odi Overseas Development Institute

THE ECONOMIC IMPACT OF NATURAL DISASTERS IN THE PHILIPPINES

Working Paper 99

Results of ODI research presented in preliminary form for discussion and critical comment

ODI Working Papers

37: Judging Success: Evaluating NGO Income-Generating Projects, *Roger Riddell*, 1990, £3.50, ISBN 0 85003 133 8

54: Environmental Change and Dryland Management in Machakos District, Kenya: Population Profile, *Mary Tiffen*, 1991, £4.00, ISBN 0 85003 164 8

55: Environmental Change and Dryland Management in Machakos District, Kenya: Production Profile, *edited by Mary Tiffen*, 1991, £4.00, ISBN 0 85003 166 4

56: Environmental Change and Dryland Management in Machakos District, Kenya: Conservation Profile, *F.N. Gichuki*, 1991, £4.00, ISBN 0 85003 167 2

57: Environmental Change and Dryland Management in Machakos District, Kenya: Technological Change, *edited by Michael Mortimore*, 1992, £4.00, ISBN 0 85003 174 5

58: Environmental Change and Dryland Management in Machakos District, Kenya: Land Use Profile, *R.S. Rostom and Michael Mortimore*, 1992, £4.00, ISBN 0 85003 175 3

61: The Informal Financial Sector: How Does It Operate and Who Are the Customers? *J.J. Thomas*, 1992, £4.00, ISBN 0 85003 178 8

64: IMF Lending: The Analytical Issues, *Graham Bird*, 1992, £4.00 ISBN 0 85003 182 6

65: The Seed Sector in Developing Countries: A Framework for Performance Analysis, *Elizabeth Cromwell, Esbern Friis-Hansen and Michael Turner*, 1992, £6.00, ISBN 0 85003 183 4

66: The Performance of the Seed Sector in Zimbabwe: An Analysis of the Influence of Organisational Structure, *Esbern Friis-Hansen*, 1992, £4.00, ISBN 0 85003 184 2

67: Political Regimes and Economic Policy Patterns in Developing Countries, 1978–88, *John Healey, Richard Ketley and Mark Robinson*, 1992, £4.00, ISBN 0 85003 185 0

68: The Impact of NGO Poverty Alleviation Projects: Results of the Case Study Evaluations, *Roger Riddell and Mark Robinson*, 1992, £4.00, ISBN 0 85003 1923

69: Continuity and Change in IMF Programme Design, 1982–92, *Tony Killick*, 1992, £4.00, ISBN 0 85003 194 X

70: IMF Lending: The Empirical Evidence, *Graham Bird*, 1993, £4.00, ISBN 0 85003 197 4

71: Issues in the Design of IMF Programmes, *Tony Killick*, 1993, £4.00, ISBN 0 85003 199 0

72: Food Aid Programmes of the European Community and its Member States: A Comparative Statistical Analysis, *Edward Clay and Charlotte Benson*, 1993, £4.00, ISBN 0 85003 200 8

73: Economic Inflexibility in Africa: Evidence and Causes, *Tony Killick*, 1993, £4.00, ISBN 0 85003 205 9

74: The Changing Role of NGOs in the Provision of Relief and Rehabilitation Assistance: Case Study 1 – Afghanistan/Pakistan, *Nigel Nicholds with John Borton*, 1994, £6.00, ISBN 0 85003 206 7

75: The Changing Role of NGOs in the Provision of Relief and Rehabilitation Assistance: Case Study 2 – Cambodia/Thailand, *Charlotte Benson*, 1993, £6.00, ISBN 0 85003 207 5

76: The Changing Role of NGOs in the Provision of Relief and Rehabilitation Assistance: Case Study 3 – Northern Ethiopia/Eritrea, *John Borton*, 1994, £6.00, ISBN 0 85003 210 5

77: The Impact of Drought on Sub-Saharan African Economies: A Preliminary Examination, *Charlotte Benson and Edward Clay*, 1994, £6.00, ISBN 0 85003 212 1

78: Financial Integration and Development in Sub-Saharan Africa: A Study of Informal Finance in Ghana, *Ernest Aryeetey*, 1994, £6.00, ISBN 0 85003 214 8

79: Financial Integration and Development in Sub-Saharan Africa: A Study of Informal Finance in Tanzania, *Mboya S.D. Bagachwa*, 1994, £6.00, ISBN 0 85003 215 6

Working Pap

THE ECONOMIC IMPACT OF NATURAL DISASTERS IN THE PHILIPPINES

Charlotte Benson

June 1997

Overseas Development Institute
Portland House
Stag Place
London
SW1E 5DP

ISBN 0 85003 248 2

Preface

Figures on the 'cost' of natural disasters abound. Such figures are generated by, for example, governments as part of their relief appeals or by the insurance industry in counting its losses. However, they are typically based on only the direct, visible impacts of a disaster, such as damage to homes, hospitals, schools, factories, infrastructure and crops. Meanwhile, less easily quantifiable effects, such as the loss of personal belongings or jobs, widening trade or government budget deficits or the increasing scale and depth of poverty are typically ignored. Similarly, positive benefits of disasters – such as post-disaster construction booms or the opportunities disasters can present to upgrade machinery and equipment – are seldom reported.

From an economic, rather than financial, perspective, the impacts of disasters can be divided into three categories: 'direct' costs, 'indirect' costs and secondary effects (e.g., see Andersen, 1991; Bull, 1992; OECD, 1994; Otero and Martí, 1995). Direct costs relate to the physical damage to capital assets, including buildings, infrastructure, industrial plants, and inventories of finished, intermediate and raw materials, destroyed or damaged by the actual impact of a disaster. Crop production losses are sometimes also included in estimates of direct costs. Indirect costs refer to damage to the flow of goods and services including lower output from damaged or destroyed assets and infrastructure; loss of earnings due to damage to marketing infrastructure such as roads and ports and to lower effective demand; and the costs associated with the use of more expensive inputs following the destruction of cheaper usual sources of supply. They also include the costs in terms of both medical expenses and lost productivity arising from the increased incidence of disease, injury and death.[1] Secondary effects concern both the short- and long-term impacts of a disaster on overall economic performance, such as deterioration in trade and government budget balances and increased indebtedness as well as the impact on the distribution of income or the scale and incidence of poverty. They can also include shifts in government monetary and fiscal policy, for example, to contain the effects of increased disaster-induced inflation or to finance additional government expenditure. Direct losses can therefore be roughly equated with stock losses whilst indirect costs and secondary effects both constitute flow losses.

Reflecting the difficulties in analysing economy-wide flow impacts and a preoccupation with the financial costs of disasters, most assessments of disasters concentrate on more easily measured direct 'stock' losses, as already noted. Yet such

[1] For example, droughts can result in an increased incidence of water-borne diseases such as diarrhoea, skin diseases and trachoma whilst floods and tropical cyclones can lead to outbreaks of water problems such as diarrhoea and cholera.

data are often of little value in informing policy-makers about the broader nature and scale of natural hazard risks faced by an economy. Similarly, they say little about the role of various underlying factors in either exacerbating or minimising the economic impact of disasters, such as the size and structure of the economy, including the relative importance of various sectors and inter-sectoral forward and backward linkages; the sectors affected by the disaster; economic performance in the period prior to the disaster; the international economic climate; the frequency and magnitude of other recent disasters; or government economic policy. Current disaster damage assessments are therefore of only limited value in helping to design appropriate mitigation, or risk management, strategies to minimise the adverse economic consequences of disasters. Indeed, the mere attempt to measure the economic impact of disasters in a single figure reflects a naive conception of such impact. Moreover, potentially underestimating the true economic impacts of disasters may have resulted in less than economically-optimal levels of investment in disaster prevention and mitigation measures.

This paper forms part of a wider investigatory study on the economic impacts of natural disasters in south-east Asia and the Pacific.[2] The paper is one of three case studies examining recent experiences in Fiji, the Philippines and Viet Nam. Each case study is based on a two-week country visit in late 1995 or early 1996 and subsequent desk-based analysis.

The case studies focus on the disaggregated impacts of natural disasters on various sectors of each economy and the role of government policy. They assess the factors determining the extent of each economy's vulnerability and whether and why that vulnerability has changed over time. They also consider how the economic consequences of disasters could be mitigated and examine the degree of attention currently attached to natural disasters in economic policy-making and planning. The case studies also briefly touch on the relationship between economic poverty and disaster vulnerability.

The case studies are necessarily exploratory given the relatively limited research to date on the economic impacts of natural disasters. This implies that some lines of investigation may reveal relatively little. However, these conclusions are findings in themselves.

[2] The study explicitly excludes pestilence, environmental and technological hazards as well as civil disturbances.

Acknowledgements

The author would like to thank all of the following people in the Philippines, in the order met, for providing invaluable advice and assistance without which this case study would not have been possible: Dr Mahar Mangahas, Social Weather Services; Hilda Tabar and Oscar Gonzales, Corporate Network for Disaster Response; Gil C. Alonsagay, Asian Social Institute; Zenaida Delica, Citizens' Disaster Response Center; Lolita Pamatmat, Board of Investment; Marcia Feria-Miranda; Tom Walsh, Srinivasa Madhur and Lim Kim Lin, Asian Development Bank; Cabinet Secretary Lina Laigo and Marina M. Tabamo, Director, Department of Social Welfare and Development; Lani Azarcon, World Bank; Jose Garzon, Christine Ignivil and Rosamund Parado, United States Agency for International Development; Emily Pimentel, Benguet Corporation and Jaime V. Ongpin Foundation; Delores Manio, National Disaster Coordinating Council; Dr Ammadore and Dr Aida Jose, PAGASA; Blenn Hueglas, Inter-Agency Network for Disaster Response; Dr Pingali, International Rice Research Institute; Raul Rodriquez, St Miguel; Muriel Lapus, United Coconut Planters Bank; Shinya Ejima, Overseas Economic Cooperation Fund of Japan; Dr Jean Tayag, PHIVOLCS; A. Santos, Emmanuel Torrente and Remedios S. Endnecia, National Economic Development Authority; Ms E. C. Mendoza, Development Bank of the Philippines; Rodolfo A. Lat, McLarens International Loss Adjusters and Surveyors; Marinella Gastillo, Department of Agriculture; Aurora Berringuela, Department of Budget and Management; and Lina Castro, National Statistical Coordination Board.

Staff of the Asian Disaster Preparedness Centre, Bangkok and Sanjay Dhar of the World Bank (Washington, DC) also provided considerable help and assistance. Finally, many thanks are extended to the UK Department for International Development (formerly Overseas Development Administration) for providing generous financial support for both this case study and the other components of the overall study.

The views expressed are those of the author and may not reflect those of any of the organisations or persons listed above. All errors of fact, interpretation or judgement lie solely with the author.

Charlotte Benson
June 1997

Abstract

There has been relatively little research on the economic impacts of natural disasters to date. This paper reports findings of a study of the Philippines which is intended as a contribution in filling that gap. Findings include the following:

- The Philippines experiences all major types of natural hazard and is widely acknowledged as one of the most hazard-prone countries in the world. Moreover, environmental degradation is playing a significant role in increasing the incidence of hazards.

- Natural disasters result in significant economic losses every year. However, there is little apparent appreciation of the economic significance of disasters, largely due to methodological difficulties in isolating the impacts of events which occur annually.

- The agricultural sector is particularly vulnerable to natural hazards. Nevertheless, although the sector is an important source of both output and employment, relatively few measures appear to have been adopted to mitigate their impact.

- Natural disasters have played some role in determining patterns of investment, particularly in discouraging new investment in particular areas in the immediate wake of major disasters.

- Natural disasters have placed a continual, if fluctuating, burden on government finance to meet investment and maintenance costs of public prevention, mitigation and preparedness measures and to fund relief and rehabilitation programmes. The unplanned redirection of resources in response to disasters has hampered efforts to improve the country's transportation network and to meet social infrastructural requirements.

- Poverty, disaster vulnerability and environmental degradation are integrally linked and natural hazards have played an important role in reinforcing poverty. However, poverty alleviation programmes have paid little attention to hazard vulnerability.

- Considerable attention has been paid to disaster management but these efforts have largely concentrated on preparedness and post-disaster response, with fewer prevention and mitigation projects.

- Similarly, donor disaster-related activities have primarily focused on preparedness and response, rather than prevention and mitigation, measures.

Contents

Preface 3

Acknowledgements 5

Abstract 7

Acronyms 11

1. Introduction 13

2. Natural hazards in the Philippines 17

3. The macroeconomy and natural disasters 26

   3.1 Natural disasters and overall economic performance, 1970–95 31

   3.2 Forecast versus actual performance 35

   3.3 Regional impacts of natural disasters 38

   3.4 Impact of natural disasters on private enterprises 45

4. Agriculture and natural disasters 50

   4.1 Disaster mitigation in the agricultural sector 56

   4.2 Consideration of natural disasters in agricultural policy 60

5. Expenditure aspects of natural disasters 63

6. Inflation and natural disasters 68

7. External sector and natural disasters 70

8. Government budgetary aspects of natural disasters 74

9. Poverty and disaster vulnerability 85

10. Disaster management policy and practice 89

   10.1 Disaster legislation and organisational set-up 89

   10.2 Mitigation measures 92

   10.3 Disaster preparedness 106

   10.4 Post-disaster relief and rehabilitation 108

   10.5 Broader economic policy and disasters 110

11. Disaster insurance 114

12. Donors 118

13. Summary and conclusions 122

References 130

Boxes

Box 2.1	The July 1990 Luzon earthquake	21
Box 2.2	The eruption of Mt Pinatubo	22
Box 3.1	Disaster damage assessment	30
Box 3.2	Droughts and power supply	33
Box 3.3	Estimating the economic impacts of typhoons	35
Box 3.4	Typhoon Rosing, November 1995	36
Box 3.5	The impact of the July 1990 Luzon earthquake on the Baguio Export Processing Zone	41
Box 3.6	The Mt Pinatubo eruption and investment: the Clark base	44
Box 4.1	Agricultural impacts of the eruption of Mt Pinatubo	53
Box 4.2	Agricultural rehabilitation in the wake of the July 1990 Luzon earthquake	57
Box 5.1	Income consequences of the July 1990 Luzon earthquake	64
Box 5.2	Employment and income consequences of the 1991 Ormoc flood	65
Box 8.1	National government disaster response funds	81
Box 10.1	The Citizens' Disaster Response Center	90
Box 10.2	Structural mitigation construction problems in the Mt Pinatubo area	93
Box 10.3	Private sector involvement in disasters	97
Box 10.4	Household adoption of mitigation measures following the Ormoc flood	103
Box 10.5	Building reconstruction efforts following the July 1990 Luzon earthquake	105
Box 10.6	Response to the July 1990 Luzon earthquake	110

Figures

Figure 1.1	Regional delineation of the Philippines	14
Figure 3.1	Philippine annual damage from natural disasters and GDP growth, 1981–94	29
Figure 7.1	Philippine coconut yields and international coconut oil price, 1980–94	71

Tables

Table 1.1	Estimated damage and number of deaths resulting from natural disasters, 1970–94	15
Table 3.1	Philippine GDP: forecast and actual performance, 1983–95	37
Table 3.2	Estimated costs of the July 1990 Luzon earthquake	39
Table 4.1	Central Luzon rice (palay) production, acreage and yields, 1988–94	54
Table 8.1	Philippine government expenditure in support of the Mt Pinatubo relief and rehabilitation programme, 1991–4	82

Acronyms

ADB	Asian Development Bank
BDRO	Barangay Disaster Response Organisations
BMC	Benguet Management Corporation
BOI	Philippine Board of Investment
CAR	Cordillera Administrative Region
CDRC	Citizens' Disaster Response Center
CNDR	Corporate Network for Disaster Response
CPI	Consumer Price Index
DA	Department of Agriculture
DBP	Development Bank of the Philippines
DCC	Disaster Coordinating Council
DND	Department of National Defense
DSWD	Department of Social Welfare and Development
EC	European Commission
ENSO	El Niño Southern Oscillation
EPZ	Export Processing Zone
GDP	Gross Domestic Product
GIS	Geographical Information System
GNP	Gross National Product
IANDR	Inter-Agency Network for Disaster Response
IDNDR	International Decade for Natural Disaster Reduction
IRRI	International Rice Research Institute
ISMI	Itogon-Soyoc Mines Inc.
JICA	Japan International Cooperation Agency
KPA	Key Production Areas
LDCC	Local Disaster Coordinating Council
LGU	Local Government Unit
MPC	Mt Pinatubo Commission
MPF	Mt Pinatubo Fund
NDCC	National Disaster Coordinating Council
NEDA	National Economic Development Authority
NGO	Non-Governmental Organisation
NLUC	National Land Use Committee
NPC	National Power Corporation
NPFP	National Physical Framework Plan
OCD	Office of Civil Defence
ODA	(UK) Overseas Development Administration
oda	official development assistance
OECF	(Japanese) Overseas Economic Cooperation Fund
OFDA	(US) Office of Foreign Disaster Assistance

P	(Philippine) Peso
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PAR	Philippines Area of Responsibility
PBSP	Philippine Business for Social Progress
PHIVOLCS	Philippine Institute for Volcanology and Seismology
PMP	Prevention, Mitigation and Preparedness
PSSD	Philippine Strategy for Sustainable Development
RDCC	Regional Disaster Coordinating Council
SWS	Social Weather Stations
USAID	United States Agency for International Development
WHO	World Health Organisation

1. Introduction

The Philippines is composed of an archipelago of some 7,100 islands, although the two major islands of Luzon and Mindanao account for some 65% of the country's total land area. It has an extensive discontinuous coastline of 34,000 km, the longest in the world (Philippine NLUC, 1992). The country achieved an average annual demographic growth rate of 2.6% between 1960 and 1993, with an estimated population of 64.8 million in 1993. Based on current growth rates, the population is expected to double between 1993 and 2027 (UNDP, 1996). Slightly over half the population lives in urban areas. The Philippines is classified as a medium human development country, ranking ninety-fifth on the UNDP human development index. In 1993 it had an average life expectancy at birth of 66.5 years and an adult literacy rate of 94.2% (ibid.). For administrative purposes the country is divided into 14 regions which, in turn, are further divided into 76 provinces, 64 cities, 1,532 municipalities and 41,153 villages (*barangays*) (Figure 1.1).

The Philippines remains primarily an agriculturally-based economy to date, although it has experienced some industrialisation. Other salient economic features include a high rate of poverty, officially estimated at 41% in 1991, and high external debt. There is also a relatively high level of unemployment, standing at 9.5% in 1994 (Philippine NEDA, 1995). The World Bank classifies the Philippines as a lower middle-income country.

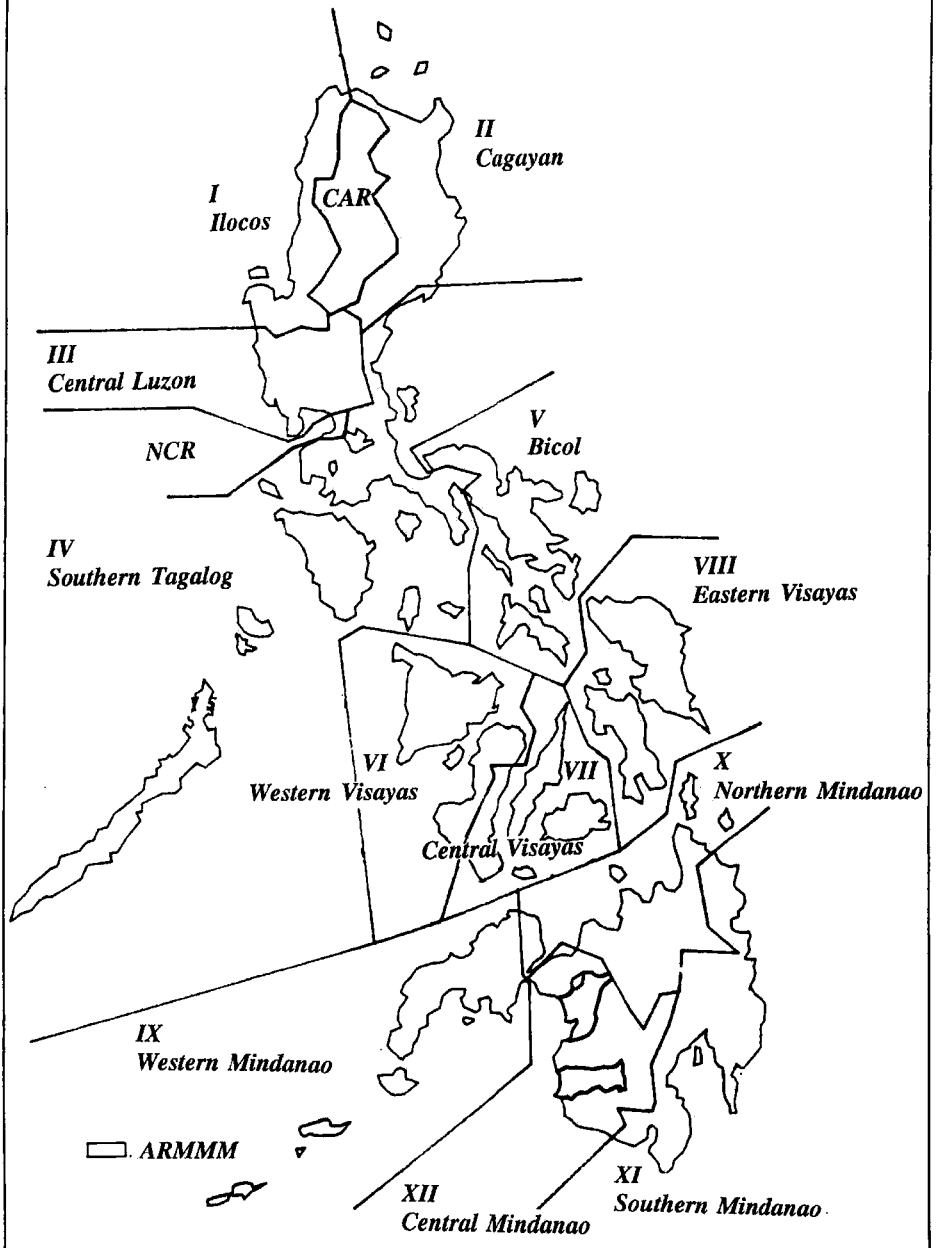
The Philippines experiences all major types of natural hazard and is widely acknowledged as one of the most disaster-prone countries in the world.[3] The number of resulting deaths is low relative to the annual incidence of disasters, with an average 495 deaths per annum between 1970 and 1989 according to official records. More recent figures are distorted by a severe earthquake in 1990 and a devastating flood in 1991. However, excluding these events, deaths averaged 604 per annum over the period 1990–4, which is not abnormally high for a country of the Philippines' size and level of development (Table 1.1).[4] The estimated damage resulting as a consequence of natural disasters also escalated considerably in the early 1990s but, again, may not necessarily reflect a longer-term upward trend so much as a few more extreme events, including the particularly high incidence of typhoons in 1993.

---

[3] For example, a joint study of disasters over the period 1900–91 by the Centre for Research on the Epidemiology of Disasters (CRED) and the World Health Organisation identified the Philippines as the most disaster-prone country in the world (Delica, 1994a).

[4] As a country develops from a low- to a middle- and then upper-income country one would expect to observe a gradual decline in the number of deaths resulting from natural disasters.

Figure 1.1 **Regional delineation of the Philippines**



Source: Philippine NLUC (1992)

Table 1.1: Estimated damage and number of deaths resulting from natural disasters, 1970-94 (million Peso at real 1994 prices)

	Typhoons		Floods		Earthquakes		Volcanic eruptions & lahars		Droughts		Total	
	Estimated damage (a) (m Peso)	No. of deaths (units)	Estimated damage (a) (m Peso)	No. of deaths (units)	Estimated damage (a) (m Peso)	No. of deaths (units)	Estimated damage (a) (m Peso)	No. of deaths (units)	Estimated damage (a) (m Peso)	No. of deaths (units)	Estimated damage (a) (bn Peso)	No. of deaths (units)
1970	17,648	1,585	20	3	99	17					17.8	1,605
1971	878	103	418	43	1	0					1.3	146
1972	14,613	1,016	210	28							14.8	1,044
1973	3,060	114	524	51	75	15					3.7	180
1974	4,060	330	40	41	43	2					4.1	373
1975	540	231	80	17							0.6	248
1976	2,903	380	913	40	5,315	3,782					9.1	4,202
1977	2,751	113	128	14	40	1					2.9	128
1978	11,459	663	(0)	2					0		11.5	665
1979	2,587	66	32	1							2.6	67
1980	7,906	143	1,968	336	13	51					9.9	530
1981	6,184	484	20	125							6.2	609
1982	7,426	337	515	27							7.9	364
1983	2,043	126	(0)	41	58	19			2,985		5.1	186
1984	15,036	1,979	6				166				15.2	1,979
1985	5,906	211	16	59		14					5.9	284
1986	3,743	171	19	4							3.8	175
1987	7,989	1,020	(0)						1,383		9.4	1,020
1988	15,597	429	(0)		1,552						17.1	429
1989	7,002	382	612	101							7.6	483
1990	18,571	670	585	36	18,024	1,293			4,953		42.1	1,999
1991 (b)	5,781	5,197	(0)				13,771	866	2,057		21.6	6,063
1992	5,941	118	955	39	213	1	646	6	4,797		12.6	164
1993	23,508	786	1,212	32			80	80	19		24.8	898
1994	1,773	243	297	24	4	4	10	20	3		2.1	291
Five-year averages												
1970-4	8,052	630	242	33	43	7	-	-	-	-	8.3	670
1975-9	4,048	291	231	15	1,071	757	-	-	-	-	5.3	1,062
1980-4	7,719	614	502	106	14	14	33	-	597	-	8.9	734
1985-9	8,047	443	130	33	310	3	-	-	277	-	8.8	478
1990-4	11,115	1,403	610	26	3,648	260	2,901	194	2,366	-	20.6	1,883

Source: Philippine NDCC

(a) Figures on estimated damage refer only to direct physical destruction.
(b) The high death toll occurring as a consequence of typhoons was primarily due to the Ormoc flash flood, which was triggered by heavy rainfall associated with a typhoon.

In terms of their broader economic impacts, hazards experienced in the Philippines can be divided into two distinct categories depending on their frequency of occurrence and intensity. Typhoons and floods are the principal hazards falling into the first category. Both occur annually, although the rate of incidence and severity varies between years. Typhoons alone are estimated to cause some P 2,428m damage every year, equivalent to 0.6% of GNP (ADB, 1994), and 'are considered one of the worst enemies of the Philippine economic recovery programme' (ibid.: 24).[5] Indeed, it is likely that such disasters have played a significant long-term role in both dampening growth rates and hindering efforts at poverty alleviation. However, their overall impact on the national economy is difficult to discern both precisely because they occur every year and because they are typically confined to relatively limited geographical areas. The second category comprises more severe disasters with considerably longer return periods, such as major earthquakes, volcanic eruptions or droughts. It is far easier to isolate the impact of such hazards on national or regional output indicators and they are widely cited as a factor determining inter-annual variations in economic performance *ex post*. However, again, there are certain methodological constraints in assessing their wider indirect and secondary effects.

No doubt as a consequence of these various methodological constraints, most efforts to date to estimate the impacts of natural disasters in the Philippines have focused on simple damage assessments. There have been far fewer studies of their wider economic impacts and this has probably contributed to the slow rate of adoption of appropriate mitigation strategies. Interest in disaster preparedness and mitigation is increasing but considerable further attention to this aspect of disaster management is required. Moreover, cohesive economic strategies need to be set in place which take account of the impact of natural disasters in overall policy and strategic planning.

[5] At the 1994 annual average rate of exchange, P 26.4 was equivalent to US$1.00.

2. Natural hazards in the Philippines

The Philippines experiences a wide range of natural hazards although the risk of various natural hazards differs between regions, reflecting both climatic and geological differences. Tropical cyclones and floods occur most frequently but the country also faces droughts, volcanic eruptions, earthquakes, tsunamis[6] and numerous landslides, as already noted. The timings of geological disasters are usually unrelated. However, the occurrence of certain climatic disasters is partly correlated to the extent that they are influenced by the El Niño Southern Oscillation (ENSO) phenomenon. The frequency of tropical cyclones is lower during ENSO periods whilst activity tends to move further east of the Philippines. Most parts of the country also experience below-normal rainfall or even drought during ENSO periods, primarily due to the lower frequency of typhoons (Jose, 1993).

Typhoons[7] Between 1942 and 1991 there was an average of 19.8 cyclones per year in the Philippines Area of Responsibility (PAR), of which 3.7 were classified as depressions, 5.3 as storms and 10.8 as typhoons.[8] There is a near 100% probability that at least four typhoons will make landfall in any year, whilst an average eight to nine tropical cyclones actually reach land and a further two offshore typhoons also result in damage every year (Brown et al., 1991). However, data on maximum wind speeds over the period 1951–90 suggest that the intensity of cyclones has been gradually increasing (Jose, 1993). In recent years, the weather also seems to have hit a period of increased extremes. In 1993, there were 32 typhoons in the Philippine

---

[6] A tsunami or tidal wave is a fast-travelling broad wave normally generated by an undersea earth displacement. As the wave nears land it slows down and becomes much higher. One of the worst tsunamis on record occurred in Japan in 1896, reaching a height of 24m and drowning 26,000 people (Alexander, 1993).

[7] All typhoons have international code names. In addition, since 1963 the Philippine Weather Bureau has given a second name to all depressions, storms and typhoons in the Philippine Area of Responsibility (PAR), using a series based on Filipino nicknames ending in ng. This practice has been adopted because these names are easily recognised; they signify a hazard in the PAR; and the series of names follow the 19 characters of the Filipino alphabet. There are four series of names, each starting with a name beginning with A and with each series used every four years. Auxiliary lists have been compiled for years in which there are more than 19 disturbances (Villanueva, 1995). In this paper, both the Filipino and international code names are reported where the relevant information is readily available.

[8] Tropical cyclones with maximum winds of up to 63 kph are classified as depressions; with maximum speeds of 64–117 kph as storms; and with maximum winds of 118 kph or more as typhoons (Jose, 1993).

area, the highest level since records began. In contrast, by the end of November 1995 there had been only 12 typhoons in that year.

The east of the country, particularly the north east, is most vulnerable to typhoons. This reflects the fact that some 95% of tropical cyclones entering the PAR originate in the Pacific Ocean. The occurrence of typhoons is highly seasonal. They are concentrated between June and December, with the highest frequency in July, August and September (Brown et al., 1991). As the typhoon season progresses, the incidence appears to move from the north to the central area and then the south of the country (ibid.).

Typhoons are associated with strong winds, heavy rains and storm surges, damaging buildings, roads, irrigation and other infrastructure. However, the excessive rainfall is typically more destructive than the strong winds, particularly in the case of slow-moving or quasi-stationary typhoons (Philippine NLUC, 1992), triggering flooding, landslides and erosion. Thus, the scale of damage depends not only on the intensity of the winds but also on levels of precipitation. Even typhoons which do not reach land can generate heavier rains and gusty winds, in turn resulting in damage. Typhoons, as well as other hazards, can also generate storm surges to which the Philippines, with its extensive coastline, is especially vulnerable (Brown et al., 1991).

Flooding Severe flooding is normally associated with the heavy rains accompanying typhoons. The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) has estimated that some 47% of average annual rainfall is due to typhoons, 14% to monsoons and 39% to other weather systems.[9] Eastern Mindanao, Northern Samar, Central Luzon and the Bicol regions are particularly prone to severe flooding. The flood plains of several major river basins where rice and corn are usually grown, also experience regular flooding.

In the past quarter-century severe floods have occurred in 1972, 1974, 1978, 1981, 1986 and 1993 (Brown et al., 1991; Pineda, 1993). The 1972 floods were particularly catastrophic, affecting the main rice-producing area of Central Luzon and disrupting commerce and transportation to such an extent that rationing of certain commodities,

---

[9] The Philippines is divided into four climatic zones and rainfall patterns vary across the country. Broadly, between April and October, rainfall over 2,000 mm occurs in western Luzon and Panay Island while the Cagayan Valley, the interior portions of Visayas and the southern part of Mindanao have rainfall under 1,000 mm. Between October and March, rainfall exceeding 2,000 mm is found in the eastern sections of the country which are exposed to the north-easterlies whilst rainfall under 500 mm is experienced in western Luzon. Generally, over 50% of rainfall in the eastern regions is experienced between October and March whilst the western sections generally receive under 25% of annual rainfall during this period (Jose, 1990).

including rice, was introduced in Metro Manila. More generally, an apparent increase in the incidence of flooding has been reported (for example, CDRC, 1994), primarily due to deforestation. Flash flooding has also begun to occur, again linked to environmental degradation, as most seriously occurred in the case of the 1990 Ormoc flood (see below). Meanwhile rapid urbanisation has overwhelmed drainage capacity, contributing to more frequent urban flooding.[10]

Flooding causes direct damage to agriculture and fisheries as well as to infrastructure and other assets. Heavy rainfall and flooding also increase rates of soil erosion, create sedimentation problems for water reservoirs, dams, hydro-electric power stations and other water infrastructure, and reduce the depth of waterways, lakes and reservoirs. Many reservoirs are already reported to have major sedimentation problems.

Droughts[11] The Philippines experiences intermittent droughts occurring at least once every five years and normally affecting the whole of the country. Typically associated with ENSO events, droughts occurred in 1957–8, 1965–6, 1968–9, 1972–3, 1982–3, 1986–7 and 1990–1 (Jose, 1993). As well as generating various problems relating to water shortages, droughts can be associated with increased sea-water intrusion as a consequence of declines in ground water levels, in turn causing additional economic losses over several years.

---

[10] The World Bank (1993) reports that every day in Metro Manila alone an estimated 2,000 m^3 of waste is left on roadsides and open spaces or thrown into local waterways and canals.

[11] This study uses drought to refer to infrequent rather than regular annual shortages of water during the dry season. Droughts are notoriously difficult to define and there is an extensive literature on their definition. For example, Glantz (1987) in a widely cited review, distinguishes meteorological, hydrological, agricultural and social drought. A general working definition of meteorological drought is 'a reduction in rainfall supply compared with a specified average condition over some specified period' (Hulme, 1995). Hydrological droughts pertain to the impacts of a reduction in precipitation on surface or sub-surface water shortfall and so may lag behind periods of agricultural or meteorological drought (Wilhite, 1993). Meteorological drought may result in hydrological conditions that have a direct impact on non-agricultural production, including hydro-electric power generation, and on human water supply. Agricultural drought is defined as a reduction in moisture availability below the optimum level required by a crop during different stages of its growth cycle and resulting in impaired growth and reduced yields. Social drought relates to the impact of drought on human activities, including indirect as well as direct impacts. However, it is difficult to establish a common basis for comparing different droughts because 'drought' as a concept is derived from the recognition of impacts. Furthermore, the relationship between rainfall variability and impacts depends on the specifics of a particular agro-ecological zone or economy.

Earthquakes The Philippines is located between two major tectonic plates – the Pacific and Eurasian plates – and within ten fault and tremor tracks (Philippine NDCC, 1990). Eight major and several minor earthquake generators have also been identified. The Pacific plate is reported to be pushing the Philippine Sea plate beneath the eastern side of the country at a rate of 7 cm per annum, generating regular seismic activity (ibid.). According to the Philippines Institute of Volcanology and Seismology (PHIVOLCS) the country experiences an average of five earthquakes per day, in turn resulting in potential ground shaking, ground rupture, liquefaction and lateral spreading, landslides and tsunamis. Between 1589 and 1990, there were some 64 earthquakes causing major damage (ADB, 1994). Meanwhile, the country experienced six earthquakes with magnitudes of 7.3–8.3 on the Richter scale between 1944 and 1993 (Rantucci, 1994). The largest recent earthquake occurred in 1990 (see Box 2.1). Earthquakes can occur throughout most of the country although there is some variance in seismic risk. Regions VIII and X contain the most seismically active areas, whilst areas in Regions I, II, III and IV are also highly active (Brown et al., 1991).

The capital, Manila, is itself located on the Marikana fault. Although no major earthquakes have been traced to this fault, Manila has been severely damaged by several earthquakes over the past few centuries, mostly generated from an active fault some 100 km east of the city. Extensive studies of the subsurface geology of Manila have led to relatively detailed macrozonation. The business areas of Makati and Mandaluyong as well as Quezon City, where many government offices are located, are very low-risk areas but downtown Manila, including the Port Area, has been classified as very high-risk.

