

# ANNEX

# 1 RELOCATION PROGRAM OF SOACHA MUNICIPALITY

## 1.1 General

Soacha municipality consists of six (6) communes, and several organizations which are Municipality, INGEOMINAS and National University carried out the studies of the risk areas in the municipality from 1992 to 2006. These studies covered all and/or specified communes, especially Villa Esperanza and Altos de Cazucá in commune four (4) were focused according to the scale of disasters. Through these studies, the Territorial Ordering Plan (POT), which covers all municipality, has been established based on the Agreement 046, 27 of December 2000.

In May 2006, the disaster caused by intense rainfall was confirmed in the area of El Divino Niño. Since many families and their assets including houses were remarkably affected, El Divino Niño was urgently designated as a “Landslide Risk Area” under the POT. In this situation, Soacha municipality carries out the relocation program of families in the risk area, especially El Divino Niño area, based on the POT and other technical recommendations.

In JICA Study the map which divides the risk area into two (2) categories of a critical zone and an emergency zone was prepared for El Divino Niño area and La Capilla in Altos de Cazucá in 2006 to facilitate and prioritize the municipality’s relocation program

## 1.2 Monitoring of Relocation Program by Soacha Municipality

The relocation activities by Soacha municipality were accelerated since house-holds in El Divino Niño area to be resettled were detected by the municipality.

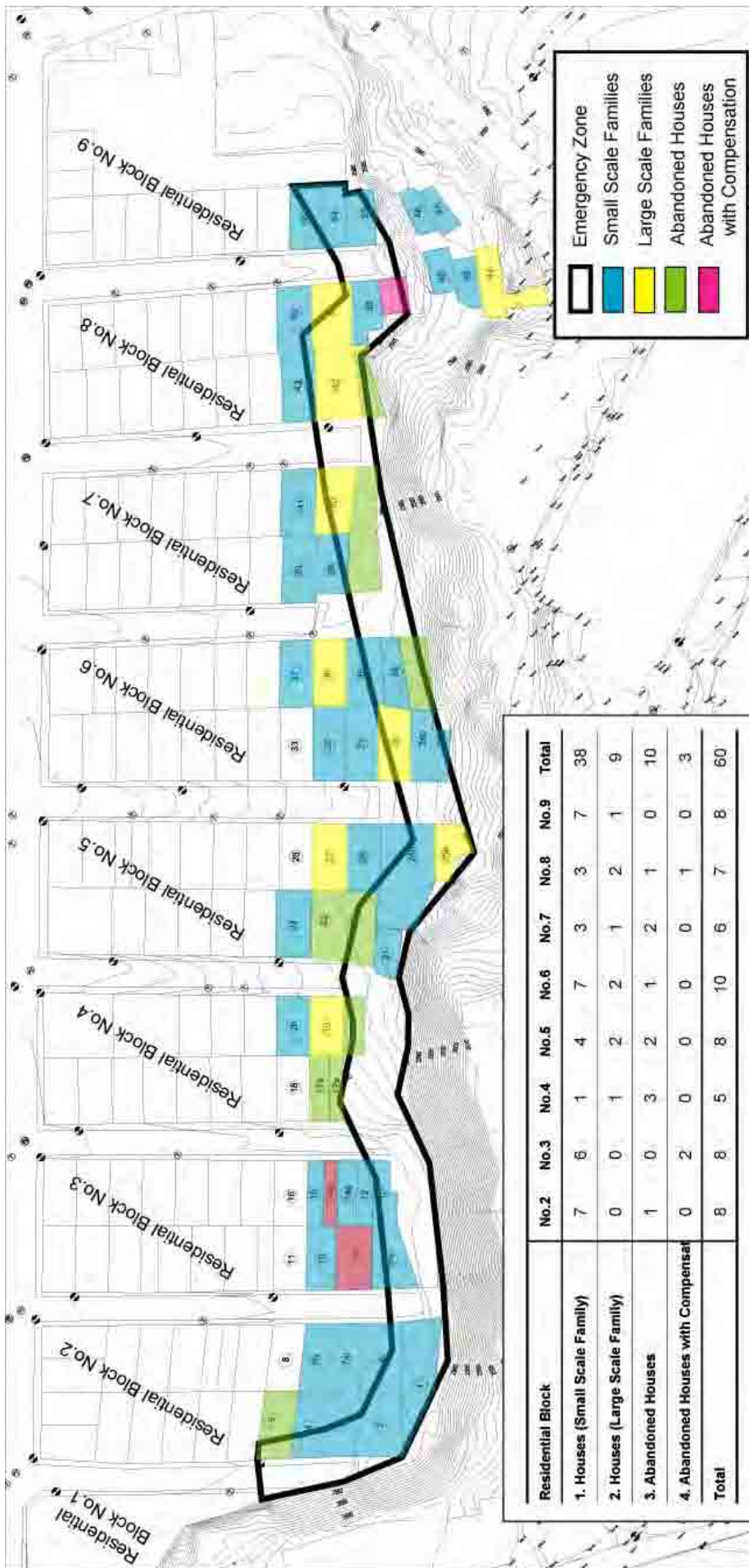
The relocation process of the municipality was divided into two (2) phases according to the site conditions. In the 1st phase, the process of relocation program was conformed to the precedent of Bogotá due to inexperience. Under this process, a possibility of disaster caused by falling rock was detected at the slope of street No.2 in El Divino Niño in May 2007. The Municipality decided and executed in a hurry to remove the rock on the slope which was estimated 96 tons, by the urgent measure. The targeted rocks were removed from 18 to 21 of May, however in order to prevent in advance the disasters caused by falling rocks, the Municipality requested a declaration of “Public Calamity” situation to National Office for the Attention of Disasters (hereinafter “DNPAD”) because of many rocks on the slope which will be the causes of disasters still exist. After the declaration of Public Calamity Situation, the activities of relocation program based on the Law were required as the 2nd phase.

### (1) Families to be relocated in El Divino Niño Area

In order to make detailed out the number of families and slope conditions in El Divino Niño area, topographic survey was carried out by the Study Team in December 2006. Based on the prepared topo-map, an emergency zone in the area has been established according to the following criteria agreed upon on 20 of November 2006.

- Slope angle is not less than 30 degree and slope height is not less than 5m
- Distance from the slope toe is within twice the slope height

Based on the established emergency zone, the Municipality took a census of the families in February 2007 with Study Team. Through this census, the Municipality decided to relocate fifty-six families including abandoned houses. In February 2008, four (4) vacant lots were detected by the municipality through the cadastral data and documents by the owner. Emergency zone and the families to be relocated are shown in the next page..



(2) Emergency measure by Soacha Municipality in May 2007

On 17 of May 2007, the Municipality received information that some cracks in the rocks which supported a huge rock were detected at the top of slope on the street No. 2 in El Divino Niño area. As in the opinion of the municipality, these cracks will immediately not affect the stability of huge rock; however this stability at present could not be guaranteed in the coming rainy season, so on the following day, 18 of May the Municipality called related organizations which are CAR, CREPAD, OPAD-CREPAD, National Police, Military and Fire Brigade in order to find out the method of urgent measure. At the same time 11 families who lived at residential blocks Nos. 5 and 6 around the street No. 2 were evacuated to the school in the area following the instruction of the municipality.

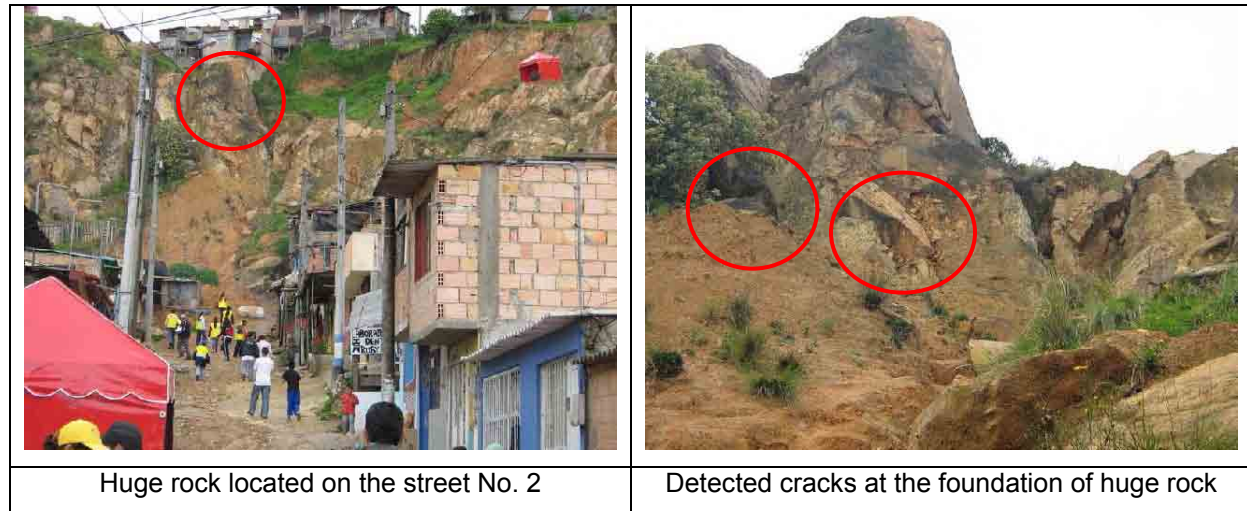


Figure 1 Location of Huge Rock and Detected Cracks

As the method of urgent measure, two (2) options which are 1) to remove directly the huge rock by heavy machinery and 2) to repair the cracks of supporting rocks by concrete were considered. The first option, which is removing of the huge rock was applied among related organizations due to period of the measure and procurement of the required material. So CREPAD started to investigate and measure the huge rock supported by rocks which has some cracks. The huge rock was estimated at approximately 96tons based on its form and general specific weight of rock. From this investigation, it was impossible to hoist directly the rock with crane or back-how which municipality possesses. Therefore following method was applied as urgent measure.

