CONCLUSIONS AND LESSONS LEARNED

The methodology developed by DHA, which incorporates the former UNDRO, was followed in formulating and executing the project, starting with a clear definition of the objectives. Peru faces huge and complex safety problems as a result of the potential for extreme natural phenomena, so that priorities had to be established for the geographical area and the risks to be considered.

The southern coast of Peru was chosen as the area of study, because a number of seismologists of various nationalities agreed on the existence there and in northern Chile of a zone of long-term seismic inactivity.

In formulating the project, five steps in the disaster prevention and mitigation methodology were considered:

- Evaluation of the principal hazards.
- Calculation of the risks entailed by those phenomena.
- Design and implementation of disaster prevention and mitigation strategies.
- Preparation of emergency plans.
- Public information.

The principal hazards identified in south-western Peru are earthquakes, tsunamis and volcanic activity, as reflected in the study topics of the PMDP's first two fields of action.

Estimates were made in respect of expected seismic intensities in the major places of interest, tsunami flood zones, arrival times of the first wave and the threat to Arequipa from the El Misti volcano.

Having been weakened by inland earthquakes in recent decades, adobe structures in the main cities of the region considered, and especially in the mountains of Arequipa, are at greatest risk.

The areas most at risk from tsunamis are the port of Ilo, where a hospital, several educational centres, and numerous inhabited dwellings and Boca del Río in Tacna are located in the flood zone. Mollendo and Islay are on high ground, as to some extent is Chala; accordingly their population would not be affected, although the harbour facilities in Matarani could be. The threat from the El Misti volcano concerns the north-eastern zone of the city of Arequipa and the ravines descending from the peak.

Microzonation studies of Arequipa and Tacna have been conducted under the PMDP. Moquegua had been the subject of an earlier study. Sufficient data are therefore available to ensure the safe and orderly growth of the largest cities in the region on the basis of land use plans. Data concerning the effects of tsunamis in ports and probable intensities in population centres are included in the results of simplified microzonation studies which may be very useful to expansion plans. It is urgently necessary to reinforce the earthquake resistance of adobe structures weakened by previous quakes and to replace those which are in an advanced state of disrepair.

Emergency plans are particularly effective for tsunamis, since the interval between the earthquake and the arrival of the wave at the coast is long enough for the population to be evacuated from the flood zone, and that aspect has been given priority. Civil Defense Region III is making major efforts to involve the local authorities in the preparation of emergency plans for each of the towns in the region exposed to the earthquake hazard.

Public information is the key to political decision being taken to apply the study and planning results, as well as to the decision of the local authorities to take measures of genuine benefit to the people most in need. That is why almost all the studies were completed during the first two years of the programme, while the focus shifted to public information activities in the third and final year. The local authorities were given the study findings to enable them to draw up and implement mitigation plans, prepare emergency plans and conduct evacuation drills. Pamphlets and leaflets were published and special seminars were held on each of the programme's three fields of action.

It should be stressed that the programme relied on a multidisciplinary approach and an attempt was made to secure the direct involvement of the sectors concerned.

Team-work was especially important. The contributions of such local institutions as the National University of San Agustín in Arequipa and resident specialists in the region were a key factor in the programme's sucess. CISMID FIC/UNI shared its experience with the other participating universities and allowed them to use its facilities.

Given the support that Peru has received from technical assistance institutions over several decades, the programme was developed almost entirely with national staff, except in the case of the study on volcanic risk, for which the services of an international consultant were enlisted. The occasion was used to strengthen the University's institutional capability in that field. The consultant generously donated publications to the library, and a professor with the same specialization will soon receive a fellowship abroad.

The study showed that economic and social development must go hand in hand with adequate protection for key infrastructure in order to prevent natural disasters from slowing down progress in developing countries.

Despite the fact that the PMDP officially ended in June 1995, the national, regional and local authorities will have to pursue the implementation of the programmes undertaken and at the same time continue the research; indeed, the likelihood of the occurrence of a destructive earthquake increase with the passage of time. This will serve to counter the apathy generated in the authorities and the public at large during the intervals between disasters.

Finally, the participation of Peru's civil defense chief, who is also President of the National Committee for IDNDR, in the World Conference on Natural Disaster Reduction held at Yokohama, and the ongoing programme of sensitization to the economic and social impact of natural disasters, are drawing political support at the highest level; this is particularly important for the formulation, development and implementation of disaster prevention and mitigation programmes.

THESIS AND PARTICIPATING INSTITUTIONS

Most of the studies carried out within the framework of the PMDP consisted of professional thesis developed at university level in consultation with the professors named below:

NATIONAL UNIVERSITY OF SAN AGUSTIN (UNSA)

Faculty of Geological and Geophysical Engineering, Arequipa

- "Microzonation for disaster prevention and mitigation in the city of Arequipa".
  Autor : Roberto Ticona Paucara, Geophysical Engineer.
  Advisers : Roberto Kosaka, Vice-Chancellor and Professor, UNSA
  Melesio Lazo, Dean of the Faculty of Geological and Geophysical Engineering, UNSA.