The Philippines is also vulnerable to tsunamis, with some 28 tsunamis reported to have occurred between 1603 and 1976 (Brown et al., 1991). The most recent severe event occurred in 1976, associated with a major earthquake in the same year. The two disasters together killed 3,782 people and caused some P 625m damage (P 5.3bn at 1994 prices), according to official data.

Volcanoes The Philippines is located along the Pacific Ring of Fire and has over 200 volcanoes distributed in five volcanic belts. Twenty-one volcanoes are considered active, of which the six most active are closely monitored.[12] The country therefore experiences considerable volcanic activity, with major events occurring approximately once every ten years (Rantucci, 1994). Recent major eruptions include those of Mt Taal in 1965; Mt Mayon in 1984 and, again, in 1993; and Mt Pinatubo in 1991 (see Box 2.2). As dramatically demonstrated in the case of Mt Pinatubo,

[12] Mayon (Region V), Taal (Region IV), Hibok-Hibok (Region IV), Bulusan (Region V), Canlaon (on the boundary of Regions VI and VII) and Mt Pinatubo (Region III).

Box 2.1 The July 1990 Luzon earthquake

In July 1990, the Philippines suffered a major earthquake of intensity 7.7 on the Richter scale with an epicentre near San Jose City, Nueva Province, Luzon. Some 100,000 km^2 including all of North as well as parts of Central Luzon were affected, with the most serious damage occurring over an area of some 15,000 km^2. The cities or towns of Baguio, Dagupan, Agoo, Aringay and Pura were particularly badly affected, whilst Tarlac, Cabantuan, Rizal and Manila were marginally damaged (Rantucci, 1994). The earthquake was followed by some 130 aftershocks, at least 15 of which recorded a magnitude of 5.0 or more on the Richter scale. The earthquake precipitated liquefaction, flooding (in turn due to various factors such as liquefaction, diversion of waterways and blockage or destruction of natural gullies), sea-water intrusion in coastal areas and massive landslides, the latter of which continued for several months as the earthquake had occurred at the beginning of the region's annual monsoon. The earthquake also triggered the intrusion of molten rock and the subsequent renewed activities of Mt Pinatubo and Mt Taal, which subsequently inflicted massive further damage on the same region (Rantucci, 1994).

volcanoes can pose a threat both during and following their eruptive phases due to the possibility of lahars (or mudflows) in the aftermath of an eruption.

Climate change and changing hazard risks A recent ADB (1994) study of the impact of climate change on the Philippines suggests that global warming is likely to increase the frequency and intensity of climatic hazards. A doubling of atmospheric CO_2 concentration will result in a rise in sea level and increases in rainfall and temperature. Greater rainfall variability is also forecast, with a shorter but heavier rainy season, in turn potentially triggering more landslides as well as increasing the rate of soil erosion. Meanwhile, the dry season will be longer and the incidence of drought higher. The recently observed increase in the frequency of ENSO events, which, as already noted, also implies a greater risk of drought, may similarly be associated with global climatic change. Whilst the study found no conclusive evidence on likely changes in the frequency of land-falling tropical cyclones, the severity of the inundation of coastal areas as a consequence of storm surges during typhoon passages is expected to increase due to the heavier rainfall accompanying typhoons. Low-lying coastal areas such as in Manila and Cebu are expected to experience more frequent flooding as a consequence of the rise in sea level, whilst underground water supplies in highly urbanised areas where water tables face particular stress will also be affected by the intrusion of sea water.[13] Such changes

[13] Saltwater intrusion has already affected 480,802 ha of land (excluding Metro Manila), primarily in Cagayan, Bulacan and Cebu. This has resulted in significant economic losses in some areas. For example, the ADB (1994) reports an unspecified 1985 study which estimated that the province of Bulucan (Region III) experienced annual economic losses of P 25.7m (P 55.7m at 1994 prices) due to sea-water intrusion. Some 41.6% of these losses occurred in agriculture, 51.8% in industry, 5.8% in transportation and 0.1% in health.

Box 2.2 The eruption of Mt Pinatubo

Mt Pinatubo, a volcano located on the west coast of Central Luzon some 100 km northwest of Manila, erupted violently in June 1991. The eruption was one of the largest, if not the largest, in the world this century and caused severe damage. Some 6 km^3 of pyroclastic material was deposited in river basins whilst a further 1 km^3 of ash was deposited across an area up to 40 km from the volcano, effectively altering the hydrology of the whole region (USACE, 1994). Fallout affected a total area of 340,000 km^2 (PHIVOLCS, 1991b). The impact was exacerbated by Typhoon Diding which occurred immediately after the eruption, scattering water-soaked ash over a very large area and causing massive mudflows. These, in turn, covered large areas of agricultural land and destroyed buildings, bridges, roads and other infrastructure. Minor eruptions continued until 4 September 1991.

The volcano had been dormant for some 600 years but signs of renewed activity were observed in April 1991, resulting in the immediate installation of surveillance equipment by PHIVOLCS, with additional support from the US Geological Survey. This permitted the anticipation of the volcano's increased activity, the issue of timely warnings and a gradual expansion of the danger zone and, thus, a low resulting loss of life as a direct consequence of the eruption.

In every year since the 1991 eruption, the Mt Pinatubo region has experienced mudflows or lahars which have been generated by heavy rainfall. These have caused additional extensive damage to agriculture and infrastructure, whilst moderate to heavy rains have also transported sediment to lowlands, together with the lahars filling major drainage channels and causing flooding. As of mid-1996, only about a third of the volcanic material was so far reported to have combined with rainfall (Luce, 1996) and annual lahars were expected to create severe damage for a total of up to 3–8 years. One of the few advantages of the lahars is that affected land in Pampanga Province will become less susceptible to flooding and so could become some of the most expensive land in Central Luzon.

will have significant implications for many aspects of the economy including agriculture, fisheries, forestry, industry, energy, infrastructure and communications as well as for water resources.[14]

Environmental degradation The incidence and severity of many natural disasters are integrally related to prevailing environmental conditions. Increasing environmental degradation, in particular deforestation, is playing a significant role in increasing the incidence of natural disasters in the Philippines. Deforestation has contributed to increased run-off and thus to a higher incidence of flash flooding and landslides. It has also resulted in the siltation of river beds, reducing their carrying capacity and in turn lowering the capacity of hydro-electric power facilities, irrigation

[14] As of late 1995, a two-year study was being undertaken by PAGASA and other agencies, with USAID financial support, to examine various aspects of climatic change including the impact on the agricultural sector, water resources and the sea level.

channels and municipal water installations as well as increasing the risk of floods.[15] Furthermore, increased siltation of river deltas, bays and gulfs, together with the destruction of mangroves and other natural breakwaters, has increased the incidence of storm surge hazards. Meanwhile, deforestation has also disrupted the country's watersheds, in turn leading to increasing water deficits, reducing dry-season flows and exacerbating the effects of any temporary decline in rainfall. Thus, for example, the 'modest' failure of the monsoons in 1983 was reported to result in 'the most extensive and protracted drought in 30 years' (UNFPA, 1991: 88). Deforestation in Central Luzon is also reported to have played a role in facilitating the mobilisation of sedimentation deposited as a consequence of the eruption of Mt Pinatubo (Rantucci, 1994). Overgrazing and urbanisation have further contributed to increased run-off, whilst mining operations have played an additional role in increasing the incidence of landslides and flash floods.

The scale of the problem is clearly indicated by figures on the extent of deforestation. Forest areas are reported to have declined from 17m ha in 1968 to 6m ha by 1990 (Philippine DA, 1992), in part due to low forest extraction charges as well as illegal logging, forest fires and increasing cultivation of upland areas. Deforestation is estimated to be continuing at a rate of 100,000 ha per annum (World Bank, 1995b). Its impact on the increased severity of natural hazards was demonstrated most tragically by the November 1991 Ormoc flood.

Mangrove plantations have also declined rapidly, although there is some dissent about the scale of the remaining forests. Plantations are reported to have decreased from 450,000 ha in 1918 to, variously, under 150,000 ha by 1992 according to the Department of Agriculture (Philippine DA, 1992), 119,000 ha according to the National Land Use Committee (Philippine NLUC, 1992) and 38,000 ha according to ADB (1994). This decrease has been due to a number of factors, including the conversion of land into fishponds, saltbeds, rice paddies and for building construction, over-exploitation for timber, firewood and tanbark use and pollution (Philippine NLUC, 1992). Coral reefs, another form of storm surge protection, have also been damaged, with only 5–6% of the country's total 33,036 km^2 classified as in excellent condition (ADB, 1994).

More fundamentally, uncertainty of land tenure, the high incidence of poverty and high demographic growth rates are generally acknowledged as some of the main factors leading to environmental degradation. Population pressure has resulted in the

[15] For example, Hall (1996) reports that in the village of Igbalangao, Panay Island, rapid deforestation has resulted in more severe riverine flooding, with flash floods now occurring every year. Much of the 'best' rice-growing land is affected by annual flooding and food security is becoming an increasing problem. As a consequence of floods and typhoons, the village is cut off three or four times per year, sometimes for several days.

gradual cultivation of uplands, with the total uplands population reported to exceed 20 million by 1991 (UNFPA, 1991). The terrain also exacerbates the rates of run-off and soil erosion, as 55% of the country is hilly or mountainous whilst 46% of upland areas have slopes of 18 to 30 degrees. Some commentators hold that past government policies have played an additional hand. For example, Cruz and Repetto (1992) argue that various economic stabilisation policies sharply increased poverty and unemployment, in turn accelerating the rate of degradation and deforestation of upper watersheds as well as the over-exploitation of coastal fisheries and mangroves.

On the positive side, the government has recognised the important linkages between environmental degradation and the increased incidence of natural disasters. For example, the National Land Use Committee states that 'the extreme pattern of climatic and weather changes is one of the most alarming environmental phenomena arising from the disturbed ecological balance' (Philippine NLUC, 1992: 8). Various efforts have been undertaken to halt the degradation, in some cases dating back many years. For example, since the turn of the century severely affected watersheds have been withdrawn from use and officially protected as 'proclaimed' forest reserves, although these efforts at protection have not always been observed. More recently, in 1991, a law was introduced prohibiting logging operations in areas with slopes of 50 degrees or above and in areas 1,000 metres or more above sea level (ibid.). Meanwhile, the World Bank (1993) reported that, as of 1993, legislation had recently been introduced 'radically increasing logging stumpage fees, reforming the protected area system, and even banning commercial logging almost entirely' (p.396). The number of forestry licences issued has also declined whilst certain projects, such as those in heavy industry, resource-extractive sectors and infrastructure, have been required to undertake environmental impact assessments.

With regard to mangroves, the Philippine Department of Agriculture has prohibited their further destruction and is replanting mangrove forests in abandoned, foreclosed or unproductive fishponds (Philippine DA, 1992). Mangrove resources development has been called for, including massive reforestation of degraded mangrove ecosystems through a community-based approach and permanent delineation of the existing resources (Philippine NLUC, 1992). Some mangrove forests are also protected under the 1993–2022 National Physical Framework Plan, although for ecological reasons rather than because of their role in coastal protection against storm surges (ibid.).

However, the public's confidence in their own ability to address environmental problems and even their belief that action needs to be taken appear to be relatively low to date. For example, a 1993 survey conducted by the Social Weather Stations revealed that 53% of the 1,200 sample believed that 'people worry too much about

human progress harming the environment' (Guerrero, 1994).[16] Some 44% of respondents were fairly or very unwilling to pay higher prices and 52% to pay higher taxes to protect the environment, with resistance typically higher in rural than in urban areas. Moreover, 'maybe because Filipinos do not consider the environment as the most important problem in the Philippines and are not conscious and lack knowledge about what is really happening with the environment, there is scepticism about the efficacy of their efforts, a general feeling of helplessness about being able to do something about the environment' (ibid.: 27).

The principal way in which many communities have learnt of the strong links between environmental degradation and increased natural hazards has been through direct experience. For example, in a survey of 90 victims of the Ormoc floods, 12% of respondents reported that the flood had made them more environmentally conscious. Similarly, PBSP (1991) reports that the 1990 earthquake convinced farmers in the affected area that excessive tree-cutting was a major cause of soil erosion and landslides. It is to be hoped that such knowledge will help avoid future disasters of a similar magnitude. But it is also important that more general awareness of the links between environmental degradation and natural disasters is enhanced and that people are equipped with both the know-how and the means to take appropriate action.

[16] The World Bank (1993), by contrast, reports that 'consciousness of (deforestation) problems has grown in the Philippines, to the point that the public attributes all droughts, floods, or power shortages to deforestation' (p.396).

3. The macroeconomy and natural disasters

The Philippine economy remains essentially agrarian. Agriculture, fisheries and forestry accounted for around half of total employment in the early 1990s, whilst some two-thirds of the population were directly or indirectly dependent on the sector (Philippine DA, 1992). It provided an average 25.2% of GDP in 1992–4 while agribusiness, broadly defined to include input suppliers, processors, wholesalers, distributors and retailers of food and fibre commodities, was estimated to account for 48% of GDP in 1990 (Alatec-Harris-Tym Group et al., 1993b).

Industrialisation began in the 1950s, initially based on import-substitution industries using imported component parts, raw materials and capital technology. An export-led policy was subsequently promoted, in part to spread the benefits of industrialisation to the rural areas and to generate foreign exchange, but again based on imported raw materials and involving exports in their component form rather than as higher-value finished products. From the late 1970s, increased emphasis was placed on backward linkages and the utilisation of local resources as well as on regional development. This policy has not yet been entirely successful but is still being pursued, mainly via the establishment of regional industrial centres and the promotion of agri-based industries (Philippine NLUC, 1992). The food industry is the principal manufacturing industry, accounting for an average 45% of gross manufacturing value added in 1981–2 and 37% in 1992–3. As of 1990, chemicals, electrical machinery, beverages, footwear, clothing and basic metals were the country's other most important industries.

Some government statements have acknowledged the serious adverse economic implications of natural disasters in dampening rates of growth and development as well as possibly exacerbating levels of poverty. For example, the National Economic Development Authority (NEDA) comments that 'disasters have no doubt seriously impaired the productive capacity of the national economy and have definitely retarded the poverty alleviation programs' (Philippine NEDA, n.d.: 6). The National Disaster Coordinating Council states that losses arising as a consequence of natural and technological disasters as well as conflict 'contribute to the perennial underdevelopment of our economy, as we have to use scarce resources to repair, reconstruct and rehabilitate the damaged facilities, instead of being able to use these resources for further investment towards development' (Philippine NDCC, 1993: 1). Similarly the government's statement of programmes planned under the International Decade for Natural Disaster Reduction (IDNDR) includes a sentence to the effect that 'the Philippines considers natural disasters as one of the major deterrents to economic progress and its development process' (Philippine Government, n.d.: 2).

However, such often rhetorical concerns appear to have been largely confined to government and other organisations working directly in the area of natural disasters. Other official documents as well as those of international organisations and other commentators have consistently failed to identify natural disasters as a general obstacle to development, which annually curtails growth potential and exacerbates problems of poverty. Instead, natural disasters, particularly typhoons, appear to have been accepted as a fact of life in the Philippines. Only abnormally large disasters have been considered worthy of comment – and even then only after the event rather than in terms of their potential impact on economic targets or forecasts. For example, the World Bank (1993) describes the economic implications of various natural disasters experienced during the late 1980s and early 1990s, yet ignores them in identifying 'principal obstacles and risks' faced by the economy.

Measurement difficulties lie at the heart of the apparent failure to acknowledge the impact of all but the most severe natural disasters. As already noted, the Philippines experiences a number of largely localised natural disasters every year which makes it intrinsically difficult to isolate their impacts. The benefits of a totally disaster-free year cannot be directly measured and the whole of the country or even whole regions are generally not affected by any one disaster, implying that provincial rather than regional or national data has to be examined. Measurement problems are further exacerbated by the fact that the Philippines experiences the full spectrum of natural disasters, yet different types of disaster themselves have varying impacts on both the overall and the local economy.[17]

---

[17] A distinction is commonly made between sudden-impact and slow-onset disasters. The former damage productive capital, including infrastructure, effectively destroying the means of production as well as stocks of inputs. They also affect non-productive social infrastructure, particularly housing. Indeed, more severe sudden-impact events, particularly earthquakes, can generate increased construction activity and thus boom conditions in the local economy. In contrast, slow-onset disasters – basically droughts – may be potentially more disruptive in the longer term. They typically occur nationally in the Philippine context and result in a more gradual erosion of underlying economic variables such as rates of savings, investment and domestic demand, as well as potentially disrupting manufacturing and industrial output via various channels (see below). Volcanic eruptions are more difficult to categorise, displaying some of the characteristics of slow- rather than sudden-onset disasters. More specifically, eruptive phases can continue for an extended period of time, continually depositing a light layer of ash over the surrounding area and creating significant uncertainty and fear amongst local communities yet inflicting relatively limited infrastructural damage. Eruptions can also be followed by several years of lahars, wiping out infrastructure very suddenly and creating economic difficulties of a nature associated with sudden-impact disasters. The threat of lahars can continue to perpetuate a climate of extreme uncertainty, undermining public and private confidence and thus delaying the replacement of destroyed assets or any new investments, in turn depressing the economy.

In practice, perhaps partly because of these measurement problems, the impacts of disasters in the Philippines have been assessed primarily in terms of physical damage while there have been few assessments of the longer-term impacts of disasters. The possible inappropriateness of this measure is demonstrated by Figure 3.1 which plots annual real GDP growth for the period 1981–94 against the reported damage inflicted by natural disasters. The graph suggests a weak relationship between the level of damage and overall economic performance in a particular year, implying either that natural disasters have had little impact on growth rates in the Philippines or that damage figures alone are a poor indicator of their impact. There are grounds for believing that the latter is at least partly true. Firstly, damage estimates may themselves be inaccurate, most notably because costs are defined in terms of reported losses only (see Box 3.1). It is possible that loss data were particularly unreliable for the earlier part of the period. Secondly, the focus on levels of damage effectively captures only the stock impacts of disasters and ignores the potentially considerable flow effects. Indeed, disasters could potentially affect longer-term growth rates as well as a host of other variables such as the budget deficit, the trade balance, the level of external debt or the incidence of poverty.[18] Yet as long as damage data are taken as the principal indicator of the economic impact of natural disasters, effectively misreporting their true economic impacts, difficulties will continue to be encountered in ensuring that disaster-related concerns are incorporated into decision-making and planning at all levels of the economy.

This paper aims to step beyond a mere aggregation of the cost of physical damage to explore the wider economic implications of natural disasters. It presents both an analysis of the impact of disasters on various aspects of the economy and examples of the impacts of particular disasters.

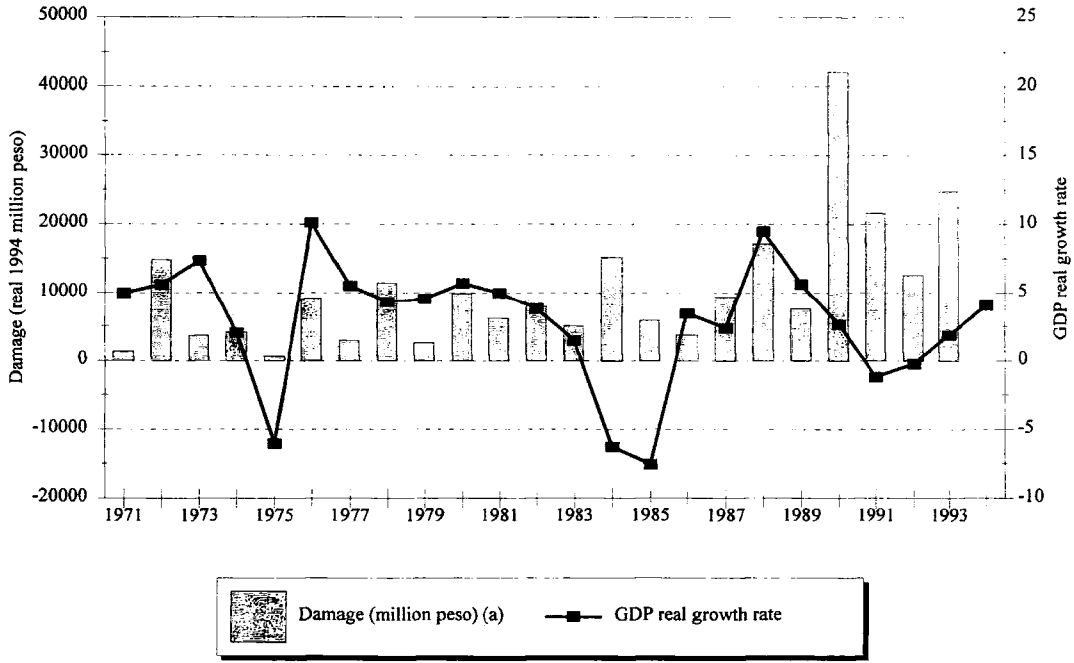
---

[18] Data on the scale of physical losses are also interpreted erroneously on some occasions as illustrated by the following quote from the Philippine DND (1994: 3):

> There were even instances when property damage negated or even exceeded the annual growth rate in the Gross National Product. Typhoon and flood damages for the years 1970, 1982, 1984 and 1986 have caused a considerable setback in our bid for economic recovery as the damage percentile for these disasters alone has exceeded the growth rate of the GNP... When viewed against the country's current economic situation, these losses plus the cost of relief and rehabilitation assistance represent a sizeable drain in our country and have truly retarded the government efforts towards self-sufficiency and stability.

Whilst stock losses as a percentage of GNP provide a useful indicator to place disaster losses in context, the losses themselves do not represent declines in GNP (with the notable exception of agricultural crop losses) but, rather, the stock factors which contribute to GNP.

Figure 3.1 **Philippine annual damage from natural disasters and GDP growth, 1971–84**



(a) Figures on estimated damage refer only to direct physical destruction.

Box 3.1 Disaster damage assessment

Disaster damage assessments should aim to serve two purposes. First, they should provide essential information upon which appropriate and timely responses can be based, addressing both short-term humanitarian needs and measures to ensure a rapid economic recovery. Second, they should form a fundamental part of efforts to ascertain the broader economic impacts of disasters, at both the macro and household levels, as an important component in furthering understanding of changing economic vulnerability to natural disasters and how development strategies can be directed to reduce their impact.

In practice, damage assessments have so far largely focused on the first of these objectives in the Philippines. Following a disaster, assessments are undertaken by local disaster coordinating councils (DCCs) and submitted to the regional and then the national council, with the primary purpose of determining emergency response, relief and rehabilitation requirements. The NDCC collates the various assessments together with reports prepared by various regional government departments and submits a single document to the President together with a recommendation on whether or not a disaster should be declared and the amount of national funds which should be released in support of the relief efforts.

However, the quality of reports is variable. Currently, there is no set procedure for assessing the damage, and different local authorities may not report the same categories of damage or use the same valuation prices. Moreover, assessments only take account of damage experienced by lower income groups and sub-sectors which may be eligible for government assistance (Chardin, 1996). A further problem arises from the speed with which the final assessment is supposed to be completed – that is, well before it is possible to measure the full economic impact of the disaster. According to Presidential Decree 1566, all relevant agencies should submit reports to the NDCC on damage within their scope of responsibility two weeks and then two months after the occurrence of a disaster (Philippine NDCC, 1989a). Indeed, in part reflecting the poor quality of official reports, NGOs often carry out their own post-disaster damage assessments to determine the nature and scope of their relief efforts.

In recognition of these difficulties, the NDCC has drawn up a detailed assessment checklist to complement the much briefer disaster report forms currently in use. In a further attempt to improve assessments, an inter-departmental Task Force led by the National Statistical Coordination Board was developing a manual on the compilation of disaster statistics as of late 1995. This manual is intended to provide guidelines for undertaking pre- as well as post-disaster assessments and could therefore play a vital role in identifying vulnerable groups and promoting measures to reduce their exposure. However, somewhat disappointingly, the draft manual focuses largely on a description of the structure and history of disaster management and disaster preparedness and warning systems in the Philippines and offers little in the way of such guidelines.

Meanwhile, there have been few assessments of the longer-term impacts of disasters, as already noted. Exceptions include the National Economic Development Authority studies on the economic impacts of the 1988 and 1989 typhoons, 1989–90 drought and the 1990 earthquake although the NEDA does not appear to have repeated these exercises more recently. Rantucci (1994) also provides a useful account of the economic impacts of the July 1990 Luzon earthquake and the June 1991 eruption of Mt Pinatubo.

Box 3.1 Disaster damage assessment (continued)

The economic impacts of disasters have also been assessed as part of the cost-benefit analysis of specific mitigation measures. For example, a Mt Pinatubo Recovery Action Plan included a cost-benefit analysis in evaluating various methods for the control of sedimentation within eight river basins (USACE, 1994). However, although economic efficiency had been identified as the primary criterion for screening alternatives, economic benefits were basically defined in terms of direct impacts and reductions in loss of life, while most indirect and secondary costs were excluded. Furthermore, the economic data were based on a relatively small sample size, resulting in uncertain estimates. Meanwhile, the Asian Social Institute has been commissioned by the Corporate Network for Disaster Response to undertake a study of the economic impacts of disasters in the Philippines with the underlying objective of helping to increase the attention paid by policy-makers to disaster prevention, mitigation and preparedness. Once again, however, the study focuses largely on stock losses, stating that 'the determination of costs will be based solely on direct economic costs' including the cost of post-disaster responses as well as public and private infrastructure and assets, and standing crops (ASI, 1995: 2). It was intended to collect information on the frequency of different disasters and to combine this with data on economic losses in order to compare the likely economic cost of various disasters with and without certain prevention, mitigation or preparedness measures.

3.1 Natural disasters and overall economic performance, 1970–95

As a starting point, it may be useful to consider the economic impact of natural disasters within the context of overall economic trends. The Philippine economy has experienced two crisis periods over the past 25 years, both resulting in negative growth rates but neither primarily attributable to natural disasters. The first crisis, in 1975, was precipitated by the world oil price shock. In the same year the country enjoyed the benefits of relatively few disasters, at least according to data on total disaster-related damage. Positive economic growth was restored in 1976, despite a major earthquake of magnitude 7.8 on the Richter scale. However, the ramifications of the oil price shock continued to be felt throughout the remainder of the 1970s as further oil price increases exerted domestic inflationary pressures, in turn leading to a tight monetary policy and selective price freezes.

The second crisis period occurred between 1982 and 1985, primarily reflecting the impact of the world recession on Philippine export markets but heightened by the assassination of opposition leader Benigno Aquino in 1983 and a subsequent period of political uncertainty and civil disobedience. Difficulties were exacerbated by a severe drought in 1984 as well as continued adverse movements in the country's terms of trade, high interest rates and excessive reliance on foreign borrowing with short-term maturities. Nevertheless, natural disasters clearly did not lie at the heart of the country's economic problems.

To help resolve the economic difficulties, the government embarked on a programme of structural change in 1983, followed by a stabilisation programme in 1984. Further structural reforms were introduced between 1986 and 1989, with the objectives of moving the economy towards sustained growth and also of alleviating poverty. From 1986 the economy began to demonstrate real positive growth although the rate of recovery slowed in 1987 as the direct consequence of a severe drought. Performance improved again in 1988 but signs of a slowdown emerged the following year, with a decrease in the rate of investment, exports and industrial growth.

From 1990 the economy entered another difficult period, this time in part directly attributable to a series of major disasters on a scale not observed during the 1970s or 1980s. Drought in the latter part of 1989 and the first half of 1990 reduced agricultural production, damaging some P 365m worth of crops and causing an estimated opportunity loss of P 1.2bn in palay production and P 808m in corn production (Philippine NEDA, n.d.). The drought also resulted in severe power shortages, leading to estimated daily losses to the industrial sector of P 25–75m and a drop in the annual rate of industrial growth from 7.4% in 1989 to 2.5% in 1990 (ibid.) (see Box 3.2). The economic difficulties were exacerbated by the combined effects of the Gulf crisis, which increased the cost of oil imports and displaced many migrant Filipino workers who had provided a major source of capital inflow. The political instability following the December 1989 coup further discouraged potential investors. Thus, for example, real capital formation increased by 14.2% in the first quarter of 1990 compared with 25.6% in the first quarter of 1989.

In the face of these various setbacks, the National Economic Development Authority reduced its growth forecast for 1990 from 7.1% as contained in the Medium-Term Development Plan (1988–92) to 4.8%, whilst the 1991 growth rate was revised from 6.9 to 5.5%. A severe earthquake in Luzon in July 1990 resulted in a further economic setback, destroying assets of a total estimated value equivalent to 1% of GDP and causing NEDA to revise its GDP growth forecasts for 1990 and 1991 down even further to 3.8 and 5.2% respectively. In practice, the economy achieved an even lower growth rate of only 3.0% in 1990, whilst inflation crept up to 14% (see Chapter 6). The earthquake was also held responsible for a 0.6% (or 152,000 person) increase in the rate of unemployment to 10.6%.

The government responded to the renewed economic difficulties with the introduction of a stabilisation programme at the beginning of 1991, including efforts to improve the fiscal deficit and control the money supply. However, any hopes of improvement were thwarted by further disasters in 1991, including the eruption of Mt Pinatubo in June and consequent lahars, Super Typhoon Trining in late October and the Ormoc flood towards the end of the year. These contributed to a negative GDP growth rate of 0.6% year on year, in turn largely reflecting lower growth in Central Luzon and the Metro Manila region (see section 3.3). The disasters also played a role in generally

Box 3.2 Droughts and power supply

Installed energy production capacity of the Philippine National Power Corporation (NPC) has increased substantially over the past 20 years, rising from 1,007 MW in 1977 to 6,692 MW by 1993 and with further increases thereafter. NPC capacity is complemented by that of other power producers, bringing the total installed generating capacity to 6,927 MW in 1993, of which 32% was hydro, 45% oil/diesel-based, 15% geothermal and 8% coal. Power is mainly oil-based in Luzon, geothermal in Visayas and hydro in Mindanao. The country has deliberately reduced its reliance on imported oil, which accounted for 84% of electricity production in 1980, through the increased exploitation of hydro-electric and geothermal potential.

However, the increased reliance on hydro-power generation has also resulted in certain drought-related electricity shortages, on some occasions necessitating temporary increases in oil imports. For example, the government's goal of reducing oil-based generation to 44% of total commercial energy consumption by 1987 was undermined by the 1987 drought, which instead resulted in a temporary increase in oil imports (EIU, 1994). Meanwhile, the nationwide 1992–3 drought contributed to particularly serious power shortages, exacerbating an existing crisis caused by insufficient production capacity and leading to the import of power-generating equipment. Daily seven-hour blackouts were common in many parts of the country in 1992–3 while the power outages were reported to cost the economy some US$200m in 1992 alone (Delica, 1994a). For example, three large cement firms in Mindanao were forced to close, resulting in a more than two-fold increase in the price of cement.

The NPC responded to the power crisis by increasing investment, increasing purchases of power from independent producers and accelerating the privatisation of the power sector. Yet, as of 1995, NPC hydro-electric power plants were again reported to be operating at reduced capacities due to the combined effects of drought and siltation (World Bank, 1995b). Intermittent power supply disruptions also imply reduced income for the power utilities and, thus, possible operating deficits which the government may partly have to bear, at least as long as the sector remains largely in public hands. For example, the July 1990 Luzon earthquake was partly responsible for a 328m kWh decline in electricity sales in 1990.

As the country's irrigation and reticulation systems expand further and the rising population and industrialisation also create increased demands for water, certain conflicts could arise during periods of drought between the storage of water for power generation purposes and its release for other uses. To help avoid such conflicts, electricity tariffs should be increased to levels equivalent to the long-term marginal cost of supply. This would encourage energy conservation practices and help avoid the development of energy-intensive industries attracted by artificially low electricity prices. Levels of stored water in the country's reservoirs also need to be closely monitored and the throughput of hydro-electric power stations adjusted in line with any longer-term hydrological trends.

undermining confidence in the economy. Nevertheless, the government managed to maintain sufficiently tight monetary and fiscal policies to satisfy IMF lending requirements.

From 1992, tighter domestic policies began to attract external capital flows again whilst inflation fell and foreign exchange reserves rose. However, GDP growth remained very weak as a direct consequence of tight monetary and fiscal policies, the latter of which were at least indirectly attributable to the high relief and reconstruction costs associated with the 1990 earthquake and the 1991 eruption of Mt Pinatubo (see Chapter 8). The country also experienced electricity shortages, in part associated with a drought in the first four months of the year (see Box 3.2).

Economic performance improved slightly in 1993 despite the continuing power crisis through the first six months of the year and a record 32 typhoons in the PAR, causing damage valued at P 25,781m at 1994 prices. Agricultural production recovered with the return of good rains whilst the ongoing domestic reform process together with the completion of an IMF stand-by and a Brady-type debt agreement boosted confidence in the economy. The economy continued to perform well in 1994, in part as investor confidence further improved and the 1992–3 energy crisis was resolved, but also reflecting the lower incidence of major natural disasters. Again, economic performance was boosted by good agricultural output, in turn reflecting favourable weather. The government was also finally able to achieve a budgetary surplus (see Chapter 8).

This summary of economic performance over the past 25 years, drawn from the documents of various government and international agencies and independent commentators, clearly suggests that droughts and major geological disasters are more likely to be identified as determinants of annual economic performance than typhoons, either individually or in their totality. Yet between 1970 and 1994 only two droughts were reported to cause damage in excess of P 4bn (at 1994 prices), whilst typhoons were reported to cause cumulative damage in excess of P 4bn in sixteen of these years – and considerably more in 1993. This could reflect the fact that damage assessments alone are a poor indicator of the wider economic impacts of disasters, as already suggested, either overestimating the direct impacts of typhoons, underestimating those of drought or failing to indicate that the indirect and secondary impacts of drought are much greater than those of typhoons. Alternatively, it could imply that the wider flow impacts of droughts are more easily discernible, even if not directly measurable, and are thus perceived as greater despite a drought's lower direct destructive capacity. The latter is likely to be at least partly true: droughts impact first and foremost on the agricultural sector where their effects are relatively clear in terms of lower yields and output and where, by definition, they affect the livelihoods of much of the population. They can also affect electricity supply, again with clear impacts throughout the economy. Furthermore, droughts only occur intermittently, rather than annually, and when they do, they frequently affect much of the country, again enhancing the visibility of their impacts.

Box 3.3 Estimating the economic impacts of typhoons

A NEDA study of the impact of the 1988 and 1989 typhoons provides some useful evidence on the annual toll of natural disasters (Philippine NEDA, n.d.). Neither year was particularly unusual in terms of either the frequency of typhoons or numbers of lives lost, with 20 cyclones in the PAR in 1988 and 19 in 1989. Furthermore, although damage estimates were relatively high in the former year, they were slightly below the 1970–94 average in the latter (see Table 1.1). According to NEDA estimates, agricultural losses alone reduced annual GNP growth by 0.3% in 1988. Regions V and VIII experienced estimated losses equivalent to 2.7 and 5.8% of regional GDP as a consequence of the 1988 typhoons. The 1988 typhoons also dislocated some 41,000 jobs and the 1989 typhoons a further 21,000.

In reality, total losses including non-agricultural impacts were almost certainly considerably higher. For example, Torrente (1993) reports that only some 40% of the total damage arising as a consequence of typhoons experienced between 1980 and 1989 occurred in the agricultural sector. The NEDA analysis also ignores the multiplier effects of agricultural losses through the economy – for example, in terms of levels of demand, savings and tax revenues. Nor does the analysis consider the opportunity cost of government support to the disaster victims or possible impacts on the extent and depth of poverty of affected communities.

Although it is purely speculative to estimate the indirect impacts of typhoons even on GDP, annual output losses could be in the region of perhaps 0.2–0.3% of GDP. Had there been no typhoons at all between 1970 and 1994 and, as a consequence, the annual rate of GDP growth consistently been 0.2% higher, absolute GDP would have been 4.8% higher than its actual level in 1994 or, with an additional 0.3% annual growth in GDP, 7.3% higher. These estimates are inevitably crude. Furthermore, economic development entails far more than the achievement of higher levels of economic growth. Thus, the growth opportunities forgone as a consequence of natural disasters should not be taken simply at face value but translated into factors such as lost investment and employment opportunities and the effective delay implied in longer-term rises in standards of living and reductions in poverty. Nevertheless, the estimates help illustrate an important point – namely, that typhoons do have very real financial costs.

