Eruption of Mount Pinatubo in the Philippines in June 1991

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The Pinatubo eruption of June 1991: The nature and impact of the disaster

Nature of the disaster

Reawakened after more than 500 years of slumber, Mount Pinatubo in the island of Luzon in the Philippines showed signs of imminent eruption early April 1991. On 12 June 1991 (Philippine Independence Day), its intermittent eruptions began. Three days after, on 15 June 1991, its most powerful eruption happened. Mount Pinatubo ejected massive volcanic materials of more than one cubic mile and created an enormous cloud of volcanic ash that rose as high as 22 miles into the air and grew to more than 300 miles across, turning day into night over Central Luzon. At lower altitude, the ash was blown in all direction by intense winds of a coincidental typhoon. At higher altitudes, the ash was blown southwestward. Volcanic ash and frothy pebbles blanketed the countryside. Fine ash fell as far as the Indian Ocean and satellites tracked the ash clouds several times around the globe. Nearly 20 million tons of sulfur dioxide were injected into the stratosphere and dispersed around the world causing global temperature to drop temporarily by 1*F from 1991 through 1993. Mount Pinatubo's eruption was considered the largest volcanic eruption of the century to affect a densely populated area.

After the explosive eruptions, posing a more serious and lingering threat to life, property and environment were the onslaught of lahars. Within hours after the eruption, heavy rains began to wash deposits of volcanic ash and debris from the slopes down into the surrounding lowlands in giant, fast-moving mudflows. Containing 40% (by weight) volcanic ash and rock, lahars flow faster than clear-water streams. These steaming mudflows cascade as fast as 40 miles per hour and can travel more than 50 miles. With 90% volcanic debris, lahars move fastest and are most destructive. When they reach the lowlands, they have speeds of more than 20 miles per hour and are as much as 30 feet thick and 300 feet wide. They can transport more than 35,000 cubic feet of debris and mud per second.

For years, lahars continued to flow down the major river systems around the volcano and out into densely populated, adjoining lowlands. They destroyed and buried everything along their path: people and animals, farm and forest lands, bridges and natural waterways, houses and cars. They also rampage with terrifying rumbling sounds. By 1997, lahars had deposited more than 0.7 cubic miles (about 300 million dump-truck loads) of debris onto the lowlands, burying hundreds of square miles of land and causing greater destruction than

the eruption itself. With the volume of volcanic debris deposited on the slopes of Mt. Pinatubo, the threat of lahars is expected to continue until year 2010.

The disaster brought about by the eruption of Mount Pinatubo had assumed a unique nature in view of the following: the widespread devastation that impacts on society and economy, the continuing threat of lahars and flooding, the destruction of endemic species of flora and fauna, the alteration of landscapes and land uses, and its impact on the global environment.

Extent of damage and socio-economic impact

The Mount Pinatubo eruptions and their aftereffects, particularly lahars during rainy seasons, not only have taken the lives of many but also have wrought havoc to the infrastructure and to economic activities of Central Luzon. Damage to crops, infrastructure, and personal property totaled at least P10.1 billion ($US 374 million) in 1991, and an additional P1.9 billion ($US 69 million) in 1992. In addition, an estimated P454 million ($US 17 million) of business was foregone in 1991, and an additional P37 million ($US 1.4 million) in 1992. Lahars continue to threaten lives and property in many towns in the provinces of Tarlac, Pampanga, and Zambales.

The actual destruction, coupled with the continuing threat of lahars and ash fall, had disrupted the otherwise flourishing economy of Central Luzon, slowing the region's growth momentum and altering key development activities and priorities. Major resources had been diverted to relief, recovery, and prevention of further damage.

The cost of caring for evacuees, including construction of evacuation camps and relocation centers, was at least P2.5 billion ($US 93 million) in 1991-1992, and an additional P4.2 billion ($US 154 million) was spent during the same period on dikes and dams to control lahars.

The longevity and impact of the calamity is so great that the public and private response must go beyond traditional relief and recovery. Return to pre-eruption conditions is impossible. Instead, responses must create an attractive climate for new investments, provide new livelihood and employment alternatives, promote growth in areas that are safe from future lahars and flooding, and provide an infrastructure that is tough enough to survive future disasters.

