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The Impact of Natural Disasters on Third World Agriculture:

*An Exploratory Survey of the Need for Some New Dimensions in Development Planning**

By FRANK LONG

ABSTRACT. This is essentially an exploration of the available information on the effects of *natural disasters* on *Third World agriculture*. These effects are a powerful partial explanation of the lack of *agricultural self-sufficiency* in a large number of *low income countries*; and consequently go some way in explaining the occurrence of *hunger* and *poverty* in such countries. The paper argues for the systematic collection of economic data on disasters and its analysis and for the establishment of *agricultural planning* mechanisms in natural disaster-prone *developing countries*, to mitigate the adverse effects of such disasters. The mechanisms should be linked to *national development planning*. The paper also sets out the need for international action on a continuing basis in this field.

I

INTRODUCTION

AGRICULTURE, WITH EXCEPTIONS enough to be conspicuous, and at this current juncture of world economic history, is the Third World's most crucial single sector. In many of these countries, especially the largely monocultural ones, it is the greatest source of employment and the most important generator of national value added and export receipts. It is also an important base for industrialization there, directly via structural linkages (real or potential) with the modern sector, and or indirectly, via savings for reinvestment in "new activities" with comparatively high marginal efficiency of capital. The agricultural sector is crucial, in addition, in the provision of wage goods for the industrial sector, and in constituting a demand nucleus for consumer goods produced by the industrial sector. Therefore, in terms of capital formation, economic transformation, and social well being in low income countries, agriculture tends to be the basic sector of the national economy.

* This paper is based on some preliminary research conducted at Queen Elizabeth House, Oxford. Comments are gratefully acknowledged from P. Ady, Fellow of St. Anne's College, and lecturer in development economics at Oxford University, and Neville Maxwell, senior research officer at Queen Elizabeth House. The author also thanks the United Nations Disaster Relief Office in Geneva for making available some important data. Needless to say, full responsibility is assumed by the author for any errors or omissions.

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Third World agriculture is not without special problems. On the whole, the Third World is unable to produce enough food to feed its growing population. In 1970, for example, out of a sample of 97 developing countries, 61 were reported to have deficits in food supply (1). In parts of the Third World, notably, the Far East, Near East, Africa, and parts of South America, as much as 25 percent of the population suffer from "significant malnutrition" (2). In quantitative terms, current estimates have it that between 400-800 million people in low income countries suffer from malnutrition (3).

Because of the prevailing food imbalance, developing countries have come to rely more and more on imports from developed economies to feed their inhabitants. With low aggregate disposable incomes, developing countries in the 1960s were unable to pay for nearly 50 percent of their total food imports on hard market terms. From 30-45 percent of their food imports had to be supplied through food aid concessions from the developed world (4). (The bulk of this was in the form of grains.)

Even more relevant is the fact that developing countries' agriculture tends to be more susceptible to the destructive effects of nature than that of developed countries. In the first place developed countries exercise greater control over the effects of natural disasters (i.e. geophysical and climatological phenomena such as cyclones, tornadoes, earthquakes, droughts, floods, volcanic eruptions, etc.) than developing countries. Control is achieved through appropriate agricultural infrastructure, for instance, which often is absent elsewhere. Secondly, a point not unrelated to the first, but analytically distinct, is the fact that available data on natural disasters show that developing countries, on average, account for roughly 90 percent of such disasters occurring world wide.

My purpose here, then, is to attempt to demonstrate the significance of natural disasters as a structural factor inhibiting the attainment of agricultural self-sufficiency in the Third World. Incomplete statistics on the effects of natural disasters on agricultural output, and a marked failure in the past to attempt to quantify these effects, compel us to treat the subject matter in largely exploratory terms. Nevertheless, the facts, such as they are, may convince us of the need for widening the scope of agricultural planning so as to minimize the impact of natural disasters on the productive sector in the Third World in general and agriculture in particular. Also, in my opinion they make a case for shifting international efforts from "pure relief

work" to more structurally relevant measures such as a program of action for pre-disaster strategies.