Yet typhoons can have significant wider economic impacts (see Boxes 3.3 and 3.4). Indeed, as long as typhoons fail to be considered a major threat to factors such as long-term sustainable development, poverty alleviation or the reduction of fiscal deficits, efforts to reduce vulnerability to them may receive less attention than is economically justifiable. Despite clear methodological constraints, efforts need to be made to improve understanding of the wider economic impacts of typhoons at the household, provincial and national level.

3.2 Forecast versus actual performance

Actual relative to forecast performance of the economy provides another indicator of the economic impacts of natural disasters, as noted above. The NEDA has included

Box 3.4 Typhoon Rosing, November 1995

Super-Typhoon Rosing (International Code Name Angela) struck a highly populous and relatively industrialised region of the country, including the capital Manila, in November 1995. Fortunately, the typhoon did not result in great loss of life but nevertheless caused very heavy capital losses, providing useful case material on the impacts typhoons can have, particularly in terms of public utilities.

According to press reports, total damage to agriculture and infrastructure was initially estimated at over P 2.2bn, excluding the costs of damage to some 96,000 houses. Damage to crops alone was put at P 1.1bn, some 77% of it in Bicol (Region V). The typhoon occurred shortly before the harvest of the wet-season rice crop, destroying some P 484m of palay. Hundreds of coconut trees were also flattened, ruining production prospects for two years and leading to an immediate 56% increase in the price of vegetable oil in the European trading market.

The typhoon disrupted the transportation network in its path, destroying bridges and leaving roads impassable. A few international flights were also delayed. Over 20 million people were affected by power cuts as transmission lines were brought down. The power corporation, Napcor, estimated shortly after the typhoon that damage to power facilities could reach P 200m. Some 80% of the Manila Electricity Company's (Meralco) damaged circuits had been restored within two days but full restoration was expected to take a week. Certain areas were also left without water supplies as pipes had been destroyed. Some industrial and manufacturing plants were damaged as well as school buildings. Major shopping malls in Manila were temporarily shut while glass was replaced. A short-term increase in hotel occupancy was also reported as people fled their homes.

The 'price tag' law, under which prices should remain stable in the aftermath of a disaster, was invoked following the typhoon. Indications suggest that the law was at least partly upheld, with local government and police checks on public markets. Mayors are empowered to close down business establishments found to be engaged in hoarding and profiteering. Some lootings and burglaries occurred in the wake of the typhoon.

five-year forecasts in its three consecutive medium-term development plans for 1982–7, 1987–92 and 1993–8. The ADB has also produced annual one-year and two-year forecasts since 1990 (Table 3.1), together providing useful points for comparison with actual performance.

The ADB one-year forecasts are obviously of most use in capturing the impacts of natural disasters as they are shorter-term and therefore based on more accurate assumptions about underlying international and domestic factors influencing economic performance. For the period 1989–95 overall, these forecasts have been consistently over-optimistic. However, the gap between actual and forecast performance was particularly substantial in 1990, 1991 and 1992, particularly for the industrial sector, clearly reflecting the impact of various unanticipated droughts, earthquakes and volcanic eruptions. Meanwhile, GDP growth in 1993 was almost a

Table 3.1: Philippine GDP: forecast and actual performance, 1983-95 (%)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
GDP growth													
NEDA forecasts as contained in consecutive 5-year plans	6.30	6.30	6.30	6.30	6.70	7.10	6.70	7.10	6.90	6.70		3.4-4.4	4.1-6.2
ADB 2 year forecast								5.40	6.20	4.10	4.30	4.50	
ADB 1 year forecast							6.30	5.00	2.10	2.80	2.80		5.00
Actual	1.46	-6.27	-7.57	3.46	2.36	9.50	5.63	2.63	-1.18	-0.25	1.83	4.03	4.80
Agricultural GDP growth													
NEDA forecasts as contained in consecutive 5-year plans	4.90	4.90	4.90	4.90	4.00	4.50	5.00	5.50	5.50	5.50		2.2-2.7	2.4-3.0
ADB 2 year forecast								3.80	3.70	3.30	2.50	2.60	
ADB 1 year forecast							3.60	2.60	0.90	2.00	1.40		3.00
Actual	-3.38	-0.93	-1.88	3.68	3.22	3.24	3.01	0.48	1.37	0.39	2.13	2.39	0.90
Industrial GDP growth													
NEDA forecasts as contained in consecutive 5-year plans	6.80	6.80	6.80	6.80	9.10	8.90	8.20	8.30	8.50	9.70		4.7-5.7	5.2-7.9
ADB 2 year forecast								6.70	7.80	5.10	5.50	2.90	
ADB 1 year forecast							8.70	6.10	2.40	3.10	6.00		7.00
Actual	1.52	-11.51	-15.75	2.30	4.01	8.75	7.38	2.53	-2.65	-0.54	1.65	6.11	7.30

Source: NEDA Annual Reports, 1982, 1986, 1995; ADB, various.

full percentage point below the forecast rate despite the fact that agricultural performance considerably exceeded forecasts, presumably partly reflecting the lingering effects of the 1992/3 drought via its contribution to the continuing power crisis.

3.3 Regional impacts of natural disasters

It is also difficult to isolate the impact of disasters at the regional level except in the case of particularly severe disasters, again partly because even this is too aggregate a unit for analysis. Ideally, investigations should focus on impacts at the provincial level instead. There are also problems in the way the data on disaster-affected areas are reported, particularly in the case of typhoons where the geographical impacts are highly localised, again hampering analysis even at the regional level.[19]

Nevertheless, disasters do have major impacts at both the regional and provincial levels. This section draws on evidence from two recent disasters to illustrate the nature and complexity of these impacts: the July 1990 Luzon earthquake and the June 1991 Mt Pinatubo eruption. These case studies focus particularly on levels of damage to public utilities and infrastructure and the impacts on regional growth rates.

The July 1990 Luzon earthquake Some 1,283 deaths were officially recorded as a consequence of the earthquake, largely in Baguio City. Over 100,000 houses were damaged of which 25% were destroyed. In Baguio City alone, about a third of the buildings were damaged. Total damage was estimated at P 12.2bn (P 15.4bn at 1994 prices) according to official data, some 56% of it to infrastructure, 12% to agriculture and 32% to private property, principally non-housing (Table 3.2). Despite the earthquake, GDP for Region I increased by 2% year on year in 1990, reflecting improved agricultural production which more than offset a 1.3% decline in manufacturing output. More generally, annual growth rates over the period 1987–92 averaged 2.3%, 5.1% lower than the regional target. One commentator attributed this poor performance to the 1990 earthquake and super typhoons as well as negative international developments as a consequence of the Gulf War (Alatec-Harris-Tym Group et al., 1993b). The impact of the earthquake was more discernible in the CAR, where Baguio City is located. GDP for the CAR declined 0.4% year on year whilst agricultural GDP alone fell by 5.5%.

---

[19] It had been intended to undertake some regression analysis of the impact of disasters on regional GDP by sector. However, considerable difficulties were encountered in constructing a suitable disaster index from data readily available in the public domain. In particular, total damage figures are typically reported, with no breakdown by region or province. Two other dummy proxy variables, rainfall and crop yields, were also briefly explored but the results were not significant, again perhaps because analysis at the regional level is too aggregate, with provincial-level analysis required instead.

Table 3.2: Estimated costs of the July 1990 Luzon earthquake (million Pesos)

	Estimated costs	As % of total
Agriculture		
Crops	550	4.5
Fisheries	408	3.3
Livestock	40	0.3
Facilities	100	0.8
Irrigation systems	327	2.7
Fish processing plants	0	0.0
Sub-total	*1,425*	*11.7*
Infrastructure		
Roads/bridge	3,472	28.4
Public buildings (incl. schools)	1,843	15.1
Public facilities	1,530	12.5
Sub-total	*6,845*	*56.0*
Private properties	3,955	32.3
Houses	147	1.2
Other privately owned establishments	3,763	30.8
Vital/utility services	45	0.4
Sub-total	*7,910*	*64.7*
Total	12,225	100.0

Source: Philippine NDCC, 1990

(a) Based on estimated cost of direct physical destruction alone.

The earthquake resulted in major temporary disruptions to transport and communications networks and to the supply of water for agricultural purposes, affecting production capabilities and marketing and distribution arrangements in the short- to medium-term. Almost 87,000 ha of rice land (including 60,000 ha of irrigated land), some 14 national and 174 communal irrigation systems and fishponds were damaged. The livestock population also declined rapidly as animals were killed, either accidentally as a consequence of the earthquake or deliberately to meet short-term food requirements (Fernandez and Gordon, 1993). Post-harvest and storage facilities were damaged, including 30 grain warehouses (with a total capacity of 82,500 t), five dryer houses and two rice mills. Landslides also contributed to increased rates of deforestation and river siltation. Employment in Baguio City's manufacturing industry fell from 6,000 in 1989 to 4,500 in 1991. Power supplies were disrupted for days, and even weeks, in some areas.[20] Education was also temporarily disrupted.[21]

A number of mining operations were also affected, including those of Benguet Mining Corporation (see section 3.4) as well as Philex and Lepento Consolidated Mining Corporations. Philex experienced particular problems relating to damage to buildings and access roads and bridges. Lepento Consolidated also faced transport difficulties, initially incurring additional costs of P 5m per month by having to transport its output over a 1,000 km, rather than the normal 160 km, route. Real mining and quarrying GDP fell by 2.6% in 1990 as a direct consequence of the earthquake, whilst mining and quarrying in Regions I–IV and the CAR alone declined by 16.2%, with a further marginal fall in 1991 (excluding Region III where the Mt Pinatubo eruption resulted in another major fall in mining productivity). Export losses from the mining sector and Baguio Export Processing Zone were estimated at around US$35m (P 851m) between mid-July and the end of August 1990 alone (Philippine NEDA, n.d.) (see Box 3.5).

Central Luzon's road network, particularly in the Baguio region, was extensively damaged by the earthquake whilst seven bridges collapsed, eight were seriously damaged and about twenty suffered lesser damage (Rantucci, 1994). One survey indicated that almost two-thirds (63%) of the sample communities faced complete or partial isolation, resulting in shortages of goods and services (Cola, 1992). Even where roads were passable, public transport was limited by gasoline shortages. As of

---

[20] For example, according to one survey of 109 households from 52 barangays, supply was resumed within three days in some areas but took as long as 60 days in others (Cola, 1992).

[21] For example, enrolment at the Lyceum Northwestern in Dagupan City was reported to be particularly badly affected, falling from 6,465 students in the 1989–90 academic year to 2,865 in 1990–1 followed by a rapid recovery to over 7,000 students in 1991–2 (Alatec-Harris-Tym Group et al., 1993b).

Box 3.5 The impact of the July 1990 Luzon earthquake on the Baguio Export Processing Zone

Four export processing zones (EPZs) have been established in the Philippines including one in Baguio where the climate is reported to be particularly suitable for electronics (EIU, 1994). Prior to the July 1990 Luzon earthquake, Baguio EPZ had accounted for 39% of total EPZ output. However, considerable damage was suffered as a consequence of the earthquake. One building in the EPZ housing two garment firms, one plastics firm, one electronics firm and one pipe fittings firm collapsed entirely, whilst another housing seven firms was partly damaged, resulting in a decline in output. The earthquake also had a longer-term impact on employment which had recently increased dramatically from 3,600 workers in 1986 to 5,100 in 1989. Some 2.680 workers were displaced and employment had still only recovered to 3,200 by 1993.

Total repair and rehabilitation costs were initially estimated at P 57m excluding, and P 117m including, electricity installations, water connections and access roads. Restoration work was expected to take 8–12 months to complete. The government offered to relocate firms to Bataan EPZ although it is not clear how many took up this offer. More generally, the government also offered loans to affected industries through its various financial intermediaries.

The largest company located in the Baguio EPZ, Texas Instruments, operates an assembly/test site. Its bulk supplies are brought in by road while most of its output is exported through Manila airport. The company operates modern stock practices and therefore relies heavily on timely deliveries of both inputs and outputs. One report indicates that it is questionable whether the firm would have chosen to locate in Baguio EPZ had it been aware of the subsequent transport difficulties it would face, relating in part to annual difficulties as a consequence of the rains as well as the 1990 earthquake (Alatec-Harris-Tym Group et al., 1993a). Such statements suggest that some firms had not fully considered earthquake risks, or even annual weather patterns, in choosing where to locate their plants. More generally, it is also not clear whether a full hazard-risk assessment had been undertaken by the Philippine Government in initially identifying the site for the Baguio EPZ.

1993, road communications had still not yet been fully restored (Alatec-Harris-Tym Group et al., 1993a).

Two major dams in the region suffered relatively minor damage but nevertheless required repair to avoid collapse or a reduction in operating levels (World Bank, 1990). Other dams were damaged by the increased rate of sedimentation. In particular, Ambuklao Dam, located near Baguio, was silted up to a level just a few metres below its water level, forcing the shutdown of electricity production and hampering irrigation activities. The dam had been expected to have a useful life of around 50 years but this was reduced to 28 years as a consequence of the earthquake (Rantucci, 1994).

Despite the considerable damage to buildings and infrastructure, the earthquake did not prompt a construction boom, as is often expected in the aftermath of an earthquake. In Region I, which alone experienced 60% of total damage to roads, bridges, public buildings and facilities and housing, construction activity declined by 4.3% year on year in 1990. This could partly reflect the more general depression in the country's construction industry, in turn due to political uncertainties following the 1989 coup. Although the industry began to pick up again nationwide in 1991, escalating costs hindered the rate of recovery. Moreover, construction activity in Region I continued to decline in 1991, 1992 and 1993 with no indication of a post-disaster boom. The earthquake also resulted in estimated financial losses of P 12.5bn and 8,000 job losses in Region I's tourist industry in 1990. In contrast, despite lower absolute losses in infrastructure and assets equivalent to 15% of the total damage to roads, bridges and public buildings and facilities and to 36% of damage to housing, the CAR appeared to experience the rise in construction activity which one might expect in the wake of an earthquake. Construction increased by 17.7% year on year in 1990.[22] Indeed, the badly damaged city of Baguio, for example, had already re-emerged as a popular tourist destination by 1993, suggesting considerable construction activity (Philippine NLUC, 1992).

The June 1991 Mt Pinatubo eruption The provinces of Zambales, Pampanga and Tarlac as well as part of Bataan, all in Region III, were most severely affected by the initial eruption of Mt Pinatubo. Some 80,000 ha of agricultural land and fishponds as well as whole villages and small towns were completely buried by ash and the initial lahars, with sometimes just a church steeple or the rooves of buildings remaining visible above the mud. Transport, communications, power, irrigation and other infrastructure as well as houses and public buildings were also damaged; drains and other water conduits were blocked, increasing the risk of flooding; commercial and industrial establishments in the cities of Angeles and Olongapo were forced to suspend operations; some 600,000 jobs were lost, equivalent to around a quarter of total employment in Central Luzon; and, at the height of the eruption, 200,000 people were evacuated. Total damage to industry, including agri-based industries, was estimated at US$32m. Ash deposits further afield also created some disruptions, forcing, for example, the closure of schools in Manila and the international airport for several days (PHIVOLCS, 1991a).

Subsequent lahars have occurred in every year since the eruption (see Box 2.2). Those in 1991 and 1992 alone affected almost 260,000 people, destroyed 4,190 houses and caused total damage exceeding P 1bn. Meanwhile, one press report stated that 1.5 million people were affected by lahars in 1995, in part reflecting heavy rainfall

[22] Further examination of regional performance would be required to confirm the role played by the earthquake in generating increased construction activity as construction activity had also increased 61% year on year in 1989. It subsequently fell by 16% in 1991.

associated with Typhoon Maming (Watkins, 1995). A Mt Pinatubo Recovery Action Plan covering eight river basins further indicated that, as of 1994, some 230,000 houses, commercial and public buildings and 80,000 ha of agricultural land were at threat from lahars and flooding. The same plan estimated the total damage over the next 25 years to these basins alone at P 12.1bn (at 1994 prices).[23] More generally, the provinces of Zambales, Tarlac, Bataan, Pampanga, Nueva Ecija and Pangasinan have been affected or are potentially threatened by lahars.

In terms of the implications for overall economic activity, GDP for Region III fell by 3.2% year on year in 1991. Manufacturing GDP alone declined by 6.8% and construction by 6.2%, although agricultural GDP increased by 2.4% (see Chapter 4). Despite the continuing threat of lahars, construction activity picked up considerably again in 1992, increasing by a massive 76.7% year on year. This no doubt partly reflected infrastructural rehabilitation efforts begun at the start of the dry season in late 1991. Positive growth was also restored to other sectors of the regional economy, although growth remained relatively depressed compared with performance in the years leading up to the eruption, presumably reflecting the role of continued uncertainty in undermining confidence in the local economy (see Box 3.6).

One major implication of the eruption has been the loss of livelihoods.[24] It is particularly important that the victims regain their financial independence as quickly as possible, as recognised by the Mt Pinatubo Commission (see Chapter 10) which regards the establishment of sources of livelihood as the most important prerequisite for recovery in the region. Moreover, there has been considerable local resistance to permanent relocation in the absence of viable resettlement and livelihood options (USACE, 1994). In an effort to redress these problems, the Commission had funded over 8,100 livelihood projects by 1994, generating some 74,000 jobs (ibid.).[25]

---

[23] This Plan was undertaken by the US Army Corps of Engineers with the financial support of USAID.

[24] The eruption has also had serious social consequences. Mt Pinatubo was home to the Ayta or Negrito tribes, a nomadic aboriginal people producing mostly coffee, root crops and bananas. Aytas have been culturally disorientated by their forced relocation as consequence of the eruption and have suffered particular health problems in the evacuation centres (Banzon-Bautista and Tadem, 1993). By 1993 some 530 people, many of them Aytas, were reported to have died as a consequence of diseases contracted in the poor living conditions of the relocation sites, significantly more than the 300-odd victims of the initial eruption (Fernandez and Gordon, 1993). Some Aytas communities were also broken up during the relocation process. For further evidence of the impact of the Mt Pinatubo eruption on the Aytas see Banzon-Bautista (1993a) and Ignacio and Perlas (1994).

[25] Evidence on the importance of the need to restore sources of livelihoods was confirmed by a PBSP study on rehabilitation options. This study entailed a survey of 560 victims in

Box 3.6 The Mt Pinatubo eruption and investment: the Clark base

Investment in the Clark mini-industrial zone provides an interesting example of investor behaviour and risk perceptions in the aftermath of the Mt Pinatubo eruption. The former US airbase was covered in a thin layer of volcanic ash and rubble as a consequence of the eruption. This precipitated the final US withdrawal from the base, although a pull-out had already been likely following the expiry of the 1947 US–Philippines Military Bases Agreement and strong domestic opposition to its extension. The decision was subsequently taken to redevelop both Clark and the former US Subic Bay naval base into agro-industrial, civil aviation and tourism centres. In the case of Clark, these plans included the development of a holiday resort and a new international airport.

However, the threat of both lahars and possible further eruptions has effectively hampered efforts to convert Clark. In fact, another major eruption of Mt Pinatubo is highly unlikely for hundreds of years but the base remains potentially threatened by lahars in the short- to medium-term. For example, the city of Angeles, which is adjacent to the base, was damaged by a lahar in 1991. The base also experiences occasional light ash falls due to secondary explosions. Transport difficulties in the rainy season have acted as a further disincentive to investment as heavy rains have generated mudflows, blocking roads and sometimes necessitating extensive detours (Tiglao and Tasker, 1995). Thus, by late 1995 Clark had still to attract any major investors, although its land leases are particularly cheap and tax incentives are also offered for companies locating within both Clark and Subic Bay. Some 50 projects up to a total cost of P 6.2bn had been approved at Clark by the end of 1994 but most of the enterprises were relatively small, employing less than 50 employees (ibid.).

One company which has constructed a 22-hole golf course, a hotel and a casino at Clark reported that it had initially been concerned about the proximity of the site to Mt Pinatubo and had therefore sought assurances that a further major eruption of the volcano was unlikely for at least several hundred years. However, despite having overcome its own inhibitions, the company has faced certain difficulties in promoting its enterprise because of the general public's poor perception, in turn, of the safety of Clark. The company has had to work hard to assure potential customers of its safety.

The Clark base also includes a resettlement site for victims of the Mt Pinatubo eruption. With few job opportunities to date in the base as of 1995, prostitution was reported to be increasingly common (Watkins, 1995).

Pampanga, Tarlac, Zambales and Bataan together with additional case studies of individuals and groups who had successfully re-established themselves since the eruption. The study also identified three categories of factors which it considered essential for designing effective aid packages in the economic, social/ethnic and attitudes and motivation spheres. The first of these included the collation of information on skills and previous work experience as well as the split of workloads within families to identify training needs and help meet job requirements (Anderson, 1993).

However, the continued threat of lahars has caused problems in designing appropriate livelihood creation schemes as well as programmes for the reconstruction of infrastructure. Further problems have been created by the fact that many of those located in resettlement camps were previously farmers yet the scope for agricultural production in the region is likely to remain limited for many years (see Chapter 4). There is also some concern that the land covered by lahars is currently barren and thus relatively worthless. However, it will eventually become productive again and land speculators are therefore starting to buy the land at very low prices. If allowed to continue, this could reverse efforts to ensure a more equitable distribution of land.[26]

Central Luzon's regional development plan has been amended to take account of the change in needs resulting as a consequence of the Mt Pinatubo eruption. In the longer term, the establishment of some 50–100 ha of industrial estates with complementary transport and other infrastructure is envisaged in Central Luzon, with manufactured goods being exported through the Subic Base Freeport. These developments are intended to provide livelihoods for communities in lahar-devastated areas as well as to ease demographic and industrial development pressures on the Manila area (World Bank, 1994).

3.4 Impact of natural disasters on private enterprises

Private enterprise experiences provide yet another perspective on the economic impacts of natural disasters. This section presents brief case studies of the impact of recent natural disasters on the production and marketing operations of two large private enterprises: the Philippines' largest single private company, San Miguel, and a large mining and agro-processing enterprise, Benguet Corporation. The two studies provide useful insights into the wide and varying nature of the impacts of disasters and of private sector risk management and coping strategies.

San Miguel The largest corporation in the Philippines, San Miguel, accounts for some 4% of GDP and 6% of government tax revenues. Beer alone accounts for around 80% of total revenue but the company also undertakes the production of other beverages, food and agri-products, packaging and property development and has a number of foreign subsidiary companies. The corporation has four domestic beer breweries and one bottling plant, with an additional brewery currently under construction (as of late 1995) in Davao.

The most significant disasters impinging on San Miguel's operations in recent years have been the 1991 eruption of Mt Pinatubo and the subsequent lahars. One of the corporation's biggest breweries is located in San Fernando, some 30–40 km from Mt Pinatubo. The plant was not directly damaged by the eruption or lahars and its water

[26] Personal communication with Jean-Paul Chardin, February 1997.

supply was also unaffected as it relies largely on deep wells. However, production fell in the immediate aftermath of the eruption due to labour-supply problems. Transport operations were also affected as goods which had previously been brought in through the Pinatubo area had to take a more circuitous route, adding an additional 200 km to the overall journey. The eruption had an additional longer-term impact on sales, forcing a downward adjustment in production. According to a corporation spokesperson interviewed for this study, between 1991 and 1994 San Miguel lost cumulated sales of perhaps P 25m (US$0.95m at 1994 exchange rates), equivalent to 10% of actual nominal national sales over the same period, because of a collapse in the local market. The area had traditionally been one of the country's strongest markets but had still not recovered to pre-1991 levels by late 1995.

San Miguel has also been affected by a range of other natural disasters. For example, coconut oil revenues were adversely affected by typhoons in 1993 as reduced copra production in Luzon and the Visayas resulted in frequent mill shutdowns and higher local prices. Droughts have also taken their toll via their effects on both reduced agricultural output and lower demand. The 1992/3 drought had a particularly serious impact on demand via its effect on the power supply and thus retailers' ability to stock refrigerated and frozen foods. Most of San Miguel's production plants have their own generating capacity and so were able to sustain output despite the drought. However, retailers typically do not have such capacity and general power cuts therefore resulted in a fall in demand for items such as ice cream, processed meats and shrimps. To boast demand, San Miguel responded by expanding the provision of coolers with inbuilt generating units, a programme which the company was already implementing as part of its broader marketing strategy.

More generally, although its factories are few in number and thus often unaffected by more localised disasters, San Miguel has an extensive network of sales offices and warehouses as well as a complex distribution network, a part of which is quite likely to suffer some disaster-related damage or disruption every year. A company spokesperson estimated that in a normal year the company loses profits to the value of perhaps P 1m as a consequence of typhoons. Losses in profits are even higher in some years, such as 1995 when they were estimated at P 2m.

San Miguel carries insurance on lost business arising directly as a consequence of natural disasters. Thus, for example, part of its losses incurred as a result of the Mt Pinatubo eruption were apparently met through its interruption-of-business insurance policy. However, because of the frequent incidence of natural disasters, high disaster insurance premiums of 15% of the insured value are charged. Somewhat surprisingly given the medium-term threat of lahar damage, there was no increase in premiums following the Pinatubo eruption.

The Benguet Corporation[27] In 1990, the Benguet Corporation was the largest gold and chromate producer and one of the largest copper producers in the Philippines, employing 13,836 workers. Its subsidiary companies included citrus and mango farming as well as a range of other non-mining activities. However, the Corporation has since suffered a series of setbacks, in part due to natural disasters, which have resulted in considerable losses and a major downsizing of operations. Admittedly, the scale of damage experienced by the Corporation is unusual. Nevertheless it provides a useful example of how natural disasters can affect seemingly immune sectors of an economy such as mining. It further demonstrates that even a firm which could be argued to have spread its hazard risks, even if inadvertently, by investing in a range of activities across various regions of the country is not necessarily cushioned from the impacts of disasters. This case study focuses on disaster-related difficulties faced by the Corporation between 1990 and 1995.

The 1990 earthquake and the subsequent typhoons affected the company's gold mining operations. Equipment, facilities and infrastructure at its Benguet Gold Operations, located to the east and south-east of the city of Baguio in the CAR, were damaged. The lower levels of one of the mines, Acupan, as well as the main haulageways at other mines on the site were also flooded, resulting in the suspension of deep mining operations. Overall, Benguet Gold Operations recorded a 29% decline in gold production year on year in 1990 to 76,808 ounces, and a posted loss of P 62m, compared with an average annual income of P 54.7m in the previous four years. Production of a by-product, pyrite, was also temporarily suspended because of low milling output. Capital development costs to the sum of P 32m were written off and some long-term capital development costs delayed although the company began preliminary drilling to explore new gold deposits to replace the Acupan ore. A voluntary redundancy programme was introduced while some employees were transferred to other sites. Hogan-Soyoc Mines Inc (ISMI), in which the Benguet Corporation acquired 54% control in 1985, also suffered disaster-related production losses of an estimated P 117m in 1990.

The Corporation suffered considerable additional damage as a consequence of natural disasters in 1991, particularly to its Benguet Gold Operations. These operations were affected by a series of typhoons, most significantly Typhoon Trining, which delayed a cost-cutting shift from narrow vein to bulk mining. Typhoons in July and October caused further extensive damage to the value of P 5.75m to the ISMI holding, almost devastating the mine. Meanwhile, infrastructure at the Corporation's largest gold mining site, Dizon Copper-Gold Operations, was damaged by lahar flows from Mt Pinatubo, resulting in suspension of operations and shipments for about six months. Some equipment was also damaged by ash fall while parts of the open pit mine and

[27] Information in this sub-section is based on Benguet Corporation et al. (various) and on an interview with a corporation spokesperson.

several access roads were flooded by a new 600 ha 'lake' which formed in the area as a consequence of the lahar. The company responded by constructing a 12 km route some 130 metres above the old road to provide new access to and from the mine, whilst in the shorter term output was simply stockpiled. For the year overall, copper production declined by 14% to 31m pounds whilst gold production fell by 22% to 107,000 ounces. However, part of the loss was covered by business-interruption and property-damage insurance claims, allowing the operation to maintain positive overall net earnings. In 1992, the same plant was again closed for a month due to further flooding and was not reopened until a second new access road had been completed. The government, in conjunction with the mine, also cut a channel south of the lahar dam to reduce water levels, allowing the mine to continue normal operations. Access roads were flooded yet again in 1993, although the channel helped drain the water to a level at which the mine could continue to operate normally. Heavy rains caused further problems in 1994.

A chromate mine owned by the Benguet Corporation was also affected by floods associated with Typhoon Kadiang in 1993, while a gold operation, Benguet Antamok Gold Operations, which had begun commercial operations in 1992, was hit by Typhoon Goring. The latter mine suffered further damage in 1994 after a tremor resulted in the collapse of the north wall of the open pit while heavy rain caused further disruption.

The Benguet Corporation has also faced damage to non-mining operations as a consequence of natural disasters. For example at the end of 1990 one of its subsidiary companies, Benguet Management Corporation (BMC) planted 270 ha of mangos and 250 ha of citrus in Zambales, North Luzon. However, the plantation was subsequently severely damaged by the lahar flow from Mt Pinatubo, resulting in the loss of P 22.8m capital development investment. No disaster insurance cover had been taken out because of the very high cost of premiums and BMC therefore subsequently posted a net loss of P 55.6m for 1991. BMC also owned 59.5% of Philippine Cocoa Estates which had completed development of a 2,500 ha cocoa property in Davao. Production was adversely affected by drought in 1991 and 1992, coinciding with weak world cocoa prices. In 1992, the decision was taken to close the estate in which it had invested P 55.9m.

The Benguet Corporation's overall profits fell by a nominal 64% in 1991 and no cash dividends were declared. Natural disasters, as well as low gold and high oil prices, were principally responsible for the poor performance. Continuing weak prices, the appreciation of the Peso and losses from the capital development costs of suspended mining operations resulted in a substantial loss in 1992 of P 558.5m. The company was forced to dispose of some non-productive assets to reduce its debt burden and generate additional cash inflow, whilst new exploration and development work was suspended. Operations at the particularly troubled Benguet Gold Operations were also

subsequently suspended in November 1992 because of continuing heavy losses and low gold prices, a closure which might have been avoided had the operation not experienced considerable setbacks as a consequence of natural disasters. A caretaker group was retained to maintain the property and equipment. Further interests in several subsidiaries and affiliates were sold in 1993, including the Corporation's share in ISMI, and these sales were largely responsible for the net income which the company achieved in 1993. Improved metal prices, reduced overhead costs and expenses and lower financing charges from smaller borrowings resulted in further net positive earnings in 1994.

4. Agriculture and natural disasters

Performance in the agricultural sector remains critical both to the overall economy and to the welfare of individual farming households. The agricultural sector provided an average 25% of GDP in 1992–4 and accounts for 45% of employment (World Bank, 1995a). Some 47% or 14m ha of the country's total land area is cultivated, including 5.8m ha under intensive cultivation. (Philippines NLUC, 1992).[28] Agricultural output is concentrated in the country's six major lowlands – the Central Plains of Luzon, Cagayan Valley, Northern and Southern Mindanao, Bicol and Western Visayas. Production is generally under rainfed conditions, with only 5% of the total cropped area irrigated (principally in Region III) and a further 5% with irrigable potential (principally in Region II) (ibid.). The main crops cultivated are rice, corn, coconut, sugar cane, abaca, tobacco, maguey and pineapple while many tropical fruits are also grown (Philippine NEDA, 1995).

The farming sector is predominantly small-scale, and most farmers, particularly in rainfed lowlands and uplands, produce only a single crop whilst also maintaining a few livestock and poultry (Philippine DA, 1992). Landless labourers and upland corn and coconut farmers together with subsistence fisherfolk broadly constitute the poorest segments of rural society (ibid.). The agricultural impacts of natural disasters are therefore crucial both because of their multiplier effects through the economy and their implications for agricultural households, many of whom are already below the poverty line.

Agricultural performance has been mixed over the past thirty years or so, reflecting both longer-term trends and the impacts of shorter-term factors such as natural disasters. With respect to longer-term trends, the sector achieved strong growth in the second half of the 1960s and the 1970s as Green Revolution technologies were adopted. However, by the 1980s many farms had already adopted high-yielding varieties, implying lower further growth potential from yields alone and instead placing the emphasis on increased expansion of cultivated areas. However, the country faces severe shortages of agricultural land which, combined with rapid demographic growth in excess of the rise in non-agricultural job opportunities, has resulted in the cultivation of marginal upland areas as well as expansion into artisanal fisheries.[29] Therefore both per capita agricultural output and, more specifically, rice

[28] A further 15m ha is classified as forests and 0.9m ha remains unclassified (ibid.).

[29] Cruz and Repetto (1992) report that net upland migration increased from an annual 3.4% of the upland population in 1970–5 to 9.4% in 1975–80 and then to 14.5% by 1983, during the economic crisis. They also indicate that cultivated upland areas were equivalent to about 10% of the lowland cropped area in the 1960s compared to 40% in the 1980s.

production gradually declined during the 1980s and, although growth picked up towards the end of the decade, it slowed down again in the first half of the 1990s.

Within the confines of these broader trends, there have also been certain inter-yearly fluctuations in performance, in part reflecting the impacts of natural disasters as well as movements in international prices for major exports, deteriorating inter-sectoral terms of trade and macroeconomic constraints (World Bank, 1995a). The agricultural sector is particularly susceptible to tropical cyclones and associated flooding and to droughts. For example, the ADB (1994) reports that some 48% of total rice and corn losses between 1968 and 1985 were due to tropical cyclones and floods, with a further 33% attributable to droughts and 18% to the weather-related incidence of pests and disease. However, the extent and nature of the impact of a particular disaster will depend both on the crops grown and the timing of the disaster relative to the growing cycle of various crops.

Droughts reduce the yields of most rainfed crops, with the notable exception of sugar which to some extent performs better under poor rainfall conditions. Longer dry spells can threaten irrigated output, depending on the overall availability of water (see, for example, Box 3.2). Drier conditions are also associated with increased pest outbreaks, with further adverse implications for yields. More generally a drought can have particularly severe effects on yields if it is preceded by several years of relatively low rainfall.

Trees are particularly vulnerable to typhoons, which can break branches, defoliate and sometimes even uproot trees as well as reduce tree crop production. Winds of 70–110 kph can knock down banana trees, tilt some coconut trees and break the branches of other trees whilst also causing considerable losses to rice and corn crops. Winds of 110–150 kph flatten most banana trees and uproot many manop and acacias; break, defoliate or uproot over half of all tall trees; and heavily damage rice and corn crops. Meanwhile, winds of over 150 kph cause extensive damage to virtually all agricultural crops and trees (Jose, 1993). The heavy rainfall which typically accompanies typhoons can also result in the waterlogging of soils whilst increasing the rate of soil erosion.[30]

Sudden-impact disasters can also have indirect implications for agricultural production by damaging farming equipment and infrastructure such as drainage and

---

[30] Jose (1993) estimates a typhoon damage index for crops (Dic) in the Philippines of:

$$Dic = 0.36955\ V^{1.1134934}$$

where V is sustained wind speed in kph, implying that the damage inflicted by a typhoon increases exponentially as the wind speed rises.

irrigation systems and rice terraces (see section 3.3). Transport and marketing services can also be adversely affected, due both to direct physical damage and increased demands exerted on the system by the movement of relief supplies (see Chapter 6). Meanwhile, major volcanic eruptions can also have longer-term agricultural impacts, as demonstrated in the extreme by the 1991 eruption of Mt Pinatubo (see Box 4.1).

Overall, the Department of Agriculture (1992) reports that at least 2% of total crop output is lost every year as a consequence of natural disasters, while losses in years of severe drought are probably considerably greater.[31] The real figure, taking account of the impact on agricultural infrastructure and production decisions, could be significantly higher. Moreover, lower agricultural production has implications for agro-processing industries.[32]

The impact of natural disasters on the Philippines' principal food crop, rice, and its largest single export crop, coconut, is discussed in further detail below.[33]

Rice Rice production is fundamental to the Philippine economy, providing the main food staple for 90% of the population and constituting the only crop grown by many farmers. The main rice-producing areas are Central and Southern Luzon and Visayas/Illios. The main crop is planted around June, following the onset of the May/June monsoon, and harvested in November. Around 70% of cultivation is under irrigation, permitting production of a second crop between December and May/June. A second crop can also be grown under rainfed conditions in the southern part of the country. High-yielding varieties are predominantly grown, accounting for 97% of irrigated and 89% of rainfed production between 1990 and 1993 and for 95% of irrigated and 85% of rainfed acreage over the same period.

