# Appendix 2

*Minutes of meeting*

**MINUTES OF MEETING**
**ON FIRST JOINT COORDINATION COMMITTEE FOR**
**ASSISTANCE FOR STRENGTHENING AND CAPACITY BUILDING OF**
**PROFESSIONAL TECHNIQUES FOR THE CONTROL AND MITIGATION OF**
**LANDSLIDE IN TEGUCIGALPA METROPOLITAN AREA**
**AGREED UPON AMONG**
**THE UNIVERSIDAD NACIONAL AUTONOMA DE HONDURAS (UNAH),**
**THE ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL (AMDC) AND**
**THE JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

The Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the JICA Consultant Team (hereinafter referred to as "JCT") and the Experts (hereinafter referred to as "the Experts") to the Republic of Honduras on the Assistance for Strengthening and Capacity Building of Professional Techniques for the Control and Mitigation of Landslide in Tegucigalpa Metropolitan Area (hereinafter referred to as "the Project") in order to perform with the Universidad Nacional Autónoma de Honduras right through the Science Faculty with the Honduran Earth Science (hereinafter referred to as UNAH) and Alcaldía Municipal del Distrito Central (hereinafter referred to as "AMDC").

As a result of discussions on this joint coordination committee, all parties agreed to the matters described on the attached sheets.

Tegucigalpa, May 21, 2015

Dr. Takeshi Kuwano
Leader of the Consultant Team
Japan International Cooperation Agency

Dr. Nabil Kawas
Dean of Science Faculty
Universidad Nacional Autónoma de Honduras

M.A.P. Cinthia Borjas Valenzuela
Coordinator UMGIR
Alcaldía Municipal del Distrito Central

# Annex 1

## I. INTRODUCTION OF THE PREVIOUS JICA-JSPS PROJECT

The Expert explained the previous project "Hazard Geology focusing on the Landslides in Tegucigalpa", which JICA and Japan Society for the Promotion of Science (JSPS) implemented for Universidad Politécnica de Ingeniería (hereinafter referred to as "UPI") in 2012 to 2014, in order to understand the significance and flow of the Project.

## II. APPROVAL OF THE PROJECT

The members at the Joint Coordination Committee agreed the contents of the Project and accepted the responsibilities by the part of UNAH and AMDC for the progress of the Project explained by JCT. Details of methodology will be adjusted during the Project with mutual agreement.

## III. APPROVAL OF THE PLAN OF TECHNICAL TRANSFER TO UNAH AND AMDC

The members at the Joint Coordination Committee agreed the --Activity Plan and Policy of the Technical Transfer must be conducted as follows:

### 1. Target Organization for Technical Transfer

a) UNAH, especially Instituto Hondureño de Ciencia de la Tierra (hereinafter referred to as IHCIT)

b) AMDC, especially Unidad Municipal de Gestión Integral de Riesgo (hereinafter referred to as UMGIR), Comité de Emergencia Municipal (hereinafter referred to as CODEM) and Gerencia de Evaluación de Riesgo (hereinafter referred to as GER)

### 2. Contents of Technical Transfer

**a) UNAH**

- Planning of landslide investigation
- Photo interpretation for detail landslide distribution map
- Arrangement of hazard factors
- Hazard (susceptibility) evaluation and hazard mapping (Landslide susceptibility mapping)
- Data arrangement of risk objects by GIS
- Preparation of landslide inventory

**b) AMDC**

- Establishing an organization to implement landslide countermeasures

- Utilization of landslide hazard map (Landslide susceptibility map)
- Examination of application of inventory and hazard map
- Technology of landslide monitoring, especially for monitoring by extensometer, inclinometer, piezometer and pluviometer
- Method of arranging monitoring data and utilization for landslide disaster mitigation
- Method of operation, maintenance and management of the countermeasures, especially for drainage channel, drainage well and retaining wall

## IV. DETERMINATION OF PILOT SITES

The pilot sites for the preparation of a hazard map and an inventory on landslides in the Project were determined as follows;

- Col. Nueva Santa Rosa
- El Edén (high part) La Cabaña
- José Ángel Ulloa

## V. PROPOSAL OF A COLLABORATIVE STRUCTURE FOR LANDSLIDE COUNTERMEASURES AMONG AMDC, UNAH AND OTHER ORGANIZATIONS

The members at the Joint Coordination Committee agreed to perform the collaborative structure for landslide countermeasures among AMDC, UNAH and other organizations as follows:

### 1. A Collaborative Structure For Landslide Countermeasures Between AMDC And UNAH

a) This collaborative structure, which has to be sustainable even after the Project, will be established to implement landslide measures in Tegucigalpa Metropolitan Area.
b) AMDC and UNAH will held several meetings to understand the current landslide situations, to identify the scope of support, to discuss the problems involved and their solutions and to determine the budget, manpower and the necessary structure.
c) Finalized recommendations will be issued as a Memorandum of Understanding between AMDC and UNAH at the final stage of the Project.

### 2. A National Association on Landslide Research Organizations In Honduras

a) The research association will provide technical support and perform technical studies for best comprehension of complicated landslides and its measures at national level.
b) UNAH will play the central role in the association through alliances with UPI, the Comisión Permanente de Contingencias (COPECO) and other organizations.

c) Several meetings will be held by the above mentioned organizations to know and understand the current measurements of landslides, to identify issues at research institutes in Honduras, to discuss landslide-prevention policies and to establish the researcher association.
d) Final recommendations will be issued in a Memorandum of Understanding among the related organizations at the final stage of the Project.

## VI. DISCUSSION

Ms. Jance Carolina Funes, UPI, mentioned that UPI is grateful to be a part of the Project and agreed to start the collaborative structures which would establish the role corresponding to each part for next steps.

Ms. Rosa María Bonilla, Secretaría de Infraestructura y Servicios Públicos (hereinafter referred to as INSEP), mentioned that landslides in a river and a road should be included into the Project. JCT and Dr. Nabil Kawas, IHCIT, explained that the Project is Technical Transfer at this moment and apply to the selected pilot sites among IHCIT, AMDC and others.

Ms. Arlette Montero, COPECO, mentioned that the landslide inventory that JCT will formulate is availed at district level as well as national level.

Ingeneer Aníbal Godoy mentioned that the most important thing is the technical transfer of the knowledge for younger generation, and proposed that UNAH has to be the leader in this new knowledge. Dr. Nabil answered that UNAH has qualified staffs and are receiving the support of JCT to have an academic at level of licentiate of Geology program according to their experience and preparation, to open the Geology career at UNAH.

Annex 2 is the List of members who attended the Joint Coordination Committee.

## Annex 2

**List of members who attended the Joint Coordination Committee**

**<HONDURAS SIDE>**

**Universidad Nacional Autónoma de Honduras (UNAH)**

Nabil Kawas (Dean, Sciences Faculty)
Manuel Rodriguez (Teacher/Researcher, IHCIT)
Maynor Ruiz (Geologist, IHCIT)
Elisabeth Espinoza (Teacher/Researcher)

**Alcaldia Municipal del Distrito Central (AMDC)**

Cinthia Borjas Valenzuela (Coordinator, UMGIR)
Marco R. Funes (Project Evaluator, UMGIR)
Rigoberto Rivera (Gerente, CODEM)
Jose Ramón Anariba (Alerta Temprana, CODEM)
Ferid Gabrie (Industrial Engineer, CODEM)
Gloria Rivera (Engineer, CODEM)
Karen Cubas (Gerente, GER)
Vera S. Véliz (Consultant)

**Other Ministries/Organizations**

Jance Carolina Funes (Rector, UPI)
Aníbal Godoy (Geologist, IGH-UPI)
Arlette Montero (Prevenction Chief, COPECO)
Rosa María Bonilla (Sub-Chief CHN, INSEP)
Juan José Alberto (Architect, INSEP)
Jose Johel Campos (Project Coordinator, INSEP)
Danira Andrews (Coordinator, INSEP)

**<JAPANESE SIDE>**

**JICA**

Tomoyuki Odani (Representative, JICA Honduras Office)

**JICA Expert**

Hiromitsu Yamagishi (GIS technology)
Kiyoharu Hirota (Investigation/inventory)

Hiroshi Yagi (Hazard analysis)
Go Sato (Topographic identification)

JICA Consultant Team
Takeshi Kuwano (Team leader)
Satoru Tsukamoto (Countermeasure technology)

**MINUTE OF MEETING**
**ON THE SECOND JOINT COORDINATION COMMITTEE FOR ASSISTANCE FOR STRENGTHENING AND CAPACITY BUILDING OF PROFESSIONAL TECHNIQUES FOR THE CONTROL AND MITIGATION OF LANDSLIDE IN TEGUCIGALPA METROPOLITAN AREA**
**AGREED UPON AMONG**
**THE UNIVERSIDAD NACIONAL AUTONOMA DE HONDURAS (UNAH), THE ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL (AMDC) AND THE JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

The Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the JICA Consultant Team (hereinafter referred to as "JCT") and the Experts (hereinafter referred to as "the Experts") to the Republic of Honduras on the Assistance for Strengthening and Capacity Building of Professional Techniques for the Control and Mitigation of Landslide in Tegucigalpa Metropolitan Area (hereinafter referred to as "the Project") in order to conduct with the Universidad Nacional Autónoma de Honduras right through the Instituto Hondureño de Ciencias de la Tierra (hereinafter referred to as UNAH) and Alcaldía Municipal del Distrito Central (hereinafter referred to as "AMDC"). As a result of discussions on this joint coordination committee, all parties agreed to the matters described on the attached sheets.