Areas and populations affected

During the eruption of 15 June 1991, heavy ash falls had caused widespread damage in the provinces adjacent to Mount Pinatubo, as they covered large tracts of land and caused the roofs of houses, buildings and public facilities to collapse. These provinces were Zambales, Pampanga and Tarlac.

The regional office of the Department of Social Welfare and Development (DSWD) had reported a total of 657 persons dead, 184 injured and 23 missing as of 29 September 1991. The casualties were mostly victims of collapsing structures, drowning due to flooding, and diseases in the evacuation center. The provinces of Zambales and Pampanga accounted for most of the victims.

Moreover, from June 1991 to November 1992, the means of livelihood, houses, or both were partially or wholly lost in 364 barangays or villages. Per 1990 census, about 329,000 families (2.1 million people) or one-third of the region's population lived in these villages.

Table 1. Total number of barangays affected as of November 17, 1992 (National Disaster Coordinating Council, 1992). ["Affected" refers to a situation where means of livelihood, houses, or both are lost or partially or completely destroyed]

Province	Affected barangays	No. of families
Zambales	96	30,115
Pampanga	173	239,131
Tarlac	88	44,367
Angeles City	5	14,197
Nueva Ecija	2	1,331
Total	364	329,141

In 1991, 4,979 houses were totally destroyed and 70,257 houses were partially damaged. The number decreased in 1992, when 3,281 houses were wholly destroyed and 3,137 units were partially damaged (Table 2).

Table 2. Total number of houses damaged (National Disaster Coordinating Council, 1992; Presidential Task Force on Mount Pinatubo, 1992; Department of Social Welfare and Development, unpublished data, 1992). [Partial damage refers to any degree of physical destruction attributed to the disaster. Total destruction is the condition when the house is no longer livable]

Extent of damage	1991	1992	Total
Totally destroyed houses	4,979	3,281	8,260
Partially damaged houses	70,257	3,137	73,394
Total	75,236	6,418	81,654

Of the 329,000 families (2.1 million persons) affected, 7,840 families (35,120 persons) were of the Aeta cultural minority (Office for Northern Cultural Communities, unpub. data, August 14, 1991). Although constituting less than 2 percent of the total affected population, these cultural minorities had received significant attention.

Impact on natural resources

Moreover, the eruption had caused massive damage to natural resources. It had buried about 18,000 hectares of forest land in ash falls of about 25 centimeters. The series of heavy rains following the eruption had induced lahars to flow down to some 8,968 hectares of low-lying areas. At least eight major river systems have been clogged up by lahar, namely Balin-Baquero Bacao, Santo Tomas, Gumain, Porac, Pasig-Potrero, Abacan, Bamban and Tarlac Rivers.

Reforestation activities had been seriously setback in the mountain range of Zambales. About 19,799 hectares of new plantations were destroyed ash falls and some P125 million worth of seedlings were lost. Damage to natural forest covers and old plantations extended to around 43,801 hectares. About 10,206 hectares of agro-forestry farms under the Integrated Social Forestry Program of the Department of Natural Resources had been destroyed.

Impact on agriculture

Agricultural land area seriously affected by the ash fall reached some 96,200 hectares. Damage to crops, livestock and fisheries was valued at P1.4 billion. As of 17 November 1992, damage from s, flooding, and salutation was reported to be P1.4 billion, with crops and fisheries as most affected.

Table 3. Existing damage to agricultural commodities (in million pesos; Department of Agriculture, Region III, unpub. data, 1991; National Disaster Coordinating Council, 1992). [Damage cost = total area damaged x expected yield per hectare. Expected yield is computed by referring to pre-calamity yield. Post-calamity yield is derived by referring to pre-calamity yield and subjecting the damaged crops to recovery chances/percentages. The value of the crops with negative chances/percentages is derived by multiplying them by the prevailing market prices of the crops. This value then becomes the damage cost.]