---

[31] Torrente (1993) reports that the 1982–3 drought affected almost 1m ha of farmland, causing estimated losses of P 763m (at 1994 prices) in agricultural production; the 1986–7 drought damaged some 53,000 ha and resulted in losses of P 706m (at 1994 prices); the 1989–90 drought affected over 300,000 ha of irrigated and rainfed agricultural land and caused losses of some P 3.4bn (US$126m); and the 1991–2 drought resulted in agricultural losses of around P 1.62bn (US$60m).

[32] The irregular quantity and quality of inputs are reported to have delayed the development of agro-processing industries (World Bank, 1995b), a problem to which natural disasters have presumably contributed.

[33] It had been intended to undertake some regional- or perhaps provincial-level regression analysis of the impact of natural disasters on production and yields of key crops. However, considerable difficulties were encountered in constructing a disaster index, as already indicated in Chapter 3. Moreover, provincial level agricultural data, which would have permitted a more sensitive analysis, were not readily available.

Box 4.1 Agricultural impacts of the eruption of Mt Pinatubo

Prior to the eruption of Mt Pinatubo in June 1991, Central Luzon had been the Philippines' prime rice-growing region, accounting for 17.5% of national production in 1988–92 and 14.7% of gross acreage. Sugar cultivation and aquaculture were also important. For example, the region produced some 45% of the country's total fishpond production in 1990. Agricultural activities were supported by an extensive irrigation and river control network.

However, the volcanic eruption and subsequent lahars have had severe implications for agricultural production. Ash to a depth of 5 cm or more was deposited over an area of some 550,000 ha as a consequence of the initial eruption in June 1991, severely damaging some 385,500 ha of agricultural land as well as forestry and aquaculture (Rantucci, 1994). Lighter ashfalls were deposited over a much wider area whilst subsequent lahars have caused further severe damage. As a result, brackish-water fishponds have been severely disrupted and much of the irrigation and river control network damaged or destroyed. The eruption has completely altered eight major river systems, raising river beds some 3–7 metres and altering river courses (USACE, 1994). Five national, 163 communal and 14 smaller irrigation systems are reported to be have been partly or totally damaged. Livestock have also been killed, both as a direct consequence of the eruption and the related collapse of buildings and as the result of subsequent shortages of fodder.

In the second half of 1991, in the immediate wake of the initial eruption, rice production in Central Luzon declined by 21.2% year on year whilst acreage fell by 14% (see Table 4.1). The first crop of 1992 was also 15.9% lower year on year, reflecting lower yields and acreage; and by 1994, production and yields had still not recovered to their 1990 levels, although gross acreage had. As of 1994, aquaculture output was also still only some 60% of previous levels due to the obstruction of water flows and tidal exchange and the destruction of breeding areas. These problems were expected to continue as more ash was washed downstream (USACE, 1994).

Some 87,000 ha of agricultural land with less than 15 cm of ash deposits was reported to be recoverable. As the chemical properties of the ash reduced fertility but did not render the land unusable, farmers were able to till the land to mix the ash with soil and restart planting operations (Fernandez and Gordon, 1993). However, in areas with deeper ash deposits it was expected to take some 20 years or more before adapted vegetation types could grow (Rantucci, 1994). The International Rice Research Institute has had some success in planting rice in volcano-damaged fields using heavy inputs of fertiliser. However, there are questions about its economic viability as rice production in the Philippines is already comparatively expensive (McBeth, 1991).

The ADB estimated that the eruption resulted in US$220m (P 6bn at 1991 exchange rates) of direct damage to agricultural production, forestry, fisheries and livestock, equivalent to 4.3% of total agricultural GDP and 0.4% of Central Luzon's agricultural GDP in 1991. Damage to agricultural facilities totalled US$15.2m, whilst a further US$179.6m was lost in foregone revenues. As of August 1991, the eruption was also expected to cause some US$890m losses in agricultural production over the following five years, with considerable multiplier effects through the economy.

Table 4.1 Central Luzon rice (palay) production, acreage and yields, 1988-94

		1988	1989	1990	1991	1992	1993	1994	Three year averages 1988-90	Three year averages 1992-4	Percentage change 1990 to 1991	Percentage change 1991 to 1992
Annual												
Production	'000t	1,271	1,685	1,911	1,748	1,736	1,604	1,887	1,622	1,742	-8.5	-0.7
Acreage	'000ha	465	517	521	500	472	477	533	501	494	-4.1	-5.7
Yield	t/ha	2.73	3.26	3.67	3.50	3.67	3.36	3.54	3.22	3.52	-4.6	4.9
January-June												
Production	'000t	523	693	664	766	644			627		15.3	-15.9
Acreage	'000ha	142	172	161	168	150			158		4.9	-11.2
Yield	t/ha	3.69	4.04	4.14	4.55	4.30			3.96		10.0	-5.4
July-December												
Production	'000t	748	992	1,247	982	1,092			995		-21.2	11.1
Acreage	'000ha	323	346	361	332	322			343		-8.1	-2.9
Yield	t/ha	2.31	2.87	3.46	2.96	3.39			2.88		-14.2	14.5
Annual irrigated												
Production	'000t	1,014	1,378	1,438	1,405	1,390	1,220	1,546	1,276	1,385	-2.3	-1.1
Acreage	'000ha	344	401	387	377	353	334	409	377	365	-2.7	-6.3
Yield	t/ha	2.95	3.43	3.71	3.73	3.94	3.65	3.78	3.36	3.79	0.4	5.6
Annual rainfed												
Production	'000t	257	307	473	343	346	384	341	346	357	-27.5	0.7
Acreage	'000ha	121	116	134	123	118	143	125	124	129	-8.3	-3.7
Yield	t/ha	2.12	2.64	3.53	2.79	2.92	2.68	2.73	2.77	2.78	-20.9	4.6

Source: Philippine Department of Agriculture

Regional production varies substantially between years, in part dependent on the incidence of natural hazards as well as more general weather conditions. Rainfed production is vulnerable to drought, particularly at the flowering stage around 60 days after planting. If the rains are late farmers will postpone the planting of rainfed crops.[34] Typhoons only pose a real danger when they occur immediately prior to the harvest.[35]

The government has continually striven to achieve self-sufficiency in rice, despite the fact that domestic production is comparatively costly.[36] Self sufficiency was temporarily achieved in 1968–71 and again from 1977 to 1988 but rice imports totalling over 900,000 t were required over the three year period 1988–90, following the severe 1987 drought and a series of typhoons and a further drought in 1989. Imports fell to well under 1,000 t in 1991 and 1992 but rose once more to 201,600 t in 1993, again reflecting the impact of natural disasters. Considerable imports were also required in 1995/6. These intermittent imports of rice have had implications for the balance of payments (see Chapter 7).

Coconuts Coconuts are the country's most important export commodity and nearly a third of the population is directly or indirectly dependent on them. Production has traditionally been concentrated in Southern Luzon and Southern Mindanao, largely under small-scale cultivation. However, output has gradually declined, particularly in Southern Luzon, due to ageing stock and insufficient replanting. National production declined by 16% between 1980 and 1994 as both the number of trees and the average fruit-bearing capacity of the remaining stock gradually fell.

Coconut production is vulnerable to droughts and typhoons. Coconut trees require at least 100 mm of rainfall per annum and are severely damaged by droughts lasting 6–9 months or more. Trees are most sensitive to droughts at the flowering stage, with three successive dry months resulting in poor flowering performance and low yields some 12–13 months later.[37] Coconut trees are also particularly susceptible to

---

[34] Within a particular area, however, farmers are likely to plant their crops at the same time to avoid pest problems in the form of tungro, a pest which jumps from mature to younger rice crops.

[35] For example, the high growth rate in palay rice of 8.5% in 1994 compared with 4.4% in 1993 was attributed to the absence of a major typhoon (Subbarao et al.,1996).

[36] Within a particular area, however, farmers are likely to plant their crops at the same time to avoid pest problems in the form of tungro, a pest which jumps from mature to younger rice crops. Irrigated and rainfed production costs averaged P 5.4/kg in 1995 compared with P 3/kg for imported Thai rice.

[37] There is no specific growing season, with coconut trees flowering every month.

typhoons, which can result in no output for perhaps two years. However, producers are typically involved in a range of activities and are not solely dependent on coconut earnings, implying that they normally continue to generate some income after a typhoon or other natural disaster. The Department of Agriculture has made some effort to reverse the gradual decline in coconut production, in part through the introduction of high yielding varieties which can produce an average of six coconuts per month compared with four nuts from lower yielding varieties. However, to date, replanting has not occurred on the scale originally envisaged. Certain difficulties also seem to have been encountered when the Philippine Coconut Authority tried to introduce dwarf high-yielding coconut trees developed on a research station in a typhoon-free area in the south into a typhoon-prone area further north. The trees were planted between established taller traditional types, providing some protection. Nevertheless, the dwarf varieties, which have shorter root systems, were uprooted by a subsequent typhoon which left most of the older trees standing. It has since been agreed that the replanting programme should concentrate on areas best suited to production, including less typhoon-prone areas. Some evidence of such a shift is already reflected in output data with production in Region IV declining from 25% of the national total in 1980 to 16% by 1994 whilst that in the much less typhoon-prone area of Southern Mindanao had crept up from 26 to 35% over the same period.

The Department of Agriculture has also provided assistance in support of the rehabilitation of coconut farmers in the aftermath of typhoons, in part through its National Coconut Productivity Programme which aims to rehabilitate typhoon-devastated areas using locally produced hybrids and promising tall varieties. In addition, fertiliser grants and livelihood projects are provided.

The Philippines is a major exporter of coconut products. In 1992–4 it was the world's largest exporter of copra oil cake, accounting for 52% of global exports in volume terms, and the second largest exporter in the much smaller copra oil market. Moreover, the price of Philippine copra is widely quoted internationally, implying that movements in world prices reflect fluctuations in Philippine production, with losses in output to some extent compensated by higher export prices. For example, world price peaks in 1973–4, 1978–9 and 1983–5 were associated with significant declines in Philippine production, the last exacerbated by a poor US soybean crop in 1983. Individual typhoons can also send world market prices soaring (see Chapter 6). However, it is not immediately clear to what extent these higher prices filter down to small-scale producers.

4.1 Disaster mitigation in the agricultural sector

In the aftermath of a natural disaster, the Department of Agriculture implements various measures in support of the rehabilitation of the agricultural sector, in collaboration with other government agencies and various voluntary and community

Box 4.2 Agricultural rehabilitation in the wake of the July 1990 Luzon earthquake

In the wake of the July 1990 Luzon earthquake, the Department of Agriculture programmed some P 3bn to sustain agricultural productivity. Some P 1.7bn was earmarked for immediate repairs and rehabilitation such as the construction of warehouses, post-harvest facilities, small water-impounding projects and irrigation facilities as well as grain production assistance and emergency rice import finance (NDCC, 1990). The remaining P 1.3bn was intended for the reconstruction phase, to meet the costs of expanding the multi-livestock programme, disaster preparedness and buffer stocking (ibid.). The government also announced the intensification of its rice and corn production enhancement programmes in the affected areas.

Despite serious damage to the irrigation system and expectations that it would take some 2–3 years to restore rice production, the rehabilitation programme appears to have been highly successful, at least at the aggregate regional level. For example, areas under rice production in all of the affected regions were higher in the second half of 1990 than in the equivalent period in 1989. Even in Region II, Cagayan Valley, where 76,800 ha or 45% of rice lands were reported to have been damaged, the area harvested was 2.6% higher year on year. Additional increases in yield implied that total palay production for Regions I–IV and the CAR were 16.9% higher year on year in the second half of 1990.

However, a survey of 109 households affected by the July 1990 Luzon earthquake revealed that some inappropriate forms of relief were received, including the wrong types of seed in one community and food assistance which was not required in two others. In one of the latter two communities, some households ceased production of their own crops and instead chose to rely on food handouts whilst in the other the food was resold, with possible implications for local market prices (Cola, 1992).

groups. These measures may include reconstruction of infrastructure, distribution of seeds and fertilisers, provision of input subsidies and marketing interventions. If well designed and carefully monitored, they can play an important role in helping to restore the sector (see Box 4.2).

Moreover, there are a variety of ways in which the agricultural impacts of natural disasters can be mitigated *ex ante* through, for example, choice of crops and planting techniques. Indeed, at this stage possible losses can potentially be much reduced. However, both an interview with the Department of Agriculture and a review of the literature on agricultural policy suggest that, in practice, few efforts are being undertaken specifically to research and promote the adoption of more disaster-resistant crop varieties or planting strategies. Most efforts to address the impacts of natural disasters appear to have been taken with regard to coconut production, as detailed above. However, even here there does not appear to have been any research specifically to develop more disaster-resistant strains. Instead, the effective strategy has been to concentrate production in less typhoon-prone areas, although this strategy will not reduce the vulnerability of those stands remaining in higher-risk areas. According to the Philippine Strategy for Sustainable Development, the development

of drought-resistant crops is also being promoted, whilst the International Rice Research Institute has developed taller rice varieties suitable for cultivation in more flood-prone areas. However, few other efforts have apparently been taken.

For example, agricultural research and extension requirements as detailed in the Agricultural Development Plan for 1992–5 (Philippine DA, 1992) include no mention of the need to reduce the hazard vulnerability of the agricultural sector, although reduced vulnerability to pests and diseases is mentioned. Similarly, although the development and dissemination of improved genetic materials are called for in the Plan, there is no mention of the need to develop strains which are more able to withstand the specific impacts of natural hazards. Instead, the hazard vulnerability of the agricultural sector appears to be largely taken as given, despite broader strategies to enhance productivity within which hazard mitigation could play a key role. Meanwhile, efforts to stabilise the incomes of rice farmers are couched primarily in terms of improving procurement, distribution and buffer stock operations rather than reducing disaster-related losses.

Similarly, the Department of Agriculture now employs a farming systems approach to increasing productivity and profitability, but natural hazard risks do not appear to have been incorporated into it. Land-suitability and other maps have been developed to assist farmers in their choice of crops. However, to date, the research seems to have focused largely on the identification of crops and systems suitable to narrowly defined agro-climatic conditions (that is, in terms of soil types, annual precipitation and range of temperatures and so on) and on consideration of appropriate policies which avoid jeopardising the long-term sustainability of resources, without explicitly taking account of natural hazard risks.

That more could be done to mitigate the impacts of typhoons on the agricultural sector is confirmed by the fact that various other reports have also identified a need for the increased implementation of such measures. For example, an unreferenced government report on Typhoon Gading (July 1986) called for the adoption of a different planting strategy to reduce typhoon-related crop losses. Meanwhile, to mitigate the impacts of climatic change the ADB (1994) advocated the promotion of stress-tolerant crop varieties through appropriate plant breeding and biotechnology activities. It also called for the implementation of new farm techniques which would 'respond to the management of crops under stressful conditions, plant pests and disease' (p.22) and for 'long-term case studies of areas where climatic constraints

cause major problems in production' (p.37).[38] Such measures could also play an important role in reducing the impact of natural hazards.

In theory, extension services could perform an important function in promoting more hazard-tolerant crop mixes and planting patterns, in keeping with local hazard risks. The need for appropriate extension services is also important as the agrarian reform programme gathers pace (see below), supporting new landowners in the adoption of appropriate cropping mixes which take account of local hazard risks as well as other factors. In practice, however, existing problems relating to the provision of adequate extension services have been exacerbated as responsibility for such services has recently been handed over to local government units as part of the decentralisation process (World Bank, 1995a). In fact, even formal extension service responsibilities with regard to natural disasters need to be rewritten: according to the 1991 Local Government Code, agricultural officers at the municipal, city and provincial levels are mandated to be in the front line of the delivery of basic agricultural services during and in the aftermath of disasters but there is no mention of their role in mitigating their impacts *ex ante*.

Longer-term climatic forecasts can also play an important role in influencing the choice of crops. Indeed, the Department of Agriculture has launched a project to provide a reliable market information service to small farmers and fisherfolk, including the provision of monthly weather forecasts as well as price, stock and other information which could play some role in influencing cropping decisions (Philippine DA, 1992) (see also section 10.2). However, the options available to farmers on the receipt of such information remain somewhat limited. In particular, during the main wet season of May/June it is not practicable to switch production out of rice because of the enormous costs of land drainage. The main mechanism for improving productivity is therefore to adjust the choice of rice variety grown, assuming that a selection of seeds is available. Longer-term forecasts are also required to facilitate optimal decision-making (see section 10.3).

Finally, the Philippine Crop Insurance Corporation provides insurance cover for rice, other crops and livestock and poultry against natural disasters, and pest and disease infestation (Philippine DA, 1992). Such policies can be used to promote reduced vulnerability to natural disasters to the extent that it is possible to make insurance conditional on certain agricultural practices (see Chapter 11). However, crop insurance does not mitigate crop losses so much as provide an alternative source of income in the event of a disaster. Indeed, the report on Typhoon Gading (July 1986)

---

[38] It further recommends the development of a management information system which will 'provide timely and accurate information on climate hazards and their likely impacts to agricultural activities ... (and) must also be able to propose effective policy responses to changes in land use, plant breeding and so forth' (ADB, 1994: 22).

called for intensification of the concept of crop insurance to lessen the public burden of disaster-related losses.

In summary, little evidence was found of efforts to mitigate the agricultural impacts of natural disasters in the Philippines. However, it is conceivable that traditional farming practices do, in fact, take account of hazard risks but that such practices are so embedded in the core of agricultural life that there is felt to be little need to verbalise them.

4.2 Consideration of natural disasters in agricultural policy

Since 1987 the government has consistently identified improved agricultural production as an essential prerequisite for equitable and sustainable economic growth (Philippine DA, 1992). This partly reflects the strong multiplier effects of higher agricultural productivity, with the initial stages of industrialisation expected to occur in agribusinesses. However, in practice, performance has been rather weak; real agricultural GDP achieved an average per capita growth rate of only 1.9% between 1987 and 1994, some 0.7 percentage points lower than the estimated annual demographic growth rate over the same period.

Indeed, the agricultural sector is widely acknowledged to face particular problems. The Agricultural Development Plan of 1992–5 attributes these difficulties to several factors:

- very limited access to and skewed distribution of land, with mostly tenant farmers and over half the farms occupying 16% of the total farm area, and with problems exacerbated by poor access to affordable credit;
- the poor quality of and limited access to extension services;
- past development policies which favoured the urban and industrial sectors and resulted in insufficient investment in rural and agricultural infrastructure; and
- indiscriminate exploitation of natural resources combined with population pressure, threatening agricultural sustainability and forcing increasing cultivation of marginal lands (Philippine DA, 1992).

Various efforts are being undertaken to address these problems, including the implementation of an Agrarian Reform Programme under which some 3.2m ha of private land and 0.6m ha of government-owned, sequestrated and resettlement lands are being redistributed; the implementation of various schemes to improve rural access to credit schemes (see Chapter 5); and commitments to increase public investment in the agricultural sector, including irrigation and drainage. However, although natural disasters clearly constitute a significant impediment to strong agricultural performance, the 1992–5 Agricultural Development Plan, as already noted, did not identify disasters as a major factor constraining agricultural

productivity. Instead, it mentioned natural disasters in just two places: in the context of the impact of environmental degradation on the increased risk of flooding and thus agricultural losses, and of necessary measures required to increase agricultural productivity and the real incomes of small farmers and fisherfolk, where it identified a need for the 'implementation of measures to cushion and minimise the damage to agriculture and rural economy brought about by natural disasters' (Philippine DA, 1992: 16).[39] However, there was no indication of what these measures might be. The Plan included a number of programmes of special assistance to poverty-stricken communities but no projects were specifically aimed at assisting communities vulnerable to natural disasters.

Similarly, although the Medium-Term Agricultural Plan for 1993–8 adopts a Key Production Areas (KPA) approach, farmers are not specifically encouraged to take account of hazard risks in making planting decisions but, instead, just 'to produce specific products only in those areas of the country where the land, water resources, and climate are suitable for those products' (Philippine DA, n.d.: iii).

As part of efforts to improve productivity and in recognition of the fact that prospects for increased productivity in staple foods and traditional cash crops are limited, increased emphasis is also being placed on agricultural diversification, particularly in the upland and marginal rice, corn, sugar and coconut producing areas of the country. Diversification offers an important opportunity to promote efforts to reduce the vulnerability of the agricultural sector to natural disasters. However, in practice little attention appears to have been paid to efforts to reduce hazard vulnerability as part of the diversification strategy, although the aims of diversification include an improvement in food security which should surely encapsulate efforts to reduce inter-yearly fluctuations in production.

More positively, an appreciation of the importance of reducing the overall hazard vulnerability of the agricultural sector is implicitly incorporated into the government's policy on land conversion. As already noted, land is a scarce resource in the Philippines and in addition to increasing cultivation of more marginal lands, there has been some conversion of land, particularly irrigated land, out of agricultural production, for use for other purposes. The government is anxious to ensure that this conversion is confined to land whose agricultural use is economically inefficient.

---

[39] Similarly, the World Bank paid little heed to the impact of natural disasters in identifying areas requiring particular attention by the Philippine Government in order to increase the contribution of the rural sector to economic growth and to alleviate poverty. The need to protect the environment and natural resources and to improve watershed management was mentioned, both of which would help reduce the severity of impact of natural hazards. However, there was no direct mention of the need for measures to mitigate the impacts of hazards, even in the discussion of efforts to enhance rural productivity.

However, it has also identified certain categories of land which should remain in agricultural use, including all productive land in low calamity-risk areas suitable for the production of trees and other cash crops.

Finally, the World Bank identifies the need to integrate the Department of Agriculture's strategy of concentrating on KPAs, which is effectively a top-down approach, with the Department of Agrarian Reform's bottom-up approach which focuses primarily on poverty alleviation, and the bottom-up participatory approach of the Department of the Environment and Natural Resources (World Bank, 1995a). This integration of strategies could be extremely useful in ensuring more careful consideration of natural hazard risks in agricultural policy and strategy design.

5. Expenditure aspects of natural disasters

Disaster shocks have potentially significant implications for levels of consumption, investment and savings, at least at the local level. A disaster would be expected to reduce aggregate real earnings as jobs are displaced (see Boxes 5.1 and 5.2). The knock-on effect on private consumption would then be determined by a number of factors, including the ability of households to dis-save as well as the scale and nature of various relief efforts. Savings in the form of assets, such as livestock, could also be reduced by a disaster, although such factors might not be fully reflected in the national accounts. In terms of investment, certain disasters, particularly more extreme geological ones, can create economic uncertainty and deter both private and foreign investors. Public resources originally intended for productive investment could also be diverted to relief and rehabilitation purposes, implying a decline in the gross investment stock as funds to replace destroyed assets are not entirely additional.

Overall data for the Philippines on national levels of consumption, savings and investment provide no indication of any impact of natural disasters, again probably reflecting the fact that the data are too aggregated. Instead, both total consumption and gross domestic investment have followed a gradual upward trend in real terms since 1985, with the exception of a sharp fall in investment in 1991 which mainly reflected the delayed impact of the 1989 coup on investor confidence and continuing uncertainties about government policy. Overall trends in gross domestic saving also suggest little relationship between levels of savings and natural disasters. However, more disaggregated as well as more qualitative data suggest a somewhat different picture.

Consumption Circumstantial evidence suggests that Filipino households typically manage to maintain some consumption during the aftermath of a natural disaster, financed by dis-savings and increased borrowing (see below). This observation is confirmed by an empirical study of savings behaviour more generally, which found evidence of 'the importance of lifetime resources, rather than just current income, in the determination of household savings, both rural and urban, in the Philippines' (Bautista and Lamberte, 1990). Relief efforts and various employer schemes further boost levels of consumption. For example, the government's response to the July 1990 earthquake included the advance payment of half their Christmas bonus to government employees in the affected area as well as additional cash gifts. A moratorium was also declared on the repayment of loans held with the Development Bank of the Philippines.

Although relevant data are not available, it is also conceivable that remittances in favour of disaster victims increase in the immediate aftermath of a disaster, again effectively helping to sustain demand in affected areas and reflecting considerable

Box 5.1 Income consequences of the July 1990 Luzon earthquake

A survey of 109 households affected by the July 1990 Luzon earthquake revealed that, on average, sample households had two sources of income prior to the earthquake, with salaries and wages comprising 55% of total income. The earthquake disrupted the income sources of 56% of sample households, with those dependent on salaries and wages being particularly badly hit. However, since most households had two income sources, the majority were able to depend on one of them whilst waiting for the resumption of income from the other. Some also secured loans.

Urban and richer households were particularly severely affected, as compared with only 16% of farming households. However, the rehabilitation of salary and wage employees was also more rapid, with 62% back to normal work six months after the earthquake. Some 59% of farmland was also reported to be back under normal operations six months after the disaster, but recovery was slower for livestock and poultry raisers as well as for property lessors. Some fisherfolk also suffered longer-term impacts as the earthquake resulted in the depletion of fish stocks.

Source: Cola, 1992.

flows of remittances more generally, both from overseas Filipinos and internally. Indeed, the World Bank (1993: 347) reports that the country 'appears to have one of the largest networks of remittances and other inter-household transfers' in developing countries, with 88% of urban and 93% of rural households involved on a monthly basis as either donors, recipients or both. Such transfers were reported to account for an average 12% of total income in both urban and rural areas, with foreign remittances particularly important in total receipts.

Credit facilities Natural disasters could generate both an increase in demand for credit as livelihoods and crops are lost and a simultaneous increase in the rate of default on existing loans. However, their overall impact on credit markets is also dependent on access to credit facilities in the first place. In fact, both lower-income groups and rural communities more generally have had relatively limited access to credit facilities in the Philippines, despite various government schemes to improve access. Thus, Subbarao et al. (1996) report that even in 1991 almost 85% of formal credit was disbursed in metropolitan Manila. In rural areas, a small proportion of the population have access to rural commercial banks or NGO-run credit facilities, which in turn have been permitted to provide formal credit as part of a deliberate government effort to help improve rural access. Nevertheless, these credit outlets remain insufficient. Access is further reduced by the fact that agriculture, the main source of rural livelihoods, is considered an inherently risky enterprise, partly because of its vulnerability to natural disasters and more general vagaries of the weather. The majority of the rural population are therefore forced to borrow from rural moneylenders at interest rates of perhaps 120–150% per annum.

Box 5.2 Employment and income consequences of the 1991 Ormoc flood

On 5 November 1991, the city of Ormoc on the island of Leyte experienced severe flash floods as a consequence of tropical storm Uring. The floods claimed 5,101 lives according to official NDCC figures, the highest death toll on record for a single disaster since at least 1970. The severity of the flooding was attributed to very heavy and intensely concentrated rainfall over a period of three hours; insufficient forest cover as a consequence of severe deforestation, in turn partly due to illegal logging; and the particular characteristics of the river system in Ormoc (Victoria, 1992).

A survey was undertaken of 90 randomly sampled victims of the Ormoc disaster, slightly over a year after the flood. Thirty respondents were taken from each of three groups: riverside areas, resettlement areas and urban areas located far from the rivers. The survey included questions on the impact of the disaster on livelihoods and household expenditure, providing useful evidence on this aspect of the disaster.

Prior to the flood, 34% of the sample group were engaged in small trade, 19% in the services sector and 24% in other jobs, whilst the remaining 23% were unemployed. In its immediate aftermath, 89% of respondents were jobless and only some of those who had returned to the riverside were earning an income. By the time of the survey the level of unemployment had declined to 31% but those who had relocated to resettlement areas were still facing particular difficulties in securing work. Indeed, of the 30 respondents who were resettled, 23% reported problems of access to their jobs or the city and 16% no livelihood as the main difficulty associated with living in the resettlement area. (The remaining 54% reported lack of basic utilities as the major problem.)

Some 44% of the sample experienced a sharp decline in income as a consequence of the flood and a further 14% a slight decrease, in both cases primarily due to poor business conditions. However, 7% experienced a rise in income due to either an increase in salaries and wages or improved business income, highlighting the fact that some members of a community may benefit from a disaster.

Source: JDI/ECFA/DEVMAN, 1993

Despite constraints in the overall availability of credit, the particular credit needs generated as a consequence of natural disasters have been recognised by various bodies. For example, some NGOs, such as the Citizens' Disaster Response Center, provide credit facilities in the wake of disasters. USAID has also funded some NGOs to operate such credit schemes, although apparently without great success. Meanwhile, the PBSP (1991) reports an extension of the grace period for the repayment of loans from cooperatives in the wake of the 1990 Luzon earthquake, whilst it also channelled various loans through existing farmers' organisations itself, both lending funds at minimum rates of interest and establishing revolving funds.

In terms of government efforts, the publicly-owned Development Bank of the Philippines provides concessional loans through its Window III programme, which aims to offer loans to groups who would otherwise face difficulties securing such finance because of lack of collateral.[40] Loans have been provided under this programme in support of disaster victims. The DBP also operates a P 600m revolving loan fund for disaster reconstruction and rehabilitation, and by late 1995 some 400 projects had received loans from this fund. In addition, the DBP offers disaster victims, both households and businesses, a 90-day moratorium on both principal and interest repayments on existing loans, which can be activated once the government has officially declared a state of calamity. This moratorium is occasionally extended on a case-by-case basis, whilst some loans may subsequently be restructured.[41]

The government's Grameen Bank Replication Project, a project targeted on those not covered by the current banking system, particularly the poorest of the poor, provides a further example of efforts to provide credit in the aftermath of disasters. Beneficiaries can obtain special loans from their group's pooled savings to meet post-disaster rehabilitation costs, although, at least as of 1993, access to the scheme remained relatively limited (Llanto, 1993). During drought years, there is also apparently some leniency in the rate of repayment of various government loans.

Investment Sudden-impact disasters destroy capital stock and infrastructure, potentially boosting overall rates of investment as lost infrastructure is replaced but only to the extent that such investment is additional rather than diverting resources from other potential areas of investment. Disasters can act as a disincentive to new investors, particularly in their immediate aftermath when perceptions of hazard risks are heightened and also, more generally, by creating economic instability. In addition, they can potentially influence the regional and provincial distribution of investments, with possible implications for regional inequalities.

In practice, as already noted, natural disasters have had no discernible impact on national rates of investment in the Philippines. In part, this may reflect the fact that existing data do not permit a distinction between replacement and new investment. Provincial-level investment data, which might be expected to reveal more sensitivity to the impacts of disasters, are also not readily available.

---

[40] In recent years, the DBP has put 30% of its after-tax net income into its Window III accounts and does not pay taxes on its Window III Developmental Lending Programme. As of late 1995, annual interest rates of 12% were charged on Window III loans compared with rates of 14–19% under its other loan agreements.

[41] The DBP was not able to provide data on the level of loans involved, as it has only just started to compile data on disaster-related debt moratoriums.

However, it is worth remarking on data provided by the Philippine Board of Investment (BOI) detailing the costs of projects approved under various investment incentive laws by province. The BOI is undertaking extensive efforts to encourage investment and operates a wide range of incentive schemes for both domestic and foreign investors. Although investments under these schemes do not capture the full impact of natural disasters on rates of investment, a wide range of other factors can cause inter-annual fluctuations in levels of investment in a particular province. Moreover, the data only run from 1990 to 1995. Nevertheless, they provide a useful indication of the impact of disasters at the provincial level. For example, they clearly suggest a sharp increase in investment in Benguet Province (CAR) in 1990 where Baguio, the city most severely affected by the July 1990 Luzon earthquake, is located. This province accounted for 6.8% of the total cost of projects approved under various investment laws in 1990, compared with an average 0.4% share in project approvals for 1991–4. Meanwhile, the three provinces most severely affected by the Mt Pinatubo eruption – Zambales, Pampanga and Tarlac (all in Region III) – received 2% of the total cost of projects approved under various investment laws in 1990, the year prior to the eruption. This figure fell to 1.1% in 1991 and averaged 0.5% in 1992–4, demonstrating the extent to which the eruption and the subsequent threat of lahars has acted as a major disincentive to would-be investors. Indeed, despite various efforts, it has proved extremely difficult to attract investors into the Mt Pinatubo region (see Box 3.6), although overall levels of investment in the area have been partly boosted by considerable structural investments to provide protection against lahars. A BOI spokesperson interviewed for this study also indicated that it is generally more difficult to attract investment into the more typhoon-prone provinces of the Philippines.

To redress such imbalances, BOI incentives could be deliberately used to attract investment into more disaster-prone areas, in the longer term indirectly helping to decrease hazard vulnerability by increasing per capita incomes. Indeed, part of the goals of the BOI's 1995 Investment Priorities Plan is effectively in keeping with such a strategy, by aiming to promote both the dispersal of industry away from already congested areas and the alleviation of poverty, particularly in the countryside (Philippine BOI, 1995).[42] However, the BOI should be encouraged to promote investments explicitly in more disaster-vulnerable areas as well.

---

[42] The BOI offers various investment incentives in support of these objectives, including incentive benefits normally only available to pioneer enterprises to all registered projects in 44 specifically identified less developed areas of the country. These areas include, for example, four lahar-affected provinces which were added to the list subsequent to the Mt Pinatubo eruption. Additional incentives are also offered for investments in necessary and major infrastructural facilities in these same 44 areas.

6. Inflation and natural disasters

In theory, natural disasters are likely to have a net inflationary impact. Prices could rise as a consequence of supply shortages, reflecting damage to both goods (especially foodstuffs) and transport and marketing infrastructure. Demand could also increase for certain items, such as building materials in the case of sudden-onset disasters. Such increases may be partly offset by a decline in demand for luxury goods or non-essentials, in turn reflecting the generally recessionary nature of major disasters and thus reduced levels of employment and income. Nevertheless, the net impact of a disaster is likely to remain inflationary. Clearly, many other factors also determine the annual rate of inflation, including policy variables. It was therefore beyond the scope of this study to undertake a detailed analysis of the determinants of inflation in order to isolate the particular impacts of natural disasters. Nevertheless, this chapter aims to provide a more qualitative sense of the price effects of natural disasters.

Localised temporary price hikes have undoubtedly occurred as a consequence of disasters. For example, a survey of 90 victims of the November 1991 Ormoc flood found that some 26% of respondents experienced a large increase in expenditure and 26% a small increase following the flood, primarily due to price increases (JDI/ECFA/DEVMAN, 1993). However, such increases were not reflected in the monthly CPI index data for Region VIII, which showed only a negligible increase in both November and December 1991.

The July 1990 Luzon earthquake provides an interesting example of the way in which a disaster in one region can have an impact on prices in another due to damage to the transport infrastructure. Disruptions to the transport network prevented the movement of vegetables, other agricultural produce and fish from North Luzon to the Manila area, in turn resulting in surpluses in the former and deficits in the latter, with knock-on price effects in both areas (Fernandez and Gordon, 1993). Indeed, evidence of the combined impact of the earthquake and the 1989–90 drought is demonstrated by an 18.9% price increase year on year for fruit and vegetables in the Manila area in 1990, compared with a 13.5% rise for food, beverages and tobacco more generally. The monthly year on year price rise for fruit and vegetables in July 1990, when the earthquake struck, was even higher at 46% although prices fell again the following month. A slight rise in the annual rate of inflation to 14% in 1990 was also partly attributed to the 1989–90 drought and the July 1990 earthquake.

However, at least since 1980, the July 1990 Luzon earthquake and droughts more generally are the only disasters which have been reported as generating national inflationary pressures. Once again, this presumably reflects the wider geographical impact of these disasters as well as methodological constraints in measuring the

impacts of annually occurring disasters.[43] The fact that droughts are specifically identified in this context presumably also reflects their potentially severe direct impact on agricultural productivity and thus on the price of food staples.

The government has made considerable efforts to minimise the inflationary consequences of natural disasters. The Ministry of Trade has responsibility both for ensuring that stable prices are maintained in the aftermath of a disaster and for providing loan assistance to retailers to help restore trade. Additional community efforts have sometimes been undertaken to avoid higher prices. For example, in the aftermath of the July 1990 earthquake six communities made arrangements with store owners to continue to sell goods at their pre-earthquake prices until supplies ran out whilst members of three other communities pooled their money to buy certain food items from wholesalers (Cola, 1992). Households also commonly stockpile food and other items prior to the onset of the typhoon season, again effectively reducing any potential price increases assuming such stockpiles are not destroyed.

More generally, government reliance on external borrowing rather than seigniorage to meet the costs of more substantive disaster relief and rehabilitation programmes has also reduced the inflationary impacts of disasters, although not without other effects (see Chapter 8).

[43] NEDA (n.d.) estimated that typhoons caused an incremental 0.1% rise in the rate of inflation for 1988, and a 0.2% rise for the last quarter of the year alone. However, it is not clear how these figures were calculated.

