How to Measure the Cost of Natural Disasters?
The Case of 'El Niño' in Ecuador, 1997-8

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The natural phenomenon of 'El Niño' is a regularly returning change in temperatures of the Pacific Ocean provoking temporal climatic change around the world. Along the South American coast changes are felt in the form of extremely heavy rainfall causing floods and landslides with disastrous consequences. Because they live in poorer housing and tend to have less access to protective infrastructure, such disasters often hit hardest on the poor.

The occurrence of El Niño in Ecuador in 1997-8 took the lives of at least 286 people. Some 30,000 persons lost their homes and forced to rely on families, friends or camps to survive (Vos, Velasco and De Labastida 1998). A much larger share of the population was affected by income losses as they saw their agricultural lands flooded or went without employment due to stagnation in economic activity. About a quarter of the total population was severely exposed to increased health risks related to floods and damage to sanitary infrastructure, and the consequent spread of infectious diseases such as malaria, diarrhoea, and cholera.

In contrast to many other natural disasters, El Niño came pre-announced. Early in 1997 it was clear that with large probability the phenomenon would set in around the month of November and cause extremely heavy rainfall with all the related consequences. Lessons had been learned from its previous appearance in 1982-3. A contingency plan was ready in July 1997 and a state of emergency was declared at that same point in time, some four months before the first symptoms announced the actual arrival of 'El Niño'. The Ecuadorian authorities had established a budget of US$ 318 million for emergency relief and reconstruction, of which US$ 231 million was in the form of loans from multilateral agencies and related counterpart funds.

The paradox of the situation was that while the Ecuadorian authorities seemed to have felt better prepared than ever (the event of 1982-3 took them by surprise), preventive action and the preparation for rehabilitation and reconstruction proved surprisingly ineffective. A broader study on the effects of 'El Niño' in Ecuador (Vos, Velasco and De Labastida) concluded that the authorities had not really learned from the previous experience and had failed to adequately distinguish between the different types of risks associated with the

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phenomenon or to identify the degrees of vulnerability of such risks to different parts of the population. Their approach to risks remained remarkably general and untargeted. The Contingency Plan identified a total of 6.5 million people at risk, that is 57 per cent of the total population, without any elaboration on how to respond to the different types of impacts of El Niño: on, for example, destroyed houses, loss of income and production, and increased health risks.

Were authorities simply negligent, or is it in fact difficult to measure the costs and impact of natural disasters and identify *ex ante* which population groups will be hit the hardest? The answer probably combines a bit of both. While somehow prepared to deal with the disaster, both political factors and the always remaining uncertainty of where and how severely the natural disaster will strike may underlie the lack of effective and targeted action. At the same time, there are important methodological problems associated with assessing both the economic costs and the vulnerability of areas and populations to the consequences of weather shocks like ‘El Niño’.

These issues seem to be recurrent problems, such that in the literature one has come to speak of a typical ‘pathology’ of policies to encounter natural disasters (e.g. Noll 1996 and Albala-Bertrand 1993). This pathology would consist of three elements:

- There is an incapacity to balance cost and benefits of the disaster or to discriminate between types of risks. This often appears to the result of a felt political need to exaggerate the problem. This may be motivated, for instance, by attempts to maximise international financial support or to blame other domestic policy problems on the natural disaster. In Ecuador, the country’s problems with maintaining macroeconomic stability, declining oil prices (the country’s major export product) and elections held in May and July 1998 may have contributed to a possible exaggeration of the economic costs of ‘El Niño’. As we shall see, official estimates of the economic costs of El Niño, based in part on a study by CEPAL (1998), run as high as 15 per cent of GDP. In this study we argue these are much lower, i.e. around 2.7 per cent of GDP.

- There is a policy tendency to invest little in protection and prevention and to concentrate action on immediate emergency relief. The contingency plan of the Ecuadorian authorities also seems to reflect this approach. Some preventive action to contain health risks through application of insecticides to stop malaria and immunisation campaigns to better protect children was taken. No measures were developed to protect or compensate the heavily affected farmers and agricultural workers. Yet the experience of 1982-3 did not lead to substantial investment in (re)construction of infrastructure to reduce vulnerability to a rehearsal of events. The heavier impact is felt there where the main risk determinants, such as lack of adequate sanitary infrastructure or river control and flood protection, are most deficient.