Commodity	1991	1992	Total
Crops (hectares)	987.2	546.8	1,534.0
Livestock (heads)	203.2	9.8	213.0
Fisheries (hectares)	284.1	164.9	449.0
Sugarcane (hectares)		56.9	56.9
Total	1,474.5	778.4	2,252.9

Impact on trade and industry

The trade and industry sector was also severely affected, especially the manufacturing and exporting sub-sectors, affecting 599 firms with total assets of P851 million. Foregone production losses were reported at 45% of potential sales for the year 1991 or P454 million while capital investments of the 306 affected firms surveyed destroyed stood at a total of P425 million. The hardest hit in the manufacturing sub-sector was the furniture industry with a total of P156.5 million in estimated damage with 108 firms affected.

Impact on social services

Health. Morbidity and mortality rates increased mainly in evacuation centers. The leading diseases were acute respiratory infections (ARI), diarrhea, and measles (Department of Health, unpublished data, 1991). The death rate (Aetas and lowlanders combined) was 7 per 10,000 per week during 1991; that for Aetas in 1991 reached as high as 26 per 10,000 per week, and averaged 16 per 10,000 per week (Department of Health, 1992), and was especially high among Aeta children.

Social welfare. -The continuing threat of s had required that relief - food, clothing, shelter, and other help - be provided far beyond the period that is normal for typhoons and other calamities. As of October 28, 1993, approximately 1,309,000 people were being served outside evacuation centers. As of the same date, 159 evacuation centers were being maintained by the Department of Social Welfare and Development (DSWD) throughout Region III, housing some 11,455 families or 54,880 persons and providing them with food-for-work or cash-for-work assistance.

Education. About 700 school buildings with 4,700 classrooms were destroyed displacing an estimated 236,700 pupils and 7,009 teachers. Damage to school buildings was estimated to be P747 million as of August 1991 an amount that is growing with continuing lahar activity. Disruption of schooling was compounded by the use of undamaged school buildings as evacuation centers, which forced delays in the opening of classes and caused other disruptions of the school calendar. Initial damage to instructional materials, furniture, equipment, and other school supplies was estimated at P93 million pesos (Department of Education, Culture, and Sports, unpublished data, 1991).

Table 4. Estimated cost of damage to school buildings by province or city as of August 12, 1991 (National Disaster Coordinating Council, 1992; Presidential Task Force on Mount Pinatubo, 1992; Department of Education, Culture, and Sports, Region III, unpublished data, 1991). [Ash fall is the major cause for this type of damage]

Province/City	Cost (x1000Pesos)
Zambales	410,000
Bataan	34,000
Olongapo City	140,000
Pampanga	130,000
Tarlac	13,000
Angeles City	12,000
Bulacan	5,050
Nueva Ecija	3,200
Total	747,250

Impact on public infrastructure

In its damage assessment report as of August 23, 1991, the Department of Public Works and Highways (DPWH) Regional Office III estimated damage to public infrastructure amounting to P3.8 billion. The gravest destruction was on irrigation and flood control systems, roads and bridges, and school buildings. Additional damage of at least 1 billion pesos was done to roads and bridges by lahars of 1992 (National Disaster Coordinating Council, 1992).

Table 5. Total cost of damage to infrastructure as of August 23, 1991 (National Disaster Coordinating Council, 1992; Presidential Task Force on Mount Pinatubo, 1992; Department of Public Works and Highways, Region III, unpub. data, 1991). [The prevailing foreign exchange rate during this period was $1 = 27.07 pesos]

Infrastructure subsector/Facility	Damage Cost (x1000Pesos)
Transportation	1,149,908
Communication	13,215
Power and electrification	54,918
Water resources	1,568,642
Social infrastructure	1,045,708
Total	3,832,391

Overall impact on sectors

As a whole, damage and production losses resulting from the eruption and subsequent lahars were about P10.5 billion in 1991 and P1.9 billion in 1992. These values include only damage and losses that were readily quantifiable. Additional losses, not included in these estimates, include human life, social fabric of communities, children's schooling, and other social aspects.

Table 6. Existing sectoral damage and production losses, 1991-92 (in millions of pesos) (National Disaster Coordinating Council, 1992; Presidential Task Force on Mount Pinatubo, 1992; National Economic Development Authority, unpublished data, 1991, 1992).