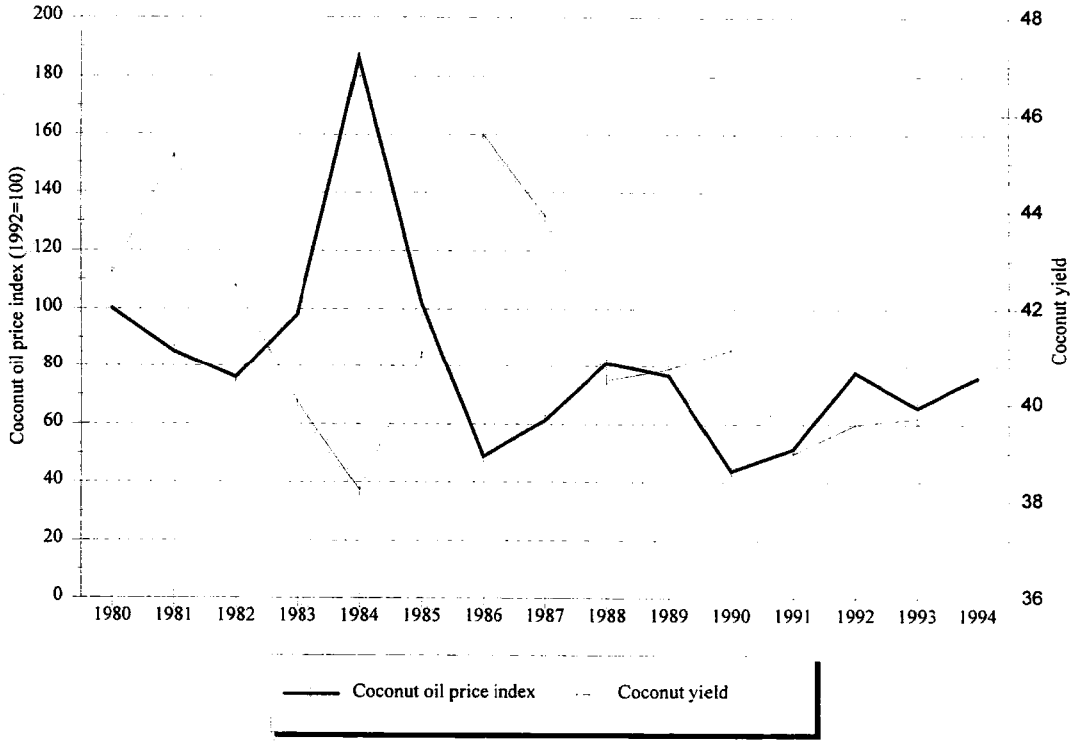
7. External sector and natural disasters

In theory, major disaster shocks would be expected to create balance-of-payments difficulties to the extent that they reduce the availability of goods for export and increase imports to meet disaster-related domestic food deficits and repair damages. Depending on levels of foreign-exchange reserves, this could result in an increase in external borrowing, with implications for future levels of debt servicing and, ultimately, economic growth. Any worsening of the balance-of-payments position could also exert pressure on the exchange rate and thus a country's international competitiveness, again with serious consequences. The impact of natural disasters on levels of exports and imports also has certain budgetary implications in so far as government revenue is derived from export and import duties and tariffs. However, to the extent that natural disasters have a domestic recessionary effect, demand for non-essential imports could decline, alleviating some of the pressure on the balance of payments if not on public finance.

In practice, the Philippines has typically run a deficit on its current account at least since the early 1970s, as its often substantial trade deficit has been only partly offset by tourism receipts and transfers, including remittances from overseas Filipinos. The current account deficit has been largely met through external borrowing from both official and private sources, in turn resulting in the accumulation of considerable external debt (see below). Meanwhile, both imports and exports have followed a gradual upward trend in real monetary terms except during the 1983–5 economic crisis and, in the case of imports, in 1991. Moreover, the performance of exports has been influenced more by international than domestic factors, particularly up to the 1980s when the country had a relatively narrow export base, largely consisting of primary products.

Indeed, the pattern of overall export performance suggests an apparent immunity to the impact of natural disasters. This may also partly reflect the fact that the Philippines has been a price-setter, rather than taker, for its principal category of agricultural exports, coconut products. Thus lower domestic production has been offset by higher international prices, effectively stabilising export earnings (Figure 7.1). Moreover, although coconut revenues have gradually declined from 19.7% of total exports (in value terms) in 1970 to 14.2% in 1980 and 5.1% by 1990 while coconut prices have been much weaker generally since the early 1990s, this negative relationship has continued to hold. For example, Typhoon Rosing (November 1995) flattened hundreds of coconut trees, leading to an immediate 56% increase in the price of vegetable oil in the European trading market, as already noted, despite record Philippine coconut exports for 1995 overall as the impact of Typhoon Rosing on exports was delayed until 1996.

Figure 7.1 **Philippine coconut yields and international coconut oil price, 1980–94**



More recently, there has been rapid growth in non-traditional, generally less hazard-vulnerable exports, particularly of electric and electronic equipment and garments, reducing the overall hazard vulnerability of the export sector. However, severe disasters such as the July 1990 Luzon earthquake have nevertheless had serious implications, affecting levels of exports from the Baguio Export Processing Zone as well as reducing mining exports.

In terms of import requirements, at least in recent years natural disasters have had the most significant impact on oil imports. As already noted in Chapter 3, the country has gradually increased production of hydro-generated electricity in a deliberate effort to reduce oil imports (see Box 3.2). However, intermittent droughts have curtailed hydro-electric output, in turn necessitating increased oil imports. For example, the 1987 drought caused an increase in oil imports which, together with higher oil prices, resulted in an increase in the merchandise trade deficit as well as forcing the current account back into deficit. Oil imports rose temporarily again in 1992–3 to help resolve a major, partly drought-related, power crisis. On various occasions, natural disasters have also resulted in increased imports of certain agricultural products, including rice (see Chapter 4) and corn, an important animal feed.

Tourism The Philippines has considerable tourist potential and the industry has gradually expanded since the early 1970s, although it has suffered various setbacks during periods of political instability. Again, it is generally difficult to discern much overall impact of natural disasters on the industry, although their effects have sometimes been apparent at the regional or provincial level (see section 3.3). However, major disasters capturing the attention of the international media have had a more discernible impact. In particular, the July 1990 earthquake and the June 1991 Mt Pinatubo eruption were held partly responsible for 13.9% and 7.1% declines in the number of international arrivals in 1990 and 1991 respectively, although total arrivals remained well above the 1987 figure in both years.

Tourist infrastructure is also particularly vulnerable to natural disasters to the extent that it is more likely to be built on exposed vantage points in coastal areas. Furthermore, at least as of 1992, tourism developments fell under the open space and recreation category of the Zoning Ordinances and so were not covered by regulations and guidelines on the location of buildings (see section 10.2). Thus, some tourist developments may be built with little regard to hazard risks, although this tendency could be offset to the extent that such properties carry disaster insurance and thus that hazard risks are more fully assessed. More positively, the Philippine National Physical Framework Plan calls for the incorporation of tourism development standards into the Zoning Ordinances, including suitability studies based on location, environment and other factors, various housing standards and the establishment of minimum distances between high-water tide marks and tourist structures (Philippine

NLUC, 1992). Hazard risks are not specifically mentioned but should certainly be built into tourism development standards.

In terms of disaster preparedness, according to the Calamities and Disasters Preparedness Plan the Secretary of the Department of Tourism is responsible for organising and training disaster-control groups and reaction teams in tourist-orientated facilities. Although it is not clear how far such responsibilities are implemented in practice, considerable efforts should also be made in this respect, not least because the death of tourists in the event of a natural disaster could receive prominence in any international news coverage, with potential adverse implications for the industry in the short-term.

External debt As discussed in the following chapter, the government has relied heavily on domestic and external borrowing to finance its budgetary deficit, resulting in a gradual accumulation of external debt which has placed a considerable strain on budgetary resources. For example, the debt-service ratio increased from 7.5% of total export earnings in 1970 to 27.7% in 1992, with even higher levels of over 40% immediately prior to a debt rescheduling agreement in 1987. High external borrowing has also led to an overvalued exchange rate, reducing the international competitiveness of exports.

Natural disasters have contributed to the country's external debt burden to the extent that they have placed additional pressures on government resources and so resulted in even further external borrowing. Some international disaster response assistance has also involved loan, rather than grant, support (see Chapter 12). Thus, for example, the 1990 earthquake and 1989–90 drought were reported to have contributed to a 6.7% increase in total external debt, and a 22.4% increase in debt from official creditors alone, in 1990 (Ernst and Young, 1991).

8. Government budgetary aspects of natural disasters

Natural disasters may have several important impacts on public finance. In the Philippine context, national budgetary resources in the form of calamity funds as well as local government resources are annually earmarked for emergency relief and rehabilitation activities. However, such funds may prove grossly inadequate in the event of a major disaster, implying either additional expenditure or partial redeployment of planned expenditure. Disasters can also reduce government revenue as lower levels of economic activity, including possible net falls in imports and exports, imply reduced direct and indirect tax revenues.[44] Although such losses may be partly offset by increased flows of official external assistance, these flows are unlikely to offset increased levels of expenditure completely. Public enterprises may also experience disaster-related losses, placing an additional burden on government resources.

As a consequence of these possible increases in expenditure and reductions in revenue, a government may face increasing budgetary pressures which it will be obliged to meet by increasing the money supply, running down foreign exchange reserves or increasing levels of domestic and/or external borrowing. These financing options, in turn, have potentially significant knock-on effects. The creation of base money is inflationary. Domestic borrowing exerts upward pressure on interest rates and can result in a credit squeeze. Foreign borrowing can result in an appreciation of the exchange rate, reducing the price of imports and increasing that of exports. It can also place future strains on the economy via higher debt-servicing costs. Another option, the run-down of foreign exchange reserves, is limited by the very size of those reserves and entails an appreciation in the exchange rate, with possible associated risks of capital flight and a balance-of-payments crisis (Fischer and Easterly, 1990). Disasters can also impose more permanent pressures on public finance to the extent that governments undertake disaster prevention, mitigation and preparedness measures, i.e. costs which governments in less disaster-prone countries do not have to bear.

In practice, it is difficult to discern much impact of natural disasters on either government expenditure or revenue at the aggregate level in the Philippines, at least since 1980.[45] Instead, both direct and indirect revenues have increased in real terms

---

[44] For example, according to calculations of the Department of Budget and Management, a 1% increase in nominal GDP results in a P 2.7bn increase in tax revenue whilst a P 1bn increase in imports generate a P 90m rise in tax revenue, as of 1995 (Philippine DBM, 1995).

[45] However, a series of droughts has been partly responsible for considerable financial difficulties experienced by the National Power Corporation (NPC), one of three public

every year since the end of the 1983–5 economic crisis, with the exception of a non-disaster-related drop in indirect taxes in 1988. Meanwhile real government expenditure increased annually between 1985 and 1990, fell in 1991 and rose again from 1992 to 1994, again suggesting that natural disasters have had little impact.

However, an analysis of the budgetary impacts of natural disasters needs to be placed in the context of overall budgetary performance, recent government policies and budgetary targets and the structure of government revenue and expenditure itself. Since the early 1980s, the Philippine Government has implemented a decentralisation programme, giving more authority, responsibilities and resources to local government units (LGUs). Meanwhile, tax revenues have gradually increased since the mid-1980s as a direct consequence of tax reforms. Since the late 1980s the government has also made a concerted effort to reduce the consolidated public sector deficit as part of its stabilisation measures, an effort which has proved successful despite the economic difficulties of the early 1990s. In consequence, the budget deficit has declined from an average 3.6% of GDP in 1986–8 to 1.4% in 1993 and 0.4% in 1994 (World Bank, 1995a). Meanwhile, the 1991 cut in government expenditure more specifically reflected efforts to satisfy conditions under the IMF stabilisation programme, efforts which were achieved despite particular budgetary pressures relating to both the July 1990 Luzon earthquake reconstruction programme and the Mt Pinatubo relief and rehabilitation efforts (see below).

Non-discretionary expenditure The composition of government expenditure, particularly the scale of non-discretionary expenditure, is also highly significant in analysing the budgetary implications of natural disasters. As already indicated, the Philippines Government has consistently had a budgetary deficit dating back at least to the mid-1970s. This has been met through heavy domestic and external borrowing, in turn placing increasing demands on government resources as interest payments have risen from around 1–2% of GNP in the early 1980s to 6.6% of GNP and 40% of total government revenue by 1990. The public sector wage bill has also increased, accounting for 35% of government revenue and 5.7% of GNP by 1990. Total non-discretionary payments accounted for around 77% of government revenue in 1990, 70% in 1991 and 71% in each of 1992, 1993 and 1994, including allocations to LGUs which have been increased in keeping with the 1991 devolution (see below).[46] Rising

---

institutions which have had significant deficits (World Bank, 1995a). Such difficulties were particularly acute in 1990 and 1991, presumably in part relating to difficulties with lower hydro-electric power generation as a consequence of the 1989/90 drought.

[46] Slightly lower values for more recent years reflect marginal falls in interest payments and wage bills. Interest payments stood at 5.3% of GNP and 28% of total government expenditure by 1994 whilst wages stood at 5.6% and 30% respectively. In the same year, LGU transfers accounted for 2.2% of GNP compared with 0.4% in 1990 (ibid.).

non-discretionary expenditure has also implied increasingly limited availability of discretionary funding. In particular, although government spending has increased from some 14–15% of GNP between 1976 and 1984 to an average 19% per annum in 1990–4, capital and maintenance spending has gradually fallen to levels commonly held to be too low.[47] The national government's capital formation has been only slightly over 1% of GNP in most years since 1983/5, principally allocated to areas of roads, irrigation, agriculture, education and health. Other areas of government expenditure have also been effectively squeezed, with inadequate expenditure on rural infrastructure and services, for example. Even education, which receives 30% of discretionary government spending, is reported to be underfunded (ibid.). Cuts in consolidated public investments have also resulted in deteriorating infrastructure and, ultimately, in the breakdown of certain services. Thus, disaster-related areas of expenditure have had to compete for increasingly tight budgetary resources.

Given the relatively small share of total discretionary spending, let alone of specifically disaster-related spending, in total government expenditure, it is not surprising that disasters have had little discernible impact on overall national government expenditure. Instead, the impact of natural disasters is more likely to be felt in terms of the reallocation of government expenditure, as discussed below.

Local government finance An examination of government finance is further complicated by the Local Government Code of 1991 under which the national government has to transfer 40% of internal revenue collections and, since 1994, at least 10% of total expenditures to local governments to meet the costs of devolved responsibilities. The Code has also given LGUs some fiscal responsibilities.

The rationale for devolution reflects the fact that since the Philippines contains considerable economic, social and physical diversity, some types of services can be better provided by local authorities, who can adjust them to local needs and preferences, than by the national government. The allocation of national government resources to LGUs is determined by a formula awarding 50% of the resources according to population size, 25% by land area and 25% divided equally between all local governments of the same category (i.e. provinces, cities and municipalities). This formula effectively aims to improve the quality of life in the least densely populated areas (World Bank, 1995b). However, the World Bank argues that 'the amounts transferred bear no necessary relationship to the actual cost implications of devolved functions. Nor do they take into account the capacity of local governments to raise their own resources or to carry out devolved functions' (World Bank, 1995a:

[47] In 1980–2, current expenditures accounted for 9.9% of GNP and capital expenditure for 6.7%, compared with respective figures of 16.6% and 3.4% in 1994. Operations and maintenance spending has also fallen from levels as high as 5–6% of GNP to under 2% (World Bank, 1995a).

43). Indeed, the Bank reports that, in practice, resources appear to have been channelled particularly to those LGUs which already have more fiscal resources and that in this way the system is doing little to help reduce regional inequalities.

Regional differences in the nature and rate of incidence of natural hazards also have implications for the equity of this division of resources. Devolved responsibilities include a number of duties which are directly or indirectly related to disaster prevention, mitigation, preparedness and response. For example, responsibility for infrastructure projects entailing the construction of seawalls, dykes, drainage and sewerage, flood control, communal irrigation and small-scale water impounding projects which serve the needs of local residents of either barangays or provinces, cities and municipalities has been devolved to LGUs. Social welfare services, including the post-disaster relief activities of the Department of Social Welfare and Development, have also been devolved.[48] Meanwhile, local governments are further obliged under the 1991 Local Government Code to set aside 5% of their estimated revenue from regular sources as an annual lump sum appropriation for use in meeting unforeseen expenditures arising as a consequence of natural disasters. However, varying levels of funding are actually drawn down depending on the incidence of disasters in a particular year.[49] Clearly, different LGUs face varying expenditure demands with regard to natural disasters at particular points in time, depending both on their vulnerability to disasters, and thus on the need for prevention and mitigation projects, and on the actual incidence and severity of disasters. Yet these differences are not taken into account in the allocation of national resources to LGUs. Moreover, the consequences of this shortcoming could be increasingly felt in the future as LGUs take over more responsibilities and, thus, face increasing financial constraints.[50] Although external grant assistance could potentially play a role in alleviating regional disparities, the national government is often only willing to forward external assistance to LGUs on a loan basis, with LGUs paying for the loan even if the national government originally received the assistance on a grant basis. This effectively means that LGUs feel obliged to use such funding in full cost-recovery projects, a practice which could discriminate against investment in disaster prevention and mitigation projects.

---

[48] Other devolved responsibilities with indirect implications for disaster prevention and mitigation include agricultural extension and on-site research and community-based forestry projects (of areas not exceeding 50 km^2). LGUs are also responsible for enforcing environmental protection laws and for preparing extensive land-use plans.

[49] This reserve had originally been set at 2% under Presidential Decree 477 (which pre-dates Presidential Decree 1566 of 1987 (see below)).

[50] To date, the World Bank (1995a) reports that total transfers to LGUs have exceeded the cost of devolved functions although some LGUs have received insufficient resources.

Natural disasters also have implications in terms of the revenue-generating capacity of LGUs, again raising questions of equity in the regional allocation of national government resources. Provinces, municipalities, cities and barangays are allowed to levy certain taxes, fees and other charges for their own use, including business and real property taxes. Such taxes should be equitable and based as far as possible on ability to pay. LGUs can also grant tax exemptions, relief and incentive privileges as they deem fit. In consequence, natural disasters can lead to a decline in revenue both via their potentially dampening impact on economic activities and also via the introduction of disaster-related tax exemptions. For example, land can be exempted from land taxes which accrue to LGUs if natural disasters legally or physically prevent improvement, use or cultivation of that land (Nolledo, 1991). In addition, both LGUs, acting on the recommendation of the local disaster coordinating council (DCC), and the President have the power to reduce or cancel property taxes following a general crop failure or natural disaster (ibid.). Such cuts can help alleviate financial difficulties experienced by households and the private sector but also represent an additional financial disadvantage for more disaster-prone regions of the country.

To help alleviate disaster-related pressures on LGUs, restrictions on rates of disbursement of LGU revenues can be lifted in the event of a natural disaster.[51] However, disbursements can only be made for purposes and amounts included in the approved annual budget, implying little flexibility in the reallocation of resources to reflect changes in expenditure priorities. Furthermore, any overdraft outstanding at the end of a fiscal year must be met from the first collections of the following year's revenue, implying that the local fiscal implications of a natural disaster may be carried through to the following year if, for example, a disaster reduces revenue and thus results in a negative end-of-year balance (ibid.).

In summary, there are therefore clear disaster-related inequalities in the availability of LGU resources which could ultimately impinge on the overall standard and level of provision of services and infrastructure in more hazard-prone areas of the country.

Disaster-related expenditure Government expenditure on disaster-related activities is provided from a number of budget lines held by various departments and levels of government, making it extremely difficult to quantify the budgetary impacts of disasters and related activities.

Financial resources for disaster mitigation and preparedness activities are largely contained within overall budgetary allocations to relevant departments, whilst these departments are issued with only loose directives about their disaster prevention and mitigation responsibilities (see Chapter 10). This makes it impossible to ascertain the

[51] Under normal circumstances, total disbursements must not exceed 50% of the uncollected estimated revenue for that year.

total amounts spent on disaster mitigation with any accuracy – a problem with real policy implications to the extent that this lack of transparency dilutes any arguments for increased spending.

Even total relief and rehabilitation expenditure is somewhat opaque, although it clearly represents a considerable drain on government finance (see Box 8.1). Disaster-related expenditure undertaken by the Department of Social Welfare and Development (DSWD), which is responsible for extending relief assistance and social services to disaster victims, is fairly clear-cut as such expenditure comes under a permanent Bureau of Emergency Assistance.[52] However, other government agencies do not contain separate disaster sections, instead reallocating existing financial and personnel resources and drawing on additional funding in the event of a disaster. Any reallocation of resources normally goes unrecorded and so cannot easily be measured. However, circumstantial evidence suggests that such reallocations are significant. For example, efforts to improve the efficiency and economy of the country's transportation systems are reported to have been only moderately successful because much of the available resources have been redirected in response to calamities. In consequence, this has slowed the pace of improvement of rural transport linkages, despite the fact that such improvements are considered important in the development of agri-industries and tourism (Philippine NLUC, 1992). Indeed, the National Physical Framework Plan 1993–2022 lists the damage caused by natural disasters and the consequent redirection of resources, in turn hampering the implementation of other infrastructural projects, as one of six key issues and concerns in terms of infrastructural development. It also calls for the prioritisation of projects which mitigate the impacts of disasters by, for example, providing alternative transport routes. The Plan also notes that the strains placed on the country's ability to provide sufficient classrooms and other social infrastructure by its rising population have been exacerbated by the damage inflicted by natural disasters (ibid.).

Some disaster-related government expenditures are undertaken at the local level, as already indicated, effectively further obscuring data on total disaster-related expenditure, as such information is not readily available. Indeed, even prior to devolution, emphasis was placed very firmly on the use of any available local or regional resources in support of disaster preparedness, response and recovery activities before requests for further funding were forwarded to the NDCC.[53]

---

[52] DSWD staff may be redeployed between provinces for periods of up to two months in the aftermath of a disaster if there are insufficient staff available locally to handle the relief efforts. However, the overall impact on non-disaster DSWD activities is reported to be relatively minimal because the department has some 6–7000 employees.

[53] This principle was established under Presidential Decree (PD1566) of 1978, according to which each political and administrative sub-division is expected to 'utilise all available

All of these caveats aside, it is nevertheless instructive to try to calculate some estimate of total government expenditure on disaster-related activities over the past few years. Data provided by the Department of Budget and Management indicate that the government spent P 24,347m (at real 1994 prices) on the Mt Pinatubo relief and rehabilitation programme between 1991 and 1994, initially drawing on the Calamity Fund and the Reserves Control Account before a separate Mt Pinatubo Fund budget line was established as part of the annual Budget. These expenditures alone accounted for between 0.9 and 3.1% of total government expenditure, and for between 2.3 and 7.4% of discretionary expenditure, between 1991 and 1994 (Table 8.1).[54] General allocations to the Calamity Fund accounted for a further 0.4 to 0.7% of total government expenditure, and 0.9 to 1.6% of discretionary spending, over the same period, together implying costs of 1.5 to 3.5% of total expenditure and 3.9 to 8.3% of discretionary expenditure. These estimates involve some double counting as, as already noted, a portion of calamity funds were allocated to the Mt Pinatubo relief and rehabilitation programme. However, over the same period, additional government resources were also allocated to a number of other disaster relief and rehabilitation programmes from various budget lines. Data on this expenditure are not readily available but it would seem reasonable to assume that it more than obviates any double counting, particularly in 1990 and 1991 when extremely high levels of expenditure were incurred under the July 1990 Luzon earthquake reconstruction programme. Indeed, this latter programme possibly pushed total relief and rehabilitation expenditure as a percentage of discretionary spending into double figures in 1991.[55] Admittedly, the early 1990s were somewhat unusual in terms of the very high levels of relief and rehabilitation expenditure necessitated by the Luzon earthquake and the Mt Pinatubo eruption. Nevertheless, even in less extreme years

---

resources in the area before asking for assistance from neighbouring countries or higher authority' (Philippine Government, 1978). This practice is intended 'to minimise the dole-out mentality of the disaster victims as well as the local officials, who, in the past, had always looked up to the national government for assistance every time a disaster hits their area'(ibid.).

[54] As of late 1995, a further P 2bn had been allocated to the Mt Pinatubo relief and rehabilitation programme for 1995. An additional P 50m had been proposed for the Mt Pinatubo Fund (MPF) under the 1996 budget, with a further P 40m to be provided from the P 540m generated from the sale of military camps. This was substantially less than the MPF's request for P 5bn and certain government departments were effectively expected to meet part of the shortfall.

[55] As of September 1990, the overall earthquake reconstruction programme was expected to cost around US$600m (P 14.6bn), equivalent to 6.7% of total 1990 government expenditure and 18.2% of discretionary expenditure, of which the government would require some US$500m in external financing (World Bank, 1990).

Box 8.1 National government disaster response funds

The DSWD administers a quick response fund of P 25,000 per annum which can be drawn upon to provide immediate emergency relief and rehabilitation assistance. Once local funds have been exhausted and assuming that the President has declared a disaster, various national relief and rehabilitation funds may then be made available, as detailed below. As in the case of local governments, the national government pursues a principle of self-reliance, only appealing for international assistance when the scale of damage exceeds its capability. However, there is no specific guidance on whether the government should seek grant or loan assistance (see section 12).

Calamity Fund Appropriations for the Calamity Fund have ranged between P 800m and P 3,840m (at real 1994 prices) over the past 20 years or so, and stood at P 2bn in both 1994 and 1995. Priority is given for their use in emergency relief operations, medical assistance and immediate repairs of vital infrastructure (Philippine NDCC, 1989b). Although funds can also be used for rehabilitation and reconstruction activities and, more recently, for mitigation and prevention activities, the implementing agencies are still expected to meet a large part of such costs (Philippine NDCC, 1993). Disbursement of funds must be authorised by the President, acting on the recommendation of the NDCC, while it typically takes one to three weeks for the release of funds. Any outstanding calamity funds remaining at the end of a fiscal year can be carried across into the following one.

Property Replacement Fund This is a sinking fund for the restoration of government buildings, equipment and transport vehicles (but not roads and bridges) damaged by fire and natural calamities. Funds are released following submission of requests. The fund effectively acts as a government self-insurance scheme.

Presidential Fund This is a lump sum annual appropriation of P 10bn which can be used, subject to Presidential approval, for a number of purposes including disaster relief. However, the Presidential Fund is normally exhausted before the Calamity Fund and so cannot meet any additional shortfalls in funding which may arise once the Calamity Fund has been fully drawn down.

Various other government bodies and funding sources may provide additional post-disaster assistance. For example, the annual budget includes a Reserve Control Account consisting of 5% of the maintenance expenditure and 5% of the capital outlay of each government department. This funding is intended to meet unforeseen needs, in some cases including disaster relief efforts. It was drawn upon, for example, as part of the initial government response to the 1991 Mt Pinatubo eruption. The Government Security and Insurance System has also met certain disaster-related expenditure on occasion. For example, in the aftermath of the July 1990 Luzon earthquake some households received finance for the repair of their houses from this source. Government employees in the affected area also received an advance on their Christmas bonus together with additional cash gifts, as already noted, placing an additional strain on government resources. Such payments can also create short-term cash flow problems by resulting in a bunching of expenditure at a time when incoming revenues may have been at least delayed, if not reduced.

Table 8.1: Philippine government expenditure in support of the Mt Pinatubo relief and rehabilitation programme, 1991-4 (million Peso at real 1994)

	1991	1992	1993	1994	Total
Administrative expenses	-	-	25	489	514
Infrastructure	7,887	4,548	1,849	4,110	18,393
Livelihood	2,055	1,249	751	302	4,357
Social services	493	18	380	192	1,082
Total	10,434	5,814	3,004	5,094	24,347
As percentage of total					
Administrative expenses	-	-	0.83	9.60	2.11
Infrastructure	75.58	78.21	61.53	80.69	75.55
Livelihood	19.69	21.48	25.00	5.94	17.90
Social services	4.72	0.31	12.64	3.77	4.45
Total	100.00	100.00	100.00	100.00	100.00
Pinatubo expenditure as % of:-					
Total government expenditure	3.1	1.7	0.9	1.3	
Discretionary government expenditure	7.4	3.9	2.3	3.1	

Source: Philippine Department of Budget and Management unpublished data

such expenditures clearly represent a major drain on government resources, although certain commentators still argue that relief expenditure is sometimes insufficient.[56]

By contrast, expenditure on disaster prevention and mitigation was almost certainly considerably lower, as suggested by the fact that the Medium-Term Investment Programme for the slightly later period 1994–8 allocated 1.1% of total resources specifically to disaster mitigation – equivalent to 0.17% of total government expenditure based on actual total capital expenditure in 1994. Again, this is an underestimate because it does not take account of any expenditure on activities with indirect disaster prevention or mitigation benefits, such as those entailed in irrigation projects. Nevertheless, it underlines the fact that expenditure on disaster prevention and mitigation is considerably less than that on disaster relief and rehabilitation.

Concluding comments In the final analysis, discretionary resources are very limited and it is highly unlikely that considerable additional resources will be allocated to disaster prevention and mitigation activities, at least in the short to medium term.[57] Meanwhile, post-disaster expenditures, by definition, are likely to continue to command a considerable share of government resources, even if on a lower scale than somewhat exceptionally observed in the early 1990s. Ultimately, however, the relative balance of expenditure between disaster prevention and mitigation and disaster response is almost certainly inappropriate, and detailed cost-benefit analysis of possible prevention and mitigation projects is required to provide further evidence on the effectiveness of such expenditure. It is not proposed that relief and rehabilitation needs should go unmet but, rather, that prevention and mitigation allocations should be increased, thus reducing relief and rehabilitation expenditure in the longer term. This strategy also demands a more general shift from annual to multi-year budgeting of public resources, allowing the government to take a longer-term perspective in planning the allocation of limited resources; and the additional provision that discretionary spending, for infrastructural expenditure at least, is protected from cutbacks.

---

[56] For example, there have been continuous demands from some quarters for the government to do more to help the victims of the Mt Pinatubo eruption.

[57] In theory, the lower budgetary deficit achieved in 1994, if sustained, could imply greater flexibility to meet the unanticipated costs of major relief and rehabilitation programmes without displacing other expenditure. However, recent improvements partly reflect windfall privatisation gains and lower domestic interest rates and, although many government corporations have begun major investment programmes to improve their financial performance, in turn gradually removing a major source of pressure on government resources, the budget deficit is likely to widen again in the future. Moreover, the government is likely to face considerable opposition in any attempt to raise additional tax revenues (World Bank, 1995a).

This proposal is clearly problematic given the extremely tight budgetary resources at the disposal of the Philippine Government. It could imply a rise in disaster-related spending in the shorter term as more prevention and mitigation projects are implemented whilst the costs of relief and rehabilitation decline more slowly, as the former projects gradually come into effect. Nevertheless, further analysis should at least be undertaken to consider the viability of this proposal. The funding constraints also imply that particular emphasis should be placed on low-cost prevention and mitigation measures, such as simple adjustments in building structures.

Finally, the World Bank (1995a) identifies three priority areas which it believes must be addressed in order to sustain recent economic improvements in the Philippines, all of which require high allocations of financial resources: infrastructural services, poverty and fiscal management. This suggests three perhaps more pressing demands on government resources. Yet reduced vulnerability to natural disasters could play some role in improving infrastructural services, by lowering levels of disaster-related damage, and in reducing poverty (see Chapter 9). Thus, higher expenditures in both these areas and in disaster prevention and mitigation are highly complementary and should be viewed as such.

9. Poverty and disaster vulnerability

Poverty is a major cause of hazard vulnerability and natural disasters, in turn, can throw households into even greater depths of poverty. Poverty has also contributed to environmental degradation, with implications for the rate of incidence and severity of natural disasters (see Chapter 2). Torrente, for example, notes the 'mutually reinforcing effects of natural disasters, poverty and environmental degradation in all phases of development efforts' (Torrente, 1993: 2). The World Bank (1993) also indirectly acknowledges the role of natural disasters in contributing to poverty.[58]

Poverty has remained a persistent large-scale problem in the Philippines, although there was some reduction in the official poverty rate in the late 1980s. According to NEDA, the proportion of the population below the poverty line increased from 49% in the early 1970s to 58% by the mid-1980s before falling again to 41% in 1991 (Cruz and Repetto, 1992). Furthermore, as of 1991, 26% of the population had insufficient income to enable them to sustain an adequate diet (Subbarao et al., 1996). Some 70% of the poor live in rural areas, with subsistence farmers, farm and forestry workers and fisherfolk reported as accounting for around three-fifths of the total (ibid.).

The government partly attributes the high levels of poverty to low rates of economic growth relative to demographic increases, creating problems of unemployment and underemployment, as well as to the uneven social and regional distribution of wealth (Philippine Government, 1995).[59] Similarly, a recent World Bank report identifies the rapid expansion of the labour force, coupled with labour absorption problems – namely, unemployment, underemployment, insufficient access to land and improved technology and low returns to labour – as the main causes of poverty (Subbarao et al., 1996). However, natural disasters almost certainly play a key role in exacerbating the scale of poverty and as long as much of the population remains highly vulnerable to disasters – for example, by virtue of their housing or primary source of income – poverty will remain a major problem in the Philippines.[60]

---

[58] The World Bank (1993: 323) states that 'there is (no) ... guarantee that the peak in measured poverty before 1988 might not be surpassed in the future if the economy or natural conditions (such as the disaster that hit the Philippines at the start of the 1990s) change in ways that are disadvantageous to the poor'.

[59] The labour force grew at an annual rate of 3.7% in the 1970s and 3.6% in the 1980s, due both to population growth and to increasing participation in the labour force.

[60] For example, natural hazards may destroy the already limited infrastructure of farmers as well as disrupt market access. Fisherfolk can also face serious disruptions, for example, as typhoons prevent fishing activities for several days or, more importantly, destroy fishing

The government has attached particular importance to poverty alleviation and has devoted considerable financial resources towards this end, with over P 4bn spent annually on such activities (ibid.). In view of limited total government resources, it is important to consider whether such programmes have taken natural disasters into account as a causal factor of poverty. In fact, natural disasters have received relatively scant consideration in the government's anti-poverty strategy. Poverty alleviation programmes over the past few decades have been focused around three basic activities: a generalised food subsidy, wage employment programmes and livelihood creation (self-employment) programmes. Although the second of these, the wage employment public works programmes, have included some disaster mitigation projects, none of the three basic activities appear to have been specifically targeted at the more hazard-vulnerable segments of the population.

More recently, as part of a series of renewed initiatives to address the poverty problem, the government adopted a Social Reform Agenda in 1995 to help improve the welfare of more disadvantaged groups (Philippine Government, 1995). The programme entails more careful targeting, focusing on six basic groups including farmers and landless labourers; fisherfolk; the urban poor; and other disadvantaged groups, including disaster victims. However, once again, natural disasters are mentioned only in the context of the particular needs of disaster victims *ex post* rather than those of hazard-vulnerable groups. Moreover, disaster victims appear as the last in a long list of 'other disadvantaged groups', while measures identified to address their needs are confined to preparedness and post-disaster responses – namely, capacity building and disaster preparedness; food-for-work schemes; resettlement; basic services for restoration and rehabilitation; and core shelter housing – and exclude measures which would address the factors underlying their hazard vulnerability.[61]

The Social Reform Agenda also fails to identify or thus to address the role of natural disasters as a factor underlying the poverty of any of the other five target groups,

---

equipment, boats and harbours. Floods and storm surges can also damage brackish or freshwater fishponds.

[61] An earlier World Bank (1993) report had found that a targeting system was required to ensure that public funds were used effectively and had suggested that targeting should be based on risk factors rather than income. It identified three groups as most at risk including 'those who are at risk due to natural resources degradation or natural calamity' (p.359) and stated that 'the profile indicates that poverty is regionally diverse – most evidently when poverty is associated with a major natural disaster' (p.360). However, the context of the discussion suggests that this report was also referring to disaster victims as it then stated that 'because the poor and the worst affected are often in remote areas, reaching them in emergency situations is difficult, and disaster preparedness could be improved' (p.360).

although those most severely affected by disasters probably form some of the poorest segments of those groups as well.

More positively, the poverty alleviation measures detailed under the Agenda are regionally focused on 19 priority provinces, with a further 17 target provinces for the programme aimed at disadvantaged groups. To the extent that these include some of the most hazard-prone regions of the country, this regional focus should at least ensure that some of the most hazard-vulnerable groups are reached.