II

DATA ON NATURAL DISASTERS

AVAILABLE DATA ON NATURAL disasters have been collected over the years. The United Nations Educational, Scientific and Cultural Organization (UNESCO) collects annual statistics on such events. Data available for 1969 suggest that, world-wide, total disasters amounted to 759 in that year. By far the most frequent disaster type according to this source was earthquakes. They accounted for 722 out of the 759 reported cases. Disaster-prone regions with corresponding breakdowns were as follows: the Pacific 467, Atlantic 68, Mediterranean 67, Africa and Indian Ocean 63, Asia 61, Europe 17 and Antarctica 1. One important limitation of UNESCO's data is that they deal exclusively with natural disasters as purely physical occurrences. In other words, they exclude socio-economic considerations from their definition; in their measurement of natural disasters the same bias holds. Perhaps the word "disaster" in this context is an overstatement. It is not surprising, for instance, that from the large number of disasters recorded by UNESCO in 1969 only 12 of these were regarded as having disastrous socio-economic effects (5). They were mainly in developing countries. The rest were merely statistics of interest to physical scientists.

Another limitation is that the data deal only with four disaster types: earthquakes, Tsunami (strong tidal waves occurring mainly in Asia), storm surges, and volcanic eruptions—*i.e.*, events of a geo-physical nature. Disasters of a climatological type such as hurricanes, tornadoes, floods, droughts, and so on are excluded from their survey. Therefore, despite UNESCO's comprehensiveness in one broad category of physical phenomena, its data do not provide the social scientist and especially the economist with the kind of information we are after.

Data obtained from the United Nations Economic and Social Council (ECOSOC) are of greater relevancy since they are directly concerned with natural disasters in a socio-economic context, general though this may be. Between 1961-70 natural disasters recorded world wide were 112 in numbers. More than half of these were caused by floods and earthquakes, with hurricanes accounting for an important share of the remainder. Developing countries in Africa, Asia and Latin America together accounted for nearly 90 percent of

total disasters recorded. Asia showed the greatest susceptibility—40 percent of the world total (6).

Moreover, disaster occurrence in developing countries has been showing a rising historic trend over the years. This tends to be borne out by the available evidence despite wide statistical discrepancy in the recording of disasters. This discrepancy stems largely from different prevailing criteria for the evaluation of disasters by the recording bodies. To date no international assessment of the economic costs of natural disasters has been made. Available evidence seems to point to the fact that they are formidable in a large number of developing countries.

It might be argued, however, that these ECOSOC figures are likely to underrepresent the real occurrence of natural disasters since they incorporate appeals mainly directed to one source, the League of Red Cross Societies. Unfortunately, the unavailability of firm data makes it difficult to establish in a precise form what magnitudes are involved in this probable undercounting. Given this reservation, it is not surprising that other statistical sources have recorded a much higher annual disaster incidence during the 1960s–70s. Consider a few of these.

The United States Agency for International Development (USAID) during the three-year period (1968–70) recorded 194 natural disasters world wide (excluding the U.S.); Asia, Africa and Latin America together accounted for 187 or over 90 percent. The breakdown was as follows: Asia 68, Latin America 64, Africa 55 and Europe 7. Floods, hurricanes and drought/famine accounted for over 90 percent of the disasters during this period. USAID data exclude, for political reasons, Soviet and socialist bloc countries, and while this omission may not be significant in a quantitative sense, it makes the picture not wholly complete (7).

Another source, the Smithsonian Institution (SI) conducted a world wide survey of natural disasters during 1968–71 and recorded 168 short-lived disasters. This differs from the USAID estimates by 19 in number and also by types of natural disasters recorded. By the SI count, major earthquakes amounted to 86; there were 71 cases of volcanic eruptions and 11 cases of drought/famine and floods together. Westgate and O'Keefe argue that this source tends to limit the scope of natural disasters because it concentrates mainly on short-lived phenomena, while some natural disasters are of a longer term nature (floods, drought/famine) (8). A survey conducted by Dwor-

kin for the Natural Hazard Research Group in the U.S. in the meantime recorded 143 major natural disasters between 1968-71 (9). And, more recently, data of the Catholic Relief Service show that between 1970-72 there were 110 natural disasters which took place world wide (10). Both of these sources show that developing countries as a group recorded the greatest number of disaster cases. Although inter-temporal comparisons between the data just cited (Natural Hazard Research Group, and Catholic Relief Service) and the USAID and Smithsonian Institution on one hand, and ECOSOC on the other, are not statistically possible there seems to be a reasonable case for arguing that there has been some underestimation by ECOSOC. In nine years ECOSOC recorded what most of the other sources have estimated in three years at most.

