information collected in the "Study on Disaster Prevention in the Bogotá Metropolitan Area, in the Republic of Colombia" carried out by a JICA study team, are going to be useful for the implementation of a quick estimation system of damages after an earthquake. This system is designed to give necessary information to the related authorities that are going to evaluate and take the proper decisions to attend the situation.

In the second stage of the programme, The System of Measures for Emergencies Support will be developed in order to share the information between the emergency related entities and so, to support the governmental decisions. This technology and support system has already been implemented intensively in Japan, and it has been installed successfully in cities such as Nagoya and in some governmental offices.

These systems must be connected to the System of Information for Risk Management (SIRE), which was created by the FOPAE in 1998, as a support for the emergencies and disasters management for Bogotá City

- Development Policy of the national/local government for the sector:

The programmes and projects done and being done by the FOPAE are incorporated into the Development Plan of Bogota (2001-2004) called "Bogota for everybody to live in the same way" as well as into the Risk Management Plan of Bogotá. They are also included into the strategy of the CONPES 3146 document : "Strategies to consolidate the execution of the Prevention and Attention of Disasters Plan –PNPAD " at national level in short and medium term.

The present proposed project is included in the Disaster Prevention Plan designed by JICA study team in "The Study on Disaster Prevention in the Bogota Metropolitan Area, in the Republic of Colombia", which analysed area was Bogotá city and eight municipalities nearby as a regional work. This Study did a diagnostic about the city, damages scenarios, and designed a Plan for Disaster Prevention, which includes the development of a Disaster Management System coordinated to the elements that already exists in the city. The JICA Study started in April 2001 and finished in February 2002.

In the same way to the outcomes of the JICA plan the Response Plan to Emergencies Triggered by Earthquake in Bogota.D.C. was performed, which was presented by the Bogota Mayor in a Council to the different entities of the city This Response Plan commands the entities to initiate this system in order to provide a technological tool for the institutional strengthening.

- Problems to be solved in the sector:

Through the development of projects such as slopes and landslides monitoring, adjustment and calibration of the hidro-meteorological and accelerographic network, and research projects, the FOPAE wants to develop a model about the relationship between rainfall intensity landslide and flood generation, in order to establish early warning levels for the phenomenon in each city zone.

At the present time, the FOPAE requires Japan's knowledge about monitoring systems for big and complex landslides, in order to adjust the basic instrumentation that already owns, as well as to incorporate new technologies to obtain more effective early warning systems.

In respect to floods, the FOPAE needs Japan's technical support to implement the river basin instrumentation, and to correlate the rivers flow levels to the precipitation measurements in the stations, and so obtain effective early warning systems.

Based on the accelerographic network information and the information collected by JICA study team, the FOPAE wants to implement the system of quick damages estimation after an earthquake; its main purpose is to provide the necessary information to take decisions.

-Outline of the project:

Design and implement an Early Warning System for landslides and floods, and a quick estimation system of damages after an earthquake; to formulate and calibrate a model of rainfall intensity – landslides – floods, in order to establish a system to provide the necessary information for taking decisions.

-Purpose of the project (short-term objectives)

- Implementation of instrumentation and real time monitoring system on areas affected by big and complex landslides, in order to obtain an effective early warning system to mitigate people vulnerability.
- Implementation of a real time monitoring system on the Tunjuelo river basin in order to obtain an effective early warning system to mitigate people vulnerability.
- Implementation of a quick estimation system of damages after an earthquake that allows the evaluation of damages and provides basic information to take decisions and responses.

-Goal (long-term objective) of the project:

Landslides and floods risk reduction, and its effects on the people and the economic and social development of the city. To have a tool for taking decisions after earthquake.

-Prospective Beneficiaries:

In respect to landslides there are three specific points:1)La Carbonera y El Espino, in the locality of Ciudad Bolivar, which affects 20,000 people, 2) Cerro Norte, in the locality of Usaquen with 5,000 affected people 3) San Luis district, Granada Sur, in San Cristobal locality with 10,000 people.

In respect to floods, the Tunjuelo river floods affect 300,000 people approximately.

This people is characterised by limited economic resources; homes constructed in masonry with inadequate structural conditions, and settled in high risk urban areas.

The system of quick estimation of damages will cover the 7 million inhabitants of Bogotá, tanks to the improvement in efficiency and response of the related entities that will attend the emergency after the earthquake, according to the Response Plan delivered by the Mayoralty of Bogota.

- Priority of the project in the National Development Plan / Public Investment Programme:

The programmes and projects done and being done by the FOPAE are incorporated into the Development Plan of Bogota (2001-2004) called Bogota for everybody to live in the same way", and into the Plan of Risk Management of Bogota which guidelines and programmes are included into the priorities of Environment and Social Justice. This Plan incorporates the topic of prevention and attention of emergencies in every distrital level and everywhere in the city.

Within these projects exist the proposal for the implementation of a telemetric system for the accelerograhic network, whose feasibility is still in study by the FOPAE.