- There is a scepticism in policies to inform and be informed adequately about the real costs of damages and to evaluate the effectiveness of actions taken to mitigate the effects of the disaster. Neither was there any serious ex-post evaluation of the impact of El Niño in 1982-3, nor were adequate information systems put in place to monitor the socio-economic impact of the disaster. Public policies in general are hardly subject to such evaluations.
Such criticism is easily voiced with hindsight, but what does it mean to say ‘the impact has been exaggerated’ or ‘there has been under-investment in protection and prevention’? Do we have straightforward methods to measure economic costs? Should governments invest heavily in protective infrastructure to minimise damage of a next, uncertain occurrence of ‘El Niño’?

The objective of this paper is to raise some of the underlying methodological questions and the consequences for making policy choices. Reference will be made to how, at least, some of these questions were dealt with in the few studies on the economic and social effects of ‘El Niño’ in Ecuador in 1997-8 (CEPAL 1998 and Vos, Velasco and De Labastida 1998). In this paper, I will deal mainly with the issues of measuring damages and income losses and with assessing which population groups appeared most affected. For the innovative methods on assessing health risks, see Vos, Velasco and De Labastida (1998). For other recent studies trying to understand the impact of natural disasters and looking for ways in which to cope with them, see, for example, Vosti (1999) on El Niño, and Barahona et al. (1999) for the effects of Hurricane Mitch in Central America.

The Economic Effects of Natural Disasters: At What Cost?

Methodological considerations

‘It’s because of “El Niño”’, is an often-heard explanation in many parts of the world for the occurrence of abnormal climatic conditions during 1997 and 1998. While a known natural phenomenon, it is not always clear to what extent heavy rainfall and flooding or prolonged periods of draught observed around the world can be attributed to ‘El Niño’. Precise indications of the deviation from normal conditions are not always available, either.

What is the appropriate benchmark?

In the case of Ecuador, the inclement weather conditions and subsequent floods and landslides that affected most of its coastal regions during 1997-8 were undoubtedly related to the ‘El Niño’ – a phenomenon which occurs at intervals of between seven to fifteen years. Yet roads, bridges and drinking water systems suffer annually from some degree of damages during the normal rainy season and agricultural producers are usually unable to harvest a portion of their crops when rural roads are impassable. Since there are no good records of what these ‘normal’ damages might be, it is difficult to measure how much of the destruction in 1997-8 was specifically caused by ‘El Niño’. Furthermore, some areas were more heavily affected than others, though not necessarily because rainfall was heavier, but because of greater deficiencies in existing infrastructure. Similarly, other areas were less affected by increased health risks because of higher immunisation coverage and better sanitation systems. This raises the issue of vulnerability whereby some areas and population groups may be more at risk from ‘El Niño’ than others. It also raises the issue of how to measure costs. Should damages be valued at the costs of restoration to
the pre-El Niño condition or at the costs of reconstruction which would give better preventive protection?

_Uncertainty regarding El Niño and vulnerability_

Studies of natural disasters are inherently complex and have to deal with important methodological problems. The first is the uncertainty regarding El Niño. Despite the general predictability of the El Niño phenomenon, a considerable degree of uncertainty still remains regarding how, when and to what degree it will affect areas of potential risk. Yet in the case of recurring disasters such as El Niño, much can be learned from past experiences to help identify the types of risks attached to the phenomenon and the different degrees of vulnerability of geographical zones and population groups likely to be affected. Such an analysis would be indispensable to plan preventive action and to monitor the impact. Unfortunately, such lessons from the past are not often drawn and adequate monitoring systems are lacking. This clearly applies to Ecuador’s way of coping with El Niño.