Sector	1991	1992	Total 1991-92
Public infrastructure	3,830	454	4,284
Agriculture	1,474	1,422	2,896
Military facilities	3,842	0	3,842
Trade and industry	851	0	851
Natural resources	125	0	125
Foregone income (trade and industry).	454	37	491
Total	10,576	1,913	12,489

Overview of the disaster management by the Philippine Government

Laws, policies and organization

In view of the magnitude and socio-economic impact of the eruption of Mount Pinatubo, the Philippine Government had initiated and ensured an organized and integrated response to the calamity and the ensuing crises. In particular, the Philippine Congress and the Office of the President had passed and promulgated a series of laws and regulations that governed the country's comprehensive response. The relief, recovery, rehabilitation and reconstruction efforts by the government, including those supported by donor governments, nongovernmental and international organizations, were coordinated and implemented within the overall disaster management plan and development strategy pursued by the government.

On 26 June 1991, President Corazon C. Aquino, through Memorandum Order No. 369, had created the *Presidential Task Force on the Rehabilitation of Areas Affected by the Eruption of Mount Pinatubo* or Task Force Mt. Pinatubo. It was mandated to guide and coordinate all rehabilitation efforts of the government, including those participated in by the private sector and the international community. After a year, the *Mount Pinatubo Assistance, Resettlement and Development Commission* succeeded the Task Force by virtue of a law, Republic Act 7637, passed by the Philippine Congress and signed by President Fidel V. Ramos on 24 September 1992. With a term of six years, the Commission was mandated, among others, to formulate policies and plans, to coordinate the implementation of programs and projects, and to administer the initial 10-billion peso fund appropriated for the "aid, relief, resettlement, rehabilitation and livelihood services as well as infrastructure support for the victims." Specifically, the Commission was tasked to (1) provide additional funds for the immediate relief of victims, (2) establish resettlement centers and home sites, (3) provide livelihood and employment opportunities, (4) repair, reconstruct or replace infrastructure damaged or destroyed, and (5) construct new infrastructure facilities needed by the affected communities. In pursuit of these tasks, the Commission, through relevant government agencies, implemented projects and activities on four major program areas: resettlement, livelihood, social services and infrastructure. Pursuant to law, President Ramos extended the term of the Commission to December 2000 by virtue of Presidential Proclamation 1201 issued on 19 March 1998.

The Commission pursued a comprehensive program that aimed to alleviate the sufferings of the victims, to protect them from further destruction, to help them rebuild their homes, and to gain a means of livelihood. In view of the limited term of the Commission and the necessity to sustain rehabilitation and development efforts, all government agencies concerned with the implementation of related works had been directed to include in their respective annual budget the necessary funding requirements (National Budget

Memorandum Circular 74). This ensured the continuity and sustainability of critical rehabilitation programs beyond the Commission's extended term. Moreover, as early as 1996, government agencies and local government units concerned had began integrating into their regular programs the delivery of basic social services to the affected communities, including school, health and welfare services. Similarly, the Department of Public Works and Highways had assumed the implementation, monitoring and improvement of engineering intervention works and lahar mitigation activities since 1997.

Before the Commission expired, President Joseph E. Estrada transferred its chairmanship to the Department of Budget and Management (DBM) and directed the preparation of a winding up program (Executive Order No. 269 issued on 19 July 2000). Upon her assumption to office in 2001, President Gloria Macapagal-Arroyo issued a series of directives to ensure the continuity, integration and sustainability of the Commission's work. Executive Order No. 4, issued on 5 March 2001, created an ad hoc body to complete the wind up activities of the Commission. Executive Order No. 5, issued on 5 March 2001, transferred the administration of upland Pinatubo resettlement communities from the Commission to the concerned local government units. Executive Order No. 6, issued on 20 March 2001, transferred 14 existing lowland Pinatubo resettlement sites under the supervision of the Housing and Urban Development Coordinating Council (HUDCC). Also, it created under the Council the Pinatubo Project Management Office (PPMO) to manage the resettlement areas. Eventually, under Executive Order No. 54, the PMMO assumed the assets, records, funds, personnel, liabilities and all related functions, tasks and responsibilities from the defunct Commission.