- excavate the material around the huge rock with back-how CAT 320L
- carry out the blast test in order to break safely the huge rock with white gun powder
- fix the huge rock by wire cable before blast works
- hoist broken huge rock with back-how at the top of slope after blast works

The process of urgent measure by the Municipality is shown in Table-1, The pictures which show the process of the works are shown in page A10 to A12.

Table 1 Process of Urgent Measures by the Municipality

Date	Activities for Urgent Measures
17/May	The municipality received information that some cracks were detected in the rocks which supported the huge rocks located at the top of slope in street No. 2.
18/May	The method of urgent measures were discussed among related organizations, at the same time 11 families who live at residential blocks Nos. 5 and 6 were evacuated under instruction of municipality. Based on the approved method, the excavation works around the huge rock was started by the Municipality.
19/May	The excavation works was continued and fixing works of huge rock was carried out by specialist. Blast test for control the explosive powder was carried out by specialist in the site. The broken rock estimated 10tons was removed after 1st blast.
20/May	After excavation works around the huge rock, 2nd and 3rd blast was carried out by specialist. From these blast works, the blasted rock was hoisted and pulling down with back-how.
21/May	The broken huge rock was completely removed out. Another two (2) rocks located under removed rock were detected through this works. One (1) rock was removed with back-how; however second (2) rock was fixed by wire cable due to difficulty of removing it out.

### 1.3 1st Phase of Relocation Process in El Divino Niño

The process of the relocation program which Soacha municipality was planning consisted of 1) identification of prioritized area and houses, 2) allocation of budget for relocation 3) negotiation with targeted families and 4) their relocation to no risk areas. As to where to be resettled, two (2) options for relocation measures were considered, the former was to provide the used apartment houses and latter was the houses with land. Following policies on the relocation sites were considered: 1) lots and houses for the relocated families should be with legal title, 2) relocation sites would be found in cooperation with real estate agencies in the urban area to purchase the lands and construct houses, 3) publicity announce prices would apply to the plots.

On the other hand, since the beginning of 2007 the municipality made an effort to establish the task force supporting its relocation program due to its inexperience. However October of 2007 will be assigned for the election of Mayor and Municipal council, and the activities for the election will be started five (5) months before the election. In the period of election, any project or contract can not be made and complied according the Law 80, 1993 “Regimen of National Contracting” and Law 996, 2005 “Election Guaranty”. Therefore any persons who appropriate to task force were not found out. Furthermore the present municipal administration would have expired on 31 of December 2008 so that the municipality decided not to establish the task force.

### 1.4 2nd Phase of Relocation in El Divino Niño following the Calamity Declaration

As mentioned above, the risk in the street No.2 in El Divino Niño was removed by means of urgent measures by the Municipality from 17 to 21 of May 2007. However the Municipality realized that there existed some latent risk caused by falling rocks in the area. From the viewpoint of saving human lives in El Divino Niño area assigned as the risk area, the Municipality decided to request a declaration of “Public Calamity stipulated in Article 48 of Law 919, 1989 to DNPAD.

#### (1) Declaration of Public Calamity Situation by the Municipality

In general “Public Calamity Declaration” is announced by DNPAD in Ministry of Internal and Justice to the disaster-stricken areas based on the Article 48 of Law 919, 1989. The Law provides extraordinary faculties to organize the national system for prevention disasters, and these faculties are given solely to the President of Republic Colombia.

The Municipality sent to DNPAD technical information based on the study of INGEOMINAS and JICA to DNPAD on 28 of May 2007, however following additional data or survey were required to the Municipality for “Public Calamity Declaration” before occurrence of disasters.

- Census of families to apply the public calamity situation
- Local Committee for the Prevention and Attention of Disasters (hereinafter called

“CLOPAD”) Statements

- Regional Committee for the Prevention and Attention of Disasters (hereinafter called “CREPAD”) endorsement for the CLOPAD statements
- Results of the technical studies on the objective risk area
- Activities already done by the Municipality

The Public Calamity Declaration was announced by DNPAD on 25 of June 2007 as Resolution No. 11 based on the documents prepared by the Municipality. The resolution No. 11 states that approximately 71 persons in El Divino Niño area were affected by the disasters caused by falling rocks from the slope and approximately 56 families in the area should be relocated and following articles were stated.

- Declare the Public Calamity Situation at Soacha Municipality in Cundinamarca Department
- CLOPAD should elaborate the special action plan based on the national plan for prevention and attention of disasters with Decree 93, 1998
- Action of competent entities which contribute for attention, rehabilitation, reconstruction and recuperation should obey to normative activity on manage of the emergency and carry out under CREPAD

## (2) Municipal Activities based on the Public Calamity Situation

As the concept of relocation program, required activities by the municipal administration had to be lawfully carried out. Therefore the municipal agreements to control the activities were issued by the municipal council as the need arise. After the declaration of Public Calamity by DNPAD dated 25 of Jun 2007, following Resolution and Agreements have been issued.

### 1) Municipal Resolution No. 1509 dated 17 of July, 2007

According to the Articles 10, 11 of Law 9, 1989 and the Articles 58, 59 of Law 388, 1997, the municipal administration declared “Public Utility of Land and Social Interest” in the risk area of El Divino Niño where were affected by disasters caused by landslide.

Furthermore in this Resolution No. 1509, the commands given to the Secretary of Territorial Ordering Plan (POT) were: 1) to gather required information about the families and lots in the risk area in El Divino Niño, 2) to advance institutionally the expropriation of the land and so on and 3) to share all expenses or indemnification related with the resettlement of families.

### 2) Municipal Agreement No. 26 dated 5 of September, 2007

Based on the Resolution No. 1509 issued 17 of Jul, two (2) debates for establishment of relocation process in El Divino Niño Area were held by the municipal council on 1<sup>st</sup> and 5<sup>th</sup> of September 2007. From these debates, the municipal council authorized the Soacha Mayor all faculties for the relocation according to the Article 11 of Law 497, 1999.

In this Agreement No. 26, the faculties given to the Mayor was 1) to negotiate legally with 56 families in El Divino Niño area for expropriation of their land according to the Law 9, 1989 and Law 388, 1997, 2) organize the offering system of immovable (fixed property) to solve the houses for 56 families and 3) to prepare an estimate for the relocation of 56 families with no excess the amount established.

The process of relocation program which was so far considered was 1) to acquire the land, 2) to obtain the license for urbanize, 3) to allocate national subsidy and municipal contribution, 4) construct the apartment building and 5) to resettle the community. However this process was rejected in this Agreement because of 18 months will be required.

### 3) Municipal Agreement No. 30 dated 8 of November 2007

According to the requirement of Municipal Agreement No. 26, the Soacha Mayor proposed the houses for relocation and required budget based on the Offering System of Immovable to the Municipal Council in October 10. The measures done by the Soacha Mayor were 1) presentation by the municipal financial institutions the offered immovable for relocation based on the

technical, juridical and financial aspects, 2) analysis of the offered immovable by the integrated committee consisted of Planning, Financial, and Legal department of Municipality and few Leaders of the community and 3) analysis of the offered immovable based on the Article 29 of Political Constitution of Colombia and Law 80 of 1993.

The proposal by the Mayor was legally debated and approved by the Municipal Council in 31 of October and 8 of November 2007. The Acquisition of immovable by the municipal administration was legally approved in the Municipal Agreement No. 30 dated 8 of November 2007.

#### Offering System of Immovable

The Offering System of Immovable based on the Municipal Agreement is 1) to evaluate technically and legally the proposed apartment for relocation, and 2) to supply the evaluated apartments with legal documents such as title and proprietary rights to the families to be relocated by the expense of the municipal administration. The only expense by the families to be relocated is \$ 500.000.00 as documentation and registration fee of the apartments. In order to accelerate the relocation of the families in the risk area, this fee is paid by the municipal administration in place of the families to be relocated. After completion of the relocation, the families should pay to the municipal administration.

In evaluation in the Offering system, the municipal administration not only analyzes the conditions of targeted apartment but also livability environment including education.

#### (3) Request of Institutional Tutelage by the Community in El Divino Niño

Based on the Agreement No. 26 by the municipal council, the municipal administration carried out sensibility investigation in the risk area of El Divino Niño; furthermore the negotiation with 56 families and the banks that possessed an apartment building was executed respectively. In the sensibility investigation by the administration, census for the families who are relocated and presentation of option of immovable were included. Based on these actions, the municipal administration sent the documents based on the offering system of immovable for approbation by the municipal council on 10 of October 2007.

On the other hand 56 families who are relocated in safety area were menaced the possibility of disasters caused by falling rocks from steep slope due to rainy season. Therefore the intention of the families for the relocation was elevated. In 18 of October the community in El Divino Niño requested to Justice the institutional tutelage based on the “Public Calamity Situation” declared 25 Jun 2007.

Based on the request of Institutional Tutelage by the community, the Court confirmed with Soacha Mayor through the document of Institutional Tutelage on 26 of October 2007. The Mayor answered to the Court based on the Institutional Tutelage on 30 of October 2007. Following sentence by the Court were legally ordered to the municipal on 1st of November.

- The municipal should relocate the families who are living in risk area within 10 days of the provisional solution
- The municipal council should approve the documents based on the Offering System of Immovable and the municipal administration should complete relocation of targeted families within three (3) months
- The Municipality should appoint a supervisor to complete the sentence of Institutional Tutelage.

#### (4) Relocation in El Divino Niño Area

By the juridical sentence based on the institutional tutelage, the municipal administration started procedure of the acquisition of houses for relocation with Banks. As sites for permanent relocation, Urbanization Quintanares and Lagos de Malibu were selected. Urbanization Quintanares located at commune five (5) was selected for small families, and Urbanization Lagos de Malibu located at commune six (6) was for large families consisted in more than 8 persons. The houses for relocation were allocated to targeted families by the method of lottery. The lottery for the apartment for

relocation was carried out on 10 and 15 of November 2007. Furthermore the apartment located first floor was priority allocated for handicapped people and old people.

1) Apartment Building for Relocation

In case of the selection of condominium-type apartments, several problems related with difference in economic and social standing between the existing residents and relocated families are normally observed. In order to minimize these social problems, the municipal administration selected a terraced-house-type apartment as the apartment building for relocation.