_How to assess the costs?_

The potential for exaggerating the costs of El Niño is great and may be logical for political reasons. It suggests the need for good baseline or benchmark indicators so that one can easily assess the losses and damages provoked by the natural disaster. But what costs and what benchmarks are we looking for precisely? Several problems are at stake here.

- One is the choice of an appropriate benchmark. If one is interested only in the cost associated with the natural disaster one should be able to (a) distinguish between the damages caused by the disaster and (b) the ‘normal’ depreciation of capital stock (infrastructure), production levels or health risk situations. In particular, what should be considered the ‘normal’ situation in areas subject to other weather and exogenous shocks? Comparison with a previous year or an average year may not be adequate. Another important consideration is how to value damage to natural and physical capital stock, output losses and foregone earnings. This is not just a technical issue, but one linked to policy objectives. For instance, damage to infrastructure could be valued at the cost of full reconstruction, making it better than before. This makes sense from a developmental point of view. However, it may also be subject to political economy problems. If roads and bridges are in bad condition to begin with, then a natural disaster may be blamed for poor investments in the past. Thus costs due to a natural disaster may be ‘exaggerated’ and this ‘political economy of natural disasters’ (see for example, Alba-la-Bertrand 1993; Noll 1996) may easily lead to misguided disaster-relief policies and ill-advised foreign assistance programs. However, if the main policy objective is to achieve developmental reconstruction of the affected areas, such valuation of resource needs may well be justifiable, as long as it is clear these are distinct from the precise damages caused by a natural disaster.

- One has to distinguish between direct and indirect losers. Farmers may have lost a harvest as a direct consequence of El Niño, but consumers and agro-
industries may be indirect losers as food prices may have increased and/or supply of inputs may have stagnated. The analysis of identifying direct and indirect effects is further complicated by market responses to the natural disaster, for example, farmers may find some compensation for output losses through higher food prices, and transporters affected by damaged roads through higher freight fees. The analysis of indirect costs require an analysis of the input-output links and the absolute and relative price effects by which production losses in one sector spill over to others. To do this properly, a general equilibrium model would be required, which is an exercise generally beyond the scope of most studies dealing with the impact of natural disasters.

- In addition, one has to distinguish losses from delays. In agriculture, for instance, losses are associated with labour that goes idle and output of crops that is not harvested. There are delays if sowing and harvesting are postponed in response to a natural disaster such as El Niño.

- The previous two points hint at a more general problem related to cost assessments which is how to account for market responses and actions taken by the potentially affected population before, during and after the disaster? How well did labour markets perform during the disaster? For instance, did agricultural workers that (temporarily?) lost their jobs because of the floods manage to find employment in other sectors or regions? How did producers respond to spreading the production process (for example, delaying sowing or harvesting) and could they thereby effectively reduce potentially foregone earnings? To what extent could transporters compensate potential losses because of the damaged infrastructure and losses in freight by raising transport costs? Who paid the price for this adjustment? Such effects on actual costs and their distribution may be very difficult to account for without in-depth analysis.

- Finally, what prices should be used to value damages? The evaluation of costs (and benefits!) from weather shocks like El Niño eventually boil down to price times quantity calculations. Price may have been adjusted as a consequence of the natural disaster (see above) and therefore may not adequately reflect costs under ‘normal conditions’. Should one take going domestic market prices (say, just before the shock) or rather use world market prices as the shadow price? For capital losses, what discount rate should be used to estimate the present value and the opportune cost of investment in repair and reconstruction? As indicated, a further issue here is whether to value at the depreciated cost of assets, their replacement value or the value of improved, more adequate assets (better roads, more solid bridges and better quality housing)?

The task for analysts is to make explicit the underlying methodology and assumptions. Which valuation is the more appropriate depends, however, to a large extent on the policy objectives one has with the desired response to the natural disaster.
Estimated Economic Costs of El Niño in Ecuador, 1997-8

The cost-measurement problems listed above are compounded when these have to be faced while the natural disaster is still active, but quick cost estimates are needed to mobilise the necessary resources for (foreign) assistance and repair. Studies by the government (Central Bank 1998), CEPAL (1998) and Vos et al. (1998) all had to face this problem. Unsurprisingly, cost estimates differed vastly. Table 1 summarises the aggregate costs estimates of these studies.