Disaster response

Early warning and evacuation

Evacuation of the population at risk had been the concern of local authorities as early as April 1991 when the Philippine Institute of Volcanology and Seismology (PHIVOLCS) declared a 6-mile-radius danger zone around the volcano. PHIVOLCS, jointly with the U.S. Geological Survey (USGS), had conducted intensive studies and monitoring of the volcano's activity from which it forecast and declared an imminent eruption and issued early warnings to the communities at risk. Among the first to have evacuated were the indigenous Aeta highlanders who had lived on the slopes of the volcano. About 20,000 in population, the Aetas had been safely evacuated before the eruption. People from the lowlands heeded also the warnings and fled to safer distance from the volcano. Also, more than 15,000 American servicemen and their dependents had evacuated from Clark Air Base before the eruption.

Immediate response

In the immediate aftermath of the eruption, the National Disaster Coordinating Council mobilized civilian and military resources to respond to the evacuation, rescue and relief requirements of the affected populations. Government agencies mobilized their respective facilities (hospitals, schools, etc.) and personnel (medical, social workers, teachers, etc.) to provide the necessary basic services in designated evacuation centers. The Department of Social Welfare and Development was in the forefront of providing emergency relief assistance to displaced families and victims in evacuation centers. The Department of Health led in the provision of medical care and public health services at evacuation centers, including disease surveillance. Heath advisories were also issued and broadcast to guide the public in coping with the ashfall as health hazard since the fine volcanic particles could cause sore eyes or trigger asthma.

Later on, a host of countries extended humanitarian relief assistance to the Philippine Government and its support NGOs, including the Philippine National Red Cross. These countries included Australia, Belgium, Canada, China, Denmark, France, Finland, Germany, India, Indonesia, Italy, Japan, Malaysia, Malta, Myanmar, Netherlands, New Zealand, Norway, Saudi Arabia, Singapore, South Korea, Spain, Sweden, Taiwan, Thailand, U.K., and U.S.A. International organizations such as WHO, UNDP, UNICEF, UNDRO and WFP also extended humanitarian relief assistance. The relief assistance was in the form of cash donations or relief items such as food packs, medicines, and shelter materials.

Recovery and reconstruction plan

Development planning concerns

The government's recovery and rehabilitation plan was guided by a development principle that rehabilitation and reconstruction should not be limited to restoration of destroyed or damages areas, facilities and systems to their original conditions but should address the vulnerabilities and deficiencies of previously existing conditions and mitigate any future disaster impact.

With the magnitude and extent of the destruction wrought by the eruption, development planners and policy-makers were confronted by the following concerns, which required immediate action as well as long-term solutions.

1) Resettlement. There was need to resettle people whose places of residence had been devastated and were beyond immediate reconstruction or had been damaged or affected and deemed unsafe for habitation. There were two target beneficiaries for resettlement: the indigenous Aeta highlanders and the displaced lowlanders. The resettlement strategy for the two groups had to differ to consider the variation in socio-cultural orientation and socio-economic activities of the Aetas and the lowlanders.

2) Livelihood. Government had to address the pressing concern of providing immediate and long-term, livelihood opportunities to displaced farmers and workers. Many farmlands had been unsuitable for agriculture and caused disruption of production of agriculture-based industries. The closure of Clark Air Base also presented the need for short-gestating livelihood opportunities and for alternative uses of base lands to cushion the effect of the massive displacement of workers.

3) Social Services. The continuing nature of the calamity had put pressure on social services sector to provide continued social services in terms of health, social welfare and education. Health and psycho-social services had to be extended to victims both in and outside the evacuation centers. The immediate opening of the classes and the extension of the school calendar had to be considered by the government at the same time that it was providing relief services to evacuees in school facilities. Social services would have to be extended in resettlement areas in order to prepare the resettlers for final resettlement.

4) Infrastructure. The eruption had caused massive destruction to the region's roads and bridges, public buildings and facilities, communication, utilities and river and flood control structures. There was also need to institute disaster mitigation measures in view of the continuing threat of lahars and flashfloods.