Tegucigalpa, September 9, 2015

**Dr. Takeshi Kuwano**
Team Leader
JICA Consultant Team
Japan International Cooperation Agency

**Dr. Nabil Kawas**
Dean
Faculty of Science
Universidad Nacional Autónoma de Honduras

**M.A.P. Cinthia Borjas Valenzuela**
Coordinator
Unidad Municipal de Gestión Integral de Riesgo
Alcaldía Municipal del Distrito Central

**Msc. Lidia Torres Bernhard**
Teacher/Researcher, IHCIT
Faculty of Science
Universidad Nacional Autónoma de Honduras

## I. Activities for the Project in UNAH

Engineer Lidia Torres Bernhard, UNAH representative explained the activities UNAH has implemented for the Project from April to September 2015 as follows:

- Meeting for activity planning for landslide investigation of the pilot sites.
- ArcGIS workshop and conferences in Global Dynamics: its relationship with landslide, Geology, applied Geophysics and ArcGIS
- Individual photo interpretation practices for the pilot sites.
- Consensual image of photo interpretation for every pilot site (El Edén, Nueva Santa Rosa)
- Digitalization of consensual photo interpretation for every site of study.
- Verification of photo-interpretacion through field visits to both sites.
- Survey application to detection of risk perception and susceptibility stage of exposed elements to risk.
- Installation Process for GIS-Server and GIS Lab.

## II. Activities for the Project in AMDC

Engineer Marco Fúnes, from AMDC explained the activities AMDC have implemented during the period April to September 2015 for the Project as below;

Establishing an Organization to Implement Landslide Countermeasures

- Prospection management intends to avoid or mitigate future disasters into the Metropolitan zone of Tegucigalpa. This project helps AMDC to establish an alliance with UNAH and other institutions to front in common and work on properly and opportunely countermeasures to help in prevention and risk mitigation of landslide hazard.
- Municipality counts on with the offices of CODEM, UMGIR, GER and UGA for risk managements, and their staff is receiving training by this Project in more techniques of risk management in Landslide Risk Management which is a new item for AMDC.

Utilization of landslide hazard map (Landslide Susceptibility Map)

AMDC has improvements to grant construction permissions in general, regarding the risk determination besides AMDC use the multi-hazard map, the landslide map elaborated by JICA; also histograms for hazard evaluation, geomorphology and basins, project susceptibility analysis LOTTI map from Italian Technical Cooperation and aerial photography from Google with coordination

Monitoring of El Berrinche and Reparto Landslides.

- AMDC now are capable to produce more efficient monitoring and report elaboration with graphics when calculating the collected data with the new software provided by JCT.
- AMDC has now partially the required electrical equipment for cleaning and maintenance of radial pipes in the water recollection Wells at El Berrinche and Reparto, yet frequently our devices are affected by delinquents.

- The collected information is always transferred to JICA and from September 2015. UMGIR will also involve in this process.
- By now AMDC is studying the possibility to involve GER for maintenance of El Bambú landslide.

## III. Proposal for the Geology Program in UNAH

Dr. Takeshi Kuwano in his presentation explained the proposal of the Geology Program at UNAH, to the members at the Joint Coordination Committee, who agreed in that matter:

- Establish that contents regarding to "Earth Basic Sciences as a Base for Geology" shall be included in subject Physics Geology (Geo 281)" also in optative subject of Nature Science or in this case "Science of the Earth"(Fs 001)".
- Make sure to utilize during all learning process of the GIS or Geography Information Systems provided by JICA Project as transversal ax in all the Geology Career, emphasizing this in subjects such as "Geomántica (Geo 246)" and cartography, aerial photography and satellite images (GIS Advanced) (Geo 459)".
- To make sure the proponed contents by JICA expert regarding Environmental Geology shall be taught into subject "Environmental Geology (5110)"to understand the relationship between geology and human life.
- Add the subject "Slope Disaster Prevention" as an optative subject for Geology and Civil Engineering with the purpose to grasp phenomenon, countermeasure and management of slope disasters.
- Increase teachers of geology and geological engineering
- Collaborate/cooperate with other faculties and organizations

## IV. Proposal for Implementation System on Landslide Countermeasures in AMDC

Dr. Takeshi Kuwano, through his presentation explained to the members at the Joint Coordination Committee the proposal of implementation system on landslide countermeasures in AMDC, which was agreed as showed below:

- Strengthen a cooperation system between CODEM and UMGIR in emergency cases.
- Secure geological/geotechnical engineers.
- Establish systems for data collection and data application.
- Strengthen a support system for CODEM.
- Strengthen capacity of UMGIR for landslide management.
- Strengthen capacity of CODEM for maintenance and countermeasures of landslide.

## V. Collaborative Structure for Landslide Countermeasures among AMDC, UNAH and Other Organizations

Engineer Oscar Elvir Ferman, UNAH representative, in his exposition to the members at the Joint Coordination Committee brought the need to establish one collaborative structure for landslide countermeasures among AMDC, UNAH and other organizations; which is accepted as follows.

1. UNAH's central role: IHCIT will fulfill central role by side of UNAH collaborating with AMDC and other Committee members in works of risk evaluations before, during and after the phenomenon of landslides happens. UNAH will provide support in data analysis from shared information send by the AMDC originated by monitoring at project sites.
2. Budget and staff: IHCIT by the present moment has no availability to engage budget to perform the activities of the Committee. Every cost on logistic, materials etc shall run by the side of every member interested in determined activity.
3. Organization of activities of team work for disaster landslide investigation: IHCIT will assign two staff members to serve as link between the Committee members for organization of different activities.
4. Understanding letter between all involved institutions (Including Engineering Faculty, Civil, Engineering Faculty, the School of Social Work, IHCIT, and AMDC) The Understanding Letter should contain: designation of one coordinator from the staff of every involved institution, definition of responsibilities to every organization, channels for communication to be used and periodically review of the annual work plan.
5. Role of every institution for landslide research committee: After the signature of the Understanding Letter UNAH with the support of the Faculty of Civil Engineering, can take the role of investigation and characterization of landslides, design and control for work mitigation, monitoring data analysis, promote risk management campaigns in the community, Geo Server information and from data base DesIventar. AMDC can be the specialist entity in risk evaluation and elaboration of corresponding judgment, also evaluate hazard, damages, periodically monitoring, budget for logistic, materials and work executions.

## VI. Activity Plan on the Technical Transfer in the Project

Dr. Kiyoharu Hirota, JICA expert during his intervention proposed an activity plan for members of the Joint Coordination Committee, which plan was accepted as follows:

- Selection of two sites, El Edén and Nueva Santa Rosa, to make the landslide inventory map.
- Show some factors to make the list of landslide inventory.
- Talk about the past activities of JICA experts.
- Explain the future plan of activities by JICA experts.

## Annex

## List of members who attended the Joint Coordination Committee

**<HONDURAS SIDE>**

**Universidad Nacional Autónoma de Honduras (UNAH)**

Nabil Kawas (Dean, Faculty of Science)
Maynor Alberto Ruiz (Geologist, IHCIT)
Elisabeth Espinoza (Physics Teacher UNAH, Coordinator of Geology)
Lidia Torres Bernhard (Teacher/Researcher, IHCIT)
Oscar Elvir Ferman (Teacher/Researcher, IHCIT)
Nelson Sevilla Raudales (Systems Engineer, IHCIT)
Mark Reilly Mullings (UNAH, Faculty of Civil Engineering)

**Alcaldia Municipal del Distrito Central (AMDC)**

Cinthia Borjas Valenzuela (Coordinator, UMGIR)
Marco R. Funes (Engineer Project Evaluation, UMGIR)
Rigoberto Rivera (Manager, CODEM)
Jose Ramón Anariba (Chief of Early Warning System, CODEM)
Ferid Gabrie (Engineer Chief of Civil Protection, CODEM)
Karen Geritza Cubas (Manager, GER)
Vera S. Véliz (Engineer of Infrastructure, AMDC)

**Other Ministries/Organizations**

Aníbal Godoy (Geologist, IGH-UPI)
José Johel Campos (Project Coordinator, INSEP)
Juan José Jiménez (Engineer, REGIOPLAN)
Fredy David Flores (Engineer, Regioplan)
Mario Aguilera (Engineer, Regioplan)
Jorge A. Tejeda (Engineer, GOAL)

**<JAPANESE SIDE>**

**JICA**

Miki Inaoka (Representative, JICA Headquarters)
Tomoyuki Odani (Representative, JICA Honduras Office)

**JICA Expert**

Hiromitsu Yamagishi (GIS technology)
Kiyoharu Hirota (Investigation/inventory)
Hiroshi Yagi (Hazard analysis)
Go Sato (Topographic identification)

**JICA Consultant Team**

Takeshi Kuwano (Team leader)

**MINUTES OF MEETING**
**ON THE THIRD JOINT COORDINATION COMMITTEE FOR**
**ASSISTANCE FOR STRENGTHENING AND CAPACITY BUILDING OF PROFESSIONAL TECHNIQUES FOR THE CONTROL AND MITIGATION OF LANDSLIDE IN TEGUCIGALPA METROPOLITAN AREA**
**AGREED UPON AMONG**
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Tegucigalpa, February 18, 2016

**Dr. Takeshi Kuwano**
Team Leader
JICA Consultant Team
Japan International Cooperation Agency

**Dr. Nabil Kawas**
Dean
Faculty of Science
Universidad Nacional Autónoma de Honduras

**M.A.P. Cinthia Borjas Valenzuela**
Coordinator
Unidad Municipal de Gestión Integral de Riesgo
Alcaldía Municipal del Distrito Central

**Msc. Lidia Torres Bernhard**
Teacher/Researcher, IHCIT
Faculty of Science
Universidad Nacional Autónoma de Honduras

## I. Activities for the Project

Msc. Lidia Torres Bernhard, UNAH representative explained the activities UNAH and AMDC have implemented for the Project from September 2015 to February 2016 as follows:

- Planning meeting with the staff of UNAH involved in the Project with the purpose to find strategies to reach the assigned activities by the Experts.
- Meetings and communications between UNAH and AMDC to plan the assigned activities.
- Analysis of the risk perception survey and make reports about it.
- Hydrological survey and reports of the site pilots.
- Activities of compiling information as: photography, press reports, reports, maps and others documents.
- Planning of fieldwork activities.
- Fieldwork to collect GPS data and geological identification.
- Geo-referenced records for the boundaries of the landslide area in each site and some internal lines of the landslides.
- Fieldwork data analysis and generation of geological maps and cross sections.
- Revision and generation of database of disaster records and/or emergencies by landslide, flooding and fires using the DesInventar data.
- Planning for fieldworks to locate public facilities in the site pilots.
- Fieldwork to geographically reference the public facilities, data process and production of map of public facilities locations in the pilot sites
- Meetings between IHCIT and DGET of UNAH to create logins into the Infrastructure of the Web System of UNAH-IHCIT, to feeding and create logins to the Project website where it will display the final results and systematization of the project.
- Relocation of the IHCIT Laboratory where were installed the licenses of ArcGIS.