Moreover, efforts to improve housing form the central thrust of the Social Reform Agenda's urban poverty and rural infrastructure programmes, effectively addressing one of the principal causes of hazard vulnerability. The housing of poorer groups is particularly vulnerable to natural hazards by virtue of its location, quality and design.[62] Poorer households are sometimes unable to restore the quality of their housing even to former levels following a disaster, whilst costs incurred in rebuilding their homes place additional financial strains on such households. In the case of Mt Pinatubo victims, for example, each relocated family has either had to take out a loan or pay rental on its new home (Fernandez and Gordon, 1993).

Nevertheless, the fact remains that more should be done to address vulnerability to natural hazards as a root cause of poverty. Indeed, the government's objective of reducing the incidence of poverty to 30% by 1998 may be particularly unrealistic in view of its failure to adopt measures specifically to reduce hazard vulnerability. However, the government's primary natural disaster agency, the NDCC, appears to have little interest in any efforts to ensure that anti-poverty strategies address hazard vulnerability. For instance, this was indicated by its reluctance to become involved in a 1995 World Bank mission to undertake a poverty assessment in the Philippines on the basis of the argument that it lacked any relevant information. Indeed, this example underlines the fundamental divide between response and prevention thinking endemic in public and bureaucratic structures. More positively, the 1993–8 Medium-Term Development Plan announced the need for 'nationwide poverty-mapping to

[62] For example, a survey of 90 victims of the 1991 Ormoc flood revealed that, of the 30 respondents remaining on the riverside after the flood, 80% had returned to this location because they had no other place to live, despite the fact that two-thirds of them now recognised the dangers of living on the riverside. Although 60% were awaiting resettlement at the time of the survey, 50% indicated that they were happy to remain on the riverside, most commonly because of ease of access to their place of work and to markets. Thus livelihood considerations had played a role in increasing their exposure to potential future hazards. The survey also revealed that, prior to the flood, 93% of respondents had owned their own houses but that this number had fallen to 62% following the disaster, primarily as victims moved into resettlement areas. Most riverside houses were repaired using salvaged materials, in effect weakening them vis-à-vis further disasters (JDI/ECFA/DEVMAN, 1993).

pinpoint depressed and disaster-prone areas, and disadvantaged and vulnerable groups' (Philippine Government, 1994: 1.10) and this could provide a good starting point for more targeted efforts to address hazard vulnerability specifically.

10. Disaster management policy and practice

Considerable attention has been paid to disaster management in the Philippines. However, these efforts have concentrated on preparedness and post-disaster response activities, with fewer prevention and mitigation projects. Broader strategies to mitigate the economic impacts of natural disasters and to incorporate hazard risks into overall policies and strategic planning exercises have also been largely neglected. This chapter focuses firstly on the role that economic factors have played in promoting disaster management efforts and, secondly, on the level of attention paid to economic considerations in disaster prevention, mitigation, preparedness and response.

10.1 Disaster legislation and organisational set-up

At least in theory, the Philippines has developed extensive institutional capacities and legislation to prepare for and respond rapidly and effectively to disasters. Government agencies are supported by a wide network of NGOs and private sector corporations (see Box 10.1), as well as the Philippine Red Cross and local self-help initiatives. However, various institutional arrangements and decrees have paid less attention to disaster mitigation and prevention activities, despite the fact that such measures are particularly crucial in minimising the economic impacts of disasters.

Legislation relating to disaster preparedness and response dates back to 1941. The National Civil Defence Administration was formed in 1954 under the Office of the President, with various responsibilities including rescue, evacuation and emergency welfare. A Committee on Warning Systems was subsequently created in 1967 and by 1968 each government department was obliged to set up a disaster-control group. An interdepartmental planning group was also established, culminating in the drawing up of a Natural Disaster and Calamities Plan in 1970 (Brown et al., 1991). This plan aimed to combine all available resources into a coordinated response. It identified the roles and responsibilities of different agencies and the operational systems required to ensure that available skills and resources were mobilised rapidly and effectively (Philippine DND, 1994). The plan was subsequently amended and reissued in 1988 as the Calamities and Disasters Preparedness Plan.

The primary government body currently responsible for natural disasters is the National Disaster Coordinating Council (NDCC), established in 1978 under Presidential Decree 1566 with the aim of 'strengthening the Philippine disaster control capability and establishing the national program on community disaster preparedness' (Philippine Government, 1978). It was also intended to promote and coordinate government and private disaster relief, rehabilitation and preparedness efforts. The NDCC is chaired by the Secretary of National Defence and composed of

Box 10.1 The Citizens' Disaster Response Center

The Citizens' Disaster Response Center (CDRC) provides an example of one of a number of small community-based indigenous NGOs active in disaster-related fields in the Philippines. The CDRC was established in 1984 specifically to work in the area of disaster relief, rehabilitation, preparedness and mitigation. It promotes 'a citizenry-based and development-orientated approach to disaster response', based on the premise that grassroots organisations are the most reliable vehicles in disaster preparedness and prevention (Delica, 1994a: 1). It further holds that it is more cost-effective to spend money on disaster mitigation and preparedness than on relief and rehabilitation. The CDRC acts as the national centre of a citizens' disaster response network and is involved in training, education, research, the production of books and reports and fund-raising activities, the latter amongst overseas as well as domestically-based Filipinos. In 1992 it also established Barangay Disaster Response Organisations (BDROs), initially amongst communities affected by the Mt Pinatubo eruption, to enable local communities to respond effectively before, during and after disasters and to launch socio-economic projects which would lessen the effects of disasters (Delica, 1994b).

The CDRC also undertakes a limited amount of advocacy work. In particular, it has been active in campaigning for a debt cap, which would release considerable government resources currently allocated to debt servicing for use in poverty alleviation, thus reducing vulnerability to natural disasters. It argues that 'that we are poor because of the numerous disasters that befall us is a myth being peddled by many, including the government', maintaining instead that there are various measures which can be undertaken to reduce both poverty and hazard vulnerability (CDRC, 1993).

In 1994, the CDRC provided 481,065 Filipinos, or 70,767 families, with disbursements and approvals of funding totalling P 32.1m, of which about 89% was for emergency assistance or immediate relief purposes (CDRC, 1994). CDRC's mitigation activities were largely focused on a Food Security and Nutrition Improvement Programme, from which almost 3,400 families benefited in 1994. This project was originally begun in October 1993 with the objective of improving nutritional status and food security through training, education and the improvement of nutrition and food production in selected disaster-prone areas. By late 1995 the programme was being implemented in 16 regions across the country. CDRC is also involved in rehabilitation activities, primarily comprised of the provision of seeds, animals, farm tools and fishing implements in support of the recovery of livelihoods as well as shelter assistance. The CDRC includes disaster-proofing features in its repairs of infrastructure.

a number of Government Secretaries including those of the Departments of Agriculture, Finance, Labour and Employment, Trade and Industry, Local Government and Budget and Management, all of whose roles are particularly relevant in considering the economic impacts of natural disasters. Meanwhile, disaster-related activities are implemented through the NDCC's member agencies.

PD1566 also created regional, provincial, municipal and barangay disaster coordinating councils (DCCs), effectively formalising previously *ad hoc*

arrangements.[63] Regional and local level counterparts of the national government agencies involved in the NDCC are also involved in the regional and local DCCs. Further disaster-related duties of individual officials at various levels of local government are outlined in the 1991 Local Government Code, which effectively entails some devolution of disaster management to local units.[64] The very fact that the Code includes disaster-related responsibilities indicates the importance attached by the government to disasters (or at least to post-disaster response). However, Delica argues that the 'disarray (in disaster management) is further aggravated by the passage of the Local Government Code ... and that while some units give priority to disaster management, most other units don't' (Delica, 1994b: 7).

In the event of a more severe disaster, a Presidential Task Force is established to supplement the work of the DCCs, as in the aftermath of the July 1990 Luzon earthquake, the June 1991 eruption of Mt Pinatubo and the quick succession of typhoons, including Typhoon Rosing, experienced in November 1995. The Presidential Task Force established in the wake of the Mt Pinatubo eruption was subsequently replaced by the Mt Pinatubo Assistance, Resettlement and Development Commission, also known as the Mt Pinatubo Commission (MPC), reflecting the longer-term nature of the disaster. The MPC was mandated to serve as the central authority for the formulation, supervision and coordination of measures aimed at creating the basic economic infrastructures needed to support the long-term recovery and development of the areas affected by the eruption.

In contrast to this extensive institutional capacity and legislation pertaining to disaster preparedness, relief and rehabilitation, disaster mitigation and prevention have received relatively little attention. For example, PD1566 included no mention of such activities, although, apparently in the context of the need for improved disaster

---

[63] However, Delica (1994b) comments that the 'organisation of response agencies is sorely underdeveloped – contrary to government claims that disaster coordinating councils from the national to village level are 100% complete and operational' (p.7). This organisational disarray, she argues, is reflected in the very low public awareness of warning systems or of disasters more generally, in turn partly reflecting very limited public resources.

[64] For example, the health, social welfare and development officers are expected to be in the front line of delivery of their respective services in the event of a disaster. The environment and natural resources officer is mandated to establish, maintain, protect and preserve watersheds and forests, including mangroves, and to participate in the renewal and rehabilitation of the environment during and in the aftermath of disasters. The architect is expected to participate in the redesign of the spatial distribution of basic facilities and physical structures following a natural disaster. The information officer is mandated to provide information to help minimise injuries and casualties and to accelerate relief and rehabilitation. The cooperatives officer is expected to aid in the survival and, if necessary, rehabilitation of cooperatives.

response, it did recognise the need for 'a revitalized (disaster management) system to enhance the survival capability and economic stability of our country against all types of disaster whether natural or man-made'. Similarly, the responsibilities of individual government departments with regard to natural disasters as specified in the Calamities and Disaster Preparedness Plan are defined very much in terms of post-disaster responses. For example, the Department of Agriculture is expected to maintain a database on agricultural activities in hazard-prone areas in order to facilitate post-damage assessments, to undertake post-disaster assessments of agricultural damage and to provide post-disaster technical assistance, seeds and fertiliser to disaster victims. However, it is not expected to promote the development of more hazard-tolerant varieties, for example, or to ensure appropriate cropping patterns which take account of local hazard risks. Meanwhile, according to the 1991 Local Government Code, the legislative bodies of municipalities, cities and provinces are mandated to adopt measures to protect their inhabitants from the impacts of natural disasters but little further guidance is provided on what would be the most appropriate structural or non-structural measures. Furthermore, with the exception of the environment and natural resources officer, no government post is specifically assigned any disaster mitigation or prevention duties under the 1991 Code.

In terms of institutional capacity, the NDCC itself faces certain constraints with regard to the promotion of disaster mitigation and prevention activities. Most fundamentally, it has limited financial and manpower resources and is basically a coordinating body. Indeed, neither the national nor regional DCCs have their own budgets but instead operate through their member agencies, who are most likely to provide resources for post-disaster relief and rehabilitation efforts, 'under the principle of coordination, complementation of resources and agency specialization' (Philippine DND, 1994: 19) (see Chapter 8).[65] The NDCC also only meets as necessary, and presumably following specific disasters. Yet to ensure adequate mitigation, it needs to meet more regularly.

10.2 Mitigation measures

Various structural measures have been implemented to mitigate the impacts of natural disasters in the Philippines, especially in relation to floods where there is particular scope for such measures. More recently, there has also been some investment in structural measures to help minimise lahar-related damage in the Mt Pinatubo area, although there is considerable concern that these projects have not been implemented

[65] More generally, Brown et al. (1991) state that the National Calamities and Disaster Preparedness Plan 'provides a sound basis for preparedness and response' but that its effectiveness 'has been greatly reduced owing to the insufficient provision of financial and human resources'. It goes on to comment that 'after a disaster, limited action is taken to draw lessons from the problems that arose and ensure that they are not repeated' (p.241).

Box 10.2 Structural mitigation construction problems in the Mt Pinatubo area

There is probably considerable scope for the construction of structural mitigation measures to reduce the scale of potential lahar-related damage in the Mt Pinatubo region. However, various problems have been encountered in their implementation, hampering the progress made to date. Ideally, construction of such measures should begin at the start of the dry season in December. In practice, however, at least up until the end of 1995, the release of construction contracts had been consistently delayed until about the following April with work commencing in May, leaving insufficient time for high quality construction work. Delays have partly reflected funding constraints, with financial allocations determined annually and so effectively restricting any longer-term planning. Local in-fighting on the location of dykes has caused further delays, with demands from many groups to have their own particular area protected. Before any construction begins, land for both the structures and the disposal sites must also be acquired and rights of way established, creating additional delays as some have wanted the protection offered by the dykes but have not wanted them constructed on their own land. For example, in Bacolar a 10km dyke costing over US$500,000 was left with a 200 metre gap because one landowner refused to allow access to his land, leading to the subsequent destruction of the area by a lahar (Watkins, 1995). Delays in the payment of compensation for the use of land is also reported to be increasing the reluctance of landowners to grant access to their properties. More fundamental disagreements also remain on the extent of protection really provided by the dykes.

As a consequence of these various delays, as of mid-1996 there were concerns that the forthcoming typhoon season could result in severe damage to towns such as San Fernando. San Fernando is the provincial capital of Pampanga and has a population of 120,000 and much of the region's industry including Pepsi Cola and San Miguel bottling plants and the province's largest sugar mill. In 1995 the lahar had stopped just short of the town and although there were plans to construct an 18 mile, 30 ft high dyke costing some P 2.5bn (US$95m) in the 1995/96 dry season, the dyke had still to be completed by August 1996 (Luce, 1996).

as rapidly that they could have been (see Box 10.2). Individual private enterprises and businesses as well as various government bodies have also been involved in such efforts.[66]

---

[66] San Miguel provides an interesting illustration of disaster-mitigation practices taken directly by a private enterprise to protect its own operations. In about 1990 the company experienced some flooding at its Manila plant, caused by the sheer volume of garbage and residential waste deposited into the adjacent river. The corporation overcame the problem by dredging the stretch of river around the plant, constructing dykes and implementing a public education programme, to the total cost of P 10–15m over the subsequent five years. This cost was borne directly by San Miguel although a spokesperson for the corporation indicated that the government might put a more ambitious dredging programme in place in the future, effectively alleviating San Miguel of its responsibility. Further examples of the corporation's

Flood-control schemes have been concentrated on the country's major river basins, the Metro Manila area and other populous urban centres. In the Manila area, for example, floodways, spillways, hydraulic control structures, dykes, dams and control gates have been constructed whilst rivers have been dredged and drainage systems improved (ESCAP, 1990). As of 1992, the country was also reported to have 5,637 completed flood-control and drainage projects, covering the major river basins in the largest areas of fertile land (Philippine NLUC, 1992).[67] However, further investments are required, as recognised by various government documents.[68] For example, at least as of 1992, the country had no regular river maintenance and dredging programme, despite heavy siltation in the major river basins (ibid.). Rapid urban growth over the past two decades has also increased the need for investment in various services and facilities, including drainage. However, such investment needs have not been fully met due to funding constraints, in turn resulting in an increasing incidence of urban flooding.

The rate of implementation of non-structural mitigation measures could also be improved. Particular disasters have generated local interest in such efforts. For example, the city of Ormoc has spent over P 12m in reforestation since the devastating November 1991 flood. Farmers in the area are also being taught about alternative farming opportunities, such as the cultivation of rattan to reduce rates of tree felling, whilst the city's drainage system has also been entirely overhauled. However, greater efforts are needed to promote non-structural mitigation measures more generally, such as the implementation of appropriate land use regulations, including the re-siting of squatter locations away from the banks of waterways and regulation of the use of flood plains; the preparation and wide dissemination of hazard

---

mitigation activities are provided in section 3.4.

[67] The first public works programme in the country, in 1972–4, also involved a flood-control project (Subbarao et al., 1996).

[68] For example, both the 1982–7 and 1987–92 Medium-Term Development Plans noted that floods had recurred because of incomplete or damaged flood-control structures, aggravated by environmental degradation. Both Plans therefore outlined strategies for the continued extensive implementation of the flood-control programme, including river-control/drainage projects, impounding dams, sabo-erosion dams and, in the 1987–92 Plan, seawalls. The 1983–7 Plan detailed infrastructural investments in flood control and drainage to the value of P 7,290m (P 28,524m at 1994 prices), whilst over the period of the 1987–92 Plan it was envisaged that P 7,511m (P 14,694m at 1994 prices) would be invested in the flood-control programme. The Philippine National Physical Framework Plan 1993–2022 similarly called for the completion of flood control and protection works in critical parts of the country, including river control/drainage projects, lahar or mudflow control facilities and seawalls, and of flood-control and drainage support systems for agricultural development (Philippine NLUC, 1992).

maps; reforestation of watersheds; water conservation measures; and provision for increased run-off from increasingly densely populated areas.[69] The first two of these are considered in more detail below.

The relatively low adoption rate of disaster mitigation measures appears to be largely due to financial constraints and legislative and administrative shortcomings. There is no separate budget line for such measures; instead, any costs are met out of the overall budgets of relevant government agencies which in most cases are already very tight. Since there is little immediate urgency to undertake mitigation and prevention activities, they can receive low priority in the allocation of resources (see Chapter 8).

In legislative and administrative terms, mitigation activities are also considered the responsibility of the relevant government departments. However, there is no directive guiding their specific roles in this area, although the NDCC is reported to be encouraging member agencies to develop mitigation projects more generally (Philippine NDCC, 1993).[70] Furthermore, government bodies at both the national and local level are not obliged to report on their mitigation activities, making it difficult for the NDCC or any other body to ensure that a comprehensive mitigation programme is being implemented.[71] The NDCC recognises this problem and has suggested the setting up of a central clearing house for all mitigation projects in order to avoid duplication and help secure external funding for such activities (ibid.). Such a system would also help highlight any gaps in the country's overall prevention and mitigation programme.

---

[69] Intensification of non-structural schemes was also specified in the 1987–92 Five-Year Plan, including 'conservation measures to increase the availability of water, improved management to reduce losses in irrigation and water supply, the regulation of the development of flood plains, and flood monitoring to mitigate flood damages' (Philippine Government, 1986: 294). Meanwhile the 1982–7 Plan announced the introduction of flood-plain management and zoning 'to regulate the type and extent of development on river basins, thereby preserving natural waterways and minimizing undue encroachment of flood plains which could reduce the value of property therein' (Philippine Government, 1982: 137). The same Plan further indicated that some 25,000 ha of watershed would be reforested. ESCAP (1990) also stresses the need to reduce the deposit of garbage and other waste into rivers, channels and drains in the Manila area, in part through the provision of education on how flood problems can be overcome.

[70] The Department of Environment and Natural Resources is expected to undertake environmentally-related mitigation measures, such as reforestation to reduce the incidence and severity of flooding. However, the hazard-related responsibilities of most other government departments are much more loosely defined.

[71] For example, the NDCC was unable to provide a list of either ongoing or completed disaster mitigation activities for the purposes of this study.

The recent devolution of power may also be frustrating efforts to develop a comprehensive disaster mitigation programme as any mitigation measures should ideally be formulated within the context of a broader geographical strategy. The absence of such a framework can create serious problems, as has already been experienced on some occasions. For example, although a National Committee on Dam Monitoring for Public Safety exists to protect the public against the adverse downstream impacts of dam water releases (NSCB, 1995), certain problems have been encountered:

> ... the government's heavy reliance on infrastructures *vis-à-vis* community preparedness programs in mitigating the impacts of hydrological hazards for example, has in several cases resulted in more intense and frequent flooding after the implementation of the foreign-assisted Bicol River Basin Development Programme. In Mindanao, dikes have been observed to protect large-scale plantations but in the process trap flood water in populated areas. In Camarines Sur, CDRC's study on Monang revealed that the Nabau dam, while intended to impound water, at the same time aggravates flooding in other areas in the province (Delica, 1994b: 8).

The IDNDR has fuelled some increased interest in disaster prevention and mitigation activities, resulting in the formation of committees on structural and non-structural measures under the NDCC.[72] However, the Office of Civil Defence (OCD) is the lead agency for the Committee on Non-Structural Measures – a probably less than ideal appointment, as the OCD is a relief agency. Instead, a government body such as NEDA would have been better suited to this role. Moreover, at least as of late 1995, it was not apparent what either committee had so far achieved.

As part of its proposed programme of activities under the auspices of the IDNDR, the government also included some research on the socio-economic impacts of disasters and the development of a comprehensive mitigation programme. Meanwhile, both NGOs and the private sector are also encouraging increased activities in the area of preparedness, mitigation and prevention, commonly referred to as PMP – in fact, a buzz word initially promoted by the US Office of Foreign Disaster Assistance (OFDA). According to one commentator, the business sector was one of the first groups to recognise the importance of PMP (see Box 10.3).

These are clearly positive intentions. However, in practice, government efforts under the auspices of the IDNDR appear to have achieved relatively little to date.

---

[72] The Department of Public Works and Highways is designated as the lead agency for the Committee on Structural Measures.

Box 10.3 Private sector involvement in disasters

There is a long history of involvement of the business community in social welfare programmes in the Philippines, in part accomplished through organisations specifically designed for this purpose such as the Philippine Business for Social Progress (PBSP) as well as through the welfare arms of particular companies. Such efforts are encouraged by tax relief on donations to charity although there is no tax relief on any assistance provided to a company's own employees.

With specific regard to natural disasters, the Corporate Network for Disaster Response (CNDR), an off-shoot of the PBSP, was originally founded in the wake of the July 1990 Luzon earthquake to provide 'a voluntary alliance of private corporations, business associations and corporate foundations ... which engages in disaster prevention, mitigation and preparedness programs and mobilizes timely and appropriate responses to natural disasters' (CNDR, 1992: 1). It was subsequently formalised in 1993. Its operations are managed by five corporations and two NGOs, all of which provide minimum annual contributions of P 0.5m. Other businesses as well as the international community – including, for example, USAID and Oxfam (UK/Ireland) – provide additional funding. The CNDR has also begun to establish local affiliates, including the Mindanao Network for Disaster Response (MNDR) and local networks in three lahar-affected areas in Region III. Further local networks are planned, spearheaded by larger corporations in the area.

In the first three to four years of operation, disaster relief and rehabilitation expenditure accounted for some 80% of the CNDR's operations, with the remainder spent on preparedness and mitigation. However, its Board of Trustees is now pushing for a shift away from 'costly' relief responses. For example, the CNDR's Mindanao affiliate has announced that it does not intend to spend any more money on relief, regarding it as a waste of money. More generally, the CNDR will continue to provide disaster relief but it hopes that the cost of such activities will decline as mitigation and preparedness measures improve. Reflecting the change in emphasis, a PMP programme was launched in about 1993, initially concentrating on the provinces of Pampanga (in the context of lahars), Leyte (typhoons) and the city of Davao (floods). However, as of late 1995, most PMP activities have focused on disaster management training and efforts to begin the preparation of disaster plans at the community level rather than on prevention and mitigation activities.

Individual companies also often extend post-disaster relief assistance to their own workforce, as already indicated. For example, San Miguel provides post-disaster assistance for affected employees through its social development fund, spending perhaps P 1m a year on such support and considerably more in the event of a major disaster. Contributions were estimated at P 8m in support of victims of the July 1990 earthquake and P 10m in support of Mt Pinatubo victims. Similarly, the Benguet Corporation established a foundation in 1980 to provide technical and social services, including disaster relief, to its mining workforce and their families and neighbours. It has also been involved in reforestation and forest protection activities, with total expenditure of almost P 500m between 1986 and 1994.

Furthermore, the brief of the Committee on Non-Structural Measures is somewhat biased towards preparedness rather than mitigation, focusing particularly on the preparation of programmes and projects on disaster preparedness, the conduct of research on social and human behaviour, the provision of public education and related activities. Similarly, NGO and private sector PMP efforts have focused primarily on preparedness rather than prevention or mitigation to date.

Most fundamentally, the government has yet to formulate a detailed and comprehensive mitigation programme, despite its more general achievements in disaster management, and thus to secure the benefits which such measures can have in reducing both the human and economic costs of disasters. Such a programme should be drawn up, covering the full range of non-structural measures such as appropriate agricultural practices and building structures and materials as well as structural measures, and assigning clear responsibilities for its implementation. Moreover, possibilities for disaster mitigation permeate almost every aspect of the economy and individual government departments as well as the private sector and individual households should therefore be encouraged to incorporate mitigation measures into all relevant activities.

Public education should also be conducted in areas benefiting from structural disaster prevention and mitigation measures, as such measures can sometimes create a false sense of security, whereby people no longer respond to disaster warnings.[73] In addition, a more general public information campaign is required to increase awareness of the prevention and mitigation measures which individuals can undertake. Indeed, the need for this is underscored by a 1992 SWS survey which revealed that whilst 53% of the sample population felt they could do a considerable amount to reduce the scale of death and destruction caused by typhoons, almost 47% believed that destruction lay in the hands of God and therefore there was little they could do. A more fatalistic attitude was particularly dominant amongst lower-income groups (Sandoval, 1994).

Damage to housing is one of the most costly direct impacts of sudden-onset hazards on individual households whilst damage to public and commercial properties more generally is responsible for many subsequent indirect economic effects. The extent to which hazard risks are considered in the choice of location and design of buildings and the materials used in their construction is therefore considered in more detail below.

---

[73] For example, some people were reluctant to leave their homes following the issue of warnings for Typhoon Rosing (November 1995), erroneously confident that nearby dykes would provide protection against flash floods and rock slides. The construction of dykes to provide protection against lahars in the Mt Pinatubo region is reported to have created a similar false sense of security.

Risk mapping and land use planning Both the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) and the Philippine Institute of Volcanology and Seismology (PHIVOLCS) are keenly aware of the importance of disseminating hazard risk information for utilisation in, for example, land-use planning and development, agriculture, building designs and risk management more generally (see Jose, 1993). These efforts have been endorsed by the National Physical Framework Plan, 1993–2022 which makes the consideration of hazard risks a central factor in determining land use, aiming in part to reduce hazard vulnerability and to maintain environmental stability and integrity by guiding the location of assets and housing and influencing land use. In terms of achieving more equitable spatial development, the NPFP also notes that particular attention needs to be paid to areas which are most vulnerable to natural disasters, including typhoons, earthquakes and volcanic eruptions (Philippine NLUC, 1992).[74]

PAGASA has undertaken broad risk mapping of typhoons. Flood-prone areas have also been broadly identified based on topography and historical rain patterns, but no systematic flood-risk mapping has been completed. PHIVOLCS has produced earthquake ground acceleration maps at the national level as well as maps for liquefaction and landslides. It has also produced three types of volcanic hazard maps for the country's six most active volcanoes (see Chapter 2), covering lahars, pyroclastic flows and ash falls.

These maps have been complemented by laws and regulations aimed at reducing the hazard vulnerability of both people and economic assets. For example, according to Section 268 of the Land Surveys of the Philippines, 'the banks, streams, esteros, rivers and the shores of seas and lakes throughout their entire length and within a zone of three metres in urban areas, 20 metres in agricultural areas, and 40 metres in forest areas, along their margins are subject to the easement of public use in the interest of recreation, navigation, floatage, fishing and salvage' (ibid.: 32). Restrictions also exist on the use of land in the vicinity of the country's six most active volcanoes. These include no permanent habitation and limited access within a 4–6 km radius around each volcano's summit, known as the Permanent Danger Zone; and limited habitation, the discouragement of the location of heavy industries

[74] More broadly, the NPFP 'seeks to prevent or at least reconcile conflicts among competing uses of land and other physical resources based on economic, environmental and other considerations' (Philippine NLUC, 1992: 3). It aims to 'support the overall development thrusts of the country, namely towards sustainable development, increased employment, social equity and poverty alleviation' and more specifically to '(a) help maintain and strengthen national cohesion and integration; (b) guide the location of public and private investments; (c) facilitate efficient production and land utilization; (d) promote the physical and environmental integrity of the country; and (e) provide spatial direction to the provision of basic services and urban development' (ibid.: 10).

and populated facilities and perhaps limited access, depending on the intensity and character of eruption of individual volcanoes, in a 2 km band around the Permanent Danger Zone.[75] More generally, as part of the 1991 programme of devolution, the legislative bodies of municipalities, cities and provinces are mandated to adopt land-use plans. Municipality and city legislative bodies are also mandated to enact integrated zoning ordinances, whilst the provincial bodies are mandated to review the city and municipal land-use plans and zoning ordinances and to adopt comprehensive provincial land-use plans (Nolledo, 1991).

However, in practice these various laws are often poorly enforced, whilst public hazard awareness is limited and hazard maps are typically not consulted. Moreover, more extensive and systematic hazard mapping is required, with most existing maps based on historical evidence and often in insufficient detail.[76] Public knowledge about the risks of geological hazards typically appears to be particularly low, despite efforts to reduce this problem.[77] A survey of 109 households affected by the July 1990 Luzon earthquake revealed that 96% of respondents were entirely unaware that they were living in an earthquake-prone area prior to the disaster, despite considerable media exposure and participation in community meetings (Cola, 1992). Similarly, one of the fastest expanding cities in the Philippines, Tagaytay, is located on the ridge of the caldera of Taal volcano, at direct risk in the event of a major eruption. Huge investments are being undertaken in the area with little apparent awareness of the risks, despite relatively recent eruptions.[78] This underlines a failure to ensure the systematic dissemination of information about natural hazards, and efforts to increase public awareness clearly need to be stepped up.[79] Meanwhile, both lack of awareness

---

[75] The delineated danger zones are 6 km from the crater for Mayon volcano, 4 km for Bulusan volcano, 4–8 km for Canlaon volcano, 3 km for Hibok-Hibok volcano, 10 km for Pinatubo volcano (at least as of 1992) and the whole of the uninhabited island for Taal volcano (ibid.).

[76] For example, most seismic hazard maps are produced on a scale of 1:250,000, with a few on a scale of 1:50,000. A notable exception is the much more detailed mapping of the Marikana fault in the Manila area, for which a map on the scale of 1:10,000 has been produced.

[77] PHIVOLCS, for example, has undertaken various activities to disseminate flood and typhoon hazard maps. It has also run a course of seminars targeted at policy-makers and civil defence officials to increase awareness about the importance of land-use planning. However, some difficulties have been encountered, for example, in that local government officials have often had little prior experience of reading and interpreting maps.

[78] Personal communication with Jean-Paul Chardin, February 1997.

[79] Similarly, although the population of Manila is reported to have 'acquired an adequate level of preparedness' in relation to the risk of flooding, its level of earthquake preparedness

and poverty have resulted in the construction of permanent structures and squatter housing on buffer strips and easements, with buildings actually overhanging the rivers in more densely populated areas. Presidential Decree 953 calling for the replanting of trees along river banks has also not been complied with.

There are two notable exceptions in terms of public awareness of the existence and potential value of hazard risk maps. First, since the 1991 Mt Pinatubo eruption local governments and banks in the affected provinces have made the issue of finance for land development conditional upon the presentation of a PHIVOLCS certificate stating that the location falls without the hazard zone.[80] Second, hazard risk maps are also reported to have been consulted frequently in the Marikana Fault area, the only part of the country where detailed earthquake hazard zoning has been undertaken. In both cases, such practices have been driven by economic considerations but made possible by the availability of detailed hazard risk maps. In the case of the Marikana Fault, the release of such information has not been without controversy. Some hold that PHIVOLCS is being too alarmist and the disagreement has resulted in considerable confusion.[81] There has also been some consultation of hazard risk maps in the Mt Mayon area, where the 1989 eruption resulted in the relocation of houses and the restriction of the use of higher-risk areas for agricultural purposes only. These changes effectively reduced the scale of damage incurred as a consequence of the subsequent 1993 eruption.

Involvement in efforts to ensure greater uptake of disaster mitigation and preparedness measures also appears to have played some role in increasing private sector awareness of the risks posed by natural hazards. For example, corporate members of the CNDR would like the organisation to undertake hazard assessments

---

is very low (Banzon-Bautista, 1993b: 124). Meanwhile, the survey of the victims of the 1991 Ormoc flood (see Box 5.2) included an investigation of their perceptions of the risk of further flooding and of the mitigation measures which they had therefore adopted. Prior to the flood, all the respondents subsequently located in the resettlement and riverside areas had been located in the latter, 55% for over 20 years and a further 23% for over ten years. Yet 62% of them had not appreciated that they lived in a dangerous location, typically because they had not experienced any serious flood damage. Of the 29% of the total respondents, including one from the urban area, who had recognised the nature of the risk, 80% had considered moving but had not done so either because of financial constraints (57%) or because they did not know where to go (23%) (JDI/ECFA/DEVMAN, 1993).

[80] The chosen site is visited by a PHIVOLCS staff member and the appropriate certificate then released. Initially, PHIVOLCS had been under pressure to issue certificates which categorically stated whether or not a site would be damaged by future lahars. However, PHIVOLCS was clearly in no position to provide such guarantees.

[81] Personal communication with Jean-Paul Chardin, February 1997.

of its members' plants. However, such assessments had not begun as of late 1995 and, anyway, might not always prove sufficiently detailed because of the constraints posed by the more general dearth of detailed, systematic hazard mapping.

More generally, efforts need to be stepped up to ensure that land-use regulations are strictly enforced and that public awareness of hazard risks is improved. However, even this is not straightforward as hazard vulnerability itself is dynamic, reflecting changing environmental and socio-economic factors. For example, there is evidence that deforestation is increasing the frequency and severity of disasters such as flooding which, combined with rising population mobility, may be reducing the level of accurate local knowledge of hazard risks. This was demonstrated by evidence from a survey following the 1991 Ormoc flood, which indicated that many households were unaware of the risk of flooding on the scale experienced, despite the fact that they had been living in the area for many years, basically because deforestation in the locality had increased the potential scale and speed of flash flooding (see Box 10.4).

Increasing population pressures are also likely to exacerbate difficulties in implementing laws and regulations on land use in the short- to medium-term by forcing poorer households on to more marginal lands. This makes both the conduct and dissemination of detailed and regularly updated risk mapping as well as the enforcement of land-use regulations even more critical. Indeed, the NPFP has called for the immediate adoption of proper infrastructure and settlement planning in areas prone to flood and storm surge and the strict implementation of legislation prohibiting the construction of permanent structures along easements and buffer strips (Philippine NLUC, 1992). As of late 1995, the National Land Use Committee was also proposing legislation to create a more powerful Land Use Commission with much more power to monitor land use at the national level.

Finally, there may be some scope for the introduction of financial incentives to encourage households and the private sector to consider hazard risks when deciding on the location and design of their properties. For example, financiers could demand that hazard maps are consulted before loans are issued, as already occurs in the Mt Pinatubo region, and loans made conditional upon the adoption of appropriate disaster-proofing measures.

Building codes The government has long recognised the importance of reducing the vulnerability of buildings to natural disasters and has both a National Building Code, as embodied in Presidential Decree 1096 of 19 December 1977, and a Fire Code. The National Building Code is administered by the Department of Public Works and Highways and, at least in theory, is applied across the country. There is also evidence of considerable traditional knowledge of appropriate building techniques and designs. Traditional structures, which are built out of bamboo, nipa and suwali according to

Box 10.4 Household adoption of mitigation measures following the Ormoc flood

A survey of the victims of the 1991 Ormoc flood (see Box 5.2) included an investigation of the extent to which households had adopted mitigation measures subsequent to the flood. Some 52% of respondents indicated that they believed they would not experience the same level of damage again because they were now more aware of the risks and thus better prepared. A further 11% specifically indicated that their homes were now located in safer places. However, some 6% of respondents took the view that such a flood would never happen again and had therefore taken no specific mitigation measures, whilst 14% believed another similar flood could occur but held a fatalistic attitude, believing that there was little they could do to reduce its effects. Meanwhile, 14% considered that the location of their homes implied that they could experience similar damage again.

Respondents were generally of the opinion that the flood was a consequence of deforestation and inadequate drainage. Some 54% identified a need for reforestation and 43% for improved drainage systems, while 72% considered that responsibility for providing such measures rested with the government. Some 27% of respondents also thought that the government should ban illegal logging, reflecting a more general swing in public opinion in favour of a total rather than a partial logging ban following the flood (Brillantes, 1992).