Table 1: Estimation of the overall direct costs of the damages caused by the phenomenon of ‘El Niño’, 1997-8 (values in millions of US dollars)

<table>
<thead>
<tr>
<th>Economic Sectors</th>
<th>Official sources</th>
<th>CEPAL</th>
<th>Vos, et. al.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>2,425.4</td>
<td>2,123.5</td>
<td>540.2</td>
</tr>
<tr>
<td>Farmers-owners</td>
<td>1,519.9</td>
<td>966.0</td>
<td>182.3</td>
</tr>
<tr>
<td>Agricultural workers</td>
<td>-</td>
<td>-</td>
<td>50.8</td>
</tr>
<tr>
<td>Domestic traders</td>
<td>-</td>
<td>-</td>
<td>73.9</td>
</tr>
<tr>
<td>Livestock</td>
<td>5.5</td>
<td>11.5</td>
<td>7.7</td>
</tr>
<tr>
<td>Livestock farmers-owners</td>
<td>-</td>
<td>-</td>
<td>2.4</td>
</tr>
<tr>
<td>Wage-earners in livestock</td>
<td>-</td>
<td>-</td>
<td>2.7</td>
</tr>
<tr>
<td>Shrimp farming</td>
<td>-</td>
<td>0.1</td>
<td>7.5</td>
</tr>
<tr>
<td>Fishing</td>
<td>0.0</td>
<td>42.3</td>
<td>12.4</td>
</tr>
<tr>
<td>Traditional fishing</td>
<td>-</td>
<td>-</td>
<td>12.4</td>
</tr>
<tr>
<td>Industrial fishing boats</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Manufacturing (agro-industry)</td>
<td>-</td>
<td>165.7</td>
<td>15.9</td>
</tr>
<tr>
<td>Tourism</td>
<td>-</td>
<td>88.0</td>
<td>88.0</td>
</tr>
<tr>
<td>Commerce</td>
<td>-</td>
<td>36.3</td>
<td>*</td>
</tr>
<tr>
<td>Transport, infrastructure</td>
<td>900.0</td>
<td>786.8</td>
<td>204.4</td>
</tr>
<tr>
<td>Damages to infrastructure</td>
<td>900.0</td>
<td>97.7</td>
<td>204.4</td>
</tr>
<tr>
<td>Income losses to transporters</td>
<td>-</td>
<td>689.1</td>
<td>*</td>
</tr>
<tr>
<td>Energy and electricity</td>
<td>-</td>
<td>19.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Urban infrastructure</td>
<td>-</td>
<td>7.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Social Sectors</td>
<td>434.1</td>
<td>540.0</td>
<td>91.1</td>
</tr>
<tr>
<td>Housing</td>
<td>15.0</td>
<td>152.6</td>
<td>35.5</td>
</tr>
<tr>
<td>Damages to construction</td>
<td>-</td>
<td>43.4</td>
<td>21.1</td>
</tr>
<tr>
<td>Loss of household goods</td>
<td>-</td>
<td>109.2</td>
<td>14.3</td>
</tr>
<tr>
<td>Health and sanitation</td>
<td>13.0</td>
<td>36.2</td>
<td>35.5</td>
</tr>
<tr>
<td>Education</td>
<td>75.0</td>
<td>20.1</td>
<td>20.1</td>
</tr>
<tr>
<td>‘Emergency aid spending’</td>
<td>331.1</td>
<td>331.1</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>2,859.5</td>
<td>2,663.5</td>
<td>631.2</td>
</tr>
<tr>
<td>Total costs as % of GDP</td>
<td>14.6</td>
<td>13.6</td>
<td>3.2</td>
</tr>
</tbody>
</table>


*Not available
Vos, et al. (1998) estimated the overall, direct costs caused by El Niño of 1997-8 in the economic and social sectors of the affected regions at US$ 533 million dollars, that is 2.7 per cent of the projected GDP of 1998. This estimate is very different from those produced by the Ecuadorian authorities and a study by CEPAL conducted in June 1998 (CEPAL 1998). Those estimates suggest that the costs may be as high as US$ 2,700 million which would be the equivalent of around 15 per cent of GDP.