The foregoing data, while far from complete, can serve as a rough preliminary and tentative approximation of disaster occurrences within recent years. Thus averaging out, it could be roughly stated that between 1968-71 the annual world incidence of natural disasters ranged between 47 and 62. Between 1970-72, using Catholic Relief Services data, a tentative yearly average could be set at 55.

The data so far presented do not, however, provide us with information on long run trends in the numbers of disaster occurrences and/or on regional intensities of these disasters. During the 51 year period from 1919 to 1971, 272 disasters were recorded, a yearly average of 5 which is much smaller than is indicated in more recent data. One important explanation for this discrepancy is the improvement in recording natural disasters in recent years. The main natural disasters during this long term period were floods, earthquakes and cyclones, together accounting for 90 percent of the disasters recorded. The main disaster regions were again those where developing countries are mainly located—Asia, 89; Americas, 49; Middle East, 38, and Africa, 33. These together accounted for 90 percent of world wide disasters recorded (11).

Further, an analysis of the 1919-71 data shows that the overwhelming majority of disasters listed as having taken place during this period occurred between 1951-71. This latter period accounted for 222 of the sum total of disasters (12). Floods, earthquakes and cyclones were the main disaster types recorded and the mean disasters per annum was about 11, *i.e.* double the 1919-1971 mean. A regional breakdown of natural disasters between 1951-71 confirms the indications of earlier data, that developing countries in Asia, the Middle East, the

Americas and Africa experienced an overwhelming number of disasters compared to the rest of the world.

Available data from another source have specified to some extent the ratio of increase of disaster types on a weighted average base between 1919-71 and 1968-71. In the latter period there was an eightfold increase in the incidence of droughts, a threefold increase in volcanic eruptions and a twofold increase in cyclones, epidemics and floods (13).

III

DISASTERS IN THE THIRD WORLD

UNITED NATIONS Disaster Relief Office data indicate that the major impact of natural disasters is concentrated among 50 to 60 developing countries (mainly located in Asia) where agriculture is the main form of economic activity. These countries are regarded as disaster prone because they are chronically affected. It is further estimated that 90 to 95 percent of disaster losses in poor countries are caused by floods, which is instructive from the point of view of agricultural planning (14).

The data also purport to show that, on the whole, agriculture is the sector which tends to be most seriously affected. Hence we now look at some general data on the impact of natural disasters in the developing world. At the same time it will be profitable to consider other available data on the impact of disasters on agriculture.

The U.N. has estimated that damages caused by natural disasters in disaster prone developing countries, "far exceed in absolute terms the external and multilateral assistance received by these countries" (15). As far as Central American Common Market countries go, between 1960-74, the United Nations Economic Commission for Latin America has estimated loss caused by natural disasters amounted to an average of 2.3 percent of annual gross national product (16). The countries affected were Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua, which are mainly agricultural producers. The areas most affected by such disasters were those involved in agricultural production so that it is fair to say that the incidence of the 2.3 percent annual loss in G.N.P. fell mainly on that sector. (Firmer data are, however, needed to establish precise magnitudes.)

Data available from the Economic and Social Commission for Asia and the Pacific, made up of 32 countries in the developing world (including 9 associate members) which have primary producing agri-

cultural economics, show that between 1961-74 total cumulative damages caused by monsoons, tropical cyclones, and floods were at least in the order of U.S.\$30 billion at 1974 market prices (17). Again, the most seriously affected sector was agriculture. Nearly 200 million acres of arable agricultural land under cultivation were flooded and there were huge but inestimable losses to farmers. Despite the fact that there was a serious chronic shortfall in agricultural output in the region as a result of natural disasters, no estimate on this is available (18).

The foregoing data only offer some broad guidelines as to the possible effect of natural disasters on agricultural output. We need to look at some yearly estimates for individual countries which are in many respects natural disaster prone. For example, in Guatemala total damage caused by the 1976 earthquake was set at U.S.\$748 million (19). Of this, U.S.\$200 million was damage caused to infrastructure, the bulk of which was related to agricultural production. Also U.S.\$58 million in losses accrued to the productive sector, with agriculture accounting for the bulk of this. It was estimated that this single disaster has retarded economic development of that country by 10 years. Given the contribution of agriculture to economic development in that country, and the observable impact of natural disasters on agriculture, it seems clear that by 'economic development' was largely meant agricultural development.