As the definitive area for relocation, Quintanares and Lagos de Malibu area were selected by the municipal administration. Quintanares area is for small scale families and Lagos de Malibu is for large scale families who have more than 8 persons.



Figure 2 Site for the Relocation of Families

2) Allocation Method of the Apartment to the Targeted Families

The municipal administration classified the families to be relocated into two (2) categories of small- and large-scale families. According to the sizes of the apartments, Quintanares area is for small-scale families and Lagos de Malibu area is for large-scale families.

After classification of the families, the first story of the apartment was priority allocated to the families who have a handicapped and/or an old person. For the other families, the lottery system was applied for the apartment allocation for the sake of fairness. The lottery was carried out three (3) times on 8th, 10 and 15 of November, and the families to be relocated were allocated as shown in Table 2.

Table 2 Allocation of the Apartment

Resettled Site	Location	Application	No. Families
Urbanization Quintanares	Commune 5	For small scale families	38
Urbanization Lagos de Malibu	Commune 6	For large scale families	9
Total			47

(Source: Soacha municipality)

3) Relocation Activities by the Families

For the relocation of families, the municipal administration prepared two (2) trucks for transportation of household effects and one (1) back-hov for demolition of the houses. Furthermore the municipal administration made an agreement with the local contractor due to organize the demolition works, and ordered the Bank to repair some equipment of the apartments for relocation according to the inspection.

The families started to dispose their household effects and furniture for the relocation. According to this progress, the key of apartments was delivered by the municipal administration to each family. The families for Quintanares area have received the apartment key from 10 of November



2007. On the other hand, the apartment building in Lagos de Malibu is under construction until the end of February 2008, therefore the large-scale families moved to a temporal apartment building on 3<sup>rd</sup> of February 2008, using Municipal subsidy.

The demolition works was commenced by mutual aid of community when the families left away in the area. The reusable materials produced in the works, which are steel door, window with frame, bricks and toilet were carefully taken out and were supplied to the communities in reward for the works.

#### (5) Disposal of Abandoned Houses

In the area under relocation program of the Municipality, there were three (3) abandoned houses and 10 vacant lots. The Municipality carried out the estimate of these abandoned houses for expropriation of land and expropriated the abandoned houses paying the estimated values to the owners. On the other hand, it was no necessary to expropriate about 10 vacant los to ensure public use of the Land.

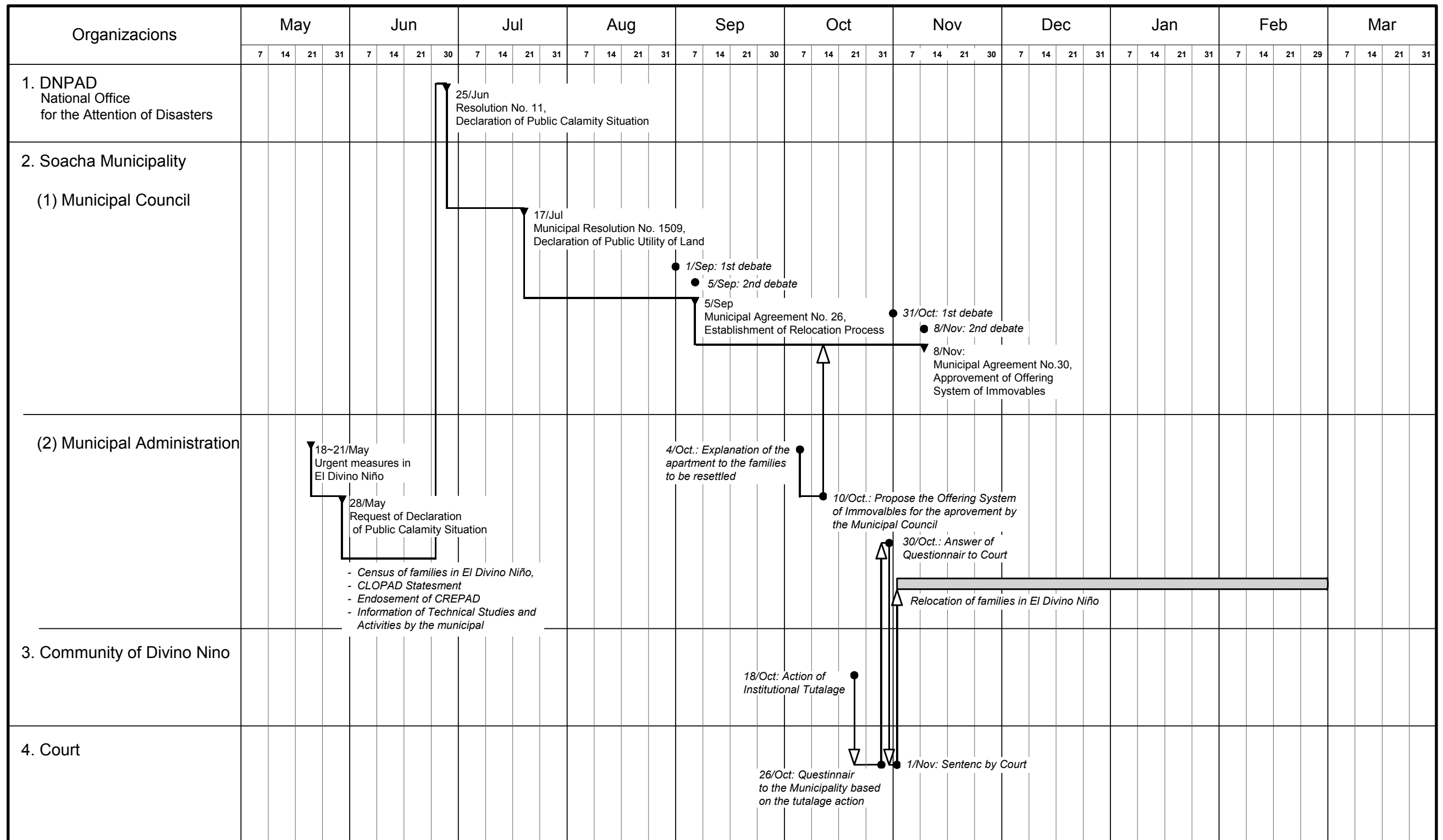


Figure 3 Progress of Resettlement by the Municipality

Investigation and Evaluation executed by Soacha Municipality



18/May/2007

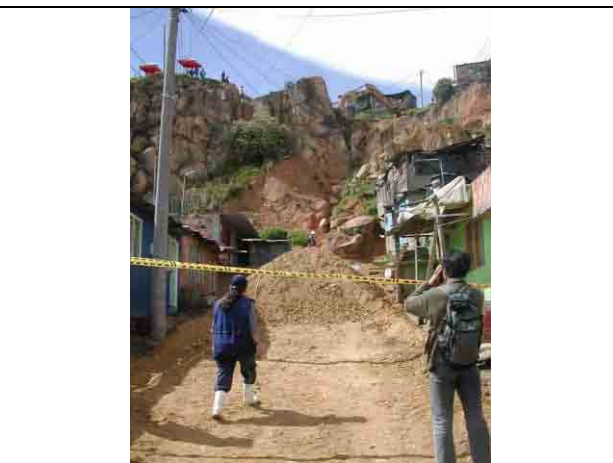
The area is located at the slope of street No.2

Some cracks at the supporting rock were informed to Soacha municipality. It was estimated that the cracks of blocks affect the stability of huge blocks at upper part of the slope.



Discussion about the existing conditions and proposition of the countermeasures among the related organizations.

Evacuation of the residents who live at street No.2 by the Municipality.



19/May/2007 Measurement of No.1 block by CREPAD

Installation of the earth wall in front of the slope at street No. 2

## Emergency Measures (1/2)



Excavation works behind the block No.1



20/May/2007

Wire net is fixed with wire rope



1st blast of block No.1 with white gun powder



Cracks of block No.1 with 2nd blast



3rd blast of block No.1



Remained pieces of block No.1 is removed with back-how

## Emergency Measures (2/2)



Termination of emergency measures for the block No.1



**21/May/2007**

Site conditions after removing of block No.1



Installation of wire rope to blocks of No.2 and 3



Removing of block No.2 after excavation of its back



The block No.3 is fixed with wire rope



Excavated material has been left in the site due to problem of new settlement in the site.

# Minutes of Meetings

Minutes of Meetings  
 On  
 Inception Report  
 For

The Study on Monitoring and Early Warning System for Landslides and Floods  
 Agreed upon between  
 Direction for Prevention and Attention of Emergency, Soacha Municipal Office  
 And  
 The Study Team of Japan International Cooperation Agency

Bogotá, July 14, 2006



Mr. Fernando Ramirez Cortes

Director

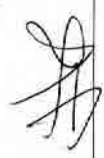
Direction for Prevention and Attention of  
 Emergency (DPAE)  
 Capital District of Bogotá



Mr. Jesus Ochoa Sanchez

Mayor,

Soacha Municipality



Mr. Kimio Takeya

Leader

Study Team of Japan International Cooperation  
 Agency

Witnessed by



Mr. Jaime Matiz

Director of Office for the Prevention and  
 Attention of Emergency and Disasters and  
 Radio Communication (OPAD)

Witnessed by



Mr. Ryogo Hataya

Resident Representative  
 Japan International Cooperation Agency (JICA)

1. The Study Team submitted the draft Inception Report of the Study (hereinafter referred as "the draft Report") and explained the content of the draft Report and the work items and their methodology to the Colombian side from June 27 to June 30, 2006.

2. The Study Team and the Colombian side agreed that the draft Report was basically reflecting the Scope of Work dated on September 1, 2005 and confirmed the purposes and the study area as they were specified in the Scope of Work, however, the following arrangement was required.

3. Regarding the details of the draft Report, Direction for Prevention and Attention of Emergency (hereinafter referred as "DPAE") proposed that the Study Team should concentrate on the technical part such as formulating a plan on monitoring and early warning system in the study area, whereas necessary activities related with communities shall be done by DPAE. On the other hand, Soacha Municipality agreed that the Study Team should conduct the Study based on the original draft Report for the Study Area in Soacha.