- "Potential Volcanic Danger of El Misti"
  Author : Luisa Macedo Franco, Geological Engineer
  Advisers : Dr. Minard Halls, American vulcanologist, Director of the ESPONA Geophysical Institute, Quito, Ecuador
  Jesús Chara, Professor, UNSA.

PRIVATE UNIVERSITY OF TACNA

Faculty of Engineering, Tacna

- "Seismic microzonation of the city of Tacna"
  Authors : Daryle Cotrado Flores, Civil Engineer
  Yuri Siña Calderón, Civil Engineer
  Advisers : Victor Reyes, Professor, Private University of Tacna
  Julio Kuroiwa, Professor, CISMID FIC/UNI
  Coordinator : Luis Vera, Professor, Jorge Basadre National University, Tacna.

NATIONAL UNIVERSITY OF ENGINEERING

CISMID, Faculty of Civil Engineering, Lima

- "Seismic vulnerability of representative cities in the department of Arequipa and technical recommendations for disaster mitigation"
  Authors : Guido Rodríguez Zamalloa, Civil Engineer
  Adviser : Julio Kuroiwa, Professor, CISMID FIC/UNI

- "Study of the seismic vulnerability of buildings in the departments of Moquegua and Tacna"
  Author : Luis Fernando Lazares La Rosa, Civil Egineer
  Adviser : Julio Kuroiwa, Professor, CISMID FIC/UNI

- "Study of tsunamis on the coasts of the departments of Arequipa, Moquegua and Tacna"
  Author : Erwin García Zumaeta, Civil Engineer
  Adviser : Julio Kuroiwa, Professor, CISMID FIC/UNI.

These thesis were submitted, defended and approved between March and December 1994.

The institutions that participated in the PMDP are listed under the subjects on which they cooperated. The Geneva-based United Nations Department of Humanitarian Affaris (DHA/Geneva) and the National Civil Defence Institute of Peru (INDECI) are grateful to the institutions and persons who participated in each stage of the programme.

CIVIL DEFENCE

The greatest tragedy ever endured by our country, one which moved the entire world, occurred on May 31, 1970 in the department of Ancash and led to the creation of the civil defense system on 28 March 1972; the latter was improved upon and given more definite shape in two legislative decrees: No. 442 of September 1987 and No. 735 of November 1991.

WHAT IS CIVIL DEFENCE?

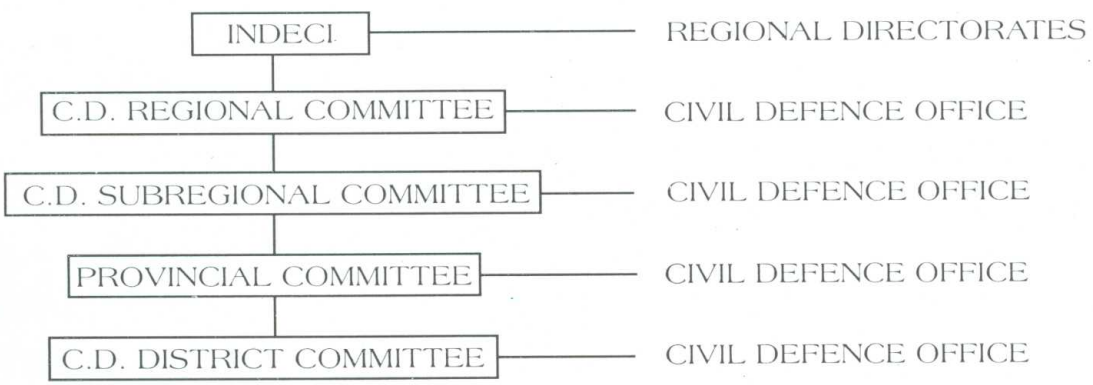
The national civil defense system comprises all agencies in the public and non-public sectors which cooperate in setting standards, expounding precepts and providing resources for the protection of the population. Should a disaster ofany sort occur, the system gears up to provide appropriate aid, with a view to eventual rehabilitation and a return to normal activity.

AIMS:

a. To prevent damage or limit its magnitude;
b. To provide aid and encourage the population to overcome the circumstances of the disaster or calamity;
c. To ensure the recovery of the population affected;
d. To raise the public's awareness of the role of civil defence and its participation therein;
e. In all cases, to ensure the establishment of the necessary conditions for the uninterrupted pursuit of the nation's activities.

In this way, through its leaders, the entire population takes part in civil defence.

ORGANIZATION:



INSTITUTO NACIONAL DE DEFENSA CIVIL - INDECI
Esquina Calles 1 y 21, Urb. Córpac, San Isidro, Lima 27 - Perú
Tel: (511) 4413277/4416557 Fax: (511) 441-3349