Estimates are also available for the 1974 floods in Bangladesh, a country which, in the words of the National Planning Commission, is one in which "floods are a major factor affecting economic development." The economic losses of the Bangladesh floods were put at U.S.\$580 million. The economic sector accounting for the biggest losses was agriculture (U.S.\$300 million in lost output). Rural infrastructure related to agriculture suffered losses of U.S.\$80 million. The floods covered 22,042 square miles—up to 40 percent of the country's land mass. The Planning Commission noted that floods effectively destroyed the country's hopes of reducing its import deficit of foods and severely affected its export possibilities as a result of heavy damage caused to jute production, that country's major export. The immediate sectoral rehabilitation costs were set at U.S.\$199 million; the foreign exchange component of this was U.S.\$55 million to be spent mainly on agriculture. On top of this, the country had to spend U.S.\$132 million for the import of food grains to feed its population (20).

In Guyana, rice output was reduced by some 40 percent from 180,000 tons in 1975 to 110,000 tons in 1976 as a result of floods. Also, an important factor accounting for the slump in export earnings of sugar from G\$413 million in 1975 to G\$219 million in 1976 was the adverse effect of the weather, especially floods (21). Rice and sugar are the main agricultural crops in Guyana; together they account for the main portion of national exports. And what is more, the problem of floods was compounded—a severe drought was to follow them.

These country data, though confined to a single year, do give some rough indication of the possible magnitude of the effects of natural disasters on agricultural output in the Third World, especially in the disaster prone countries. While it is true that these effects will vary from country to country, depending on such factors as the degree of agriculturalization, infra-structural state, rate of occurrence, periodization and so on, in spite of the reservations one must have about data on natural disasters, evidence does seem to point to the fact that natural disasters tend to serve as an important structural obstacle to agricultural self sufficiency in a large number of Third World countries. What is more, it has an important bearing on general economic development and problems affecting social well being in these countries.

The situation has indeed led to the conclusion by UNDRO experts that the effects of natural disasters in disaster prone developing countries tend to cancel out real growth in these countries. If, for example, much emphasis is placed on agricultural production, such as modernization of techniques, the use of fertilizers and other investments intended to boost production, the effects of these are bound to be suboptimal if output is uncertain to a considerable extent. So that natural disasters loom critically over the question of modernization and development of Third World agriculture.

Indeed, a number of nationally and internationally sponsored agricultural development programs have been mounted over the past decade or so to consolidate agriculture in poor countries. However, a great deal of this effort and of the resources associated with it goes wasted since, as we just indicated, the return on agricultural investments is bound to be adversely affected if these investments are subject periodically to partial or complete destruction. No operational recognition of natural disaster control measures is built into the programs even though active international relief services—essentially “after care” services—exist for countries thus affected. Moreover,

disasters cost these countries farm jobs, often the most important source of gainful employment available.

In addition, consider the case of low income countries which are attempting to industrialize as a result of fostering linkages between the modern sector and agriculture, thereby economizing the use of domestic resources in development, as a number of them seem to be doing by way of the active promotion of agro industries. A major shortfall in agricultural output, besides serving to reduce food supply, is bound to retard the pace of industrialization by introducing discontinuities in the modern sector production process. Where the potential for such agriculturally linked industrialization exists but is not fully exploited, factors inhibiting the attainment of a consistent agricultural surplus to feed factory workers are likely as well to affect such economies' capacities to foster manufacturing and thus add greater balance to their productive structures.

The problem therefore does not stop at food output. It would seem worthwhile to explore in greater detail the non-agricultural dimensions which are directly linked to inadequate primary output caused by floods and other natural disasters. This would repay further research.

IV

NEW DIMENSIONS OF AGRICULTURAL PLANNING

AGRICULTURE, MORE than any other sector, is prone to the fate of nature. Whereas the production process of other economic sectors is amenable to man-made control through the instruments of technology to an important extent, this is not true of primary agriculture. Even so, to a significant extent, I believe, the effects of natural disasters on Third World agriculture could be drastically minimized.