Taking those comments into consideration, the draft Report has been revised and agreed upon by all parties concerned: DPAE, Soacha Municipality, Study Team and JICA.

4. Counterpart

DPAE and Soacha Municipality assigned counterpart personnel according to the composition of key persons of the Study Team as attached in the Annex-2.

5. Steering Committee

The members of Steering Committee are as follows:

Members: DPAE, Soacha Municipality, OPAD, JICA Colombia Office

It was agreed between the Study Team and the Colombian side that DPAE will coordinate logistical actions as previous agreement with Soacha Municipality, for planning and developing workshop and other activities that involve both counterparts.




6. Sub Technical Committee

The Colombian side will decide the members of Sub Technical Committee and notify to JICA Colombia office as well as to the Study Team as soon as possible. DPAE and Soacha Municipality shall coordinate the Committee appropriately for smooth implementation of the Study.

7. Cover Title of the Report

The Study Team, the DPAE and Soacha Municipality agreed that the title of the Report cover will be the Study on Monitoring and Early Warning System for Landslides and Floods in Selected Areas of the Capital District of Bogotá and Soacha Municipality in the Republic of Colombia.

8. Number of report copies

The reports specified in the Scope of Work are prepared by the Study Team.

9. Counterpart Training in Japan

JICA is ready to accept Colombian counterpart personnel for the training in Japan on the subjects related to the Study for an effective technology transfer. The subject and the number of person(s) for the training in JFY 2006 will be notified by JICA Colombian office, and Colombian side will submit the application form(s) to JICA Colombian office without delay upon the notification.

10. Others

This Minutes of Meetings have been prepared in English and Spanish. In case of any discrepancy arises in interpretation, the English text shall prevail.

Annex-1  
ATTENDANCE LIST

Colombian Side

Direction for Prevention and Attention of Emergency (DPAE)

Mr. Fernando Ramirez Cortés Director

Mr. Guillermo Ávila Study Coordinator

Ms. Diana Gonzalez Coordinator of National & International Cooperation

Soacha Municipal Office

Mr. Jesús Ochoa Sánchez Mayor

Mr. Iván Calderón Ulloa Study Coordinator

Mr. Nelson Cifuentes Engineer

OPAD

Mr. Jaime Matiz Director

Japanese Side

Study Team

Mr. Kimio Takeya

Mr. Kazunori Inoue

Mr. Yoshitaka Yamazaki

Ms. Paulina Chaverri

Mr. Ryo Miyazaki

Mr. Ruben Kanashiro

Team Leader/Disaster Prevention Planning  
Deputy-Team Leader/Flood and Debris Flow Disaster Prevention  
Landslide and Steep Slope Failure Disaster Prevention  
Community Disaster Prevention and Socio-economy  
Topography, Geology, Aerial Photo Analysis and Survey  
Coordinator

JICA Colombia Office

Mr. Ryozo Hanya

Mr. Naofumi Takase

Mr. Shintaro Akiyama

Resident Representative

Deputy Resident Representative

Chief of Technical Cooperation



ANNEX-2 List of Counterpart  
DPAE

Name	Position	Area
Guillermo Ávila	General Coordinator of DPAE Counterpart	
Doris Suaza	Deputy General Coordinator of DPAE Counterpart	
Carolina Rogelis	Studies and Concepts Group. Research and Development Coordination	Flood
Jorge Rossas	Studies and Concepts Group. Research and Development Coordination	Flood
Pablo Garzón	Studies and Concepts Group. Research and Development Coordination	Landslide
Lucy Bohórquez	Rural and Slope Areas Group, Territorial Management Coordination	Landslide
Misael Murcia	Expert on Community Participation	Community Participation
Claudia Sandoval	Rural and Slope Areas Group, Territorial Management Coordination	Community Participation
Duván López	Studies and Concepts Group. Research and Development Coordination	Geography and Geological Analyses
Piedad Camargo	Studies and Concepts Group. Research and Development Coordination	Geography and Geological Analysis
Diana González	National and International Relations	Logistics

Soacha


Name	Position	Area
Iván D. Calderón Ulloa	General Coordinator of Soacha Counterpart	Expert on Administrative Law
María Eugenia Casas Buenas	Civil Engineer	Landslide
Ramón Augusto Mendoza López	Architect	Flood
Sandra Bacca	Catastral Engineer	Geographical Analysis
Rodrigo Cumbe	Civil Engineer	Flood
Jorge E. Barragán	Geologist	Landslide
Sonia Marentes	Social Worker	Community Participation
Nelson Cifuentes	Civil Engineer	Landslide

Minutes of Meetings  
On  
Progress Report 1  
For


The Study on Monitoring and Early Warning System for Landslides and Floods  
Agreed upon between  
Direction for Prevention and Attention of Emergency, Soacha Municipal Office  
And  
The Study Team of Japan International Cooperation Agency

Bogotá, August 17, 2006

  
Mr. Guillermo Ávila  
Study Coordinator

  
Mr. Kazunori Inoue  
Deputy Team Leader  
Study Team of Japan International Cooperation Agency

Direction for Prevention and Attention of  
Emergency (DPAE)  
Capital District of Bogotá

  
Mr. Iván Calderón Ulloa  
Study Coordinator  
Soacha Municipality

flood disaster prevention activity. The Study Team replied that the priority of Soacha City will be taken into consideration in the study on selection of the pilot project area in the 2<sup>nd</sup> field survey which is scheduling on September 2006 in Colombia.

8. Others

This Minutes of Meetings have been prepared in English and Spanish. In case of any discrepancy arises in interpretation, the English text shall prevail.

1. The Study Team submitted the Progress Report 1 of the Study (hereinafter referred as "the draft Report") and explained the content of the draft Report to the Colombian side on August 14 to 15, 2006.

2. DPAAE pointed out that there are several materials to be reviewed for landslide study other than the list of the existing studies on landslide shown in the draft Report. The Study Team recognizes that World Bank Study is the most comprehensive one which is covering most of the previous studies, however, the Study Team will continue to review the existing studies on September 2006.

3. DPAAE recommended the Study Team should clarify the methodology on landslide hazard zoning to update the existing map, because DPAAE had already applied probabilistic methods for Altos de la Estancia and DPAAE's interest is to update the maps using similar or superior methods. The Study Team agreed that they will continue to discuss about this issue on September 2006.

4. DPAAE asked the Study Team, regarding the pilot project in Altos de la Estancia, to make sure if the Team is considering only a part of Altos de la Estancia. The Study Team replied the area and contents of the pilot project will be discussed on November 2006 among DPAAE and the Study Team.

5. DPAAE asked the Study Team, regarding the selection of the pilot project watershed for flood, to confirm the selection should be done based on not only the existing availability of monitoring station but also hazardous condition. The Study Team confirmed that the selection should be done based on some criteria.

6. Soacha City accepts the draft Report and is willing to review it on August and make comments later. The Study Team replied that any constructive comments are valuable and they are reflected in the Study.

7. Finally, Soacha City expressed a strong desire to select the Rio Soacha watershed as the pilot project area for flood in this Study because the Rio Soacha has priority in terms of

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Annex-1  
ATTENDANCE LIST

Colombian Side

Direction for Prevention and Attention of Emergency (DPAE)

Mr. Guillermo Ávila Study Coordinator  
Ms. Carolina Rogelis Flood  
Mr. Pablo Garzón Landslide

Soacha Municipal Office

Mr. Iván Calderón Ulloa Study Coordinator  
Mr. Rodrigo Cumbe Flood  
Ms. María Eugenia Casas Landslide  
Buenas

Ms. Sonia Marentes Community Participation  
Ms. Sandra Bacca Geographical Analysis

Japanese Side

Study Team

Mr. Kazunori Inoue  
Mr. Ruben Kanashiro

JICA Colombia Office

Mr. Kazunori Hayashi Resident Representative  
Mr. Naofumi Takase Deputy Resident Representative  
Mr. Shintaro Akiyama Chief of Technical Cooperation

Deputy-Team Leader/Flood and Debris Flow Disaster Prevention  
Coordinator

Minutes of Meetings

on

Discussion of Progress of the Study and Selection of the Pilot Project Area

for

The Study on Monitoring and Early Warning System for Landslides and Floods

Agreed upon between

Direction for Prevention and Attention of Emergency

and

The Study Team of Japan International Cooperation Agency

Bogotá, November 20, 2006



Mr. Raul Navarro Mejia  
Director in Charge  
Direction for Prevention and Attention of  
Emergency (DPAE)  
Capital District of Bogotá



Mr. Kimio Takeya  
Leader  
Study Team of Japan International  
Cooperation Agency

Witnessed by



Mr. Kazunori Hayashi  
Resident Representative  
Japan International Cooperation Agency  
(JICA)

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The Study Team had series of meetings with Direction for Prevention and Attention of Emergency (DPAE) and visited sites, with the participation of The Advisory Team of Japan International Cooperation Agency (JICA) (hereinafter referred to as "the Advisory Team") for the "Study on Monitoring and Early Warning System for Landslides and Floods" (hereinafter referred to as "the Study"), which visited Colombia from November 14, 2006 to November 20, 2006. The list of the participants to the meetings is shown in Appendix 1.

During the meetings, the Study Team and the Advisory Team presented and explained to DPAAE the progress of the Study, the draft Plan on Monitoring and Early Warning System for Landslides and Floods (hereinafter referred to as "the Draft Plan") and the selection of pilot project areas.

This document summarizes major items discussed in the meetings.

#### **I. Draft Plan on Monitoring and Early Warning and Selection of Pilot Project Area**

##### Landslide Monitoring and Early Warning Plan and Selection of Pilot Project

1. The Study Team proposed only simplified monitoring plan for Altos de Estancia landslide, and no early warning system plan was proposed based on the consideration of landslide characteristics of the target area.
2. Installation of simplified monitoring equipment and monitoring activities will be done during the pilot project period by the Study Team.
3. Since forerunning phenomena of landslide appear limited to the around of the landslide, monitoring activities by residents on and around the landslide is essential because residents can recognize any changes on the ground or the structure at first and have possibility to understand them well. The Study Team expressed to DPAAE the importance of enhancement of monitoring capacity of residents which will be carried out by DPAAE. DPAAE replied that the monitoring activities by residents are difficult because the situation of the area is sensitive, and DPAAE is currently carrying out the monitoring activities by themselves.
4. DPAAE believes that it is important to develop a more comprehensive monitoring system inside Phase 1 and 2 in order to prevent sudden changes in the landslide. The study team states that the landslide is very slow and therefore simplified monitoring by direct monitoring is enough taking into account of saving lives, and DPAAE understands this position.

