. One single earthquake, for instance, may set a country back by several years in its development. The social and economic implications are wide-ranging. The more thorough the exercises to examine the impact of disasters on economic development the greater appears to be the cost. Few countries examine the effect on agricultural and industrial manufacture. At the national level, the impact of disasters on the per annum growth of national income has been estimated to be as high as 8.5% in the case of Yugoslavia (the UNDRO World Survey of Disaster Damage). A paper given at a recent NATO CDSM Conference[1], puts Italy's annual average exceptional atmospheric phenomena costs to agriculture alone at $490 million per annum (300 billion lira), and UNESCO[2] gives some earthquake costs averaging $63 million a year (1963-1973).

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1. M. Giorgi and G. Fea - "The Primento Project", in Disaster Assistance (Flood Mitigation) Nato, CBSM, No.2. 1970 p. 31-1. The costs here apply only to agricultural damage. A provisional and unofficial estimate o additional damage to property and industry from direct atmospheric causes would add another $300 million per annum to the above cost (of $490 million

2. UNESCO "Annual Summary of Natural Disasters", UNESCO Press; Volumes for 1968, 1971, 1972 and 1973 refer. UNESCO give costs where they can, but as secondary sources are used for cost estimates, not all destructive earthquakes are covered for costs.

In terms of growth of national income, this is 6.9%. Given that periods of quiet alternate with those of disaster, it is clear that when disasters strike a large portion of national income growth has to go into reconstruction. Table I below gives an estimate of the average annual direct cost impact of disasters over the period 1960-73 for some mediterranean countries.

ble I Estimated Costs of Disasters, National Income and Growth of National Income 1963 - 1973

diterranean Country	Average National* Income $M 1963-73	Average Annual Increment in National Income 1963-73 $M	'Estimated' Average P.A. disaster damage $M	% NI (4)÷(2) x 100	% NI (4)÷(3) x 100
1.	2.	3.	4.	5.	6.
goslavia	13,000	1,900	+162.2	1.25	8.54
aly	86,000	8,000	+550.0	0.64	6.88
geria	4,200	200	12.5	0.30	6.25
rkey	11,400	980	** 30.0	0.26	3.06
.R.	5,700	200	1.0	0.18	0.50
rael	2,800	270	1.0	0.04	0.37
ain	35,000	5,000	11.4	0.03	0.23

UN Statistical Yearbook 1974 table 188.
IBID M. Giorgi and G. Fea as note I on page 1 of this paper
"The Primento Project"; IBID UNESCO, note 2 on page 1 of this paper
A. Aytun - "General Information on Organisation and Activities for Earthquake Disaster Response in Turkey" Nato CDSM No.9. Vol. 2. p.31-5 (adjusted for some inflation elements).

These costs give only a static indication of impact (a point of time camera snap-shot). They do not show by themselves how much the productive capital of the country has been affected which would continue to dampen development[1].

3. Most disasters, however, can through proper planning be averted. Not only must disaster risks be taken into

1. For comparison ESCAP in "Water Resources Journal" Dec. 1973, gives in table 1 the % rate of flood damage in selected ECAFE countries in relation to average GNP (Japan 0.42, Rep. Korea 0.76, Philippines 0.43, Thailand 0.44, Australia 0.01, Burma 0.01, India 0.33, Indonesia 0.03, Malaysia 0.09, New Zealand 0.04, Pakistan 0.97 Sri Lanka 0.27. The average ECAFE rate was 0.19.

consideration in any development project, whether small-scale or large-scale, but vulnerability to disasters must be one of the variables taken into consideration in the physical and economic planning process of the countries concerned or in any regional integrated effort such as the one contemplated in the Blue Plan.

II. Relation to environmental problems and Present State of the Art

1. Natural disasters are an inherent risk of the environment, which is sometimes made worse by man's activities (such as deforestation in relation to floods). Also disasters, whether natural or man-made, directly affect the environment. By and large, as far as natural disasters are concerned, it can be said that this is a case where the problem is mainly one of protecting man from the environment and not the other way around.

2. In the present state of knowledge, one cannot say - except a few hours in advance in some cases - when a natural phenomenon likely to cause a disaster is going to happen, but one can determine with a fair degree of accuracy where it will occur (in flood plains, along tectonic faults, in avalanche corridors, etc;). Knowing where the risk exists means that basic preventive measures related, first, to physical planning and land use and, second, to building codes and other technical measures, can be taken.

III. Long-term trends and impact on the environment

1. The real impact of natural disasters is felt more in the poorest countries where the death toll and the damage caused in terms of GNP are much higher (indirect effects such as forced unemployment, crops destroyed, harvests which spoil because they cannot be delivered to centres of consumption, the added nutritional problems particularly for women and children, the higher incidence of certain diseases in the wake of disasters, etc., are often much more important than the

apparent effects such as destroyed houses). Within countries, the hardest hit areas are the most marginal ones, such as shanty-town and squatter settlements which are often built in the highest-risk areas (sometimes right in river beds, for instance). The poorest people in the world are being pushed more and more into the most marginal work and living areas. Other types of natural disasters, earthquakes and typhoons strike hardest at the large areas of marginal housing. Some traditional tropical country housing collapses easily but is also cheap to reconstruct. The intermediate stage developing mediterranean countries feature amongst those where earthquakes and floods can be at their most serious level for life and property, neither cheap enough to re-build at nil cost, or fall down with no loss of life, nor expensively constructed or designed to cover a large part of disaster risk. Studies made in Turkey and Yugoslavia illustrate this point. Studies were made of five Turkish earthquakes between 1966 and 1970[1]. Deaths and infrastructure damage were highest even where densities were low because the predominant type of building was round stone and adobe. The ceilings were heavy in relation to the load bearing capacity of the walls. The timber buildings were more vulnerable to fire arising from the earthquake, but were resistant and less damaged by the earthquake itself. The traditional housing in the old city of Skopje (Yugoslavia) was of similar design and suffered more intensive damage than any other type of building. These houses were likely to be inhabited by the poorest citizens of the city[2].