In support of this belief, one could cite efforts throughout history to control floods; efforts to combat drought by well-drilling, dams, river diversion and reforestation; mitigating the effects of volcanic eruptions by architectural and engineering techniques, and so on. What are needed in this area, however, are practical techniques, on the one hand, and cost/benefit analyses, on the other. The evidence that man is capable of controlling the natural environment, to some extent at least, is found in the history of civilization.

In developing economies, agriculture is often a basic feature of development plans. This stems from the primacy of agriculture in the overall structure of production, and recognition of the fact that it

will remain a key sector in most of these economies in the foreseeable future. Most development plans have a time horizon of about five years or so. Since transformation of economic structures goes way beyond this period, this recognition is wholly justified in most cases. The particular concern of this section is with the agricultural aspect of development planning. We confine ourselves to the subject matter of discussion.

For what might be done in this area, let me illustrate by citing the way spokesmen for the People's Republic of China portray their programs for combatting the effects of natural disasters. I summarize freely a second hand account (22):

Historically agriculture and economic development in China were severely handicapped as a result of the legendary floods of the Yangtse, Hua and Yellow Rivers. Recognizing the need to control the effects of natural disasters, post-revolutionary China developed an equally legendary slogan: "Be prepared against war, be prepared against natural catastrophes." To deal with floods, a special program was launched to chart the main rivers throughout. Also elaborate dyke control and afforestation schemes were implemented. Heavy investments were also made in updating the country's meteorological services. To deal with earthquakes, a number of techniques for predicting events and controlling effects, ranging from high-powered seismological exercises to analyses of animal behavior, and the testing of water pressure in wells, were brought into active use. Hail storm techniques, involving the use of hand made rockets have been developed to diffuse the impact of hail drops so as to mitigate damage to crops. Various crop preservation measures have also been introduced to circumvent the effects of weather on primary production.

Courses are also carried out on practical techniques of disaster management and in the preparation of emergency operations. These measures, carried out under largely "self reliant program," in which the Chinese masses play an active role, have gone an important way in increasing the viability and dynamism of Chinese agriculture and indeed that country's social economy. In many areas floods have been brought under effective control (23).

In developing countries, as a whole, recall that floods are the greatest source of damage. In many of the disaster prone developing countries, conventional irrigation facilities do not incorporate systematic control measures to deal effectively with chronic problems of floods. Ad hoc measures are, however, instituted but these, as we earlier observed, are launched mainly as "post disaster operations."

And there are no known international assistance programs which deal specifically with this problem. This is unfortunate as it seems

clear that many of the hard core disaster prone developing countries, lacking necessary capital, technology, know how, and financial resources, would not be in a position to attack the problem through a "do it yourself experience." For instance, some years ago Bangladesh, which was then part of Pakistan, had developed a flood control model running into over U.S.\$50 million which would have drastically mitigated chronic flood damage to agriculture. It involved the use of physical infrastructure (barrages, soil levelling, modern irrigation facilities to cope with sudden onrush of floods) on the main flood plains. The project, however, failed to come into existence because the country, unable to "do it alone," failed to obtain the necessary funds from multilateral agencies. The cost of the 1974 floods, it might be recalled, was over 10 times larger than the cost to permanently minimize, if not eliminate, such losses. If private profitability criteria, instead of social ones, are used as a basis for determining needed development assistance, then surely disaster prevention measures will appear low on the priority list.

Some practical aspects of agricultural planning incorporating natural disasters may be indicated. Any planning model intended to mitigate the effects of natural disasters, it is apparent, should at least entail the following:

1. Sensitivity analyses of disaster prone regions, *i.e.*, spatial dimensions, degrees of frequency, observable losses, socio-economic groups suffering from greatest vulnerability. Evidence seems to suggest that they are from the less affluent social classes.

2. Physical planning costs per identified region and in a given time period, starting with the minimum essential construction projects needed to make a meaningful counter disaster strategy.

3. Use of forecasting techniques, *e.g.* meteorological, seismic, etc., as an integral feature of forewarning systems. The United Nations is rapidly accumulating worthwhile expertise on this. It could therefore provide necessary know-how in this area to developing countries.