## II. Collaborative structure for landslide countermeasures between AMDC and UNAH

Engineer Marco Funes, representing Ing. Cinthia Borjas AMDC explained the collaborative structure between AMDC and UNAH as below;

- UMGIR of AMDC, IHCIT of UNAH and Civil Engineering Department (DIC) of UNAH have prepared Memorandum of Understanding (MOU) for technical collaboration through the three parties.

- The objective of the MOU is strengthening of capacity or UMGIR, development of joint research, exchanging of data/information, establishment of more effective mechanism for collaboration, and technical assistance for AMDC.
- The area of the collaboration will be disaster risk management, climate change and territorial planning.
- The activities defined under the MOU are applied research, advisory service, seminar and workshop, and sharing of facility and exchanging of study report.
- The parties agreed to combine efforts targeting to realize the signing of the interinstitutional agreement to broaden the range of mutual cooperation between AMDC and UNAH.

## III. Establishment of the Slope Disaster Committee in Honduras

Msc. Oscar Elvir Ferman, UNAH representative, in his exposition to the members at the Joint Coordination Committee brought the establishment of the Honduras Slope Disaster Committee, which is accepted as follows;

- The Committee does academic studies in investigation, analysis, assessment, countermeasures, early warning/evacuation and recovery in affected areas by slope disaster, also in activities of public awareness about slope disasters and share knowledge and human resources to understand this theme in the country.
- It is part of the Committee, the institutions members of Sistema Nacional de Gestión de Riesgo de Honduras (SINAGER) which have interest to work in the theme of slope disaster (COPECO, INSEP, UNAH, AMDC, UPNFM, among others)
- UNAH through IHCIT fulfils the main role with the collaborations of the others members of the committee in related activities. It performs investigation, analysis and evacuation for slope disaster support it by the Civil Engineering Department.
- AMDC evaluates damages and anomalies (cracks, steps, subsidence, small failures, spring waters etc.) as monitoring of such anomalies and activities of slope disasters in the Metropolitan area of Tegucigalpa. Budget provision (logistic, materials and work execution) for the academic institutions (UNAH, UPNFM, UPI) and for activities that AMDC required.
- COPECO shares information in slope disaster, meteorological monitoring information, mapping, and documentation and feed the database related to landslides coming from the Committee and bring it to CENID-GDR (Studies, scientific researches, database, analysis of fieldwork, etc.)
- Entities as INSEP and other government entities collaborate in attention to slope disasters and support others activities consider relevant by the Committee.
- The Committee prepares an annual work plan for the contribution in the exchange of knowledge and

technologic in slope disasters at the beginning of the fiscal year, and is revised periodically.

## IV. Framework for Disaster Risk Management in Honduras

Engineer Haruka Yoshida, from JCT explained the framework for disaster risk management, its positive aspects, current status and issues. She also explained how the collaborative structure of AMDC and UNAH, and the Slope Disaster Committee in Honduras to solve the issues on slope disaster risk management as below;

Current status and issues in general

- The main framework for disaster risk management in Honduras such as SINAGER Law defines the various aspects relating to disaster risk management.
- The main framework has effectively promoted disaster risk management by creating responsible institutions, funds and emergency response procedure.
- However, there are several issues which have not fulfilled the framework, that is, further interinstitutional cooperation and enhancement of knowledge, institutional structure and preparedness are required in order to promote disaster risk management.

Issues on slope disaster management and proposed solutions by the Project

- General issues mentioned above apply to slope disaster management.
- Collaborative Structure and Committee which the Project has proposed will solve these issues on slope disaster as both the Collaborative Structure and Committee propose the cooperation procedure, technical transfer, sharing human resources and preparedness of focusing on slope disaster.

## V. Activity Plan on the Technical Transfer in the Project

Dr. Kiyoharu Hirota, the Experts during his intervention proposed an activity plan for members of the Joint Coordination Committee, which plan was accepted as follows:

- The process to make the landslide inventory maps on El Edén and Nueva Santa Rosa.
- The way to make the landslide inventory through the seminar including practice and fieldwork.
- The past activities by the Experts.
- The future plan of the 3rd and 4th activities by the Experts.

## VI. Plan of Next JICA Project on Slope Disaster

Dr. Takeshi Kuwano in his presentation explained the plan of next JICA project on slope disaster, to the members at the Joint Coordination Committee, who agreed in that matter:

- JICA is planning next project, the Countermeasure Management on Slope Disaster, after the Project. The target of the next project is slope disasters like landslide, slope failure and rockfall, and the project area is the whole Metropolitan area on Tegucigalpa. The counterparts of the next project are tentatively UNAH and AMDC.
- The next project is composed of three components, 1) investigation and analysis, 2) countermeasure management, and 3) regulation for land-use. For the investigation and analysis, risk analysis by topographic interpretation with high resolution images and GIS hazard mapping and risk mapping in the Metropolitan area will be implemented. For the countermeasure management, disaster countermeasures based on geological survey and monitoring in pilot sites will be constructed, while technology on design and management method for the countermeasures will be transferred. For the regulation, regulations/laws for land-use and building in disaster prone area will be proposed, while early warning/evaluation system and education will be provided to local residents.
- Honduras counterparts are requested provision of human resources and necessary equipment, and budget for Honduras side in order to fulfil the next project. Honduras counterparts should give opportunity of potential participants for the next project, and be cooperative with the launch the project.

## VII. Discussion

- Regarding to the presentation of the framework of SINAGER, Dr. Kawas expressed that would be good to considered the remarks and solutions and take them to the committee which are revising the Law.
- The student Ana of UPI expressed her desire to apply a manual method of slope disaster analysis and economic, which was recognized and awarded in Nicaragua, her idea is use here with LIDAR even the cost is high, she hope to have the support of AMDC or others, about this Dr. Kawas answered the Committee could consider it.
- According to the results showed by the Ms. Lidia, about the knowledge to respond against to a disaster event that should face the local people living in the pilot sites, the Sub Commissioner Julio expressed even when these areas were declared unlivable, these people live and build, he suggest that every institutions need take measures and control established by the municipal ordinances and promote a training campaign.
- About the establishing of the Committee, Engineer Julio suggested to taking in considerations the Law, and the possible effects of it and which will be the legal impacts if a committee is created out of the law. SINAGER group all the entities which the committee will be formed; and Dr. Kawas and Msc. Lidia accept the remark and consider this committee should be part of SINAGER to study the

slope disaster in the Country. They clarify not procure that committee have an own budget but instead to support entities which require help, in that case the needy entity has to cover the cost for any activity. The purpose is to open a framework to anyone who wants to work in this theme.

- Regarding to the lack of historic records, Ing. Julio made a remark in the not consideration of previous data records coming from CODEM/AMDC and COPECO; Ms. Lidia responded it could not get more records from others entities so they took as a base the information from DesInventar which is a public base, updated and certified and been the best option available as records saved by the president of the CODEL in Nueva Santa Rosa, for this she insisted to give the first step to promote a culture of information centers in entities which are responsible for it. She mentioned also this project can support this issue as another results of it, strengthen CODEM and AMDC in this kind of documentation system. .
- Engineer Julio expressed the importance the use of information and special with the Master Plan against Landslide in Tegucigalpa in 2002 made it by support of JICA, to be careful with others maps which have errors.
- Dr. Kawas declared the importance of the exchange ideas, information, studies, indicators estimations and asking to Msc. Oscar to look for information and integrate it.
- The Sub Commissioner Julio said: it is very necessary to look for positive effects, to analyze the committee base, which it will be based in SINAGER or a civil society and reach a result.