Estimation methodologies were clearly different. The study by Vos et al. (1998) suggests that the official estimates tended to exaggerate actual costs, possibly for some of the reasons labelled as the 'pathology of natural disaster politics'. The studies mentioned mainly cover direct costs in terms of foregone earnings and discounted investment costs of damaged infrastructure and other capital losses. The CEPAL study includes a limited definition of indirect costs. That is, it does not measure indirect costs in the full input-output sense, but estimates more sector-specific costs related to production or capital losses. Such costs include, for example, those of imported agricultural inputs which otherwise could have been obtained domestically, additional operations costs and foregone earnings of transporters as a consequence of damaged infrastructure, and the cost of damaged furniture and belongings of those that suffered damage (capital loss) to their homes. Except in the case of transport (see table 1 and below), the direct costs are nevertheless by far the major component of the estimates of total damages in the CEPAL study.

The studies also shared the problem of having to estimate costs while the natural disaster had not yet fully subsided. Hence, not all cost are derived from direct observation, but rather from a vulnerability analysis or expected risk of damages.

The details of the estimates of the economic costs of El Niño will not be discussed here (see Vos, Velasco and De Labastida 1998). Rather, I will highlight the two major cost components (agricultural income losses and damages to the road infrastructure) to illustrate how divergent the methodological problems discussed above can be dealt with in practice with obvious important consequences for policy action.

Agricultural income losses

Agriculture was, next to roads and transportation, a main economic sector that suffered damages from the El Niño event (Table 1). Even though all the effects had not become visible by June 1998, total expected net losses, valued in terms of foregone earnings, have been estimated at US$ 112.3 million (or 4.7 per cent of agricultural GDP and 0.6 per cent of total GDP). While substantial, these losses are considerably lower than those of the CEPAL study conducted around the same time. CEPAL estimated damages in agriculture as high as US$ 966 million which would be the equivalent of 37.6 per cent of agricultural GDP and 4.8 per cent of total GDP. Differences in identifying the areas actually flooded and differences in valuation methodology largely explain the discrepancy. The lower estimate in the Vos study is in part due to greater precision in identifying the areas actually flooded at an adequate level of topographic detail (with lowest interval at 0-5 meters of altitude), and in identifying the agro-ecological zones by actual and potential land use (Vos, Velasco and De
Labastida 1998: section 2). The CEPAL study (and with it official estimates) comes to a much broader identification of vulnerable areas (roughly, at the provincial level), thereby overestimating the amount of agricultural land actually affected and the concomitant production losses.

In addition, there are important valuation differences. Foregone earnings in the Vos study have been valued in terms of value added, rather than total production costs as in the CEPAL study. In effect, most annual crop production (and harvesting) was delayed and thus did not incur much of the intermediate input costs. Furthermore, 'pre-El Niño' off-farm and market prices are used. Prices are differentiated by the 'normal' market orientation of the produce (domestic or external). In contrast, the CEPAL study applied export prices for most crops, even if exporting the crop did not represent a realistic opportunity cost. These methodological differences are detailed further in Vos, Velasco and De Labastida (1998: Annex 1).

Another difference is that the Vos study accounted for some important benefits to agriculture and fishing brought by El Niño. For some agricultural crops more rainfall in normally dry areas yielded productivity increases. The most noticeable gains were observed, however, in (on-land) shrimp farming. Damages to the fishing pools were limited and warmer waters allowed for substantial productivity gains due to increased natural larva production.