4. Community participation in both assessment of problem areas and in the implementation of physical planning targets. It is possible that immense scope exists for grass roots "expertise" in terms of identifying disaster specific problems of agricultural production and rural social welfare. After all it is they who bear the burden in terms of losses and deprivation and therefore tend to have much basic knowledge on practical aspects of such disasters. What is more, such

participation is fundamental for any effective implementation of rural plans geared to alleviate adverse effects of disasters. What if grand plans are designed but rural peasants and farmers decide for one reason or the other to accelerate their drift to the towns in search of a more secure livelihood? What if plans are made and farmers decide to curtail output? These would seem to defeat the very purpose of the plans. It is through this grass-roots-oriented incorporation that impinging problems, needs, etc., of the rural population could be felt. Their non-resolution tends to produce plans that really don't work since they lack a supportive base.

5. Physical planning allocation (manpower, technological content for building and construction and other infrastructure, engineering requirements, maintenance, etc.) On the basis of likely occurrences, the use of cost/benefit allocation criteria could be set for establishing appropriate infrastructure in already settled areas, or programs could be launched to settle the population in "safe agricultural settlement areas" which are spatially secure from the effects of natural disasters. Naturally, resource availability, including the availability of public funds, engineers, architects, meteorologists, physical planners, etc., will be an important constraint to many countries. This, however, does not affect the principle with which we are concerned.

6. A system of co-ordination of various disaster-mitigating projects and feedback mechanisms involving technocrats active in the projects, central planners, and the population so that there could be a meaningful functional interaction among these as part of the overall planning process.

In the case of floods what seems basic are the erection of storage systems to hold excess water. These should then have irrigational links with other key agricultural areas. Conversely, to avoid droughts in dry seasons water could be made available as necessary. In the case of hurricanes, earthquakes and volcanic activity, planning to mitigate effects could be more formidable, even though with adequate forecasting facilities and warning techniques some losses could be avoided. In such instances, it should be noted in passing, floods tend to be the most important single source of destruction.

With some plan mounted to deal with controlling the effects of natural disasters, the following clear-cut advantages are possible:

Greater agricultural stability and output since production disruptions are likely to be less marked. What is more, agricultural producers will be inclined to produce more and invest more in long term im-

provements when fear of economic losses in their means of livelihood is reduced.

Reduction of rural poverty as a result of greater availability of food supply may be anticipated.

Greater economy in the use of agricultural technology could be exercised, *e.g.* fertilizers, pesticides, farm machinery etc. could be employed to best advantage since their use could be rendered more rational.

Higher foreign exchange earnings, on the assumption of given unit prices for agricultural exports; and reduced balance of payments problems partly as a result of reduced food imports (*i.e.*, import substitution since unobtainable domestic food is now obtainable).

Ability to plan the process of industrialization and development more successfully. Consider a multi-sectoral plan with reasonably assured input supplies, *i.e.* agricultural raw materials to manufacturing production; consider alternatively a flow relationship in which it is difficult to ascertain supplies. It is clear that the latter is inclined to produce major bottlenecks as far as the economy's production matrix goes.

Given the role of agriculture in macro-economic activity, the foregoing results will help to put the economies affected, into a more healthy stage of development. The benefits of this could then be translated into greater social welfare, under favorable distributional assumptions.

The question of planning could also help in increasing collaboration among developing countries concerned with natural disaster mitigation. This could result in forms of economic and scientific cooperation since economies could be reaped as a result of "resource pooling."

It could also provide a meaningful avenue for developed economies with expertise in areas of mutual concern—like Holland's with flood control—to render assistance to developing countries in specific areas of technological interest. The same is true of international agencies, for they can play a major role in promoting the necessary international climate through which resources could be mobilized and action taken to increase the viability of Third World agriculture via direct disaster control measures.

V

CONCLUDING REMARKS

THE FOLLOWING CONCLUSIONS emerge from this exploratory study:

Natural disasters tend to exert a major negative impact on Third

World agriculture affecting in important ways the attainment of self-sufficiency in a number of hard core disaster prone countries.

Because of this there is need for Third World countries concerned to incorporate planning for disaster control in national agriculture plans. This would tend to provide a rational framework with which to effectively deal with the problem.

On the question of controlling the effects of natural disasters, there is immense scope for forms of technical and economic co-operation among Third World countries to attempt to resolve problems of common concern.