From the viewpoint of the capacity development, DPAAE states that the proposed monitoring system doesn't improve the current capacity of the city. The Study Team offered technical transfer seminars and trainings to overcome this situation.

##### Flood Monitoring and Early Warning Plan and Selection of Pilot Project

1. The Study Team explained the following planning concepts.
  - Overall objective of the planning is to prevent or reduce the damage of the people from future flood damage who previously suffered from floods.
  - To achieve this, establishment of meteorological and hydrological monitoring network and early warning system based on the observed and historically accumulated data are necessary.
  - It is essential to accumulate the long-term observed information for analyzing the flood characteristics and setting up the appropriate warning criteria.
  - It is also essential that the people act properly by understanding the early warning system. Therefore installation of advanced simulation software and equipment would be effective only when community and organizations concerned have enough information and capacity to manage it.
2. Based on the above mentioned planning concept, the Study Team proposed the Draft Plan that is focused on the middle and upper reaches of Chiguaza creek, because the inundation problem of other target river basins and the lower Chiguaza river basin will be solved by the completion of the Cantarana Dam that is currently under construction.
3. The Study Team also proposed that the pilot project will be focused on the same area for setting up the warning criteria using maximum utilization of existing (historical accumulated) information. For setting up of warning criteria effectively and issuing of warning timely, the Study Team expressed the necessity of re-installation of Juan Rey station of DPAAE by own effort.
4. Community based monitoring activities will be proposed and such activities will be done by DPAAE.
5. DPAAE basically agreed with the Draft Plan, and pilot project area for flood disaster.
6. DPAAE believes that both community based and telemetric systems must be implemented in the pilot area as has been done in Limas Creek. It is very important to install the telemetric system as soon as possible without waiting for the community training, it means that for DPAAE both processes should be carried out at the same time.
7. DPAAE insists in the necessity of having parallel systems, one for the community and

another one in DPAA that should be telemetric due to the fact that DPAA needs to understand the magnitude of the emergencies in real time.

The Study Team replied that as we mentioned in 1. of this part, installation of advanced technology would be effective and will be considered by the Study Team only when community and organizations concerned have enough information and capacity to manage it.

The draft plan and the selection of pilot project areas will be concluded by JICA Headquarters after the discussion of the JICA Advisory Committee Meeting which will be held on November 28, 2006. The conclusion will be informed to Colombian side through the Study Team.

#### II. Office of the Study Team

The Study Team strongly required to DPAA that the Colombian side shall provide new office space of the Study Team after the office in Cruz Roja is closed in December, 2006. DPAA promised to provide the new office space including furniture, internet connection and high security by the beginning of January, 2007.

#### III. Others

This Minutes of Meetings have been prepared in English and Spanish. In case of any discrepancy arises in interpretation, the English text shall prevail.

#### Appendix-1 ATTENDANCE LIST

##### Colombian Side

Direction for Prevention and Attention of Emergency (DPAA)  
Study Coordinator  
Mr. Guillermo Avila  
Landslide  
Ms. Diana Arévalo  
Landslide  
Mr. Pablo Garzón  
Flood  
Ms. Carolina Rogells  
Coordinator of National & International Cooperation  
Ms. Diana Gonzalez

##### Soacha Municipal Office

Mr. Jesús Ochoa Sánchez  
Mayor  
Mr. Iván Calderón Ulloa  
Study Coordinator  
Ms. Maria Eugenia Casas  
Civil Engineer  
Buenas  
Mr. Ramón Augusto Mendoza  
Architect  
López  
Ms. Sandra Bacca  
Catastral Engineer

##### OPAD

Mr. Jaime Matiz  
Director

##### Accion Social

Ms. Carolina Porras Rodriguez  
Official Development Support

##### Japanese Side

##### Study Team

Mr. Kimio Takeya  
Team Leader/Disaster Prevention Planning  
Mr. Kazunori Inoue  
Deputy-Team Leader/Food and Debris Flow Disaster Prevention  
Mr. Fumihiko Yokoo  
Landslide and Sleep Slope Failure Disaster Prevention  
Mr. Ryo Matsumaru  
Disaster Prevention Planning  
Mr. Kenji Morita  
Meteorological Analysis

##### JICA Advisory Committee

Mr. Kazunori Fujisawa  
Landslide  
Mr. Hiroaki Sato  
Flood/Early Warning System  
Mr. Kenta Ono  
Study Planning

##### JICA Colombia Office

Mr. Kazunori Hayashi  
Resident Representative  
Mr. Naofumi Takase  
Deputy Resident Representative  
Mr. Shintaro Akiyama  
Chief of Technical Cooperation  
Mr. Oscar Emilio Angel  
Staff

Minutes of Meetings  
on  
Discussion of Progress of the Study and Selection of the Pilot Project Area  
for

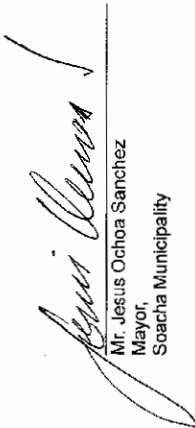
The Study on Monitoring and Early Warning System for Landslides and Floods

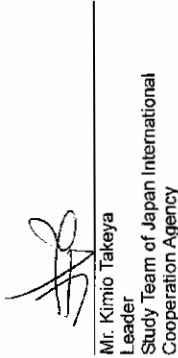
Agreed upon between  
Municipality of Soacha

and

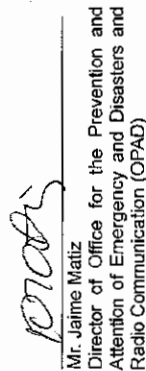
The Study Team of Japan International Cooperation Agency

Bogotá, November 20, 2006

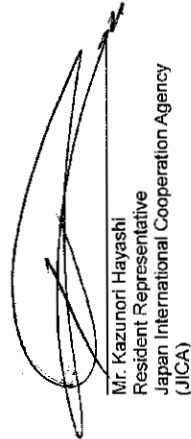
  
Mr. Jaime Matiz  
Mayor,  
Soacha Municipality

  
Mr. Kimio Takeya  
Leader  
Study Team of Japan International  
Cooperation Agency

Witnessed by

  
Mr. Jaime Matiz  
Director of Office for the Prevention and  
Attention of Emergency and Disasters and  
Radio Communication (OPAD)

Witnessed by

  
Mr. Kazunori Hayashi  
Resident Representative  
Japan International Cooperation Agency  
(JICA)

The Study Team had series of meetings with Soacha Municipality and visited sites, with the participation of The Advisory Team of Japan International Cooperation Agency (JICA) (hereinafter referred to as "the Advisory Team") for the "Study on Monitoring and Early Warning System for Landslides and Floods" (hereinafter referred to as "the Study"), which visited Colombia from November 14, 2006 to November 20, 2006. The list of the participants to the meetings is shown in Appendix 1.

During the meetings, the Study Team and the Advisory Team presented and explained to Soacha Municipality the progress of the Study, the draft Plan on Monitoring and Early Warning System for Landslides and Floods (hereinafter referred to as "the Draft Plan") and the selection of pilot project areas.

This document summarizes major items discussed in the meetings.

I. The Draft Plan and Selection of Pilot Project Area

Landslide Monitoring and Early Warning Plan and Selection of Pilot Project

1. The Study Team explained the study was carried out on Altos de Cazuca and El Divino Niño. As a result of the study, significant relation between rainfall and landslide occurrence has not been found out, and issuing early warning is impracticable. Therefore, no early warning plan was proposed, however, commencement of rainfall monitoring using rain gauges that will be installed at fire station and simplified rain gauge installed in the site in the Study is recommended to collect the information about the relationship between rainfall and landslide.
2. The Study Team explained that the implementation of the "emergency countermeasure" which makes the slope stable permanently on the targeted slope failure and landslide areas in Soacha is impracticable from the technical point of view, attached as Annex-2.
3. Soacha Municipality requested supports with some countermeasures for the safety promotion of the areas.
4. The Study Team proposed the temporary works for El Divino Niño with the purpose of reducing the damage by the small-scaled slope failures and rockfalls at the toe of the cliffs where the relocation is planned by Soacha Municipality as for the "emergency countermeasure", attached as Annex-3.
5. Soacha Municipality basically agreed with the proposal for monitoring and early warning.

  
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and pilot project area for landslide disaster, presented by the JICA Study Team along works done.

Flood Monitoring and Early Warning Plan and Selection of Pilot Project

1. The Study Team explained the following planning concepts.
  - Overall objective of the planning is to prevent or reduce the damage of the people from future flood damage who previously suffered from floods.
  - To achieve this, establishment of metrological and hydrological monitoring network and early warning system based on the observed and historically accumulated data are necessary.
  - It is essential to accumulate the long-term observed information for analyzing the flood characteristics and setting up the appropriate warning criteria.
  - It is also essential that the people act properly by understanding the early warning system. Therefore installation of advanced simulation software and equipment would be effective only when community and organizations concerned have enough information and capacity to manage it.
2. Based on the above mentioned planning concepts, the Study Team proposed the Draft Plan covering both Soacha and Tibanica River basins.
3. Soacha River basin will be selected as the pilot project area of flood disaster because the Lilano Grande area along the Soacha River is the most seriously affected by May 2006 flood.
4. Proposed monitoring and early warning system will not be advanced system such as telemeter system but conventional system in initial stage of the pilot project
5. Some of the proposed early warning system could be upgraded after information accumulation is achieved, and community based early warning and evacuation system is evaluated to be established properly during the pilot project period.
6. The Study Team proposed that the existing hydrological data of related organizations should be made use of as much as possible.  
Soacha Municipality agreed the proposal.
7. Community based activities will be proposed, and information transaction and evacuation drills will be conducted during the pilot project period and such activities will be carried out by Soacha Municipality supported by the Study Team.
8. The community based activities might be carried out in cooperation with other organizations.