Finally, greater detail in identifying vulnerable agricultural zones matched to data on actual and potential land use, land distribution, and poverty data allowed the Vos study not only to identify production losses by crops and areas, but also to single out which socio-economic groups were most affected and to define what has been the expected impact of El Niño on rural poverty. See Table 1 for the aggregate cost to different rural agents. The main losers in terms of agricultural income losses appear to be the self-employed farmers and traders of rice, corn, and coffee and agricultural wage labourers in banana and sugar cane plantations. Policy action would have to be differentiated by the varying production and employment conditions of these affected groups. The official approach and the CEPAL study only show production losses by crop at the provincial level, which to say the least, seems incomplete as a basis to target compensatory action or to focus incentive and investment policies to recover production and reduce agricultural vulnerability.

**Damages to roads: which benchmark?**

According to the Vos study, the transport sector (roads, bridges) is the single most affected sector (US$ 204 million), followed by the agricultural sector (US$ 167 million). The estimated costs are based on the direct cost of restoring infrastructure to its state before the natural disaster and the income (value added) losses incurred by production sectors due to floods and subsequent damages to crops, livestock and other production.

El Niño left the coastal road infrastructure in poor condition, but then much of the road system was in bad shape to begin with. Many transportation connections over land consist of unpaved secondary and tertiary roads (some 9,000 km) which are locked out for weeks or even months during the normal rain season as well. The main road system (some 2,500 km) suffered some severe damages, but only on a limited number of specific spots. On the basis of own
fieldwork, Vos et al. assessed that only some 60 kilometres required complete reconstruction, while some 400 km are in need of partial repair. Ten bridges have fully collapsed and the cost of rebuilding these constitute about half of the estimated damages to the road system.

Official estimates indicated far larger damages to the transport sector. These would seem to assume that the entire main road system was virtually destroyed as a consequence of El Niño. A visit to the area would quickly prove otherwise, and, as indicated above, the roads are poorly maintained as a rule. The study by CEPAL (1998) recognised this and came to a lower estimate of the actual damages to infrastructure (US$ 97.7 million). CEPAL underestimated, however, the cost of rebuilding the collapsed bridges. On the other hand, a large amount of ‘indirect’ costs was seen to be incurred by the transport sector in the form of higher operational costs and losses of cargo by transport operators. Our own fieldwork and interviews with transporters suggested that vehicles indeed operated at higher variable costs and some shipments had to be foregone. Yet all (main) roads remained accessible during the period of the disaster and prices were raised to make up for the increase in operational costs. Though it is not clear overall how much loss in income was actually incurred by the transport sector, it is not likely anywhere near the magnitude of US$ 689 million (3.5 per cent of GDP!) as suggested by the CEPAL study.

These numbers are of quite some political importance. Political forces in the Costa are particularly keen on getting large budgets for reconstructing infrastructure in the region. CEPAL’s numbers for total damages to the transport sector have already been misinterpreted as representing the need for restoring infrastructure, while in fact CEPAL suggested that most costs represented income losses to transporters. Another important point to raise here is that thus far the authorities have failed to recognise that roads and bridges were in bad condition to begin with. There may be good reason to think about reconstructing the entire road system in the coastal areas which makes more economic sense and would provide better protection against future disasters such as El Niño (see Vos, Velasco and De Labastida 1998: section 5.4). Nevertheless, such a plan should consider current problems of political corruption that is affecting adequate construction and maintenance of infrastructure. Insiders at the Ministry of Public Works have indicated, among other things, that the collapse of many bridges could have been avoided if these had been constructed with better foundations. While financially feasible within the available budgets, such has not happened because of the huge ‘commissions’ paid to public officers out of those budgets. In every new cycle of El Niño, the same bridges usually collapse again.