## Annex-1

**List of members who attended the Joint Coordination Committee**

**<HONDURAS SIDE>**

**Universidad Nacional Autónoma de Honduras (UNAH)**

Nabil Kawas (Dean, Faculty of Science)
Jimena Mejia (Coordinator of Culture and Risk Management, DVUS)
Elisabeth Espinoza (Physics Teacher UNAH, Coordinator of Geology)
Alejandro Galo (Director of Science School, Faculty of Science)
Lidia Torres Bernhard (Teacher/Researcher, IHCIT)
Oscar Elvir Ferman (Teacher/Researcher, IHCIT)
Nelson Sevilla Raudales (Systems Engineer, IHCIT)

**Alcaldía Municipal del Distrito Central (AMDC)**

Marco R. Funes (Engineer Project Evaluation, UMGIR)
Jose Ramón Anariba (Chief of Early Warning System, CODEM)
Ferid Gabrie (Engineer Chief of Civil Protection, CODEM)
Oscar Amílcar Pavón (Monitoring/Informatics, CODEM)
Roger Cañas Dubón (Monitoring, CODEM)
Jose Alberto Pinto (Assessor, GER)
Marcio López (Assessor, GER)

**Other Ministries/Organizations**

Ana Julia Garcia (Vice Minister in Public Works and Housing, INSEP)
Jorge A. Tejeda (Engineer, GOAL)
Julio Cesar Quiñonez (Sub Commissioner Regional 7, COPECO)
Rudi J. Argeñal (Official CENID-GDR)
Mario Aguilera (Engineer, Consulting Support AMDC)
Lilian Yolibeth Oyuela (Chief Environmental Department UPNFM)
Javier Garcia Reynard (Teacher, UPNFM)
Ana Nataren (Student, UPI)

**<JAPANESE SIDE>**

**JICA**

Naoki Kamijo (Director, JICA Honduras Office)

Hisashi Suzuki (Representative, JICA Honduras Office)

Glorianna Alfaro (Assistant, JICA Honduras Office)

**JICA Expert**

Kiyoharu Hirota (Investigation/inventory)

Hiroshi Yagi (Hazard analysis)

Go Sato (Topographic identification)

**JICA Consultant Team**

Takeshi Kuwano (Team leader)

Takashi Hara (Landslide countermeasure technology)

Haruka Yoshida (Landslide management and organization)

Vilma Mejia (Assistant)

**MINUTES OF MEETING**
**ON THE FINAL JOINT COORDINATION COMMITTEE FOR**
**ASSISTANCE FOR STRENGTHENING AND CAPACITY BUILDING OF PROFESSIONAL TECHNIQUES FOR THE CONTROL AND MITIGATION OF LANDSLIDE IN TEGUCIGALPA METROPOLITAN AREA**
**AGREED UPON AMONG**
**THE UNIVERSIDAD NACIONAL AUTONOMA DE HONDURAS (UNAH),**
**THE ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL (AMDC) AND**
**THE JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

The Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the JICA Consultant Team (hereinafter referred to as "JCT") and the Experts (hereinafter referred to as "the Experts") to the Republic of Honduras on the Assistance for Strengthening and Capacity Building of Professional Techniques for the Control and Mitigation of Landslide in Tegucigalpa Metropolitan Area (hereinafter referred to as "the Project") in order to conduct with the Universidad Nacional Autónoma de Honduras right through the Instituto Hondureño de Ciencias de la Tierra (hereinafter referred to as "UNAH") and Alcaldía Municipal del Distrito Central (hereinafter referred to as "AMDC"). As a result of discussions on this joint coordination committee, all parties agreed to the matters described on the attached sheets.

Tegucigalpa, July 21, 2016

桑野 健

**Dr. Takeshi Kuwano**
Team Leader
JICA Consultant Team
Japan International Cooperation Agency

**Dr. Nabil Kawas**
Dean
Faculty of Science
Universidad Nacional Autónoma de Honduras

**M.A.P. Cinthia Borjas Valenzuela**
Coordinator
Unidad Municipal de Gestión Integral de Riesgo
Alcaldía Municipal del Distrito Central

ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL
UNIDAD MUNICIPAL DE GESTION INTEGRAL DE RIESGO UMGIR

**Msc. Lidia Torres Bernhard**
Teacher/Researcher, IHCIT
Faculty of Science
Universidad Nacional Autónoma de Honduras

## I. Activities for the Project

Msc. Lidia Torres Bernhard, UNAH representative explained the activities UNAH and AMDC have implemented for the Project as follows:

• Presented a summary of the development of activities during the project referring to the originally stated objectives and presenting the final results, with which the successful completion of the project that has been carried by 18 months. Emphasizes the importance of accompaniment of Japanese experts, technicians of AMDC (CODEM, UMGIR, GER) as well as the highlighted participation of UPNFM; noting that the synergy achieved between the teams and the guidance of experts made possible the full implementation of the objectives and even more: overcoming the expectations initially raised.

• Among the activities were explained can be mentioned: workshops theoretical / practical training, design and application of risk perception survey, visits data collection on field trips, photo interpretation, reconnaissance visits and field verification, digitalization using ArcGIS, proofread and approval of the program of geology at the bachelor's degree, capacity building of staff IHCIT and AMDC, strengthening links between other public and private universities public as well the private enterprise, accession IHCIT to the ICL, MOU between AMDC-IHCIT-DIC and between IHCIT-JICA, personnel training IHCIT and AMDC in Japan, development of the project cloud as a dynamic tool for teaching / learning and finally the successful development of the Second Central American and Caribbean Landslides Congress held from 18 to 20 July.

## II. GIS Landslide Inventory and its Sustainability

Msc. Nelson Sevilla, UNAH representative, in his exposition to the members at the Joint Coordination Committee explained;

- The activities developed in each stage allow achieving results like landslide inventory for the pilot sites Nueva Santa Rosa and El Edén applying the transferred methodology by the Japanese experts who supported in every step.

  Among these activities are the photo-interpretation of satellite images, the validations of this information in the field visits and rectification thereof to be later digitalized in a geographical information system (GIS); in which each landslide blocks was georeferenced and characterized integrating to them the generated information of geological, hydrological, structural, social and historical character as resulting a susceptibility map for landslide to both sites.

  It is published on the website www.ihcit.unah.edu.hn

- Also as aggregated, UNAH disclose that in relation to the cloud service for sharing access to the counterparts and the general public according to the different levels established for the use of the System.

## III. Maintenance manual at the monitoring and the countermeasures at AMDC

Mr. Ferid Gabrie, AMDC-CODEM representative, in his exposition explained about the Maintenance Manual prepared in the Project, and its advantage for monitoring and maintenance works:

- The importance of the regular monitoring is to be performed in every work of mitigation as much as measurement equipment and countermeasures which are executing.
- The maintenance work will be performed with the manual to secure the proper condition of monitoring equipment and facilities, and with corresponding inspection sheets to check the status of the countermeasure facilities which have been installed on the sites.
- The manual will help not only to the officers of CODEM, but officers of the relevant organization such as AMDC and UNAH.

## IV. Plan of next JICA project on slope disaster

Ing. Ruben Hernandez, AMDC representative, in his exposition to the members at the Joint Coordination Committee explained the proposal project 2nd phase as follows:

- This proposal is presented as a project to potentiate the municipality in the first instance, and for the country additionally, in the self-management for solutions to address the problem of the phenomena of landslide that occur in metropolitan areas.
- The presentation refers being conducted through a participative process, inclusive, harmonic and cordial where the participative organizations (UNAH, COPECO AND JICA) were able to integrate their vision upon the thematic and its linkage in this proposal, address it to the posed needs by AMDC and the route toward to the framework "Municipal Development plan".
- The proposal is presented under the Japanese philosophy "Learning by doing". Propose to reach the characterization of phenomenon to define the failure mechanism which will be possible to establish conceptual designs of intervention works. Later, based in the conceptual designs estimates to make the final design of countermeasures works, bidding procedures, assignment, execution and supervision of the works. With the execution work based in the project it is proposed to generate the management processes of the territory thus achieving the regulation of land use affected by landslides. In each stage it is posed the use of the national capacities incorporating it throughout a systematic participation in the SINAGER framework, however the intervention of each stage result should

produce the different tools and instruments which will be institutionalized to ensure the knowledge sustainability on the time regardless to the municipal management changes.

- Finally, with the experience obtained in the process as well as with the developed instruments and tools, firstly AMDC will be able to replicate easily the experience in the other identified areas by JICA as affected for landslides in its landslide inventory for the metropolitan area of DC, and through COPECO to the rest of the country, which proposes to raise the experience, instruments and tools produced to the Governing Board of SINAGER for the adoption throughout national territory. Once the experience is achieved with the development of the project, it is proposed to extend to the countries of the region by sharing the experience, instruments and tools considering the feasibility of the implementation and/or adaptation to their metropolitan areas in Centro America.

## V. Lessons and issues on the current JICA project

Dr. Takeshi Kuwano in his presentation explained the lessons, the efforts and the issues of the project on slope disaster, to the members at the Joint Coordination Committee, who agreed in that matter:

- As the efforts and lessons in UNAH, thanks to the leadership of UNAH, the technical transfer was successfully promoted through the Project. The Internal/external cooperation of UNAH and related faculties and organizations enabled more effective technical transfer and project activities. The 2nd Central American and Caribbean Landslide Congress was organized to widely share the outcomes of the Project with the region.
- As the efforts and lessons in AMDC, the landslide management implementation flowchart with the tasks of each organization and department was developed. The JCT and AMDC took the procedure of identifying the actual landslide phenomenon and had discussions at the site, particularly for the activities in the Project. AMDC are able to obtain the knowledge and experience when considering and discussing the actual situation at the site. On the manual used by CODEM, figures and photos were used in the manual which helps engineers with little experience on landslide.
- As the overall efforts and lessons of the Project, 13 workshops have been conducted as on-demand workshops, and 177 in total participated. For enhancing the technical transfer by report and manual, 4 recommendation reports and 1 manual have been prepared.
- On the issues in the future, landslide hazard evaluation in metropolitan areas should be conducted and implementation of the countermeasures is urgently required. *The Committee on Risk Analysis on Slope Disasters in Honduras* is expected to be a structure where all the related organizations and individuals are able to interact with each other throughout the year under the leadership of UNAH. UNAH and AMDC, which acquired knowledge and experience of the basic techniques, need to utilize the techniques to strength landslide management techniques. The system to secure national budget for actual construction of landslide countermeasures is essential in AMDC.