(5) Desirable or Scheduled time for the commencement of the project.

Month April year 2003.

(6) Expected funding source and/or assistance (including external origin) for the project

The city through the FOPAE would provide the support for the experts, with a budget allocation close to $120 millions pesos (US$45,396, -money change rate of $2,643 pesos per dollar-). In the same way, for the next year the FOPAE has planned to invest in the maintenance of hidro-meteorological network and to continue with the projects of landslides monitoring. For a vehicle to the transport of the study team, the FOPAE can invest about $30 millions pesos (US$11,349). There will be available an office for the experts in one building that belongs to an official entity, which will be located in a strategic area in the city regarding the mobilisation.

(7) Other relevant projects, if any.

2. TERMS OF REFERENCE

(1) Necessity/Justification

This study is needed for the implementation of a Disaster Management Information System (DMIS), which supports the functions of the main entities in charge in emergency cases (Response Plan Earthquake). The system will be one of the most effective tools for supplying information in order to determine the adequate response.

The system was proposed by the JICA Study Team in the Basic Plan of Disaster Prevention formulated in the Project " Study on Disaster Prevention in the Bogotá Metropolitan Area in the Republic of Colombia (2001)".

The previous Study was developed by JICA in the modality of *Development Studies*, in the frame of Agreement of Co-operation and Exchange of Technology in the theme of "risk, prevention of emergencies and disaster" signed by the Bogota Mayor and the Government of Cundinamarca in 1998. The Study did a diagnostic situation in the city and around it in respect to analyses of vulnerability estimation of disaster scenario, which were formulated in the Basic Plan of Disaster Prevention in the Metropolitan Area of Bogota.

The activities initiated in April – 2001 and finished in February -2002. However, FOPAE is using different aspect of the Study such as The Response Plan of Earthquake, which was modified and redesigned by FOPAE in other document the Bogota Mayor presented this document on April 30th In the same way, other outcomes such as emergency roads have been used and integrated into activities of entities such as Urban Development Institute - IDU, which controls the main roads in the city.

(2) Necessity/Justification of the Japanese Co-operation

The project requires the Japanese knowledge and experience in monitoring big and complex landslides, in order to adjust the existent monitoring network and to introduce new technologies, which will allows to design efficient early warning systems.

In aspects related with floods, the Japanese support is necessary to implement a monitoring river basins system in the main rivers, as well as to obtain relationships between rainfall measurement levels and early warning systems more effective than the already existent.

In the seismic matter, Bogota City needs the Japanese experience and technology in the installation of transmission systems of accelerographic networks, and the modelation of damages

scenarios generated after an earthquake with a special software and therefore, be able to obtain basic information to take decisions.

Finally, the Japanese technical co-operation is necessary to incorporate the monitoring network described in Disaster Management of Information System (DMIS), which is composed by five (5) independent systems with the following functions:

1. Information Collection and Transmission System (CTS).
2. Database System (DB),
3. Information Processing System (PS).
4. Decision-support System (DSS).
5. Information Distribution System (IDS).

This study is focused to complement and strengthened the first three systems and to begin the fourth one to take decisions.

3. Study Objectives

To design and establish a monitoring system compounded by extensometers, inclinometers, electronic piezometer, load cells, etc; all systems should register and send information in real time with automatic transmission systems, and software for reception and analysis of damages. This must be done in order to install an effective early warning system for complex landslides.

- To complement the hydro-meteorological stations network, which would allow to control rainfall levels and to measure the water level, speed and others. Additionally, to implement a data transmission system, and the appropriated software for the reception and analysis of the information given by the monitoring system, in order to install an effective early warning system of complex landslides.
- To complete the accelorographic network through the installation of a data transmission system in the equipment of accelerometers network (30 equipment Etna – Kinemetrics), composed by GPS's, antennas, solar panels, modem to each accelerometer, reception software, data and analysis register system, as well as software for damages estimation and configuration of damage scenarios.
- To Conform the Disaster Management of Information System (DMIS), which shall collect the data supplied by the geotechnical, hidro-meteorologycal and seismic monitoring systems established before.

(4) Area to be covered by the study:

- Enter the name of the target area for the study and attach a rough map to the document submitted. The attached map should be at a scale that clearly shows the project site. Mark the site in red.

The study shall cover the whole city area, which means 85,832 ha. According to each phenomenon it might be distributed as follows:

In respect to landslides there are three specific points: 1) La Carbonera y El Espino, in the Locality of Ciudad Bolívar which affects 20,000 people; 2) Cerro Norte, in the Locality of Usaquén with 5,000 affected people 3) San Luis district, Granada Sur, in San Cristobal locality with 10,000 people.

In respect to floods, the Tunjuelo river floods affect 300,000 people approximately.

This people is characterised by limited economic resources, homes constructed in masonry with inadequate structural conditions, and settled in high risk urban areas.