5) Land use and environmental management. The effects of the eruption, especially lahar, continue to destroy farmlands, forest lands and watersheds and had caused damages to the river systems and overall environment of the region. This required careful physical land use re-planning of the region.

6) Science and Technology. The need to undertake scientific studies and formulate corresponding studies and policies was an evident concern and challenge for science and technology. The development of alternative uses of ash fall for commercial or industrial was an important concern for both government and the private sector.

In response to the above-mentioned concerns, the government vigorously pursued the following specific development objectives:

- To mitigate further the destruction brought about by the adverse effects of the eruption, especially the lahars;
- To normalize and accelerate economic recovery including the creation of an alternative investment climate;
- To provide adequate livelihood and employment alternatives, especially for displaced farmers and workers;
- To promote growth and development in resettlement and new settlement areas serving as alternatives to permanently damaged/ high-risk areas;
- To ensure the continuous flow of goods and services, especially during relief operations when calamity strikes (lahars had made many areas inaccessible);
- To strengthen institutional structures, arrangements, and mechanisms for disaster preparedness/ responsiveness and raise public awareness on disaster mitigation and reduction;
- To reduce susceptibility of vertical and horizontal infrastructures to damages due to lahars and other disasters; and
- To prevent further degradation of the environment and rehabilitate damaged ecosystems.

Development strategy

As key feature of its development strategy, the government adopted team work or “kabisig” in the pursuit of rehabilitation and reconstruction programs and projects. As an overall approach, the government emphasized cooperation and coordination among national and local government agencies, private sector, including NGOs and the victims themselves to prevent duplication of efforts. The government also ensured that these programs and projects were consistent with the broader regional development framework. The overall spatial development strategy for Central Luzon envisioned the region as the transit lane between the resource-based areas of the Northern Luzon and the highly populated and industrialized areas of the National capital region. As such the region shall continue to serve as the catchment area for population and industry spillover from Metro Manila and assume the provide the requirements of the

Northern Luzon provinces in terms of processing and manufacturing of goods and their distribution.

Moreover, the government developed specific strategies, programs and projects that address the concerns earlier mentioned, i.e. in areas of resettlement, livelihood, social services, infrastructure, science and technology, and land use and environmental management. These were made in consultation with local government officials, community leaders and the beneficiaries themselves.

Programs and projects

In accordance with the development strategy, the government established programs for the following:

- Resettlements for the Aetas highlanders (P349 million) and the lowlanders (P1.689 billion).
- Livelihood programs focused on agriculture and industry, providing quick-generating income opportunities to affected families: Bamboo Development Project (P80 million), Agricultural Rehabilitation Program (P197.4 million); Agricultural Development Program ((P615 million); Productivity Centers (P1.12 billion), Integrated Cattle Fattening program ((P120 million), Integrated Poultry Livelihood Program ((P40 million), Deep Sea Fishing ((P58 million), Financing Programs (P3.718 billion), Common Service Facilities (P50 million).
- Delivery of basic social services: relief services (P370.5 million), health and nutrition service ((P367 million).
- Infrastructure rehabilitation and reconstruction: River Systems Rehabilitation and Improvement Project (P2.9 billion), Reconstruction and Rehabilitation of Roads and Bridges (P1.5 billion), Development of Alternate Routes in Capas-Botolan Road (P537 million) San Fernando-Dinalupihan Road (P1.4 billion), and in Angeles-Porac-Floridablanca-Dinalupihan Road ((P169 million), Rehabilitation of Damaged Schools and Public Buildings (P982 million), Mobile Health Facilities (P40 million), Repair and Rehabilitation of Damaged National and Communal Irrigation Systems (P228.6 million), Rehabilitation of Railway Facilities (P70 million).

With the assumption by the national government agencies of certain programs and projects, the National Disaster Coordinating Council and the National Economic Development Authority are currently consolidating and assessing the status, outcome and impact of critical rehabilitation and reconstruction programs and projects.