## Annex-1

## List of members who attended the Joint Coordination Committee

**<HONDURAS SIDE>**

**Universidad Nacional Autónoma de Honduras (UNAH)**

Nabil Kawas (Dean, Faculty of Science)
Lidia Torres Bernhard (Teacher/Researcher, IHCIT)
Nelson Sevilla Raudales (Systems Engineer, IHCIT)
Elisabeth Espinoza (Physics Teacher UNAH, Coordinator of Geology)
Alejandro Galo (Director of Science School, Faculty of Science)
Oscar Elvir Ferman (Teacher/Researcher, IHCIT)
Manuel Rodríguez (Teacher/Researcher, IHCIT)

**Alcaldía Municipal del Distrito Central (AMDC)**

Juan Carlos García (Vice Major, AMDC)
Karen Cubas Triminio (Manager, GER)
Rigoberto Rivera (Manager, CODEM)
Marco R. Funes (Engineer Project Evaluation, UMGIR)
Ruben Hernandez (Specialist in Risk Management and Climate Change, UMGIR)
Jose Alberto Pinto (Assessor, GER)
Marcio López (Assessor, GER)
Jose Ramón Anariba (Chief of Early Warning System, CODEM)
Ferid Gabrie (Engineer Chief of Civil Protection, CODEM)
Oscar Amílcar Pavón (Monitoring/Informatics, CODEM)
Roger Cañas Dubón (Technical, CODEM)
Leonel Gálvez (Technical, CODEM)
Vera Véliz (Civil Engineer, Consulting Support AMDC)
Juan Jiménez (Civil Engineer, Consulting Support AMDC)
Fredy D. Flores (Civil Engineer, Consulting Support AMDC)

**Other Ministries/Organizations**

Ana García (Ministry of Foreign Affairs and International Cooperation)
Zenia Danira Andrews (Coordinator Engineer, INSEP)
Jorge A. Tejeda (Civil Engineer, GOAL)
Rudi J. Argeñal (Official CENID-GDR, COPECO)
Lilian Yolibeth Oyuela (Chief Environmental Department UPNFM)

<JAPANESE SIDE>

**Japanese Embassy**

Izuru Kibe (Representative)

**JICA Headquarters**

Junji Miwa (Senior Advisor, Glogal Environment Department, JICA Tokyo)

Miki Inaoka (Representative, Glogal Environment Department, JICA Tokyo)

**JICA Honduras Office**

Naoki Kamijo (Director, JICA Honduras Office)

Hisashi Suzuki (Representative, JICA Honduras Office)

Glorianna Alfaro (Assistant, JICA Honduras Office)

**JICA Expert**

Kiyoharu Hirota (Investigation/inventory)

Hiroshi Yagi (Hazard analysis)

Go Sato (Topographic identification)

**JICA Consultant Team**

Takeshi Kuwano (Team leader)

Takashi Hara (Landslide countermeasure technology)

Haruka Yoshida (Landslide management and organization)

Vilma Mejía (Assistant)

# Appendix 3

*Other activity results*

# Appendix 3-1

*Programme of the second landslide Central American and Caribbean Landslide Congress*

# II Central American and Caribbean Landslide Congress Agenda

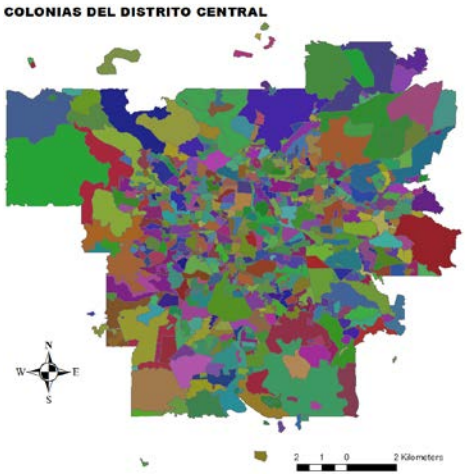
| Day | Block name | Starting time | Finishing time | Name of presentation/activity | Speaker | Country |
|---|---|---|---|---|---|---|
| Monday July 18 | | 08:00 | 08:20 | Registration of participants | | |
| | | 08:20 | 09:00 | Opening Ceremony<br>Mr. Yuichi Miyagawa Japan Ambassy Counsellor<br>Mrs. Julieta Castellanos, Rector of the Universidad Nacional Autonoma de Honduras, UNAH<br>Mr. Naoki Kamijo, Chief Representative of JICA Honduras Office<br>Mr. Mónico Oyuela, Dean Faculty of Engineering, UNAH<br>Mr. Nabil Kawas, Dean Faculty of Science, UNAH | | |
| | Landslide susceptibility I | 09:00 | 09:25 | Landslide susceptibility mapping in data scarce regions using tools from geomorphometry, statistics and data mining – a case study from Maily-Say, Kyrgyzstan | Anika Braun | Germany |
| | | 09:25 | 09:50 | Cartography for the landslide process using a geomorphologic method in the upper basin of the General River in Costa Rica | Adolfo Quesada | Costa Rica |
| | | 09:50 | 10:15 | Morphometric model for the landslide susceptibility determination: a case study for the northeastern slope of the Poas Volcano | Gustavo Barrantes | Costa Rica |
| | | 10:15 | 10:45 | Coffee Break | | |
| | Landslide susceptibility II | 10:45 | 11:10 | Evaluation of the debris flows and landslides in El Pilan community, El Ayote, South Caribbean Autonomous region, Nicaragua | Gisselle Bellorín | Nicaragua |
| | | 11:10 | 11:35 | Landslide susceptibility analysis in the Jamapa and La Antigua watersheds | Gilbert Torres | Mexico |
| | | 11:35 | 12:00 | Update of the map for critical sites and landslide monitoring in Nicaragua | Eveling Espinoza | Nicaragua |
| | | 12:00 | 13:15 | Lunch | | |
| | Hazard and risk assesment I | 13:15 | 13:40 | Landslide characterization in Nicaragua | William Martínez | Nicaragua |
| | | 13:40 | 14:05 | Development of a landslide risk rating system for small-scale landslides affecting settlements in Guatemala City | Ethan Faber | Guatemala |
| | | 14:05 | 14:30 | Technical and prospective evaluation of landslide risk in Granma province, Cuba | Eberto Hernandez | Cuba |
| | | 14:30 | 14:55 | Threat assessment in Juco basin, Orosi, Paraiso, Cartago, Costa Rica | Luis Guillermo Salazar | Costa Rica |
| | | 14:55 | 15:25 | Coffee Break | | |
| | Hazard and risk assesment II | 15:25 | 15:50 | Application of the Cuban Methodology for Hazard, Vulnerability and Risk studies for landslides at municipality level in Villa Clara Province. Republic of Cuba. | Francisco Viera | Cuba |
| | | 15:50 | 16:15 | Landslide risk assessment in the commune of Petit Goáve Republic of Haiti | Eberto Hernandez | Cuba |
| | | 16:15 | 16:40 | Scale and objectives, landslide susceptibility mapping adopting Analytical Hierarchical Process (AHP) method. | Hiroshi Yagi | Japan |
| | | 16:40 | 17:00 | Closure of session | | |

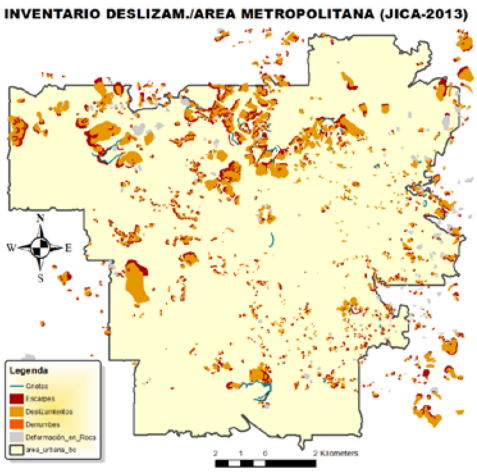
| Day | | Starting time | Finishing time | Name of presentation/activity | Speaker | Country |
|---|---|---|---|---|---|---|
| Tuesday July 19 | Landslides studies at local level, Tegucigalpa | 08:00 | 08:25 | JICA Landslide Project for Strengthening and Capacity Building of the Control and Mitigation in Honduras | Takeshi Kuwano | Japon |
| | | 08:25 | 08:50 | Landslides Susceptibility Analysis in Urban Envirinments: A Case Study in the Area of El Eden, Central District, Honduras. | Javier Garcia | Honduras |
| | | 08:50 | 09:15 | Preliminary Report: Relationship between geology and landform in landslides of the Tegucigalpa Basin, Honduras | Kiyoharu Hirota | Japon |
| | | 09:15 | 09:40 | Landslide mapping using a 2m DEM based on AW3D digital topographic data in Tegucigalpa, Honduras | Go Sato | Japon |
| | | 09:40 | 10:10 | Coffee Break | | |
| | Landslides studies at local level, Tegucigalpa | 10:10 | 10:35 | How to make a database for landslides in Tegucigalpa as a learning interactive teaching tool | Lidia Torres Bernhard | Honduras |
| | | 10:35 | 11:00 | Landslide susceptibility characterization in the Ulloa neighborhood in Tegucigalpa, Honduras | Jorge Tejeda | Honduras |
| | | 11:00 | 11:25 | Systemic approach for urban disaster risk reduction | Ana Nuñez | Honduras |
| | | 11:25 | 11:50 | Monitoring system in major landslide sites in Tegucigalpa, Honduras | Julio Anariba | Honduras |
| | | 11:50 | 13:05 | Lunch | | |
| | Landslides studies at local level, Tegucigalpa | 13:05 | 13:30 | Geophysical Prospection and Layering Analysis of a Landslide susceptible area | Luis Vargas | Honduras |
| | | 13:30 | 13:55 | The Project for Landslide Prevention in Berrinche and Reparto in Tegucigalpa | Alejandra Muñoz | Honduras |
| | Landslides studies at city level, Tegucigalpa | 13:55 | 14:20 | Municipal platform for risk, territorial studies and climate change adaption | Rubén Hernández | Honduras |
| | | 14:20 | 14:45 | What do we know of landslide hazard in Tegucigalpa? | Gines Suarez | El Salvador |
| | | 14:45 | 15:15 | Coffee Break | | |
| | Landslides studies at city level, Tegucigalpa | 15:15 | 15:40 | The use of the matrix method for the landslide susceptibility mapping of Tegucigalpa, Honduras | Elias Garcia-Urquia | Honduras |
| | | 15:40 | 16:05 | Municipal perspective against landslides in the metropolitan area of Tegucigalpa | Cinthia Borjas | Honduras |
| | | 16:05 | 16:30 | Landslide susceptibility map in Nueva Santa Rosa, Tegucigalpa | Nelson Sevilla | Honduras |
| | Landslides studies outside Tegucigalpa | 16:30 | 16:55 | Identification of unstable slopes indicators in Carrizal-Semane, Yamaranguila in the southwest of Honduras (Poster-n-Article) | Ángela Morales | Honduras |
| | | 16:55 | 17:15 | Closure of session | | |