**Macroeconomic consequences?**

The direct economic costs of El Niño to agriculture and transportation infrastructure thus appear to be substantial enough to affect macroeconomic indicators. Clearly, the natural disaster came at a bad moment. The most serious attempts to date towards macroeconomic stabilisation of the Ecuadorian economy in the mid-1990s (see Jácome, Larrea and Vos 1998; Vos 1999) had been already heavily tested by the strong drop in oil prices in 1997. Oil is the country’s main export product and oil revenues have a strong direct impact on
the fiscal balance and the overall growth rate. Estimates for economic growth suggest a drop in GDP over the first two quarters of 1998 to 0.6 per cent, down from 2 per cent growth achieved in the first half of 1997. Overall growth for 1998 was 2.2 per cent, somewhat below the average rate of the 1990s (2.7 per cent). Overall inflation reached 34 per cent per annum in July 1998, up from 30 per cent for 1997.4

It is difficult to trace the precise impact of El Niño on these macroeconomic indicators due to the presence of other external shocks. The fiscal deficit has increased in the first half of 1998 due to a further drop in oil prices and a loosening of spending controls in face of the presidential and congressional elections held in May. This may have caused the additional inflationary pressure as much as the drop in the supply of agricultural products. Central Bank data indicate a fall in agricultural GDP by 1.3 per cent in the first two quarters of 1998 compared to the first half of 1997. Output also fell in the oil and construction sectors, but in contrast other sectors like transport (!) and electricity showed an increase in their rate of growth despite of the presence of El Niño, while the growth impact on other urban sectors seems to have been minor.

A major consequence of El Niño in 1982-3 was a steep rise in food prices. This has not occurred in 1997-8. Food prices rose from 35 per cent at the end of 1997 to 43 per cent in July 1998 (annual rates), but far from the dramatic increase observed in the previous decade. This may confirm that the agricultural damages were not as big as suggested by the estimates of the Ecuadorian authorities and CEPAL. One should add, though, that timely increases in imports of basic food crops such as rice and sugar have weakened the upward pressure on food prices. Furthermore, there has been no apparent major impact on the urban economy. The urban population has suffered from a rise in food prices, but this rise has been far from dramatic. Fully comparable data on urban employment were not available by June 1998. Yet two different labour force surveys held in November 1997 and April 1998, respectively, indicate that urban unemployment did not increase in that period and may even have dropped slightly.5

In all, there is sufficient reason to believe that the government may be overestimating the actual costs of the economic damages caused by the El Niño phenomenon. In the Vos study, a more precise analysis of agricultural income losses in particular was conducted. However, this study also has its limitations, as (a) no actual impact study could be conducted, but only a vulnerability study leading to estimates of expected losses, and (b) no full account could be taken of indirect and general equilibrium effects of the type previously suggested. The indicated macroeconomic outcomes suggest nevertheless that the economic costs of the Vos study seem more plausible. However, the policy response may simply not wish to account for the ‘actual’ cost of the damages, but would rather calculate what would be needed for reconstruction for enhanced development and future protection.

**Policy Considerations**

What should the response to natural disasters like El Niño be? What objectives should be pursued in disaster relief actions? During and immediately after the
disaster there is the need for emergency action to save lives, evacuate people from flooded areas and provide them with shelter and food, health interventions to prevent outbreak of epidemics, and so on. After the event, what can and should be done to compensate those that suffered most and what by way of preventive action in the case of future occurrences? Though we recognise that El Niño is a recurring event, there will always remain the uncertainty of knowing when, where and how it will cut a swathe of disaster.

How should losses be compensated and what preventive action should be taken? These policy questions refer back to the methodological issues raised earlier regarding the problem of assessing the costs of a natural disaster; they will have to be framed with a clear view of the objectives that are to be achieved. Finally, given the recurring nature of El Niño, the question could be raised whether much more should be invested in preventive action and insurance schemes to protect families and workers from the costs they may suffer in the future.

The Ecuadorian authorities showed early concern with the potential dangers posed by El Niño (see Vos, Velasco and De Labastida 1998). However, emphasis was on emergency relief. The process of elaborating of plans for reconstruction has been fraught with political conflicts and administrative coordination problems. In Ecuador one can also see shades of what was labelled as the ‘pathology of policy responses to natural disasters’ in that:

- authorities and politicians, probably with an interest to mobilise more foreign aid and political gain, seemed to have overestimated the actual costs of the damages;
- in considering the experience with a previous severe episode of the El Niño phenomenon, there appears to have been little interest in planning preventive action and durable protection against the disaster; insufficient preventive investment was undertaken after the El Niño-related disaster of 1982-3; most of the same areas were affected and the same type of damages occurred in 1997-8;
- confusing official reports about the actual costs were a result of inadequate information systems to diagnose problems and to monitor and evaluate public action; timely and desegregate data with regard to, in particular, agricultural vulnerability and health risks were difficult to obtain; and authorities neglected to improve information systems.