In general, the government had acted in dispatch in implementing rehabilitation and reconstruction programs and projects, including the construction of infrastructures for lahar and flood mitigation. For example, for the protection and rehabilitation of lahar-threatened areas in Central Luzon, the DEPWH had completed in just four (4) months the construction of the 24-kilometer Pasig-

Potrero Outer Dike or “Megadike”in Bacolor, Pampanga. The megadike served as a defense of the vulnerable areas against rampaging lahars during the 1996 rainy season.

Moreover, the participation and support of the private sector, including the NGOs, had hastened and enhanced the delivery of basic services to the affected populations and had ensured that the necessary services, where ever and whenever government was seen to be deficient, were present and responsive to the needs of victims.

Significance of international assistance

With the magnitude of rehabilitation and reconstruction needs in Central Luzon, the government was able to pursue its recovery and rehabilitation plan more efficiently and effectively with the support and assistance of other governments and international funding institutions.

Most of the foreign assistance for rehabilitation and reconstruction came in the form of grants, loans, and technical assistance packages. Among the countries that had extended assistance included Australia, Canada, France, Germany, Israel, Japan, Netherlands, United Kingdom and U.S.A. World Bank and Asian Development Bank had also extended support and loan facilities.

Some specific projects under the auspices of the DPWH, which were made possible by foreign assistance, included:

- ADB-funded Mt. Pinatubo Damage Rehabilitation Project
- German Bank for Reconstruction-funded Mt. Pinatubo Emergency Aide Project
- Japan International Cooperation Agency (JICA)-funded Mt. Pinatubo Relief and Rehab Project
- USAID-funded United States Army Corps of Engineers' Mt. Pinatubo Recovery Action
- Dutch-funded dredging of the Pasac- Guagua-San Fernando Waterway
- Overseas Economic Cooperation Fund (OECF)-funded Pinatubo Hazard Urgent Mitigation Project
- German Centrum for International Migration (CIM)-funded Technical Assistance for Mount Pinatubo Emergency-PMO
- JICA-funded Grant Aid for Water Supply in Mt. Pinatubo Resettlement Areas and Study on Flood and Mudflow control for Sacobia-Bamban/Abacan Rivers
- IBRD-funded Technical Assistance for Mt. Pinatubo and Rehabilitation Works
- Swiss Disaster Relief-funded Technical Assistance for Mt. Pinatubo Rehabilitation
- JBIC Yen Loan Package-funded Pinatubo hazard Urgent Mitigation Project

Based on the Philippine experience in responding to and coping with the impact and lingering effects of the eruption of Mount Pinatubo, inter-agency coordination and multi-sectoral and multilateral cooperation are vital in achieving short-term and long-term goals for recovery, rehabilitation and reconstruction. With the accomplishment of urgent development projects, the affected communities were able to recover quickly from the disasters and government was able to institute necessary disaster mitigation measures.

The application and use of good practices and experiences made available through technical assistance extended by other governments and international organizations facilitated the development and implementation of critical development programs and projects and the early recovery and rehabilitation of the affected areas.

Promoting cooperation and coordination of international assistance

In view of the beneficial impact of international assistance on recovery and rehabilitation, the promotion of cooperation and coordination in this area is worthwhile if not an imperative to ensure early recovery from disasters. Disaster-stricken countries or communities should have ready access to international assistance, or, at least, to bodies of information on best practices on recovery and rehabilitation. This access could be established and realized if there is an efficient and effective mechanism for sharing information and coordinating or facilitating international assistance. An efficient information system on local damage and needs and the available external resources, including funds and expertise, plays a critical role in the coordination or facilitation of any international assistance.

Moreover, on one hand, the national or local disaster coordinating body or focal point agency is a critical enabling mechanism whose initiative and involvement in accessing, securing and availing an international assistance has to be ensured. On the other hand, international bodies or organizations that may assume the role of facilitator or coordinator in matching local appeals with external assistance should possess an efficient system for information sharing and communication among the national and local focal points and the potential donors in the international community.

However, while its significance in ensuring early recovery and rehabilitation is appreciated, the establishment of a truly efficient and effective coordinating body or organizational function at the international level may only be achieved through a process of consultation and consensus-building (especially on procedures and protocols) among the critical stakeholders, including governments (decision-makers), national focal points, donor agencies, international organizations, and nongovernmental organizations.

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