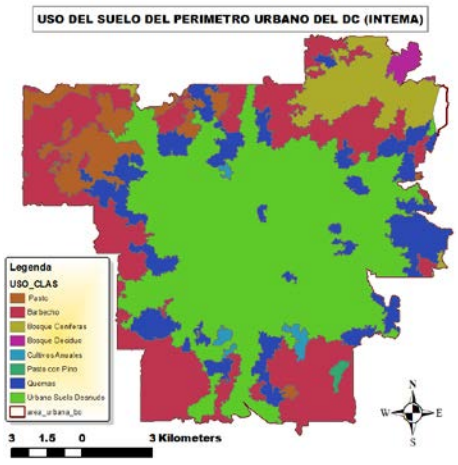
| Day | | Starting time | Finishing time | Name of presentation/activity | Speaker | Country |
|---|---|---|---|---|---|---|
| Wednesday July 20 | Landslides studies outside Tegucigalpa | 08:00 | 08:25 | Landslides in Honduras: an overview from the action perspective of COPECO | Jorge Miguel Aguilar | Honduras |
| | | 08:25 | 08:50 | Combined Factor Method for the landslide susceptibility analysis | Oscar Elvir | Honduras |
| | Landslides studies at national level | 08:50 | 09:15 | Implementation and future of the LIDAR technology in the landslide identification in Honduras | José Arce | Honduras |
| | | 09:15 | 09:40 | JICA Preparatory Survey for The Project for Landslide Prevention in National Road CA-6 | Irma Rosario Valladares | Honduras |
| | | 09:40 | 10:10 | Coffee Break | | |
| | Landslides and climate change | 10:10 | 10:35 | The role of climate change in the Los Andes Centrales slope instabilities | Stella Moreiras | Argentina |
| | | 10:35 | 11:00 | Climate change and soils | Aleyda Montoya | El Salvador |
| | Landslides and seismic activity | 11:00 | 11:25 | Landslides prompted by the seismic activity in El Sauce, 2015 | Iveth Dávila | Nicaragua |
| | | 11:25 | 11:50 | Classification of the coseismic landslide processes of the Chinchona Earthquake in Costa Rica on the 8th of January 2009 | Adolfo Quesada | Costa Rica |
| | | 11:50 | 13:05 | Lunch | | |
| | Social construction of landslide risk | 13:05 | 13:30 | Risk as Social Construct: A Comparative View from Risk Scenarios | Rosa Sánchez | Guatemala |
| | | 13:30 | 13:55 | Educational Methodologies Implemented in Latin America for Landslide Inventory and Analysis | Rigoberto Moncada | Honduras |
| | | 13:55 | 14:20 | The social construction of risk and landslides in Tuxla Gutiérrez, Chiapas, México | Jorge Paz Tenorio | Mexico |
| | | 14:20 | 14:50 | Coffee Break | | |
| | Landslide modelling and field tests | 14:50 | 15:15 | Identification and studies of unstable zones in Panama highways and roads | Eric Chichaco | Panama |
| | | 15:15 | 15:40 | Modeling shallow landslides triggered by rainfall in the Colombian tropical and mountainous terrains | Edier Aristizabal | Colombia |
| | | 15:40 | 16:05 | Electric Tomography in Landslides and Infrastructure monitoring: Experiences from El Salvador | Alonso Alfaro | El Salvador |
| | | 16:05 | 16:30 | Closure of session | | |
| | | 16:30 | 17:00 | Closing ceremony<br>Mr. Nabil Kawas, Dean Faculty of Science, UNAH<br>Mr. Mónico Oyuela, Dean Faculty of Engineering, UNAH<br>Mr. Hiroshi Yagi, JICA | | |

# Appendix 3-2

*Proposal for the next project*




# ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL

**JULIO DE 2016 | TEGUCIGALPA MDC, HONDURAS C.A.**

| | |
|---|---|
| **1.- Date:** | Friday August 05th, 2016 |
| **2.- Applicant:** | Alcaldía Municipal del Distrito Central |
| **3.- Title of the Project:** | Mitigation Measures for Management In the light of Disasters by Landslides Movement Events in the Metropolitan Area Of Central District, JICA 2E |
| **4.- Type of Project:** | Technical Cooperation Project/ Technical Cooperation for the Development Planning. |
| **5.- Contact:** | Central District Municipal Office (initials in Spanish AMDC), Mayor´s Office.<br>Address: Municipal Campus in the 21st of October Colony, Rincon Neighborhood.<br>Contact Person: Ing. Cinthia Borjas, Mayor´s Office<br>Telephone: +504-2221-6971<br>Celular: +504-9493-0185<br>Email: 4094@cichorg.org |

## 6.- BACKGROUND OF THE TECHNICAL COOPERATION

According to the Climate Risk Global Index for 2015[1], Honduras maintains the first place on the chart of the ten most affected countries from 1994 to 2013 (Annual average), with a 10.33 score on the Long Term Climate Risk Ranking (CRI). According to this report, in Honduras during this period 69 events were registered that have caused economical loss in around 813.56 millions of American dollars, and a human lives loss rate by the order of 4.6 deaths per 100,000 habitants.

The Index is focused on the impacts generated by the extreme climate phenomenon´s like hurricanes, tropical storms, tropical depressions, intense rain, etc., same phenomenon that in our country regularly trigger trough their way emergencies and disasters because of landslide movements and floods.

Particularly, being this one of urban centers most populated[2] of the country, were the majority of economical and commercial activity is concentrated, and were the political- administrative capital is comprise by the cities of Tegucigalpa and Comayagüela, the Central District Municipality represents one of the geographical areas of the national territory were the impacts caused by events of natural origin (mainly extreme climate events), bringing the majority of loss and damages. Added to this, and because of the specific conditions of the geological vulnerability, irregular and steep topography, the deforestation and the residential zone expansion in areas not suitable for housing purposes, the risks caused by landslide movements are exacerbated even more, and thus according with the municipal figures, with at least 350 thousands persons exposed for living on them.

### DEVELOPMENT POLITICS

Managing the disaster risks in the Central District Municipality (Tegucigalpa y Comayagüela) and with it reduce the human lives loss and its economic impact, has become an important and urgent necessity to attend from the national perspective, therefore above the base of the National Development Strategy (Republic of Honduras, Country Vision 2010-2038, and the Nation Plan 2010-2022), specifically on the governmental initiative based on the seven sectors of most importance for the environment and climate change, the actions proposed are focused in the prevention. The disasters caused by events of natural origin form part of the seven sectors, being this one of the reasons why the country undertakes

[1] *Germanwatch*
[2] *The estimated population for the Central District for the year 2016, according to the Statistics National Institute (initials in Spanish INE) is of at least 1,276,620 habitants.*

a race to reducing the risks of disasters through the creation of the SINAGER law, the state policy Integral Risk Management of Honduras (PEGIRH initials in Spanish), and now the construction of its National Plan for Risk Management of Honduras (PNGIRH).

**PROBLEMS TO SOLVE**

The Central District municipality, because of its particularly natural conditions its geographical location and the combination of different elements of natural-social and anthropogenic origin, has made it the most vulnerable city of the country, estimating that at least 11% of the population is settled in high risk land in the light of landslide movements and floods. In these sense, the estimated annual loss for Central District as a consequence of disasters and damages originated by the effects of natural events are equivalent to $105 millions of American Dollars a year[3].

Although of the particular geographical condition, its location and, its physiographical characteristics represent aspects that contribute to generate susceptibility in the light of landslides and floods, the construction of vulnerabilities, as a consequence of the social process, intensifies the problematic.

Inside this process, we can enunciate the increase of the population, the migration from the countryside to the city, the establishment of urbanizations in high risk zone and the invasion of forest areas, etc. Added to this, the lack of the right planning of land use and the absence of historic vigilance by the responsible entities, contribute everyday more to bring about these vulnerabilities, and in general, form the social construction for risk to disasters as a part of the adopted development model.