Source: JDI/ECFA/DEVMAN, 1993

long established designs, are well adapted to resist natural hazards, particularly typhoons and earthquakes.[82]

However, there has been some decline in the use of traditional building materials and designs, nor is it clear how far the modern building codes and land restrictions are adhered to nor whether they are sufficiently stringent. Indeed, the Department of National Defence refers to 'gross violation of the National Building Code and Fire Code (Philippine DND, 1994: 21). Similarly, the NPFP stresses that strict implementation of and adherence to the building code, especially the provisions for seismic loading, should be observed, again suggesting that current codes are not being fully implemented.

As regards the stringency of building codes, the NDCC (1993) notes that further investigations into ground acceleration have revealed that seismic standards are insufficiently high and that even structures conforming to the codes, which are based on design parameters taken from the 1940 El Centro California earthquake, could

[82] For example, in a study of a village in Panay Island, Hall and Bellers (1996) report the traditional use of very strong joints in the construction of buildings, consisting of tongue-and-groove joints which are pegged together with split bamboo wedges. Every year the pegs are checked and re-hammered in or replaced as necessary, providing structures which can withstand very strong winds.

collapse in the event of a severe earthquake. Indeed, the need to revise the building codes was recognised in the aftermath of the July 1990 Luzon earthquake, and part of the World Bank loan provided in support of the reconstruction activities (see Chapter 12) was intended to finance this. However, in practice it appears that the impetus to improve building standards was not sustained (see Box 10.5). Seismic codes also need to be delineated to reflect local risk. Yet, at least as of 1992, a uniform seismic building code was being used for, for example, the whole of the Manila area (Saldivar-Sali, 1992).

Non-compliance with building codes and poor construction standards have also been partly blamed for the scale of damage and loss of life as a result of a number of other disasters. The loss of some 103 lives as well as the extensive damage incurred as a consequence of Typhoon Gading (July 1986) was partly attributed to the poor implementation of legislation prohibiting settlements in high-risk areas, resulting in construction in landslide-prone areas; to the sub-standard condition of many public buildings; and to the design of roads and bridges. Similarly, much of the infrastructural damage caused by the July 1990 Luzon earthquake was attributable to low construction standards and non-compliance with the building codes (Rantucci, 1994).

There are various socio-economic factors underlying non-compliance with building codes, including funding constraints on the part of households (see Chapter 9). In fact, even externally funded projects may face indirect financial pressures which result in lower building standards. For example, the NDCC (1993) reports that in the aftermath of the 1990 earthquake some bridges were rehabilitated 'in a hurry to use the aid before a certain deadline' (p.15) using the same seismic standards as contained in the destroyed bridges. The standard of buildings constructed on informally occupied land, including marginal land unsuitable for building development, is also typically low, partly because households are unable to obtain proof of ownership and so do not obtain building permits, with the result that construction is not formally supervised. Lack of legal ownership also generates a certain reluctance on the part of the occupants to improve properties.

Shifts in preference towards modern building materials and designs are also playing a role in increasing the hazard vulnerability of housing. Modern houses were reported to withstand the impact of typhoons relatively well in the study of one village in Panay Island (Hall and Bellers, 1996). However, it was quite common for homeowners to combine traditional and modern materials and designs as they could not initially afford to use modern materials alone. Such buildings suffered considerably more damage than traditional ones in the event of a typhoon, whilst the cost of repairs was also far greater.

Box 10.5 Building reconstruction efforts following the July 1990 Luzon earthquake

The July 1990 Luzon earthquake caused extensive damage to buildings, underlining the need for improvements in their quality and the increased application of appropriate seismic-proofing measures and land hazard maps. After the earthquake, public buildings were supposed to be reconstructed in conformity with seismic standards but it is not clear whether the overall building stock is any more able to withstand future earthquakes of similar magnitude, principally because of funding constraints.

Various programmes, including part of a World Bank loan as well as several government schemes, were expected to provide funding for the reconstruction of some 44%, or 44,800, housing units (World Bank, 1990). However, about two-thirds of assisted houseowners received loans rather than grants, effectively implying an increase in indebtedness. Furthermore, although the level of funding available was clearly substantial, it was nevertheless insufficient, as demonstrated by the fact that six months after the earthquake only 36% of respondents to a survey of earthquake victims had repaired their houses, apparently principally because of funding constraints. Funding constraints are also likely to have meant that much of the housing stock was repaired or reconstructed without the addition of seismic-proofing measures. Average restoration costs were equivalent to 7–8 months' average earnings for the sample households, but only 3 months' earnings for poor households, who relied largely on materials available in nearby brushland and swampland and on the labour of relatives and neighbours (Cola, 1992).

Baguio City was particularly badly affected by the earthquake. Again, it seems likely that many of the buildings were reconstructed or repaired without the incorporation of seismic-proofing features as over half of them were reconstructed by their owners and under 20% by skilled workers or licensed contractors. Multi-storey buildings suffered particular damage, although only 7.2% of the pre-earthquake housing stock exceeded two stories. Yet although it was decided in the aftermath of the earthquake to limit all buildings in Baguio to a maximum of four stories, this policy was reversed only three years later and some higher-rise buildings have now been constructed. Moreover, one three-storey building in the Baguio Export Processing Zone which had to be demolished following the earthquake was replaced by another building on the same site which failed to contain adequate seismic-proofing features.

Price factors have also forced some changes in the choice of building materials. In the past, timber was commonly used, producing strong buildings which could withstand both earthquakes and typhoons when appropriately designed. However, timber has gradually been replaced by reinforced concrete as timber prices have increased in response to a decrease in production. Reinforced concrete buildings often suffer little damage during typhoons and floods but can collapse in the event of an earthquake or a strong flash flood, causing far more extensive damage and loss of life.

The very fact that the Philippines faces the full spectrum of major natural hazards causes additional problems in the design and construction of disaster-proof structures

as the risk of different types of hazard necessitates adjustments. For example, buildings with timber rather than concrete slab floors are more appropriate in seismically active zones, yet the building code does not permit timber floors because of the risk of fire (Alatec-Harris-Tym Group et al., 1993a). Similarly, houses in flood-prone areas have traditionally been built on stilts, but these structures can be more vulnerable to both earthquakes and flash floods. Nevertheless, the building code may need careful re-examination to assess the extent to which it is sympathetic to the risk of multiple disasters.

10.3 Disaster preparedness

Considerable efforts have been made to improve disaster preparedness in the Philippines and so reduce both human and economic losses. These activities have included the training of relief workers, the organisation of disaster drills, the implementation of public information campaigns to promote preparatory measures, the encouragement of the stockpiling of relief supplies at both the national and local level, and communications and warning activities. Since 1988, the first week of July has also been designated as Natural Disaster Consciousness Week. This section focuses in particular on disaster warnings, which can play an important role in reducing the economic and human impacts of disasters.

Disaster warnings Adequate warnings are particularly important in reaping the full benefits of disaster preparedness measures, providing vulnerable communities with an opportunity both to minimise the impacts of impending disasters and, most fundamentally, to prevent loss of life. Indeed, the government has disseminated information on a number of recommended actions which should be taken following the receipt of a disaster warning. These include securing windows and doors, tying down roofs and cutting tree branches in the event of a typhoon; moving possessions and livestock to higher ground and greasing immovable machinery in the event of a flood; and covering houses with a damp cloth and intermittently sweeping accumulated ash from rooftops in the event of a volcanic ash fall.

The two key government bodies involved in the provision of disaster warnings are PAGASA and PHIVOLCS. Particular efforts have been made to provide an adequate typhoon warning system. There are four categories of warning depending on the forecast strength of the impending typhoon, and the warnings are disseminated through various means, including a radio communications network.[83] A 1990 SWS survey revealed that 60% of the survey group was satisfied with the comprehensibility of typhoon warnings. However, according to a 1992 SWS survey, only a third of respondents were aware of the new fourth warning level (Sandoval,

[83] The fourth level of warning was introduced in the early 1990s for particularly severe typhoons, with wind speeds over 185km, which are anticipated within 12 hours.

1994). As a consequence of this survey the fourth level of warning was renamed a 'Super Typhoon' and now carries greater public recognition than the previous 'fourth level of warning'. PAGASA also operates a flood forecasting system although, as of 1994, this system was only operational in four river basins and four dam sites (Delica, 1994b). Meanwhile, although the current state of scientific knowledge does not permit the prediction of earthquakes, PHIVOLCS regularly monitors the country's six most active volcanoes – Taal, Mayon, Bulusan, Hibok-Hibok, Canlaon and, since 1991, Mt Pinatubo. A lahar warning system has been installed in the vicinity of Mt Pinatubo since the 1991 eruption, with funding from the Japan International Cooperation Agency (JICA).

However, much of PAGASA's monitoring equipment is out of date, whilst the organisation also faces perennial funding constraints. Thus, for example, Delica (1994b) cites an unreferenced report by the ADB which finds that PAGASA's storm detection and surveillance capabilities are 'marginal ... relying primarily on subjective techniques using forecaster skill and experience plus empirical rules'. Much of PHIVOLC's volcanic and seismological monitoring equipment is similarly out of date, with the notable exception of that used to monitor the Mt Pinatubo and Taal volcanoes. This state of affairs implies that the human and economic costs of natural disasters could perhaps be reduced by improved warning equipment, demanding careful analysis of the potential returns to higher investment in systems.

There is also certain evidence that disaster warnings are not always heeded, possibly reflecting their unreliability and thus limited public confidence in them but also suggesting a need for greater public education about the positive action which individuals can take following the receipt of a warning.[84] For example, the 1992 SWS survey on storm warnings revealed that although 48% of the sample population felt that they could do a considerable amount following the receipt of a typhoon warning, 40% thought they could do little and 12% almost nothing to prevent loss of life or property. Respondents in Visayas and Mindanao as well as those in rural areas generally took a more fatalistic view, although the SWS suggested that this could

---

[84] In the case of typhoons which are either, somewhat atypically, preceded by generally good weather and/or outside the normal typhoon season, communities are also less inclined to undertake adequate preparedness activities. Such intransience was demonstrated in 1984 in the case of Typhoons Nitang (International code name Ike) and Undang (International code name Agnes). In both cases, the decision to take no action was also influenced by a number of previous 'near misses' in the two areas following the issue of typhoon warnings (Amadore et al., 1985) As a consequence, typhoons Nitang and Undang resulted in 1,795 deaths and damage to the value of P 5.455bn, whilst casualty figures were the highest on record until 1991, when the devastating Typhoon Uring and the consequent Ormoc flood occurred. This suggests a need for efforts to enhance public confidence in the warning system, in part to reduce the economic impacts of disasters.

partly reflect the fact these groups also experience a higher incidence of disasters than groups in the other survey areas (Luzon and the NCR) (Sandoval, 1994).[85]

There may also be some scope for longer-term rainfall forecasts, allowing various adjustments in economic behaviour in expectation of droughts. Weather patterns in the Philippines are causally linked to El Niño Southern Oscillations (ENSO), with a higher incidence of droughts in El Niño years (see Chapter 2). At least in theory, ENSO-based longer-term forecasts could therefore permit adjustments in cropping decisions or levels of exports, assuming that the forecasts are widely disseminated in an easily understood form and that local communities have both the knowledge and the resources to adjust their activities accordingly. Such forecasts could also permit the government to arrange for the timely import of rice, corn and other agricultural products.

In fact, the government already makes some agricultural production forecasts and arranges imports as necessary, although apparently not using ENSO-based estimates. Regular monthly weather forecasts are also provided, accompanied by advice to farmers to help minimise potential losses. In addition, some modelling work on the relationship between ENSO events and weather patterns has been undertaken since 1987, from which three-monthly and six-monthly forecasts are generated. A drought early warning and monitoring system was also begun in 1987. Efforts should be undertaken to ensure that longer-term forecasts are placed in the public domain and that socio-economic benefits can be derived from them.

10.4 Post-disaster relief and rehabilitation

Post-disaster relief efforts constitute a vital component of disaster management. Appropriate and carefully targeted packages can play an important role both in meeting immediate humanitarian needs and in ensuring a rapid economic recovery.

Immediate relief efforts are well organised and effective in the Philippines, drawing on a combination of governmental, Red Cross, NGO and private sector resources as

[85] The Ormoc flood and associated typhoon provide a further example of widespread failure to respond to a disaster warning. In a survey of the flood victims, some 92% of respondents reported that they were aware of an approaching typhoon yet only 17% evacuated prior to the flood. Of those respondents who did not evacuate, 77% believed that there was no real danger (JDI/ECFA/DEVMAN, 1993). In this case, the limited response partly reflects the fact that environmental degradation had increased the level of risk posed by typhoons to an extent that had not been appreciated by the local community.

well as considerable self-help initiatives.[86] In some disasters, external assistance is also drawn upon but the government pursues a policy of self-reliance, only appealing for international assistance when the scale of damage is considered beyond its capability (see Chapter 8). To help coordinate their response activities and enhance their disaster preparedness activities, NGOs established an Inter-Agency Network for Disaster Response (IANDR) in 1989. NGOs also enjoy a good, if sometimes contentious, working relationship with the government and both the IANDR and the Philippine Red Cross are represented on the NDCC. Meanwhile, the involvement of voluntary workers in disaster relief is effectively encouraged by government provision of compensation in the event of their death or injury.

The large number of sources of post-disaster relief makes it extremely difficult to gauge either the scale or exact nature of disaster relief. However, it is clear that efforts extend beyond short-term humanitarian assistance to include measures such as the provision of agricultural seeds and fertiliser and infrastructural support (see Box 10.6). Some of these latter types of assistance are specifically identified under the Calamities and Disaster Preparedness Plan. For example, the Ministry of Labour is responsible for providing emergency employment and livelihood opportunities to disaster victims. The Ministry of Trade has the role of ensuring that normal prices are maintained in the affected areas, of providing loans to retailers to help restore local commerce as quickly as possible and of assisting in the maintenance of basic supplies (see Chapter 6). Meanwhile, the Department of Agriculture is expected to provide post-disaster technical assistance, seeds and fertiliser to disaster victims, as already noted. There is also evidence that local contractors may be used in the rehabilitation efforts, effectively increasing the multiplier effects of reconstruction activities through the local economy.[87]

---

[86] For example, the survey of the impact of the July 1990 earthquake on a sample 109 households from 52 barangays revealed that the affected communities undertook a range of rehabilitation work themselves including, for example, the repair of houses, clearance of road blockages, the opening of alternative transport routes and the construction of canals and embankments to prevent the flow of flood water experienced in the wake of the earthquake. Further evidence of self-reliance was indicated by the fact that 46% of sample households did not seek outside assistance. Of those community leaders who did draw on external assistance, 73% turned to NGOs and the Philippine Red Cross, whilst only 35% requested help from national and 8% from local government agencies. Some 30% of affected households also provided assistance to other households (Cola, 1992).

[87] For example, local contractors have been used in the construction of dykes to control the flow of lahars in the Mt Pinatubo area.

Box 10.6 Response to the July 1990 Luzon earthquake

The July 1990 Luzon earthquake reconstruction programme was expected to take some 3–5 years (World Bank, 1990) and, as of September 1990, to cost some US$600m (P 14.6bn). The Philippine Government placed particular emphasis on the reconstruction of roads and bridges, water supply, power, irrigation, flood control, communication services and social infrastructure. In recognition of the severity of the earthquake and the substantial rehabilitation programme required, a Presidential Task Force on Rehabilitation was established.

Other efforts to restore economic activity in the aftermath of the disaster included the Department of Agriculture programme, as already noted (see Box 4.2); and the provision of various long-term employment projects by the Department of Labour and Employment, to a total value of P 125m (NDCC, 1990). The latter included various training programmes and the establishment of an employment-exchange network to match the skills of displaced workers with suitable vacancies.

There was also overwhelming public support in favour of the earthquake victims. For example, Philippine Business for Social Progress (PBSP) provided immediate emergency assistance and, subsequently, an earthquake rehabilitation programme in part aiming to improve the ability of local communities to deal with future disasters. It managed to raise P 50.3m for the rehabilitation efforts in the first year alone, exceeding its target of P 50m over three years. These funds were used in a variety of ways, including to support the rehabilitation of the livelihoods of upland and lowland farmers, market vendors and micro-entrepreneurs; to rebuild schools; to rehabilitate water systems, irrigation facilities and basic health services; to rehabilitate food-processing activities; and to locate alternative markets for agricultural produce where normal transport routes had been destroyed. The PBSP also recognised the importance of ensuring that rehabilitation projects took environmental concerns into account in their design.

10.5 Broader economic policy and disasters

As already noted, most government reports and documents, other than those prepared by bodies specifically concerned with natural disasters, have failed to identify disasters as an obstacle to development. Similarly, hazard risk analysis has consistently been omitted from broad economic policy and planning exercises.[88] Thus the Philippine National Physical Framework Plan states that:

[88] According to one commentator interviewed for this study, many NGOs also used to fail to take natural hazard risks into account in their normal development activities, even in poverty alleviation activities. However, there has been a general improvement in disaster awareness since the July 1990 earthquake and NGOs are increasingly recognising hazard management as a major component of their development efforts.

> Disaster preparedness planning and management are inadequately integrated into the overall planning process. The consideration of natural hazards as constraints in development seems to be weak and inadequate both at the national and local levels due to poor implementation of disaster preparedness measures/policies. In most instances, the government appears reactive and not proactive in dealing with hazards faced by the country (Philippine NLUC, 1992: 49).

This point is clearly illustrated by an examination of the content and emphasis of the last three Medium-Term Development Plans:

- The 1983–7 Plan listed a number of problems which the economy would have to tackle over the next five years. These included low agricultural productivity, rural and regional growth disparities and inadequate infrastructural development, all of which are partly a consequence of natural disasters. Yet although the Plan noted the special attention which would have to be accorded to 'depressed areas such as upland and non-irrigated areas' (Philippine Government, 1982: 4) and also to the protection of critical watersheds, there was no direct reference to natural disasters of any kind as an obstacle to the achievement of the three basic national goals. Similarly, the basic strategies and policies of the Plan failed to mention disaster mitigation and prevention other than in the context of maintaining the environmental balance, in part to prevent floods. A separate section on infrastructure called for an extension of the flood-control and drainage programme. An expansion to the crop insurance scheme was also noted (ibid.).

- The 1987–92 Plan placed particular emphasis on the development of the agricultural sector, as part of its broader objectives of increasing employment opportunities and incomes, alleviating poverty and improving the spatial distribution of growth. However, at least in its overview section, it included no mention of the need to reduce the hazard vulnerability of the agricultural sector. Similarly, it failed to include any hazard risk analysis in outlining its targets for regional and sectoral growth, investment and savings, consumption and external transactions, population and employment, social development or poverty reduction. Meanwhile, although strategies and policies were identified to address various problems and challenges, those posed by natural hazards were not considered except in the context of the need for, firstly, more effective assistance schemes for disaster victims, secondly, an expansion of the flood-control programme and thirdly, an intensification of scientific, technological and research activities, technical services and human resources development to further improve the disaster preparedness system. Broader strategies to mitigate the impacts of disasters were ignored.

- The 1993–8 Plan acknowledged the contribution of a succession of natural disasters to the particular economic difficulties experienced by the country in 1991. The role of natural disasters was also acknowledged in terms of preventing the attainment of sectoral goals and targets in social welfare and community development, as regular programmes were later adjusted to respond to particular disaster events; and in terms of reducing the rate of progress in the development of infrastructural facilities. More generally, the Plan also stated that 'the experience of the last six years highlights the need to strengthen the economy's ability to withstand both external and internal shocks and uncertainty' (Philippine Government, 1994: 2.4). Yet the government's macro-economic goals over the period of the Plan included no mention of efforts to help reduce the overall economy's hazard vulnerability. Instead, the only disaster-related measures identified by the Plan dealt with *ex post* issues and very specific, narrowly defined mitigation activities – namely, the need for effective and adequate relief and rehabilitation assistance and preparedness; improvements in the government's capacity to respond to natural disasters and calamities; the promotion of environmental awareness; the strengthening of the crop insurance programme; and the implementation of structural and non-structural flood measures, the latter including zoning regulations and reforestation works. The Plan also called for studies to be undertaken on disaster risk mapping, damage assessment and the socio-economic impact of disasters but not on household vulnerability (Philippine Government, 1994).

Natural disasters are only one of many problems faced by the government in promoting strong, sustainable economic growth. However, their frequency in the Philippines and wide economic consequences would suggest that hazard risks are worthy of greater consideration in the design of government policy. Indeed, reduced hazard vulnerability would help achieve the government's basic objectives over the duration of all three medium-term development plans – namely, sustainable development, increased employment, social equity and poverty alleviation.

The call for greater consideration of natural hazards in overall economic planning in the Philippines is certainly not new. For example, Delica (1994a) identifies a critical need 'to place disaster planning and management high on the country's agenda for development'. She goes on to argue that 'disaster preparedness and response must constitute a major component of development planning and financing. Financial planning for disaster response must be done on a medium- and long-term basis, and not as a knee-jerk reactive response' (p.9). Meanwhile, the NPFP has called for the establishment of a multi-hazard mitigation/protection plan using physical infrastructure and economic systems, taking account of the vulnerability of each element to various risks and aiming to maximise the reduction in the threat to economic production and structures as well as to human life (Philippine NLUC, 1992). The long-term objectives of the NDCC also include the integration of disaster

preparedness and mitigation into socio-economic plans. However, such proposals and goals have yet to be implemented, almost certainly partly because NEDA, the government body with responsibility for economic planning, has yet to recognise the fundamental economic threat posed by natural hazards and the considerable role which it could play in mitigating the realisation of those threats.

11. Disaster insurance

Insurance is not an economic solution to potential disaster losses: it is a mechanism for the transfer of risk (possibly via reinsurance overseas), effectively altering the economic impacts of a disaster but not necessarily eliminating them. However, insurance facilitates the recovery of individual producers and may encourage investment in more hazard-prone areas. Extensive use of insurance also offers an important source of funding for reconstruction, thus reducing the burden on the government. Furthermore, some part of the revenue collected through insurance premiums may justifiably be put into disaster mitigation rather than relief activities to the extent that such investments directly reduce subsequent claims, thus providing an additional source of disaster mitigation and preparedness funding. Such investments may be viewed as a particularly appropriate use of funds if insurance cover is obligatory. The insurance industry also offers a potential mechanism for increasing public awareness about hazard risks and so promoting the adoption of improved building standards and other disaster prevention and mitigation measures, encouraging local authorities to engage in more appropriate land-use decisions, discouraging the development of more disaster-prone areas and, implicitly, stimulating levels of domestic savings.

The Philippine insurance industry is relatively well developed. Although coverage remains fairly limited to date, gross premiums written by private non-life insurance companies increased by an average 8.3% per annum between 1988 and 1993, reflecting more general economic growth (Insurance Commission, 1995). Per capita expenditure on total private insurance reached P 245 per annum (1.2% of per capita GDP) in 1993, while per capita expenditure on private non-life insurance alone totalled P 109 in 1993 and P 94.61 in 1994 (ibid.). The industry was deregulated in 1994 and some foreign companies are now allowed to operate, although certain restrictions remain on the operations of foreign insurers. In 1994 there were 117 domestic and 10 foreign companies, including one foreign and three domestic reinsurers. The activities of the industry are monitored by the Insurance Commission of the Department of Finance. There is a considerable amount of domestic reinsurance whilst some is also placed internationally. Multinationals are allowed to purchase insurance policies overseas, but have no rights under Philippine law in the event of any subsequent disputes over claims.

According to an insurance broker interviewed for this study, approximately 10% of businesses in the formal sector carry adequate disaster insurance whilst a further 30–40% carry some form of disaster insurance. Many multinationals also take out insurance on loss of business as a consequence of natural disasters, an event not covered by standard disruption to business cover. This implies that the impact of natural disasters on private enterprises is at least partly cushioned. With regard to

private household insurance, if a household takes out a loan from any of the state-owned banks it must carry a basic insurance policy. In principle, this stipulation could offer an important mechanism for promoting the uptake of disaster insurance but, unfortunately, basic policies provide no cover against disasters other than fire and lightning. Nevertheless, an estimated 10% of households do carry additional disaster insurance according to the insurance broker interviewed, a relatively high figure given that almost half the population lies below the poverty line. Meanwhile, the government itself relies partly on self-insurance for its own properties, as is the case in many other developed and developing countries, with some of its properties and assets insured on the London market.

It is to be hoped that disaster insurance coverage will increase further in the future, reflecting both increasing per capita incomes and the recent introduction of a differential premium structure. In the past, a uniform minimum premium rate of 0.19% was applied for typhoons and 0.10% for floods. However, in 1994 the country was divided into six zones and a new premium structure introduced, with premiums ranging from 0.15% in Zone I to 1.5% in Zone VI for typhoon cover and from 0.10% in Zone I to 0.60% in Zone II for flood cover, with the additional proviso that flood cover could only be extended in conjunction with typhoon cover (ibid.). This change effectively reduced premiums in lower-risk areas, potentially encouraging uptake rates in these areas. Meanwhile, differential earthquake insurance premiums are based on seismic macrozonation maps, with premiums charged ranging between 0.144 and 0.432% per annum in 1995.

In the longer term, the differential premium structure could also encourage the siting of properties, particularly commercial ones, in less hazard-prone regions reducing the country's overall hazard vulnerability. However, this could produce widening regional disparities,[89] suggesting the possible need for the introduction of premium reductions linked to the adoption of disaster mitigation measures, as, for example, already occurs in Fiji. Currently, disaster insurance is typically issued following only superficial inspection of a property – if any, in the case of private housing – and no such discounts are apparently offered.

In the shorter term, however, growth in the disaster insurance industry seems likely to be relatively limited on the basis of the fact that recent disasters have apparently

---

[89] Changes in the cost of volcanic eruption insurance could also have knock-on implications for insurance in the vicinity of volcanoes. Insurance against volcanic eruptions used to be provided at no extra charge to households and businesses located further than 15 km from the nearest volcano. However, this practice was halted following the Mt Pinatubo eruption and some insurance policies in lahar-vulnerable areas have been cancelled. As of late 1995, it was also extremely difficult to obtain insurance policies for properties or businesses within a 100 km radius of Mt Pinatubo.

generated little increase in coverage. For example, there was no increase in the uptake of earthquake insurance following the July 1990 Luzon earthquake, probably because many households simply cannot afford it. Thus, the insurance industry cannot be expected either to fund the bulk of post-disaster reconstruction costs or to play a major role in encouraging disaster mitigation, at least in the foreseeable future. In fact, some businesses have stopped taking out insurance cover because increasing premiums combined with sometimes high deductibles imply that the returns may be relatively low.[90]

From the supply perspective, the insurance industry attempts to spread the risk of disaster insurance by reinsuring a relatively high proportion of risk with other companies, as already noted. For example, 69% of earthquake, fire and shock and of typhoon, flood and tidal wave risks underwritten in 1993 were ceded either domestically or internationally, compared with 42% of total non-life insurance. Nevertheless, there are fears that the insurance industry would face severe financial stress in the event of a major earthquake, causing greater damage than the 1990 one. Even in 1993, when there was a very high incidence of typhoons but no major geological disasters, losses and claims payable on earthquake, fire and shock and on typhoon, flood and tidal wave policies amounted to 7.4% of total losses and claims payable on all types of direct business insurance compared to only 4.6% of total premiums. Despite the introduction of differential tariffs in 1994, it is therefore clear that the industry needs to continue to monitor the appropriateness of levels of disaster insurance premium charged and to promote disaster-proofing measures as a way of reducing claims. The collapse of the insurance industry in the event of a major disaster would deal a severe blow to the Philippine economy.

Finally, some crop insurance is offered by the government-owned Philippine Crop Insurance Corporation (PCIC). This provides cover against all eventualities including natural disasters, although to date cover is limited to rice and corn whilst only about 10–15% of farmers are insured under the scheme. Insurance payouts are based on standard levels per hectare damaged, with no variations based on regional differences in average yields, although the payout is adjusted to take account of the age of the crop. Meanwhile, premiums are determined by local hazard risks. There has been some discussion of extending the scheme to include other crops. However, the existing one is already underfunded and has had certain difficulties in meeting claims.

---

[90] Deductibles are typically based on the total value insured rather than on the value of individual buildings or plants. Thus if a company owns three buildings only one of which is damaged as a consequence of a natural disaster, the standard 2% deductible will nevertheless be based on the value of the three buildings combined. Deductions on loss of business coverage are also very high. For example, the Benguet Corporation can only make claims in excess of P 1m, implying that it has only claimed against two disasters at least since 1990 – namely, the July 1990 Luzon earthquake and the June 1991 Mt Pinatubo eruption.

Data available for 1981–91 indicate that an average of 29% of rice farmers insured by the PCIC made claims each year, with an average of 35% for the more recent 1986–90 period alone. Such data suggest that high premiums have to be charged to cover the costs of the scheme, particularly when administrative costs are also taken into account. This implies that poorer farmers are unlikely to take advantage of crop insurance schemes, particularly if they are anyhow likely to receive some form of state or private support when crops fail.

12. Donors

Total net external official development assistance (oda) accounted for 1.6% of GNP in the Philippines in 1994, making it an important but not enormously significant source of finance. This paper does not attempt to provide a comprehensive account of multilateral, bilateral and NGO disaster-related assistance. Instead, it merely aims to impart a flavour of this aid, on the premise that donor behaviour is in part an indication of the international community's perception of the physical, economic and social risks posed by natural disasters. The impact of natural disasters on existing development projects is also briefly discussed. In addition, the degree of concessionality of disaster-related assistance is considered because of its enormous relevance in the Philippines, which already carries a sizeable external debt burden.

Donor disaster-related activities have primarily focused on preparedness and response, rather than on prevention and mitigation, measures. Many multilateral and bilateral donors and NGOs have committed funds in support of relief and reconstruction efforts, much of which has been provided to meet immediate humanitarian needs. However, such assistance has also included some funding of measures to mitigate the impact of future hazards, implicitly recognising the need to tackle the root of the problem. For example, the European Community, the Asian Development Bank and the World Bank all attempted to reduce future hazard vulnerability as part of their response to the July 1990 Luzon earthquake.[91] The World Bank loan was also partly aimed at alleviating the balance-of-payments problems faced by the country at the time of the earthquake and which the latter only served to

[91] The World Bank extended a US$125m emergency reconstruction loan to help finance reconstruction of roads and bridges, housing, medical facilities (including buildings and equipment) and irrigation (World Bank, 1990). The project also included the provision of technical assistance for project execution and the implementation of measures to mitigate the impacts of future earthquakes (including the provision of geological and seismological training, in part to begin the development of reliable seismic zonation maps); the procurement of seismological equipment; recommendations on revisions to local building codes and improvements in technical construction expertise in both the private and public sector; improvements to slope cuts along roads and highways; and the stabilisation of slopes with ground cover and reforestation. In addition, the project provided continuous desilting of river systems until gravity supply was restored and comprehensive evaluation of the safety of dams. Up to 20% of the loan was provided as retroactive funding to meet some of the costs already incurred by the government in the initial rehabilitation work. The overall loan was to be implemented over a period of three and a half years and disbursed over four years (World Bank, 1990).

exacerbate.[92] Similarly, Japan extended commodity loans to the Philippine Government to improve the country's balance-of-payments position following both the July 1990 earthquake and the June 1991 eruption of Mt Pinatubo. On occasion, donors have also relaxed conditions on their assistance in the aftermath of a disaster, in recognition of the additional pressures placed on government finance. For example, the ADB earthquake reconstruction loan covered 81% of the costs of the project rather than the normal 60%.

Meanwhile, some development resources have been diverted in the aftermath of a disaster towards relief efforts, particularly where a disaster has hampered normal project activities. For example, following the July 1990 earthquake, vehicles and staff funded under an EC agricultural development project were used to assist in the supply of emergency food supplies and other assistance. Another example involves the diversion of an Australian-supported GIS mapping exercise from an assessment of forests in Central Luzon to that of the likely flow of lahars following the Mt Pinatubo eruption, contributing to the re-siting of several refugee camps away from areas which were subsequently struck by lahars. Uncommitted development funds have also been diverted into relief activities on occasion. Examples include the use of an uncommitted US$5m from an ADB infrastructure loan in support of the relief efforts following Typhoon Uring (November 1991), and the reallocation of US$79m of uncommitted World Bank funds from six existing loans in support of the July 1990 earthquake reconstruction efforts. However, there is little apparent evidence of large scale divergence of development funds into relief activities

In terms of preparedness, several donors have provided assistance to improve technical forecasting capacities and support disaster training efforts. For example, the Japanese Government, the largest single bilateral donor to the Philippines, has funded courses in disaster management as well as seismology and seismic engineering (Philippine NDCC, 1993). It has also extended loans and grants in support of the installation of lahar warning devices, flood forecasting and warning systems, meteorological telecommunications systems development and maritime communications and safety improvement. As another example, the Italian Government has supported the creation of an information centre at the foot of Mt Mayon which has been important in ensuring both a quick response in the event of increased volcanic activity and also in raising the level of hazard awareness in the area. Meanwhile, USAID operates a regional disaster programme providing support in the broader area of prevention, mitigation and preparedness.

---

[92] The loan included finance to help meet the costs of intermediate imports, including construction materials and fuel.

However, to date the USAID programme has largely focused on preparedness. Moreover, with a few notable exceptions,[93] there is relatively little evidence of other donor involvement in disaster prevention and mitigation, other than in the Mt Pinatubo region. More positively, various externally-supported environmental programmes have had indirect disaster prevention and mitigation benefits. Many donors also now include environmental impact assessments in their feasibility studies for some types of project, effectively helping to contain problems of environmental degradation and thus to prevent the increasing incidence of natural hazards (see Chapter 2).

As regards the type of financing of external disaster-related assistance, some rehabilitation and reconstruction activities have been funded by loans rather than grants including the World Bank's US$125bn July 1990 earthquake loan already noted as well as two concessional ADB loans of US$100m and US$37m.[94] Obviously, such loans imply an increase in external indebtedness and thus even higher debt-servicing costs. As argued in Chapter 8, debt-servicing costs put severe pressure on overall government finances and ultimately squeeze levels of spending on capital projects, including possible structural disaster mitigation projects. Indeed, the 1987–92 Medium-Term Development Plan stated that a reduction in the country's debt burden was a necessary, although not sufficient, condition for economic recovery, and called for 'a more stringent review of projects requiring foreign assistance' (Philippine Government, 1986: 47). Disasters effectively create additional external debt pressures to the extent that they also destroy infrastructure and other assets funded with external loans, thus reducing their income-generating capacity. For example, the Japanese Overseas Economic Cooperation Fund (OECF) extended a loan for the construction of rural roads in Northern Luzon which were subsequently damaged by typhoons.[95] In some cases, even disaster mitigation measures have been

---

[93] For example, the Japanese Government has supported some flood control projects and the upgrading of various disaster-prone projects.

[94] The first of these was approved from the ADB's Special Fund resources in response to the July 1990 earthquake to help finance the reconstruction of damaged public infrastructure, including roads, bridges, flood-control facilities, water supply systems, schools and college buildings. The second loan was approved in 1991 in response to the Mt Pinatubo eruption, again drawn from the Special Fund, to support the development of a resettlement site at Clark, farm rehabilitation, the improvement of post-harvest facilities and a farm livelihood programme. The project aimed to help restore social and economic activities and to minimise the disruptive effects of further lahars.

[95] Similarly, in another case the OECF extended a loan in support of a sea-transport project linking two islands by ferry in the mid-1980s but one of the ferry terminals, in Leyte, was later destroyed by a strong typhoon. Following some dispute about responsibility, OECF extended a second loan to finance the reconstruction of the ferry terminal although to

destroyed by subsequent disasters. For example, part of the infrastructure financed under the ADB loan in support of the Mt Pinatubo rehabilitation efforts has subsequently been destroyed by lahars. However, such loans cannot be cancelled.

In view of the government's high debt burden, one idea which some donors might consider in the Philippine context is that of debt for disaster relief swaps. In other words, in the event of a disaster donors could consider writing off part of the Philippine Government's debt rather than providing disaster assistance, thus effectively reducing debt-servicing costs. Reduced non-discretionary payments would not guarantee increased government expenditure on disaster response or prevention and mitigation, particularly since, even if some conditionality was negotiated, government resources are ultimately fungible. However, increased expenditure in other areas could at least potentially contribute to a reduction in disaster vulnerability.

The evidence also points to the need for increased efforts by both donors and governments to ensure that hazard risk analyses are undertaken in the design of projects and appropriate mitigation measures built in. Donors typically assume that the Philippine Government has taken on this responsibility since it will be the government's loss if any damage subsequently occurs. The ADB, for example, does not check this aspect of project design or require the government to ensure that such features are incorporated. Moreover, few donors appear to undertake hazard risk analysis in designing programmes of assistance more generally except in instances where a high risk is clearly apparent, such as that of lahars in the case of projects in the Mt Pinatubo area.[96] However, building on its previous experience in the Philippines, the Japanese Government, at least, has begun to encourage the Philippine Government to include disaster-proofing features, for example, in the design of roads.

higher standards than previously. However, OECF was in no position to cancel part of the first loan.