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9. Soacha Municipality basically agreed with the draft plan on monitoring and early warning, and pilot project area for flood disaster.

The draft plan and the selection of pilot project areas will be concluded by JICA Headquarters after the discussion of the JICA Advisory Committee Meeting which will be held on November 28, 2006. The conclusion will be informed to Colombian side through the Study Team.

**II. Others**

This Minutes of Meetings have been prepared in English and Spanish. In case of any discrepancy arises in interpretation, the English text shall prevail.



(69)

Appendix-1  
ATTENDANCE LIST

Colombian Side

Direction for Prevention and Attention of Emergency (DPAE)

Mr. Guillermo Avila Study Coordinator  
 Ms. Diana Arévalo Landslide  
 Mr. Pablo Garzón Landslide  
 Ms. Carolina Rogelis Flood  
 Ms. Diana Gonzalez Coordinator of National & International Cooperation

Soacha Municipal Office

Mr. Jesus Ochoa Sánchez Mayor  
 Mr. Iván Calderón Ulloa Study Coordinator  
 Ms. María Eugenia Casas Civil Engineer  
 Mr. Ramón Augusto Mendoza Architect  
 López Catastral Engineer  
 Ms. Sandra Bacca

OPAD

Mr. Jaime Maitz Director

Accion Social

Ms. Carolina Porras Rodriguez Official Development Support

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 Mr. Kazunori Inoue Deputy-Team Leader/Flood and Debris Flow, Disaster Prevention  
 Mr. Fumihiko Yokoo Landslide and Steep Slope Failure Disaster Prevention  
 Mr. Ryo Matsumaru Disaster Prevention Planning  
 Mr. Kenji Morita Meteorological Analysis

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 Mr. Hiroaki Sato Flood/Early Warning System  
 Mr. Kenta Ono Study Planning

JICA Colombia Office

Mr. Kazunori Hayashi Resident Representative  
 Mr. Naofumi Takase Deputy Resident Representative  
 Mr. Shintaro Akiyama Chief of Technical Cooperation  
 Mr. Oscar Emilio Angel Staff

Technical Explanation on the "Emergency Countermeasures" for Soacha municipality

In El Divino Niño, perpendicularly slopes are formed by the activity of mining and remained as cliffs. At present, a lot of houses are built and many people lives near the toe of cliffs and upper part of the cliffs. Rock fall and slope failure frequently occur in this area even in fine weather as well as in rainy weather. Therefore, countermeasure for protecting human lives is urgently required.

A number of similar cliffs like Divino Niño are found other areas in Soacha municipality and capital district of Bogota.

These areas have suffered from not only rock falls and slope failures but also massive landslides. It is known that quarry, which was carried out until about 50 years ago, triggered the Massive landslide in Altos de la Estancia in capital district of Bogota. In Villa Esperanza in Soacha municipality, to prevent the movement of massive landslide occurred at the abandoned quarry, earth-filling works was implemented by the army. A lot of landslides including above two cases are in active right now, and the areas of landslide are developing upper and down parts of the slopes. It is quite difficult to stop the movement of landslide once activated by human activities such as quarry because the imbalance of landslide body is substantially bigger than natural case.

Topographical and geological conditions in Divino Niño are similar to the above two landslide cases. Three types of phenomena such as rock fall, slope failure and massive landslide must be studied.

The cliff in Divino Niño is covered by clayey material which was created in process of weathering of sandstone and mudstone. Cuboid blocks and boulders by development of cracks on outcrops can be observed on the cliff. In addition, open cracks are observed. The phenomena that a block that produced in the above ways moves in unity is called "rock fall" and the phenomena that several blocks leaving from significant cracks are falling down is called "slope failure".

On the other hand, open cracks observed on the cliff indicates that the entire body of slope is continuously moving from the past, therefore, it is necessary to pay attention to the

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phenomena of transition to massive landslide.

It is carefully recognized that small-scale slope cut and excavation can trigger massive landslides in which slopes have similar topographical and geological conditions to Altos de la Estancia in capital district of Bogota. In reality in Altos de la Estancia, slope cutting and excavation by human activities promoted transition phenomena, and finally triggered massive landslide.

Consequently, further cutting on slope in Divino Niño should not be carried out because the slope is regarded as in unstable condition by the former quarry activities.

To plan the emergency countermeasure for rock fall and slope failure, it is effective to form the slopes to gentle because the scale of the rock fall and slope failure phenomena is comparatively small.

However, forming the slopes to gentle is equal to removal of toe of the slope and this activity increase the risk of massive landslide. Thus it is impractical from the viewpoint of prevention of landslide.

It is obviously difficult to stop massive landslide movement once after the occurrence by human activities as massive landslide which is relatively small seen in Villa Esperanza.

It is theoretically possible to form the cliff to gentle slope after landslide prevention works like piling works and anchors, but these countermeasure works are quite expensive. It is a basic rule that these expensive countermeasures should be done after completion of counter-weight filling works at the toe of landslide.

The counter-weight filling works would be large-scale work on flatland where many houses exist at present and it would be similar to recovery work to the original land shape.

Therefore the "emergency countermeasures" in Divino Niño is impracticable to implement from the technical viewpoints.

Since the scale of the slopes in Villa Esperanza and La Capilla in Soacha municipality is larger than Divino Niño, it is clear that the conclusion will reach the same as Divino Niño if we investigate the emergency countermeasures.

As for the landslide in Villa Esperanza, the landslide movement is observed to be quite slow, and the emergency countermeasure is not required.

As the conclusion of technical consideration, the "emergency countermeasures" in any areas in Soach is impracticable to implement.



Proposal of Urgent Temporary Works

In the study, the hazard map will be prepared based on the study on rockfalls and failures in the study area, El Divino Nino and Altos de Cazuca. The hazard map will show the Rockfall/Slope Failure Critical Zone (Critical Zone). The Japanese standard is applied to the decision of the Critical Zone (Figure 1). The Critical Zone is defined as the followings.

- Slope angle is not less than 30 degree, and slope height is not less than 5m
- Distance from the slope toe is within two times of height of slope.
- Critical area above the slope (will be proposed in the Study)

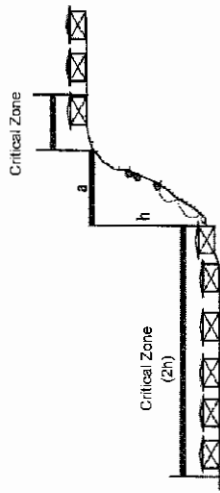


Figure 1 Rock fall/Slope Failure Critical Zone

As for massive landslide, criteria for preparation of hazard map will be proposed in the Study.

Soacha municipality is carrying out relocation plan from landslide disastrous areas. According to the Soacha municipality, the progress of the relocation plan such as reservation of the settlement land, selection of houses to be relocated is on going at the moment. The Study Team will recommend to implement the plan based on the hazard map prepared by the Study Team.

El Divino Nino area is the most critical area in the Study Area since rock falls and

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slope failures are occurring most frequently in the Study Area, and therefore El Divino Nino shall be given high priority in the relocation plan.

Since there are huge numbers of houses to be relocated in this area, the relocation seems to take time.

Accordingly, the Critical Zone shall be classified into two zones; Emergency Zone (the area within 10 m or 2 rows of houses from the toe of the slope, Figure 2) and the remaining (at the end of emergency zone and above the slope). In the relocation plan of Soacha municipality, this Emergency Zone shall be given the first priority.

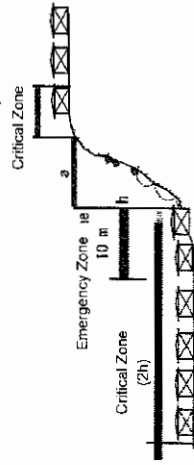


Figure 2 Emergency Zone

The Study Team will recommend temporary works such as temporary wall using gabions in the Emergency Zone after completion of relocation from the Emergency Zone. The execution of works may be done by the Study Team during the pilot project period.

The purpose of this temporary works is to reduce the damage by small-scale slope failures and rockfalls, but it does not secure the safety of remaining area. The detailed of locations of the works will be decided in the Study.

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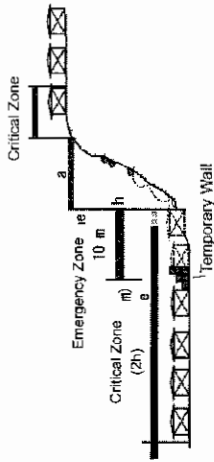


Figure 3 Example of Temporary Works

Soacha municipality shall continue to implement the relocation plan of the remaining area, even when the temporary works is completed.

The Study Team strongly recommends that Soacha municipality should execute necessary activities to protect the Critical Zone from peoples' occupation.

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Minutes of Meetings  
On  
Interim Report  
For  
The Study on Monitoring and Early Warning System for Landslides and Floods  
Agreed upon between  
Direction for Prevention and Attention of Emergency, Soacha Municipal Office  
And  
The Study Team of Japan International Cooperation Agency

Bogotá, December 5, 2006

Mr. Guillermo Ávila  
Study Coordinator  
Direction for Prevention and Attention of  
Emergency (DPAE)  
Capital District of Bogotá

Mr. Kazumori Inoue  
Deputy Team Leader  
Study Team of Japan International Cooperation  
Agency

Mr. Avian Calderón Ulloa  
Study Coordinator  
Soacha Municipality

corrected considering the DPAAE comments and would be submitted to both counterparts next week.

8. Others

This Minutes of Meetings have been prepared in English and Spanish. In case of any discrepancy arises in interpretation, the English text shall prevail.

1. The Study Team submitted the Interim Report of the Study (hereinafter referred as "the draft Report") and explained the content of the draft Report to the Colombian side until December 5, 2006.