The demand of housing projects in the capital city, caused by the increase of the population, has brought as a consequence, a strong increase in urban property investments and housing development. These investments, in turn bring a great incidence on the expansion process of populated areas of Central District, and for which this process has been obliged to identify spaces in the territory that meet the right conditions for the implementation of the developments. However, because of the lack of instruments and tools for the management and analysis of the territory, as well as low local capacities, in both public and private sectors, to carry away the evaluations of the plots and sites of projects, in which are defined, if the same gather the right conditions for the proposed developments, have contributed the increase in the incidence of landslide cases that affect the settlers of the district. Additionally and because of the lack of planning of the territory, whose foundation is the right identification of the land use and its characteristics, the inclusion of Risk Management and Climate Change Adaptation; possibilities are introduced that the population or the final consumer of this projects build vulnerabilities and they be affected by diverse hazards that put in risk even their own lives, besides the personal properties acquired throughout time and which are the product of their job. In these sense, the Central District Municipality has been a recent scenario of different landslide movement cases, which in a majority occur because of the inappropriate use of the territory (Because of lack of knowledge of it), because of the low institutional and national capacities in landslide movements topics, lack of regulation and vigilance, and other of different type that have been allowed. Cases like City of Angel Residence that compromised more than 17 millions of American Dollars investments in a housing project that led to the loss of the houses of at least 182 families, and others like the ones presented in the Nueva Santa Rosa, the Eden, Campo Cielo and, Jose Angel Ulloa colonies, etc., that affected an elevated number of population are examples of it.

**THE DEVELOPMENT ACTIVITIES IMPLEMENTED**

Particularly in the case of landslide movement, after been severely affected by Hurricane Mitch, the Central District Municipality has been accompanied by the Japanese International Cooperation Agency

[3] The Inter-American Development Bank, in its recent Action Plan for Tegucigalpa y Comayagüela (development Plan undertaken by the Initiative of Emergent and sustainable Cities, ( initials in Spanish ICES-BID)

JICA, through the highly numerous significant contributions in Integral Management of Disaster Risk matter. The knowledge of risk generated through the strengthening of institutional capacities, which have gone together with the instruction of methodologies for the development of landslide movements inventories, strengthening of the monitoring capacities for landslide movements events, etc., which are some of the most significant results, however, giving steps to the institutionalization of the instruments, the creation of ordinance and with it secure the implementation of the land management, represent the major challenges to which the municipality works toward the construction of safer environment in the light of landslide movement hazards in the Central District metropolitan area. The stabilization of two of the most critical areas, affected by the gravitational process or removal of mass events, such as Berrinche and Reparto, are between others, two of the most outstanding interventions. However, even though of the development of mitigation works in the light of landslide movements from Berrinche and Reparto, have contributed fundamentally to safeguard the life of hundreds of settlers of the municipality, the participation of JICA has also allowed to generate experiences and strengthen the systematic and institutional capacities of the country, because due to the development of these engineering works, gave the inclusion to national and municipal technicians in the knowledge of science, techniques, and technologies implemented for Japan in attention to similar cases.

The Japanese Cooperation has also strengthen the communitarian response system, allowing to the municipality through the Emergency Municipal Committee (Initials in Spanish CODEM), to develop local structures under the implementation of the BOSAI Methodology, building a prevention culture and replicating the legacy of "Learning to live with Risk".

**PROJECT PRIORITIES**

From the municipal perspective, the management evolution of this type of phenomenon (landslide movement), has been manifested through the constant, highly active, progressive, and consistent dynamic with an integral process. Many of the accomplishments obtained have been the result of important contributions of the different cooperation bodies and authorities, being the one of greatest significance on landslide movements topics, the Japanese Cooperation Agency; who being interested in contribution to the municipality and communities, have accompanied us. However, its notable the necessity of the municipality to strengthen even more the technical entities for the decision-making based on the scientific-technical criteria, which after being integrated in the instruments and/or tools of analysis and land management, will let them develop a more complete analysis of the land management. This instruments and/or technical tools should be built with the purpose of becoming a legal instrument that allows developing land management activities, handling the risk to disasters and enabling the climate change adaptation.

The Japanese Cooperation has contributed to produce significant changes in the municipality, stimulating the implementation of procedures that include a vision about landslide movements risk and other menacing phenomena, improving our land management and reducing the risk to disasters, however, as a community we hope to give the next step, becoming self-managers to solutions in the light of these events. After being part of the different processes that JICA has undertaken in the country, particularly in Central District, arises through this project the consideration to potentiate the capacities generated by them, consequently it's proposed to generate tools and instruments of analysis and management for the definition of measures for intervention in the light of landslide movements. This tools and instruments should be developed through real attention dynamic processes, extracted during the development of undertaken actions for the integral boarding of selected cases, in a continuous and systematic process that gathers all the elements to generate solutions whose implementation can be valuated as a reference of the effectiveness of the process. Meaning, that with this project, the construction of the instruments and tools for analysis and land management is proposed, product of a logical-sequential intervention, that will be the beginning to the characterization of events ( fault mechanism); continue with the definition of measures, the design of

them, the generation of the tender books, execution, supervision, maintenance, etc., and finally will get to the zoning, generating modifications to the land use and its regulations by means of legal instruments such as municipal ordinance or commands of the SINAGER governing board.

It proposed to give continuity to the initiated processes by JICA since 2001 on its Master Plan "Study of Floods Control and Landslide Prevention in the Metropolitan Area of Tegucigalpa, Republic of Honduras", in which 17 landslide areas interventions were priority and because of scientific-technical capacity and economic reasons, only Berrinche and Reparto have been attended. In this same study the defined priority is to attend the landslide movement sites located in the Nueva Santa Rosa, Eden and Campo Cielo colonies, for which and in result of the "Support to the strengthening and training of professional capacities in Mitigation and Control in the light of landslide movements in the Tegucigalpa Metropolitan Zone of Republic of Honduras Project, they´ve obtained a rich characterization product, besides the local technical capacities to replicate the experiences throughout the municipality, however, the development of countermeasures in the light of landslide movements in these sites, still remains a necessity every day more complex, mainly because of marginality and overcrowding [4]. In this sense, through this project is proposed to give continuation to the projects mentioned, undertaking processes for the definition and implementation of small and medium scale structural and nonstructural measures, to improve the stability of the proposed sites (Nueva Santa Rosa, Eden and Campo Cielo colonies), but at the same time, produce the tools and instruments that enable the Central District Municipality, subsequently of this project, to manage in an autonomous way its mitigation measures in the light of disasters for landslide movements events in the Central District Metropolitan area.

## 7.- OUTLINE OF THE T/C

### 7.1) OVERALL GOAL (Long -Term Objective)

Build local and national scientific -technical capacities based on the practical experience obtained with the accompaniment of the Japanese International Cooperation Agency (JICA), for the integral approach of the landslide movement events (Landslides and other gravitational process) through the cases that are developed in the Central District Metropolitan Area.

### 7.2) T/C PURPOSE (Objective expected to be achieved by the end of the project period. Elaborate with quantitative indicators if possible)

1. Give continuity to the project "Assistance for Strengthening and Capacity Building of Professional techniques for the Control and Mitigation of Landslide in Tegucigalpa Metropolitan Area, Honduras Republic (JICA1E) / developing and executing the countermeasures in the face of Landslide movement events, in at least three sites of the Central District Municipality (Tentatively Eden o Bambu, Nueva Santa Rosa and Campo Cielo).
2. Build, adapt, and/ or modify tools and instruments of analysis and management of risks and territory oriented to the landslide movements phenomenon approach (Landslides and other gravitational process), which can be replicated or easily adapted for the implementation in the Metropolitan Areas of the Central American region. At least five documents of guides and/or

[4] Marginality and overcrowding: the lack of water and sanitation network, as well as other services such as communication routes in the right conditions and rainwater channeling, allow that because of the infiltration and runoff, the waters contribute significantly to the instability. In case of overcrowding, its important highlight that because of the difficulty to a access to a house and plots to build, contributes to the construction of new risks applying inappropriate materials and techniques with the purpose of maximizing the use of small plots of which they dispose, but at the same time, leading to concentrate an elevated amount of population to high susceptible to landslide movement areas.

manuals will be created for related topics to the characterization of landslide movement events, Management of structural and nonstructural mitigation measures in the light of landslide movements, the zoning and regulation of landslide movement affected areas, etc.

3. Generate and strengthen the institutional capacities of the AMDC, UNAH, and COPECO in Mitigation and Landslide Movements topics (Landslides and other gravitational process) applicable in the Metropolitan Areas. Increased the scientific and technical capacities of SINAGER by COPECO-CENICAC, with at least 20 prevention certified officials, through their participation in JICA´s developed processes with the execution of this project.
4. Develop technical tools for Analyzing and Management of the Mitigating measures in the face of Landslide movements (Landslides and other gravitational process) applicable in the Metropolitan Areas. A technical guide will be constructed for the characterization of the landslide movement events ensuring to get to the identification of fault mechanism and minimum design parameters; also a basic manual for structural countermeasure works in the light of landslide movements will have to be constructed. Finally, a general manual of maintenance for countermeasure works in the light of landslide movements will be made.
5. Develop technical tools oriented to the land management with focus on the Integral Management of Disaster Risk, but especially in the face of land movement applicable in the Metropolitan Areas. A criteria guide will be made for the zoning and regulation of affected areas by landslide movements, likewise, a revision guide for actualization on inventory of landslide movements, hazard maps, and susceptibilities in the light of landslide movements will be constructed, and that will be used for the revision and actualization of the local and national events.
6. Generate and strengthen the national systematic capacities on Mitigation and Landslide Movements topics (Landslides and other gravitational process) oriented to the Metropolitan Areas, specifically through the socialization of the instruments and tools generated with this project, likewise replicate the process in other urban and/or metropolitan sites of the country. The contribution to the SINAGER in the attention to at least one of their interest case that is affected by landslide movement events must be made.
7. Share the experiences and diffuse the generated instruments nationwide, regional and internationally. Develop at least dos workshops, local and national course and certificate, with the purpose to socialize the tools, instruments, and experiences obtained with this process, likewise a regional participation space will be generated for the sharing of the generated experiences, instruments and tools. Additionally, the search for international spaces will be made, seeking to identify where is possible the diffusion of the result of this project.