The pressing strategic policy question remains whether to concentrate on disaster relief (beyond emergency assistance) or on development investment. How much should one spend on repair and restoration (of roads, houses and agricultural lands) to bring disaster areas back into their state prior to the disaster, or should one focus on reconstructive investment oriented at reducing vulnerability and enhancing development in general? In the latter case, relocating the populace away from vulnerable areas and reorienting economic activities are options to be considered. Time and cost dimensions will be important here as development investment takes time and resources may be limited to meet structural needs in all affected areas.

The findings and, hence, the policy recommendations of this study depend to a considerable extent on an analysis of the probability of being affected by El Niño through the study of risk factors and identification of vulnerable areas.
and population groups. Ecuador lacks adequate and timely monitoring systems to capture the actual impact on incomes and health status during and shortly after the main symptoms of the disaster have disappeared. Hence a complete evaluation of the full impact of the disaster has yet to be made. It is important that this be done.

The main study produced on the effects of El Niño of 1982-3 was a report by CEPAL (1983) in February 1983 when the natural phenomenon was still in full force. No further serious ex-post evaluation has been produced. The country will again be ill-prepared for the next return of El Niño if an ex-post evaluation is again lacking for the 1997-8 event. Such a study could also test the adequacy of the vulnerability analysis applied in the present study as a tool for preventive action in the face of expected new natural disasters. It may be more important, however, to set priorities and target overall development policies in agriculture, health and infrastructure in Ecuador’s vulnerable coastal region.

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**Notes**

1. This paper discusses some of the methodological aspects of a broader study on the economic and social effects of ‘El Niño’ in Ecuador. The extensive report (see Vos, Velasco, and De Labastida, 1998) was prepared for the Inter-American Development Bank (IDB). The views and opinions expressed in this paper are entirely those of the authors and do not necessarily coincide with those of the directors and managers of the IDB or of the governments of its member states.

2. The phenomenon El Niño should not be confused with the ocean current ‘El Niño’ which brings warmer seawater to the coasts of Ecuador and Peru each year around Christmas, and retreats back to the coast of Mexico around April. This period marks the rainy season. The phenomenon of El Niño originates in waters near Indonesia. It returns with a regularity of about once every seven years, but with a maximum delay of 15 years. The previous occurrence with heavy impact of the phenomenon El Niño in Ecuador was in 1982-3. When referring to ‘El Niño’ in this study it is meant to refer to ‘the phenomenon’. Useful websites on El Niño include, for a description of the phenomenon: http://rossby.cdc.noaa.gov/ENSO/ensd.description.html; and, for a comparison of recent El Niño events: http://www.cdc.noaa.gov/~kew/MEI/mei.html.

3. See, for instance, the August 1998 report by the Coordination Unit for the Emergency Program to encounter the phenomenon El Niño (COPEFEN 1998: 16) which refers to the CEPAL study, but ‘re-interprets’ the cost to the transport sector as being damages solely to road infrastructure.


5. Both the regular urban employment survey of INEC (November 1997) and a new urban labour force survey conducted by the Universidad Católica de Quito (April 1998) report an
open unemployment rate in the major cities of around 9 per cent. The CEPAL study (CEPAL 1998) and official reports (e.g. COPEFEN 1998) also cite these surveys and report a steep increase in urban unemployment (to around 17 per cent). This outcome was based, however, on the provisional, unpublished data from the April 1998 survey, where an error was made to classify housewives not actively seeking work as unemployed. After correction of this error, the open employment rate in the major cities is given at about 9 per cent in April 1998, which is somewhat below the rate observed in November 1997.

References