[96] The ADB Mt Pinatubo rehabilitation loan identified a number of risks in the successful implementation of the project, such as that parts of the farm lands supported by the loan could be affected by future lahars, and that two bridges being reconstructed under the loan were based on limited hydrological and geomorphological data regarding lahar flow conditions.

13. Summary and conclusions

The main findings of the paper are as follows:

- The Philippines experiences all major **types of natural hazard** and is widely acknowledged as one of the most hazard-prone countries in the world. These hazards can be divided into two distinct categories: first, typhoons and floods, both of which occur annually although with varying rates of incidence and severity and, second, more severe hazards with longer return periods such as major earthquakes, volcanic eruptions and droughts.

- **Environmental degradation** is playing a significant role in increasing the incidence of natural hazards. In particular, forest areas are reported to have declined from 17m ha in 1968 to 6m ha by 1990. This has contributed to increased run-off and thus to a higher incidence of flash flooding, landslides and, by disrupting the country's watersheds, droughts. Increased siltation of river deltas, bays and gulfs, together with the destruction of mangroves and other natural breakwaters, has increased the incidence of storm surges. The government has recognised the strong linkages between environmental degradation and the increased incidence of natural hazards and has stepped up efforts to halt environmental degradation. However, public awareness of the links between the two, as well as of appropriate action which individuals can take to redress environmental degradation, is generally poor.

- **Global warming** is expected to increase the frequency and intensity of climatic hazards in the future, with greater rainfall variability resulting in a shorter but heavier rainy season and a longer dry season. Low-lying coastal areas are likely to experience more frequent flooding as a consequence of the rise in sea level.

- Natural disasters result in significant **economic losses** every year. However, there is little apparent appreciation of the economic significance of disasters other than within government bodies and other organisations working directly in the disasters sphere. Only abnormally severe hazard-related disruptions, such as those associated with a series of droughts, earthquakes and volcanic eruptions experienced in the early 1990s, have been considered worthy of comment elsewhere – and even then only after the event. Yet typhoons, a minimum of four of which occur with a near-100% probability every year, have caused annual damage and disruption, possibly inflicting greater economic losses than any other type of disaster in the Philippines over the past 25 years.

- **Measurement difficulties** lie at the heart of the apparent failure to acknowledge the economic significance of all but the most severe natural disasters. The fact that

the country experiences a number of largely localised natural hazards every year makes it intrinsically difficult to isolate their impact because the benefits of a totally disaster-free year cannot be directly measured. Moreover, post-disaster damage assessments often do not even attempt to begin to analyse the potentially significant flow effects of disasters, such as the consequences for the incidence of poverty or public finance. Instead, they largely focus on the cost of direct physical damage alone whilst even these assessments are typically incomplete, only taking into account damage experienced by lower-income groups and sub-sectors which are eligible for government assistance. Yet, despite these deficiencies, data produced as a result of such assessments are commonly aggregated to provide figures on the annual cost of disasters. Thus, the true economic cost is considerably underestimated, making it difficult to demonstrate the major threat they may pose to, for example, poverty alleviation or reduced fiscal deficits or, thus, the case for incorporating disaster-related concerns into sectoral and macroeconomic decision-making and planning.

- The **agricultural sector** is particularly susceptible to tropical cyclones and associated flooding, and also to droughts. In addition, sudden-impact disasters can damage farming equipment and infrastructure, such as drainage and irrigation systems, rice terraces and transport and marketing networks. According to the Philippine Department of Agriculture, at least 2% of total crop production is lost every year as a consequence of natural disasters. The real figure, taking account of the indirect impacts on future as well as current crops and on marketing opportunities, could be significantly higher whilst direct losses are also much greater in years of severe drought. However, although the sector plays a crucial role as a source of both output and employment and there are a variety of ways in which the agricultural impacts of natural disasters can be mitigated (for example, through choice of crops and planting techniques), relatively few such measures appear to have been adopted. Similarly, various agricultural policy documents aimed at improving productivity – a goal which the government views as an essential prerequisite for achieving equitable and sustainable economic growth – have failed to identify natural hazards as a major factor constraining productivity or to highlight opportunities for reducing the sector's hazard vulnerability.

- As the World Bank (1995a) argues, there is a clear need for the integration of the Department of Agriculture's strategy of concentrating on Key Production Areas, which is effectively a top-down approach; the Department of Agrarian Reform's bottom-up approach, focusing primarily on poverty alleviation; and the bottom-up participatory approach of the Department of the Environment and Natural Resources. Such an integration of government programmes could be extremely useful in forcing more careful consideration of natural hazard risks in agricultural policy and strategy design, and should be combined with mapping of the most hazard-vulnerable communities.

- Natural disasters have played some role in determining patterns of **investment**, particularly in discouraging new investment in particular areas in the immediate wake of major disasters. There is some evidence to suggest that more hazard-prone regions of the country face greater difficulties in attracting investors, with possible longer-term implications for inter-provincial inequalities.

- The government has made considerable efforts to minimise the **inflationary impacts** of disasters. Such efforts have extended to the issue of loans to retailers to help restore trade as well as more general monitoring of prices. Disaster-affected communities have also undertaken their own initiatives to minimise any price effects. More generally, reallocation of appropriated government budgetary resources and reliance on external borrowing rather than seigniorage to meet the costs of more substantive disaster relief and rehabilitation programmes have also reduced the inflationary impact of disasters. In consequence, over the past fifteen years only the severe July 1990 Luzon earthquake and a succession of major droughts have been reported to have exerted national inflationary pressure although some temporary localised price increases have undoubtedly occurred.

- Summary data suggest that the **external sector** has been largely immune to disasters. This partly reflects more general measurement problems alluded to above, relating to difficulties in measuring the impact of annually-occurring disasters. However, the fact that the Philippines has been a price-setter for its principal agricultural export, coconut products, has also played a major role. This has implied that coconut revenues have remained relatively stable as temporary declines in domestic yield have resulted in higher international prices. In terms of imports, natural disasters have had the most significant impact on oil imports at least in recent years, as government efforts to reduce oil imports by increasing reliance on hydro-electric power generation have been temporarily disrupted by intermittent droughts.

- Natural disasters have placed a continual, if fluctuating, burden on **government finance** to meet investment and maintenance costs of public prevention, mitigation and preparedness measures and to fund relief and rehabilitation programmes. Non-discretionary expenditure has gradually increased to around 70% of total government spending due to high public wage and debt servicing bills, placing considerable pressure on all categories of discretionary expenditure. The unplanned redirection of resources in response to disasters has then implied only modest success in efforts to improve the efficiency of transportation systems, with knock-on implications for the pace of improvement of rural transport linkages despite their perceived importance in the development of agri-industries and tourism (Philippine NLUC, 1992). Indeed, the National Physical Framework Plan, 1993–2022, lists the damage caused by natural disasters and the consequent

redirection of resources as one of six key issues and concerns for infrastructural development. Similarly, the strain placed on the country's ability to provide sufficient classrooms and other social infrastructure by its rising population has also been reported to have been exacerbated by the damage inflicted by natural disasters.

- Government expenditure on disaster-related activities is provided from a number of budget lines held by various government departments and at various levels of government, making it extremely difficult to quantify the budgetary impacts of disasters. Moreover, government finance for disaster mitigation and preparedness activities is largely contained within the overall budgetary allocations to relevant departments whilst those departments are issued with only loose directives about their disaster prevention and mitigation responsibilities. This makes it impossible to ascertain the total amounts spent on disaster mitigation with any accuracy – a problem with real policy implications to the extent that this lack of transparency dilutes any arguments that increased spending is required. However, readily accessible data on relief and rehabilitation expenditure alone indicated annual spending figures of 1.5 to 3.5% of total national government expenditure and of 3.9 to 8.3% of discretionary expenditure in 1991–4, while the true figures are probably higher. Additional spending in the wake of the July 1990 Luzon earthquake is likely to have pushed total relief and rehabilitation expenditure as a percentage of discretionary spending into double figures in 1991. The early 1990s were somewhat unusual in terms of very high disaster response needs. Nevertheless, the figures demonstrate the enormous drain placed on the economy by natural disasters. Probably reflecting the fact that the high cost of response has squeezed non-disaster related areas of expenditure, disaster prevention and mitigation has been much lower, probably well under 1% of total expenditure.

- This relative balance of expenditure between disaster prevention and mitigation and disaster response is almost certainly inappropriate. It is not proposed that relief and rehabilitation needs should go unmet but, rather, that prevention and mitigation allocations should be increased, so reducing relief and rehabilitation expenditure in the longer term. This proposal is problematic in view of the extremely tight budgetary resources at the disposal of the government. It could imply a rise in total disaster-related spending in the shorter term, before the benefits of improved prevention and mitigation measures are reaped. Nevertheless, further analysis should at least be undertaken to ascertain the relative effectiveness of prevention, mitigation and post-disaster response measures. Funding constraints also imply that some emphasis should be placed on low-cost prevention and mitigation measures, such as simple adjustments in building structures, as well as on major structural undertakings.

- Natural disasters have implications for the relative revenue-raising capacity and pattern of expenditure of different **local government units**. Since 1991, the Philippine Government has been introducing a gradual programme of devolution, including the transfer of responsibility for some taxation and a number of duties directly or indirectly related to disaster prevention, mitigation, preparedness and response away from national government. Local governments are also obliged to set aside 5% of revenue for use in the event of a disaster. Clearly, different local government units (LGUs) therefore face varying disaster-related expenditure demands and revenue-raising capacities depending on the incidence and severity of hazards. Yet these differences are not taken into account in the allocation of national government resources. Ultimately, inequalities in the availability of resources between LGUs arising as a consequence of natural disasters could impinge on the overall standard and level of provision of services and infrastructure in more hazard-prone areas of the country.

- **Poverty**, disaster vulnerability and environmental degradation are integrally linked and natural hazards have played an important role in reinforcing poverty. However, although these relationships have been recognised, those most severely affected by disasters are likely to form some of the poorest segments of the population and poverty remains a persistent large-scale problem in the Philippines, poverty alleviation programmes have paid little attention to hazard vulnerability. Instead, such programmes have typically only mentioned natural disasters in the context of the particular needs of disaster victims *ex post*. Poor housing is typically the most important single cause of hazard vulnerability and poorer households sometimes even lack the resources to restore homes to their previous standard following a disaster whilst rebuilding costs place additional financial strains on households.

- Considerable attention has been paid to **disaster management** in the Philippines. However, as reflected in the relative pattern of expenditure reported above, these efforts have largely concentrated on preparedness and post-disaster response, with fewer prevention and mitigation projects. This appears to reflect both financial constraints, with no separate budget line for disaster prevention and mitigation, and legislative and administrative shortcomings. Mitigation activities are considered the responsibility of the relevant government departments yet there is no directive covering specific duties in this area and no reporting or monitoring procedures to keep track of overall prevention and mitigation activities.

- The government should formulate a comprehensive **disaster mitigation** programme in view of the particularly important and cost-effective role which such measures can play in reducing both the human and economic costs of disasters. This programme should include a functioning reporting system, facilitating the identification of any gaps in overall prevention and mitigation activities, and cover non-structural as well as structural measures. For example, efforts need to be

stepped up to increase public awareness of high-risk areas and to ensure that land-use regulations and building codes are both sufficiently stringent and strictly enforced. More extensive systematic hazard mapping of the Philippines is also required. Since possibilities for disaster mitigation permeate almost every aspect of the economy, individual government departments as well as the private sector and individual households should be encouraged to incorporate mitigation measures into all relevant activities. The dynamic nature of hazard vulnerability, reflecting changing environmental and socio-economic factors, also needs to be recognised and incorporated into vulnerability and hazard assessments.

- Considerable efforts have been made to improve **disaster preparedness** in the Philippines and so reduce both human and economic losses arising as a consequence of natural disasters. However, there is scope for greater public awareness of appropriate actions which should be taken upon receipt of warnings. Warning capabilities could also be further improved.

- Immediate **relief** efforts are usually well organised and effective, drawing on a combination of governmental, Red Cross, NGO and private sector resources as well as considerable self-help initiatives. These efforts extend beyond short-term humanitarian assistance to include rehabilitation measures such as the provision of agricultural seeds and fertiliser as well as infrastructural support, thus helping to restore normal economic activities as rapidly as possible.

- In terms of **broader economic policy**, most government reports and documents, other than those prepared by bodies working specifically in the area of disasters, have consistently failed to identify natural disasters as a more general obstacle to development. Similarly, hazard risk analysis has consistently been omitted from broad economic policy and planning exercises. Natural disasters are only one of many problems faced by the government in promoting strong, sustainable economic growth. However, their frequency and wide economic consequences would suggest that they are worthy of greater consideration in the design of government policy.

- Currently, an estimated 10% of households and 10% of businesses in the formal sector carry adequate **disaster insurance** whilst a further 30–40% of businesses are covered by some form of disaster insurance. It is to be hoped that the extent of coverage will increase further in the future, reflecting both increasing per capita incomes and the recent introduction of a differential premium structure. However, the charging of higher premium rates in more hazard-prone regions could ultimately result in lower investment in these areas, with implications for regional disparities. This suggests the need for the introduction of insurance discounts linked to the adoption of disaster mitigation measures.

- **Donor disaster-related activities** have primarily focused on preparedness and response, rather than on prevention and mitigation, although donor-funded rehabilitation measures have sometimes included elements aimed at reducing vulnerability to future disasters. There is little apparent evidence of large-scale diversion of development funds into relief but some disaster rehabilitation and reconstruction activities have been funded by loans rather than grants, implying an increase in external debt and future debt-servicing costs. Debt-servicing costs place severe pressure on overall government finance, ultimately squeezing levels of spending on capital projects. In view of the government's high debt burden, donors might consider debt for disaster relief swaps.

Devolution has created new challenges. Local government units are now responsible for local disaster mitigation and prevention activities as well as for a range of other activities where disaster-proofing activities can play a crucial role, such as agricultural extension, school building and housing projects and some public works. The promotion of disaster prevention and mitigation measures will therefore require particular efforts on the part of central government in disseminating information about the importance of, and scope for, incorporating disaster prevention and mitigation measures into local government activities and in ensuring that such measures are implemented. Even if a major national mitigation and prevention strategy is drawn up, there is no guarantee that it will be implemented across the country as national government allocations to local government units are unconditional. However, more positively, devolution also offers an important opportunity for local prevention and mitigation initiatives to be better tuned to local risks.

Other factors which could alter the nature of impact of natural hazards in the short to medium term are the current trends towards increased investment in the agricultural sector and the strengthening of agricultural and industrial links.[97] Indeed, the country aims to become an agri-industrial economy by 2000 (Philippine NLUC, 1992). As part of this strategy, various new agricultural commodities are being promoted including a number, such as cut flowers and fresh fruit and vegetables, which are potentially highly vulnerable to natural disasters either directly or indirectly (for example, because they are perishable goods intended for export and thus dependent on a functioning transport system). Yet there is little evidence that natural hazards were considered in the design of this policy and there is therefore a danger that, as it is implemented, the multiplier effects of disasters throughout the economy will

[97] For example, the Medium-Term Development Plan 1993-8 has three basic objectives, one of which is the development of strong and ecologically sound links between agriculture and industry. Similarly, the Philippine Board of Investment is encouraging investment in pioneer projects which increase inter-sectoral linkages and involve substantial use and processing of domestic raw materials.

increase. In other words, the economy could become increasingly vulnerable to natural disasters.

This case study has demonstrated the difficulties of isolating the impacts of natural disasters at the national or even regional level in the Philippines. Nevertheless, natural disasters do have serious economic implications at both the national and local level. These impacts should be explored further through provincial-level studies, which would both avoid some of the methodological difficulties encountered in this study and provide important evidence on appropriate disaster prevention and mitigation measures. Some progress has been made with disaster prevention and mitigation in recent years at least to the extent that such activities are now being discussed. However, efforts still need to be stepped up to ensure greater implementation.

References

ADB (1994) *Climate Change in Asia: Philippines Country Report*. Regional Study on Global Environmental Issues. Manila: Asian Development Bank, July.

ADB (various) *Asian Development Outlook*. Manila: Asian Development Bank.

Alatec-Harris-Tym Group and Angel Lazaro and Associates (1993a) 'Interim Report: Baguio – Volume 1'. Earthquake Rehabilitation Programme, Urban Planning Studies: Baguio and Dagupan. Project reference ALA/PH/9021. Baguio City: September.

Alatec-Harris-Tym Group and Angel Lazaro and Associates (1993b) 'Interim Report: Dagupan – Volume 1'. Earthquake Rehabilitation Programme, Urban Planning Studies: Baguio and Dagupan. Project reference ALA/PH/9021. Baguio City: September.

Alexander, D. (1993) *Natural Disasters*. London: UCL Press.

Amadore, L.A., Medina, D.C., Tabien, M.A., and Fulgueras, A.S. (1985) 'Damage and Casualty due to Typhoon Ike (Nitang, 8411) and Typhoon Agnes (Undang, 8424)'. Paper presented at Joint AMS/PMS International Conference in Applied Meteorology and Climatology, 18–22 March, Manila. Quezon City: Department of Science and Technology, Philippine Atmospheric, Geophysical and Astronomical Services Administration.

Anderson, M.B. (1991) 'Which Costs More: Prevention or Recovery?' in A. Kreimer, and M. Munasinghe (eds), *Managing Natural Disasters and the Environment: Selected Materials from the Colloquium on the Environment and Natural Disasters Management*. Colloquium sponsored by the World Bank, 27–8 June, 1990, Washington, DC. Washington, DC: World Bank.

Anderson, M.B. (1993) 'Lessons in Rehabilitation/Resettlement Efforts: Implications for Mt Pinatubo Assistance Programs', *Philippine Journal of Public Administration* XXXVII (4): 351–74.

ASI (1995) 'Conceptual Framework: Economic Impact of Disaster Project'. Manila: Asian Social Institute, July.

Banzon-Bautista, M.C.R. (1993a) 'Responses to the Challenge of Mt Pinatubo in the First Two Years' in M.C.R. Banzon-Bautista (ed.) *In the Shadow of the Lingering Mt Pinatubo Disaster*. Manila and Amsterdam: University of the Philippines, College of Social Science and Philosophy and University of Amsterdam, Centre for Asian Studies.

Banzon-Bautista, M.C.R. (1993b) 'Disasters in Metropolitan Manila: Preliminary Notes on the Socio-Psychological Preparedness of the Papulation' in DOST-PHIVOLCS (ed.), *Disaster Prevention and Mitigation in Metropolitan Manila Area*. Quezon City: Department of Science and Technology, Philippine Institute of Volcanology and Seismology.

Banzon-Bautista, M.C.R. and Tadem, E.C. (1993) 'Brimstone and Ash: The 1991 Mt Pinatubo Eruption' in M.C.R. Banzon-Bautista (ed.), *In the Shadow of the Lingering Mt Pinatubo Disaster*. Manila and Amsterdam: University of the Philippines, College of Social Science and Philosophy and University of Amsterdam, Centre for Asian Studies.

Bautista, R.M. and Lamberte, M.B. (1990) *Comparative Saving Behaviour of Rural and Urban Households in the Philippines*. Working Paper Series No. 90–15. Manila: Philippine Institute, June.

Benguet Corporation and subsidiaries (various, 1991–4) *Annual Reports*. Manila.

Brillantes, A.B. (1992) 'The Philippines in 1991: Disasters and Decisions', *Asian Survey* XXXII (2): 140–5.

Brown, N., Amadore. L.A. and Torrente, E.C. (1991) 'Philippines Country Study' in ADB, *Disaster Mitigation in Asia and the Pacific*. Manila. Asian Development Bank.

Bull, R. (1992) 'Disaster Economics'. *Disaster Management Training Programme*. First edition. New York and Geneva: United Nations Development Programme and United Nations Disaster Relief Office.

CDRC (1993) 'Debt and the People's Vulnerability to Disasters'. Quezon City: Citizens' Disaster Response Center, February.

CDRC (1994) 'CDRC 1994 Annual Report'. Quezon City: Citizens' Disaster Response Center.

Chardin, J-P. (1996) 'Report on Mission to the Philippines, 10–22 May'. Mimeo. Geneva: International Decade for Natural Disaster Reduction Secretariat.

CNDR (1993) *Corporate Network for Disaster Response – 1992 Annual Report*. Manila: Corporate Network for Disaster Response.

Cola, R M. (1992) 'Households and Communities in a Post-Earthquake Situation: Lessons on Survival and Self-Reliance' in Interagency Committee for Documenting and Establishing Database on the July 1990 Earthquake, *The July 16, 1990 Luzon Earthquake: A Technical Monograph*.

Cruz, W. and Repetto, R. (1992) *The Environmental Effects of Stabilization and Structural Adjustment Programs: The Philippines Case*. Washington, DC: World Resources Institute, September.

Delica, Z. (1991) 'Development Issues and Disaster Response in the Philippines in the 1990s'. Manila: Citizens' Disaster Response Center.

Delica, Z. (1994a) 'Emergency Response in the Philippines: Problems and Prospects'. Manila: Citizens' Disaster Response Center.

Delica, Z. (1994b) 'Disaster Prevention System Against Typhoons, Floods and Lahar in the Philippines'. Manila: Citizens' Disaster Response Center.

EIU (1994) *Philippines Country Profile*. London: Economist Intelligence Unit.

Ernst and Young (1991) 'Booming and Busting'. *Economic Forecast*. Australia: Asia-Pacific Economics Group.

ESCAP (1990) *Urban Flood Loss Prevention and Mitigation*. Water Resources Series No. 68. Bangkok: UN Economic and Social Commission for Asia and the Pacific.

Fernandez, C. and Gordon, J. (1993) 'Natural Disasters and their Human Consequences – Overcoming the Vacuum between Humanitarian Aid and Long Term Rehabilitation' in P.A. Merriman and C.W.A. Browitt (eds), *Natural Disasters: Protecting Vulnerable Communities*. Conference Proceedings. London: Thomas Telford.

Fischer, S. and Easterly, W. (1990) 'The Economics of the Government Budget Constraint'. *The World Bank Research Observer* 5(2): 127–42.

Glantz, M.H. (ed.) (1987) *Drought and Hunger in Africa: Denying Famine a Future*. Cambridge: Cambridge University Press.

Guerrero, L.L.B. (1994) *Attitudes of Filipinos Toward the Environment: The 1993 ISSP Survey*. SWS Occasional Paper. Quezon City: Social Weather Stations, April.

Hall, N. (1996) 'Incorporating Local Level Mitigation Strategies into National and International Disaster Response'. Paper prepared for the Intermediate Technology Seminar on *Mitigating the Millennium*, 9 October, London. Rugby: Intermediate Technology.

Hall, N. and Bellers, R. (1996) 'Coping with Typhoons in the Philippines', *Appropriate Technology* 22(4) March: 21–4.

Hulme, M. (1995) 'Climatic Trends and Drought Risk Analysis in Sub-Saharan Africa'. Norwich: University of East Anglia, Climatic Research Unit.

Ignacio, L.L. and Perlas, A.P. (1994) *From Victims to Survivors: Psychological Intervention in Disaster Management*. Manila: UP-IPPAO.

Insurance Commission (1995) *1994 Annual Report of the Insurance Commission*. Manila: Department of Finance, Republic of the Philippines.

JDI/ECFA/DEVMAN (1993) 'Disaster Management: The Ormoc Experience – Analysis of Survey Results Conducted among Victims of the Flash Flood in Ormoc City'. February.

Jose, A.M. (1990) 'El Nino-Related Drought Events in the Philippines during the Past Decade'. Paper presented at the 1990 Philippine Water Congress and Exhibitions, Baguio Convention Center, 26–28 July. Quezon City: Department of Science and Technology, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA).

Jose, A.M. (1993) 'Climatological Information on Tropical Cyclones in the Philippines'. Quezon City: Department of Science and Technology, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), March.

Llanto, G.M. (1993) *'Agricultural Credit and Banking in the Philippines: Efficiency and Access Issues'*. Working Paper Series No. 93–02. Manila: Philippine Institute for Development Studies, June.

Luce, E. (1996) 'A Race Against Time to Hold Back the Mud', *The Guardian*, London, 31 August.

McBeth, J. (1991) 'Misery to Come', *Far Eastern Economic Review*, 19 September.Nolledo, J.N. (1991) *The 1991 Local Government Code with Basic Features*. Manila: National Book Store, Inc.

NSCB (1995) 'Disaster Information System'. Draft. Report prepared by the Task Force on Disaster Statistics. Manila: National Statistical Coordination Board.

OECD (1994) *Guidelines on Aid and Environment No. 7: Guidelines for Aid Agencies on Disaster Mitigation.* Paris: Development Assistance Committee, Organisation for Economic Co-operation and Development.

Otero, R.C. and Martí, R.Z. (1995) 'The Impacts of Natural Disasters on Developing Economies: Implications for the International Development and Disaster Community' in M. Munasinghe and C. Clarke, (eds) *Disaster Prevention for Sustainable Development: Economic and Policy Issues.* Washington, DC: The International Decade for Natural Disaster Reduction (IDNDR) and the World Bank.

PBSP (1991) 'The Task of Rebuilding: PBSP Earthquake Rehabilitation Program – Year-End Report October 1990 – September 1991'. Manila: Philippine Business for Social Progress.

Philippine BOI (1995) 'Investment Priorities Plan '95'. Manila: Department of Trade and Industry, Board of Investments.

Philippine DA (1992) *Philippine Agricultural Development Plan, 1992–5.* Manila: Department of Agriculture, January.

Philippine DA (no date) *The Medium-Term Agricultural Development Plan, 1993–8.* Manila: Department of Agriculture.

Philippine DBM (1995) *Budget of Expenditure and Sources of Financing Fiscal Year 1995.* Manila: Department of Budget and Management.

Philippine DND (1994) 'The Philippine Disaster Management System'. Quezon City: Department of National Defence, Office of Civil Defence.

Philippine Government (1978) 'Presidential Decree No. 1566 Strengthening the Philippine Disaster Control Capability and Establishing the National Program on Community Disaster Preparedness'. Manila.

Philippine Government (1982) *Five-Year Philippine Development Plan, 1983–7.* Technical Annex. Manila: National Economic Development Authority, May.

Philippine Government (1986) *Medium-Term Philippine Development Plan 1987–92.* Manila: National Economic Development Authority, November.

Philippine Government (1994) *Medium-Term Philippine Development Plan 1993–8.* Manila: National Economic Development Authority, March.

Philippine Government (1995) *Winning the Future: The Social Reform Agenda.* Manila.

Philippine Government (no date) 'International Decade for Natural Disaster Reduction'. Manila.

Philippine NDCC (1989a) 'Consolidation and Evaluation of all Reports on Damages by Typhoons and other Calamities to Prioritize and Facilitate Releases of Funds for Relief and Rehabilitation'. NDCC Memorandum Order No. 2. Quezon City: Office of Civil Defence, National Disaster Coordinating Council.

Philippine NDCC (1989b) 'Policies and Procedures in Requesting, Allocating, Releasing and Monitoring of Calamity Funds'. NDCC Memorandum Order No. 4. Quezon City: Office of Civil Defence, National Disaster Coordinating Council.

Philippine NDCC (1990) 'NDCC Preliminary Report on the July 16, 1990 Earthquake dated August 21, 1990 – Executive Summary'. Disaster Management Course II. Quezon City: Department of National Defence, National Disaster Coordinating Council.

Philippine NDCC (1993) 'The Philippine Disaster Management System'. Quezon City: Department of National Defence, National Disaster Coordinating Council.

Philippine NEDA (1995) *Social Development in the Philippines: Visions, Challenges and Imperatives*. Manila: National Economic Development Authority, March.

Philippine NEDA (no date) 'Economic Impact of Disasters'. Manila: National Economic Development Authority.

Philippine NEDA (various) *Annual Reports*. Manila: National Economic Development Authority.

Philippine NLUC (1992) *National Physical Framework Plan, 1993–2022*. Manila: National Economic and Development Authority, National Land Use Committee.

PHIVOLCS (1991a) 'Mt Pinatubo Wakes from 600 Years Slumber'. Quezon City: Department of Science and Technology, Philippine Institute of Volcanology and Seismology.

PHIVOLCS (1991b) 'Pinatubo Volcano Wakes from Four Century Slumber'. Quezon City: Department of Science and Technology, Philippine Institute of Volcanology and Seismology.

Pineda, A.L. (1993) 'The Philippines: Common Haven of Natural Disasters'. *INCEDE Newsletter*. 2 (3): 1–4. Tokyo: University of Tokyo, Institute of Industrial Science, International Center for Disaster-Mitigation Engineering.

Rantucci, G. (1994) *Geological Disasters in the Philippines: The July 1990 Earthquake and the June 1991 Eruption of Mount Pinatubo – Description, Effects and Lessons Learned*. Report in cooperation with PHIVOLCS. Rome: Italian Ministry of Foreign Affairs, Directorate General for Development Cooperation.

Saldivar-Sali, A. (1992) 'An Earthquake Risk Analysis of Metro Manila from a Foundation Engineering Perspective', *Journal of the Geological Society of the Philippines*, XLVII (1–2): 1–4.

Sandoval, G.A. (1994) 'Public Response to PAGASA Typhoon Warnings: The SWS December 1992 Survey', *Social Weather Bulletin* 94–5. Manila: Social Weather Stations, March.

Subbarao, K., Ahmed, A.U. and Teklu, T. (1996) *Selected Social Safety Net Programs in the Philippines: Targeting, Cost-Effectiveness and Options for Reform*. World Bank Discussion Papers 317. Washington, DC: World Bank.

Tiglao, R. and Tasker, R. (1995) 'Back in Business', *Far Eastern Economic Review*, 14 December.

Torrente, E. (1993) 'Disasters and Development: A Case Study on Disaster Management in the Philippines'. Paper prepared in partial fulfilment of the requirements for the Masters degree in Development Administration. Canberra: Australian National University, National Center for Development Studies, November.

UNDP (1996) *Human Development Report 1996*. New York and Oxford: Oxford University Press.

UNFPA (1991) *Population, Resources and the Environment: the Critical Challenge*. New York: United Nations Fund for Population Activities.

USACE (1994) *Mount Pinatubo Recovery Action Plan Abbreviated Version: Eight River Basins, Republic of the Philippines*. Portland District: US Army Corps of Engineers, July.

Villanueva, T.T. (1995) *Economic Geography of the Philippines*. Quezon City: Phoenix Publishing House.

Victoria, L. (1992) *The Socio-Economic Implications of Typhoon Uring*. Citizens' Disaster Response Center Monograph Series No. 2. Manila: Citizens' Disaster Response Center.

Watkins, K. (1995) 'Shadowland', *The Guardian*, London, 20 December.

Wilhite, D.A. (ed.) (1993) *Drought Assessment, Management and Planning: Theory and Case Studies*. Boston, MA: Kluwer Academic Publishers.

World Bank (1990) 'Memorandum and Recommendation of the President of the International Bank for Reconstruction and Development to the Executive Directors on a Proposed Loan in an Amount Equivalent to US$125 Million to the Republic of the Philippines for an Earthquake Reconstruction Project'. Report No. P-5379-PH. Washington, DC: World Bank, September.

World Bank (1993) *The Philippines: An Opening for Sustained Growth*. Volume II. Report No. 11061-PH. Washington, DC: East Asia and Pacific Region, Country Department I, Country Operations Division, World Bank, April.

World Bank (1994) 'Staff Appraisal Report: Philippines – Subic Bay Freeport Project'. Report no. 12773-PH. Washington, DC: East Asia and Pacific Regional Office, World Bank, May.

World Bank (1995a) *Philippines Public Expenditure Management for Sustained and Equitable Growth*. Volume I. Report No. 14680-PH. Washington, DC: East Asia and Pacific Region, Country Department I, Country Operations Division, World Bank, September.

World Bank (1995b) *Philippines Public Expenditure Management for Sustained and Equitable Growth*. Volume II. Report No. 14680-PH. Washington, DC: East Asia and Pacific Region, Country Department I, Country Operations Division, World Bank, September.

80: Devolution of Management in Public Irrigation Systems - Cost Shedding, Empowerment and Performance – A Review, *Hugh Turral*, 1995, £6.00, ISBN 0 85003 221 0 (Reprinted 1997)
81: Changing Public and Private Roles in Agricultural Service Provision, Diana Carney, 1995, £6.00, ISBN 0 85003 222 9
82: Structural Adjustment and Sustainable Development in Mali: A World Wide Fund for Nature Study, *A.S.Maiga, B. Teme, B.S. Coulibaly, L. Diarra, A.O. Kergna, K.Tigana, with J. Winpenny*, 1995, £6.00, ISBN 0 85003 223 7
83: Structural Adjustment and Sustainable Development in Cameroon: A World Wide Fund for Nature Study, *R.Tchoungui, S. Gartlan, J.A. Mope Simo, F. Sikod, A. Youmbi, M. Ndjatsana, and J. Winpenny*, 1995, £6.00, ISBN 0 85003 224 5
84: Regional Integration in Latin America: is Mercosur a New Approach? *Douglas Zormelo*, 1995, £6.00, ISBN 0 85003 225 3
85: Financial Integration and Development in Sub-Saharan Africa: Informal Finance Sector in Malawi, *C. Chipeta*, 1996, £6.00, ISBN 0 85003 226 1
86: The Formal Financial Sector in Ghana After the Reforms, Ernest Aryeetey, £6.00 ISBN 0 85003 227 X
87: Financial Linkage and Development in Sub-Saharan Africa: the Role of Formal Financial Institutions in Tanzania, *Mboya S.D. Bagachwa*, 1996, £6.00, ISBN 0 85003 228
88: Financial Linkage and Development in Sub-Saharan Africa: the Role of Formal Financial Institutions in Nigeria, *Adedoyin Soyibo*, 1996, £6.00, ISBN 0 85003 229 6
89: Financial Integration and Development in Sub-Saharan Africa: the Formal and Semi-formal Financial Sectors in Malawi, *C. Chipeta and M.L.C. Mkandawire*, 1996, £6.00, ISBN 0 85003 230 X
90: Financial Linkage and Development in Sub-Saharan Africa: the Informal Financial Sector in Nigeria, *Adedoyin Soyibo*, 1996, £6.00, ISBN 0 85003 231 8
91: Planning and Policies on Extensive Livestock Development in Central Asia, *Carol Kerven, John Channon and Roy Behnke*, 1996, £6.00, ISBN 0 85003 238 5
92: Institutional Change within the Forest Sector: Centralised Decentralisation, *Mary Hobley*, 1996, £6.00, ISBN 0 85003 239 3
93: Decentralising Forest Management and Conservation in Central America, *Michael Richards, Guillermo Navarro, Alberto Vargas and Jonathan Davies*, 1996, £6.00, ISBN 0 85003 240 7
94: Conditionality and South-East Asian Adjustment, *Ana Marr*, 1996, £6.00, ISBN 0 85003 242 3
95: Is Aid Conditionality Consistent with National Sovereignty? *Douglas Zormelo*, 1996, £6.00, ISBN 0 85003 244 X
96: Conditionality and the Political Economy of Policy Reform in Latin America, *Ramani Gunatilaka*, 1997, £6.00 ISBN 0 85003 250 4
97: The Economic Impact of Natural Disasters in Fiji, *Charlotte Benson*, 1997, £6.00, ISBN 0 85003 251 2
98: The Economic Impact of Natural Disasters in Vietnam,*Charlotte Benson*, 1997, £6.00, ISBN 0 85003 247 4
99: The Economic Impact of Natural Disasters in The Philippines, *Charlotte Benson*, 1997, £6.00, ISBN 0 85003 248 2
100: Danish Aid Policies for Poverty Reduction, *Lars Udsholt* (Centre for Development Research, Copenhagen), 1997, £6.00, ISBN 0 85003 249 0
101: German Aid Policies for Poverty Reduction, *Eva Weidnitzer* (German Development Institute, Berlin), 1997, £6.00, ISBN 0 85003 391 8

Overseas Development Institute
Portland House
Stag Place
London SW1E 5DP
UK

Telephone +44 (0)171 393 1600
Fax +44 (0)171 393 1699
Email: publications@odi.org.uk
Website: www.oneworld.org/odi/

£6.00