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1. A. Aytun - "Experience gained from recent earthquakes in Turkey" Ibid Nato CDSM No. 9. Vol 2. Pp. 11-1 to 11-9.

2. UNESCO - "The Skopje Earthquake 1963", Paris 1968
Very severe earthquakes with prolonged lateral shaking can cause even modern earthquake resistant buildings to collapse with proportionately higher costs. However these earthquakes are sufficiently infrequent to be of less significance in global damage count. Even in USA it is the more traditional structures that suffer the greatest damage.

Table II Damage, Loss of Life and Population Density in Some Recent Turkish Earthquake

	Deaths	rank	Number of dwellings damaged	rank	Density per sq. km.	rank	Traditional dwelli predominant building type
Varto	2,500	1	20,000	1	24	5	Abode
Adapazari	86	3	7,100	3	90	1	Timber frame
Bartin	26	5	260	5	75	2	Poor quality masonry
Alasehir	41	4	2,500	4	55	3	Masonry
Gediz	1,086	2	15,000	2	35	4	Timber and masonry

2. The dual phenomenon of rapid urbanization and high rates of population growth tends to increase the destruction and loss of life from disasters, as these affect larger and larger concentrations of people, which constitute, so to speak, bigger targets for disaster impacts and more high risk areas are being settled. The same applies to "man-made" disasters (conflagrations, oil spills, etc.). Potential natural disaster zones are relatively static in geographical space, but over time, man and his capital aids moves increasingly into high risk zones. When this happens the size of the natural phenomena may be the same but the damage they cause increases. Rapid urbanisation not only concentrates population allowing a disaster of given dimension to produce greater loss of life and property damage but also can reduce natural safeguards. An example is how the swamp lands in river delta or flood plain acts as a reservoir. With reclamation, drainage has either to be improved or flood risk increases. It is clear that this is happening in parts of the Mediterranean, certainly in Italy but how much so is less certain. In Japan calculations have been made to show how urbanisation has increased flood damage cost. The impact of urbanisation in Japan in relation to other countries demonstrates sharply the high level of vulnerability to damage from urbanisation in areas of disaster risks.

Table III Urbanisation and number of houses damaged in Japan

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
umber of houses damaged by lood (thousands)	650	71	208	171	363	440	393	96	172	230
n urban area (percentage)	58	50	78	69	69	73	74	74	64	72
n rural area (percentage)	42	50	22	31	31	27	26	26	36	26

Source: ECAFE secretariat, "Damage caused by typhoons, cyclones and associated storm surges" (WRD/TC5/10), Oct. 1972

Water Resources Journal, Dec. 1973 table II.

3. The impact on the environment is directly linked with the concentration of population: an earthquake or a flood striking an uninhabited area is not a disaster; it becomes one only when it strikes a non-protected or poorly protected human settlement: and when this occurs, the larger the settlement, the larger the disaster.

4. There is also a possible feedback between the size of natural disasters and the changing mode of life adopted by man. Increasing land reclamation in the coastal deltas and flood plains can itslef increase the risk of floods; altering the ecology of the watersheds of rivers can multiply the number of destructive 'flash-floods'. Rapid industrialisation may push pollution to the point where it reaches disaster dimensions. However, available statistics also show that beyond a certain level of development, the death toll from disasters tends to come down while the total amount tends to sky-rocket in absolute terms (but not in terms of percentage of GNP); but this may be misleading in the sense that no severe disaster - such as a strong earthquake - has hit a major city in a developed country in recent years.

IV. Unsolved questions and remedial action needed

1. For the most types of risks (floods, volcanic eruptions, landslides, avalanches or "man-made" risks due to the vicinity of chemical or other major pollutants the exact location of the risk is either well-known or easy to determine. For earthquake risks, the matter is more complex; however, seismic microzoning is making great strides and one can nowadays also determine to a large extent the areas of highest seismic risk.

2. The present situation is characterized by the fact that nowhere is any systematic effort made to carry our "composite" vulnerability analyses for all types of risks. Sometimes one given risk, floods for instance, will be taken into consideration, but other risks which may exist in the same location (earthquake, landslide, etc.) are ignored. Most often, disaster risks of all types are ignored altogether. What is immediately needed is:

(a) The introduction of the vulnerability concept as an additional variable in the formulation of national and regional development plans.

(b) The inclusion as part of any development and investment project of a vulnerability analysis of the site contemplated for such a project. (This analysis, just like a regular feasibility study, must be an integral part of the project)[I]. The main effort in the near future should probably focus on the development of simple methodologies for the execution of composite vulnerability analyses.

I. It should be noted in this respect that the expenditure involved in a vulnerability analysis is negligible in comparison with the total cost of a project (a fraction of one percent). But the "multiplier effect" of this prophylactic measure can be enormous, not only from the point of view of damage avoided and relief and reconstruction which would not be necessary, but also of human lives saved.

3. For the longer term it is probably necessary to consider how it may be possible to:

(a) influence the man made forces of urbanisation and industrialization which tend to exacerbate natural phenomenon into major disasters or turn pollution into man-made disasters:

(b) either equalise disaster risk for all classes of the population or compensate for those who by reason of poverty have to live in higher risk areas.

Within any systems approach to the problems of the mediterranean basin, natural and man made disasters could be included as one of the integral important elements.