2. DPAAE pointed out that some descriptions about other related organizations are direct, and would cause misunderstanding of those organizations and their products. The Study Team said such descriptions will be revised in an appropriate way as possible it can.

3. DPAAE pointed out that information source of some table and figures are not indicated. The Study Team said they would be added and revised as possible it can.

4. DPAAE recommended the Study Team should clarify the description of final products such as maps, scales, type of instruments and monitoring and early warning system of the two pilot project areas as well as the remaining Study Area in order to have clear definitions. The Study Team agreed that they should be included in the Report together with the technical limitations.

5. DPAAE explained that one of the main policies of DPAAE is implementation of the telemeter system in the Tunjuelo river basin for landslide and flood as well as local floods in creeks. The Study Team explained that in the Study Area, people's participation and understanding of the hydrological data is at first to be established and after that, such telemeter system should be considered if it is necessary. However, the Study Team understood that the Tunjuelo river basin-wide system is the DPAAE's important interest and such issue shall be considered in the description of IICA reports.

6. DPAAE wanted to clarify the methodology for community's involvement in the pilot projects. The Study Team said it is responsible for the hydrological equipment installation in the pilot projects, at the same time DPAAE would study the mechanism to carry out community-based activities. And it was proposed that community training regarding to reading and observation will be done by DPAAE and the supervision over the data collection will be done by the Study Team and this will be discussed with DPAAE at beginning of next year.

7. Soacha Municipality accepted the draft Report. The Study Team said the draft Report would be

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Annex-1  
ATTENDANCE LIST

Colombian Side

Direction for Prevention and Attention of Emergency (DPAE)

Mr. Guillermo Ávila Study Coordinator  
 Ms. Diana Arevalo Coordinator of Landslide and Flood  
 Ms. Carolina Rogelís Flood  
 Mr. Pablo Garzón Landslide  
 Ms. Diana Gonzalez Logistics

Soacha Municipal Office

Mr. Iván Calderón Ulloa Study Coordinator  
 Ms. María Casasbuenas Landslide  
 Ms. Sandra Bacca Geographical Analysis

Japanese Side

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Mr. Kazunori Inoue Deputy-Team Leader/Flood and Debris Flow Disaster Prevention  
 Mr. Ruben Kanashiro Coordinator

JICA Colombia Office

Mr. Kazunori Hayashi Resident Representative  
 Mr. Naofumi Takase Deputy Resident Representative  
 Mr. Shintaro Akiyama Chief of Technical Cooperation  
 Mr. Oscar Emilio Angel Coordinator of Technical Cooperation

Minutes of Meetings  
 On  
 Progress Report 2  
 For

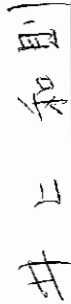
The Study on Monitoring and Early Warning System for Landslides and Floods

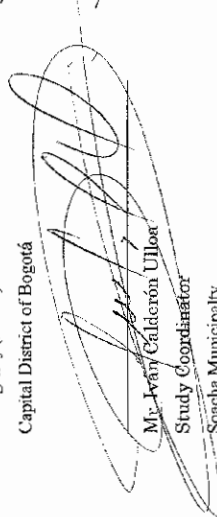
Agreed upon between  
 Direction for Prevention and Attention of Emergency, Soacha Municipal Office  
 And

The Study Team of Japan International Cooperation Agency

Bogotá, July 31, 2007

  
 Mr. Guillermo Ávila  
 Study Coordinator  
 Direction for Prevention and Attention of  
 Emergency (DPAE)  
 Capital District of Bogotá

  
 Mr. Kazunori Inoue  
 Deputy Team Leader  
 Study Team of Japan International Cooperation  
 Agency

  
 Mr. Iván Calderón Ulloa  
 Study Coordinator  
 Soacha Municipality

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said they would discuss more internally about the communication tool for the pilot project.

DPAE expressed her concern about the sustainability of Moralba rainfall station because the rainfall data would be monitored by security guards who not belong to the local community. The Study Team answered that the important thing is the people upstream is cooperative for the downstream and the Moralba (school) station was selected considering not only hydrological good position but also the high security during the pilot project period, also the rainfall gauge can be used for education to students.

3. Soacha city accepted the contents of the Report. The technical comments on the report from the city are as follows,

Soacha city explained clearly that in fact the city had been facing some difficulty on the relocation process until beginning of this year; however, at present the city has been doing the best efforts for the relocation process.

Soacha city explained to the Study Team that the city regarded "El Papiro" as inappropriate area for the relocation because water supply and sewerage system, which shall be installed under the EAAB master plan for Soacha, had to be installed in advance.

Soacha city questioned about the time of rainfall monitoring for landslide by school. The Study Team answered that the observation time three time a day is basically specified, but, actually the observer will modify and write the exact time when they observe.

Soacha city explained that the regarding the Study Team's proposal on the investment from public (city) for the private property for evacuation center, the city has difficulty for such investment to any private facility because of laws. The study team suggested discussing about the financial source further.

#### 4. Others

This Minutes of Meetings have been prepared in English and Spanish. In case of any discrepancy arises in interpretation, the English text shall prevail.

1. The Study Team submitted the Progress Report 2 of the Study (hereinafter referred as "the Report") on July 23, 2007 and explained the content of the draft Report to the Colombian side on July 25 and 30, 2007.

2. DPAE accepted the contents of the Report. The technical comments on the report from DPAE are as follows,

#### 2.1 Landslide

DPAE mentioned regarding page 2-1-8, in order to interpret the monitoring results by topographical survey, the criteria and necessary accuracy for the determination of critical condition of the phase III area are to be provided in the final report. The Study Team said that accuracy of the information and analysis of the monitored data in the pilot project shall be written in the draft final report.

DPAE mentioned that regarding the simple crack gauge and tiltmeter monitoring, the monitored result shall be interpreted carefully because such monitoring is quite local. The Study Team said that the monitored results shall be evaluated comprehensively referring to all monitoring results.

#### 2.2 Flood

DPAE mentioned that the three (3) target areas for early warning in Chiguaza creek in Table 2-1-1 should be shown on figure. The Study Team said such figure shall be included in the draft final report.

DPAE mentioned that monitoring frequency by people proposed in Table 2-1-6 is necessary, however, DPAE is afraid of the people would be boring. The Study Team suggested that the important thing is that DPAE will try to let the people have such monitoring experience in the first stage.

DPAE mentioned that for the communication tool between observers at monitoring station and other organizations, handy radio is not appropriate because of DPAE policy. The Study Team explained the case of Soacha to DPAE regarding the usage of radio system. DPAE

Annex 1  
ATTENDANCE LIST

Colombian Side

Direction for Prevention and Attention of Emergency (DPAE)

Mr. Guillermo Ávila  
Study Coordinator  
Flood  
Ms. Carolina Rogelis  
Landslide  
Ms. Diana Alevaro

Soacha Municipal Office  
Mr. Iván Calderón Ulloa  
Ms. Sandra Vasquez

Japanese Side

Study Team

Mr. Kazunori Inoue  
Mr. Ryo Matsumaru  
Deputy-Team Leader/Flood and Debris Flow Disaster Prevention  
Disaster Prevention Planning

Minutes of Meetings

on

Discussion of Progress of the Study

for

The Study on Monitoring and Early Warning System for Landslides and Floods  
Agreed upon between

Direction for Prevention and Attention of Emergency (DPAE)  
Capital District of Bogotá,  
Municipality of Soacha

and

The Study Team of Japan International Cooperation Agency

Bogotá, November 9, 2007

Mr. Guillermo Ávila  
Study Coordinator  
Direction for Prevention and Attention of  
Emergency (DPAE)  
Capital District of Bogotá

Mr. Kimio Takeya  
Leader  
Study Team  
Japan International Cooperation Agency

Witnessed by

Mr. Jaime Matiz  
Director of Office for the Prevention and  
Attention of Disasters (OPAD)

Witnessed by

Mr. Kazunori Hayashi  
Resident Representative, Colombia Office  
Japan International Cooperation Agency

The Study Team had series of meetings with Direction for Prevention and Attention of Emergency (DPAE), Capital District of Bogotá and Soacha Municipality, and visited sites, with the participation of the Advisory Team of Japan International Cooperation Agency (JICA) (hereinafter referred to as "the Advisory Team") for the "Study on Monitoring and Early Warning System for Landslides and Floods" (hereinafter referred to as "the Study"), which visited Colombia from November 3, 2007 to November 10, 2007. The list of the participants to the meetings is shown in Annex 1.

During the meetings, the Study Team and the Advisory Team presented and explained to DPAE and Soacha Municipality the progress of the Study.

This document summarizes major items discussed in the meetings.

## 1. Landslides

### 1.1 Bogota Monitoring

The Study Team concluded that the mass movement is not so fast and warns that in case of movement the community would have enough reaction time to evacuate. However the landslide area is expanding annually toward upper area, so that is recommended to continue the monitoring activities.

DPAE should continue monitoring works after the Study finishes, as it is defined in "Action Plan for the Risks Mitigations in the Sector of Altos de la Estancia" that is in execution under coordination of DPAE and counts with the participation of different district entities related with the sector. In case any movement was found on survey points, site reconnaissance should be carried out around the point and the frequency of monitoring should be increased. If significant effects of the landslide are recognized around the point, Phase II and Phase III area should be reconsidered.

DPAE made presentation to the Study Team on Nov. 7, 2007 about the mitigation measures in Altos de la Estancia. According to this, DPAE is in the detailed design phase of countermeasures, based on the proposed measures in study done by the engineering company Ingenieria y Geotiesgos in 2005 year, that includes contention works (anchoring), underground drainage measures and dike in the slope base.

The Advisory Team recommends DPAE to consider the possibility of having an international advisory due to the magnitude and complexity of foreseen stabilization works. Furthermore,

as the technical transfers have not been sufficient through the Study, the Advisory Team recommends also DPAE integrate the past study results and improve the study policy in order to increase DPAE's capacity of landslide study.

In this Study, some installed monitoring equipment such as bench mark and simple crack gauge were destroyed. For the successful monitoring, it is recommended to emphasize inside the action plan defined by DPAE, the development of education activities directed to the community incorporating the topics related with the landslide, so like this, environmental aspects.