There is need for international agencies, given the scarcity of resources in Third World countries and the magnitude of the problem, to take a more active role in controlling the effects of natural disasters in low income countries.

This, of course, should not divert interest from other factors of a social and political character—like land reform, for instance—which go an important way toward mitigating problems of hunger, starvation and dispossession in the Third World. But because the problem is many-sided, we should not continue to deal inadequately with the physical aspect of it.

The case for Third World countries concerned with incorporating planning for disaster control in their national development plans would appear to provide a rational institutional framework with which to deal with the problem, given the role of agriculture in the overall development of such countries.

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1. United Nations Food and Agricultural Organization, *Preliminary Assessment of the World Food Situation, Present and Future* (Rome: FAO, 1974), p. 2.

2. *Ibid.*

3. *Ibid.*

4. *Ibid.*

5. See K. Westgate and P. O'Keefe, *Some Definitions of Disaster* (Bradford, Eng.: University of Bradford Disaster Research Unit, 1976). The UNESCO data on the number of disasters in 1969 included tsunami 5; storm surge 7; and volcano 25. See *Annual Summary of Information on Natural Disasters 1969*, UNESCO, Paris, 1971. The compilation of disasters by region included a category for all other regions, 15, *loc. cit.*

6. The ECOSOC list included hurricanes 10; floods 58; earthquakes 19; volcanic eruptions 3; droughts/famines 8 and epidemics 6. By regions: Asia 46; Africa 22; Middle East 20; Europe 13; Americas 11. See United Nations Eco-

nomic and Social Council, *Assistance in Cases of Natural Disasters: Comprehensive Report of the Secretary-General*, Document E/4994 (New York: UN, 1971).

7. USAID, *Disaster Emergency Relief: 11th Report 1972*, Washington: 1973.

8. Center for Short Lived Phenomena, *Annual Report 1971* (Washington: Smithsonian Institution, 1972).

9. J. Dworkin, "Global Trends in Natural Disasters 1947-73," (Boulder, Colo.: University of Colorado Working Paper No. 26, 1974).

10. Catholic Relief Services, *Narrowing the Gap* (New York: 1974).

11. The data included 21 disasters in other places than the world's principal regions. See D. C. Stanissis, *Disaster Analysis* (Geneva: United Nations Disaster Relief Office, 1972).

12. The breakdown according to type was: floods 127; earthquakes 43; cyclones 25; epidemics 9; famines 8; droughts 7; volcanoes 3. Stanissis, *op. cit.*

13. Dworkin, *op. cit.*

14. See *The Protection of Human Settlements* (Geneva: UNDRO, 1976).

15. Data from UNDRO.

16. *Ibid.*

17. *Ibid.*

18. Developing countries which are full members of the Commission are Afghanistan, Bangladesh, Bhutan, Burma, Cambodia, China, India, Indonesia, Iran, Republic of Korea, Laos, Malaysia, Mongolia, Nauru, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Tonga, South Vietnam, Western Samoa. Associate members are British Solomon Islands, Hong Kong, Papua New Guinea, Brunei, Cook Islands, Fiji, Gilbert Islands, Trust Territory of the Pacific Islands and Tuvalu.

19. Data from UNDRO.

20. All data on the Bangladesh floods are drawn from *A Report on 1974 Flood Damages* (Bangladesh: National Planning Commission, 1974).

21. Speech to the Guyana Parliament by Finance Minister Frank Hope, January, 1977.

22. The author has no data bearing on the spokesman's assertions.

23. The observations on China are drawn largely from personal conversations with Neville Maxwell of Queen Elizabeth House, Oxford, who recently conducted research work there. They will need to be tested against rigorous empirical evidence on costs, timing, the implementation of disaster relief programs, statistics on the decline of natural disasters following the execution of the programs, data on program failures, etc.

Justice for Homemakers—The Babson Bernays Award

AMONG THE FRIENDS of the *American Journal of Economics and Sociology* are two very special ones, Doris Fleischman Bernays (who was a reporter and editor on *The New York Tribune* when I was breaking in as a member of the news staff of *The New York Times*) and her husband and professional partner, Edward L. Bernays, widely known as "the father of public relations." This makes it a particular pleasure to call to the attention of the social scientists and other scholars who constitute this *Journal's* readership the award which the Bernayses are offering through the Edward L. Bernays Foundation and Babson College.