### 1.2 Soacha

#### (1) Monitoring

Soacha City should continue the monitoring works on rain gauges which were installed in Altos de Cazuca and Divino Nino and the landslide records should be continued.

#### (2) Temporary Works

The Study Team sincerely expresses fully respects for the Soacha City's efforts on the relocation from landslide emergency zone.

The Study Team informed the Soacha City that unless the Study Team receives the request letter on the temporary works by November 20, 2007, the works can not be implemented in this Study. Any works will not be implemented beyond the Japanese fiscal year of 2007.

The Soacha City promised to transfer initiative to implement the temporary works to the new Mayor who will be in office from January 1, 2008 and his administration.

The Soacha City understood the above situations and promised to do the best as much as possible.

Since the above all conditions are confirmed by both the Soacha City and the Study Team, the Study Team has decided to postpone the implementation schedule.

Even after the temporary works are completed, the Study Team does not guarantee the safety of the remaining critical zone in Divino Nino. Therefore the Study Team recommended that relocation program should be continued by the Soacha City.

#### (3) Other Area

The Study Team also recommended that the houses in Critical Zone in La Capilla shown in the detailed hazard map should be relocated through same steps as Divino Nino. Also another



critical zone in Soacha City should be set up around hazardous steep slopes in abandoned quarries, and plan of relocation from the critical zones should be made as soon as possible.

Until the relocation programs completed, peoples in critical zones should be informed that they are in critical zones.

(4) Other recommendations

The steep slope after the abandoned quarry site has unstable rocks having several meters diameters, which could fall down toward the houses below the slope. In the backside of the slope there is landslide area, so that slope cutting can not be conducted. This is an urgent issue, so that the Soacha city has been conducting taking out of large rock by blast above the houses as a temporary measure. There is possibility that remaining rocks fall down to the houses. Also it is anticipated that in the slope next to the taken out rock layer there are other unstable rocks, in this sense substantial countermeasure such as relocation is necessary and such program should be promoted. Soacha City must implement actions to prevent new and extended residential houses for these areas according to Law 388 of 1997, Decree 564 de 2006 and POT de Soacha.

2. Floods

2.1 Common Aspects

The early warning criteria tentatively proposed by the Study Team are only estimations given the conditions derivate from scarcity of registers. Such rainfall criteria and waterlevel should be updated to precise their reliability through the use of registered information by the community even after the Study, therefore those tentative criteria are not definitive values.

After the Study, DPAAE and Soacha City will conduct the following activities, (a) Continuous monitoring, (b) Studies for early warning criteria using the monitored data, (c) Establishment of more reliable early warning plan, (d) Dissemination of the plan to the communities, based on the recommendation of the Study Team.

Even self-recording type observation equipment installed, manual observation by community people should be continued in parallel.

2.2 Bogota

The proposed flood early warning plan is properly working just under the condition that there is no significant clogging which is the cause of the past serious flood events. The flooding such as

May 1994, which took place by the clogging of the structures in the zone, can not be mitigated by any early warning system.

The proper maintenance of the JICA installed equipment is the only condition for providing JICA's equipment to DPAAE.

Integration of the community monitoring and the telemeter monitoring systems in Bogota is the policy of DPAAE and one of the important strategies for the risk management of floods. DPAAE considers of high importance to continue with the community monitoring in the catchment of Chiguaza. The recommendation of the monitoring point in the catchment done by the Study Team will constitute the starting point for the system. When there will be more information such as the monitored data, information from executed works by other district entities, DPAAE will review and revise the location of the monitoring if necessary.

Based on the above understanding, DPAAE agreed to start the following activity recommended by the Study Team.

- Continuation of community people's water level monitoring of staff gauge at Molinos and La Gloria
- Starting and continuation of community people's water level monitoring of El Hoyo bridge with coordination of the related communities
- Conducting same timing monitoring at Molinos and El Hoyo bridge

With confirmation of above, the Study Team will install the ultrasonic type sensor at Molinos. Even after the installation of ultrasonic type waterlevel sensor, DPAAE agreed to continue the people's waterlevel measurement by reading of staff gauge.

The early warning criteria, 20 mm per 30 minutes at Moralba station and the waterlevel 3.6 m at Molinos Station are only estimated values based on the assumption, and should be modified as early as possible using the observation results, for which DPAAE will integrate this data to the existing flood alert system in the city, including the constant revise to calibrate and adjust the alert criteria.

Since the early warning criteria can be modified only using observed waterlevel relationship, the relation between the waterlevel in the past flooded area and the upstream should be monitored continuously.

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2.3 Soacha

It is evaluated that the capacity and awareness of Soacha City officials and community on flooding of Soacha River is significantly increasing through the Study activities, such as community workshops, evacuation drill and information transfer drill.

Based on this recognition, it is considered that Soacha City and community have capacity to operate the advanced equipment, and therefore the Study Team will upgrade the waterlevel gauge at Ladrillera Santa Fe to ultrasonic type.

Soacha City promised to continue the people's waterlevel measurement at Ladrillera Santa Fe, even after the installation of ultrasonic type.

Since the display of logger was installed in the security house at the gate of the brick factory, it is difficult to monitor the observed waterlevel by the downstream community people.

Considering this situation, the Study Team requested to Soacha City to do necessary arrangement to be able to observe the display of logger by the people living in the downstream area.

The early warning criteria, 7.5 mm per 1 hour at San Jorge station and the waterlevel 2.2 m at Fusunga Station, etc. are only estimated values based on the assumption and should be modified as early as possible using the observation results by Soacha City.

Since the early warning criteria can be modified only using observed waterlevel relationship, rainfall and waterlevels should be monitored continuously.

It is recommended that the observer at Fusunga waterlevel station checks the rainfall gauge at San Jorge.

The activities carried out in this Study, such as monitoring of rainfall, waterlevel and riverbed elevation, information transfer/evacuation drill, etc.) should be continued by the Soacha City's initiative. Soacha City and community will take necessary actions and/or measures if necessary things raise in the activities.

3. Others

This Minutes of Meetings have been prepared in English and Spanish. In case of any discrepancy arises in Interpretation, the English text should prevail.

Annex-1  
ATTENDANCE LIST

Colombian Side

DPAE

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Ms. Carolina Rogelís  
Ms. Diana Gonzalez

Study Coordinator  
Landslide  
Flood  
Coordinator of National & International Cooperation

Soacha Municipal Office  
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Ms. Sandra Vasquez  
Mr. Oscar Gomez  
Ms. Angela Alfonso

Study Coordinator  
Civil Engineer  
Secretary of Finance  
Technical Operator

Cundinamarca  
Mr. Ernesto Pineda

Secretary of Cundinamarca Government

OPAD

Mr. Jaime Matiz

Director

Japanese Side

Study Team

Mr. Kimito Takeya  
Mr. Kazunori Inoue  
Mr. Fumihiko Yokoo  
Mr. Ryo Matsumaru  
Ms. Paulina Chaverri  
Mr. Daigo Yano

Team Leader/Disaster Prevention Planning-1  
Deputy-Team Leader/Flood and Debris Flow Disaster Prevention  
Landslide and Steep Slope Failure Disaster Prevention  
Disaster Prevention Planning-2  
Community Activity  
Design/Construction Supervision

JICA Advisory Team  
Mr. Kazunori Fujisawa  
Mr. Hiroaki Sato  
Mr. Osamu Hattori

Landslide  
Flood/Early Warning System  
Study Planning

JICA Colombia Office  
Mr. Kazunori Hayashi  
Mr. Naofumi Takase


Resident Representative  
Deputy Resident Representative

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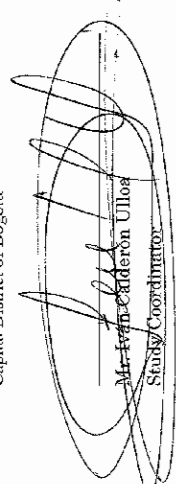
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Minutes of Meetings  
On  
Draft Final Report  
For  
The Study on Monitoring and Early Warning System for Landslides and Floods  
Agreed upon between  
Direction for Prevention and Attention of Emergency, Soacha Municipal Office  
And  
The Study Team of Japan International Cooperation Agency

Bogotá, January 31, 2008

  
Mr. Guillermo Anla  
Study Coordinator  
Direction for Prevention and Attention of  
Emergency (DPAE)  
Capital District of Bogotá

井上 和 則  
Mr. Kazumori Inoue  
Deputy Team Leader  
Study Team of Japan International Cooperation  
Agency

  
Mr. Ivan Calderon Ulloa  
Study Coordinator  
Soacha Municipality

1. The Study Team submitted the Draft Final Report of the Study (hereinafter referred as "the Report") on January 29, 2008 and explained the content of the Report to the Colombian side on January 30 and 31, 2008.
2. The Study Team explained the schedule until Final Report submission to Colombian side. The Study Team asked DPAE and Soacha to submit their comments to the Study Team until February 13, 2008.
- DPAE expressed that DPAE would prepare the comments on the Report until February 6, 2008 and submit to the Study Team and would like to confirm the modified Report in February.
3. DPAE confirmed the Report reflected the discussion on November 2007 with the Monitoring Mission and basically accepted the contents of the Report. The technical observations on the report from DPAE during the discussion are as follows.
  - DPAE requested that the methodology of debris flow should be described more in detail in the Report for the future application in Bogota area and comparison with other methodologies.
  - DPAE requested that the data including monitored data generated in the Study should be provided in digital format as much as possible.
4. Soacha city accepted the contents of the Report. The technical comments on the report from the city are as follows.
  - Soacha city requested that recommendation on critical zone other than relocation program should be included in the Report to find out any possible solution.
  - Regarding observations other than the above, Soacha city will prepare comments on the Report and submit until February 11th, 2008.



5. Others  
This Minutes of Meetings have been prepared in English and Spanish. In case of any discrepancy arises in interpretation, the English text shall prevail.



Annex-1  
ATTENDANCE LIST

Colombian Side

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Ms. Paulina Chaverri

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Mr. Daigo Yano

Design and Construction Supervision