### 7.3) OUTPUTS

1. Strengthened the cooperation ties and technical-scientific collaboration between JICA and Honduras.
2. Strengthened the institutional coordination capacities between AMDC, UNAH, COPECO and JICA.
3. Extended and Strengthen the regional capacities with the use of the experience with generated by JICA 2E projects.
4. Generated and strengthened the institutional capacities of AMDC, UNAH, COPECO in the topics of landslide movement events.
5. Extended and strengthened the institutional capacities of AMDC, UNAH, and COPECO for the

investigation, evaluation, analysis, and determination of physical-mechanic characteristic in landslide movement events (Landslide and other gravitational processes).

6. Extended and strengthened the institutional capacities of AMDC, UNAH, and COPECO for the management of countermeasure in the light of Landslide movement events (Landslide and other gravitational processes).
7. Extended and strengthened the institutional capacities of AMDC, UNAH, and COPECO for the analysis and regulation of territory affected by landslide movement events (Landslide and other gravitational processes).
8. Generated and strengthened the national systemic capacities for the approach in landslide movement (Landslide and other gravitational processes) cases, through the participation of the multidisciplinary and institutional commission for the technical evaluation of housing projects in Central District.
9. Strengthened the technical-scientific regional ties about the themes of landslide movement events through the successful experiences interchange obtained with this project.

### 7.4) T/C SITE (In case the proposed T/C assumes a particular area, please enter the mane of the target area for the T/C and attach a rough map to the document submitted, The attached map should be at a scale that clearly shows the Project site)

The site were the activities of this project will be developed is referred to the Central District Municipality, which corresponds to the geographical area of the national territory were the capital city of the Republic of Honduras is located. Composed of two principal cities, Tegucigalpa and Comayagüela, which represent the municipality urban area. Likewise, its rural area is made up of by 41 villages and 293 hamlets. It belongs to the Department of Francisco Morazán, with a total area of 1,514 square kilometers and counts with at least 1,276,620 numbers of inhabitants[5]. Following is a schematic map of the location:

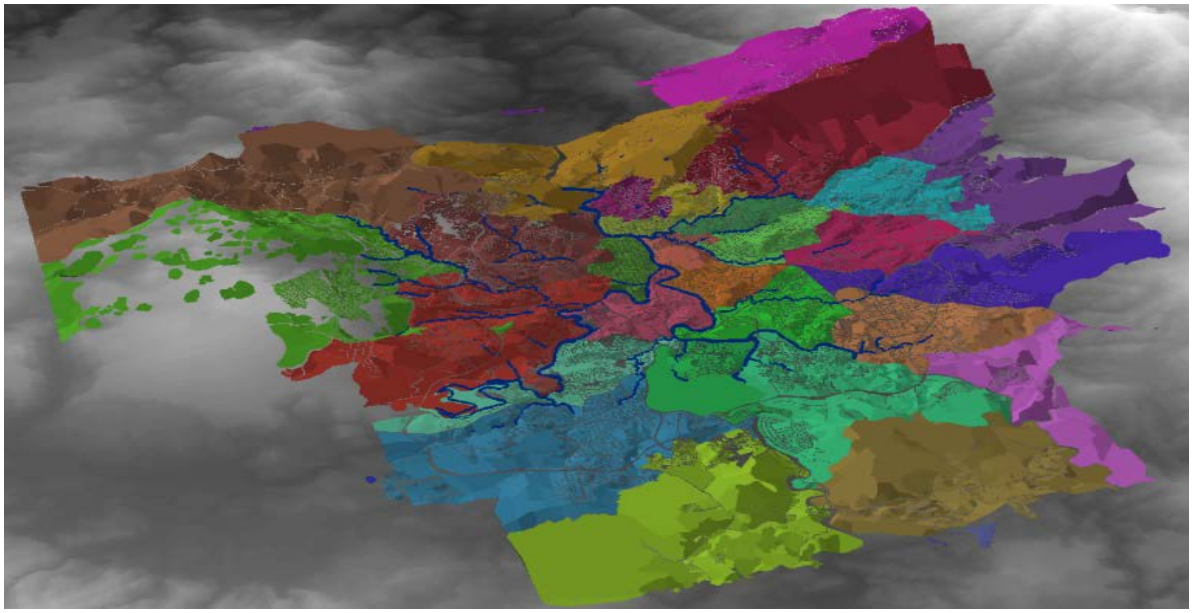
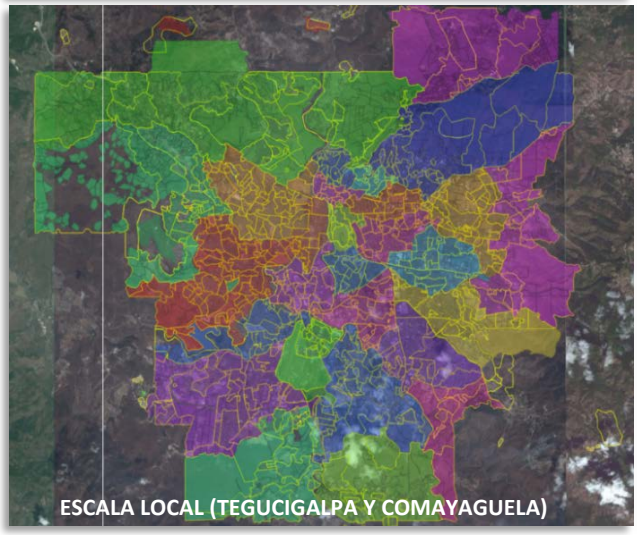
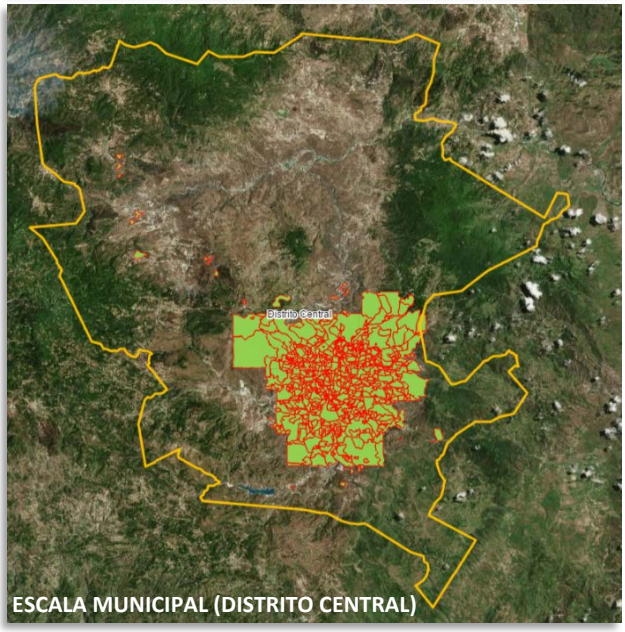


***Image Political Administrative Division of Metropolitan Area of Central District (Local scale)***

[5] Instituto Nacional de Estadística y Censo (INE)-2010






***Schematic maps of the different regional, national, local and municipal area of the JICA 2E project were the implementation is proposed.***

## 7.5) T/C Activities (Specific actions intended to produce each "Output" of T/C by effective use of the "Input")

### 7.5.1) INVESTIGATION, ANALYSIS AND CHARACTERIZATION OF THE LANDSLIDE MOVEMENTS (LANDSLIDES AND OTHER GRAVITATIONAL PROCESS) APPLICABLE IN THE METROPOLITAN AREAS

a. Special studies oriented to the Metropolitan Areas affected by Landslide Movements (Landslides and other gravitational process)/ Investigation of Characteristics and Topographic Parameters, Geomorphological, Geological, Geotechnical, Geophysical, Hydrological, Hydrogeological, etc.,
b. Review, Analysis, and Interpretation of data records obtained with the exploration.
c. Analysis of Landslide Movement Hazard (Landslides and other gravitational process). This activity will be sent to the Final Characterization of the sites of interest.
d. Analysis of the Vulnerability caused by Exposition to Landslide Movement (Landslides and other gravitational process) of the selected sites of interest for the development of the project.
e. Risk Analysis associated to the exposition in the light of hazard of the sites of interest selected for the development of the project.

f. Definition of design concepts for the works of the countermeasure in the light of landslide Movement (Landslides and other gravitational process) proposed as mitigation measure or stabilization of the selected interest sites for the development of the project.
g. Development of the Evaluation Guide Analysis and Characterization of the Hazard in the face of landslide movement (Landslides and other gravitational process) applicable to Metropolitan Areas

### 7.5.2 COUNTERMEASURES MANAGEMENT IN THE LIGHT OF LANDSLIDE MOVEMENTS (LANDSLIDES AND OTHER GRAVITATIONAL PROCESS) APPLICABLE IN THE METROPOLITAN AREAS

a. Monitoring of the Parameters and topographical, Geotechnical, Geophysical, Hydrological, and Hydrogeological characteristics necessary for the design development of countermeasure works.
b. Design of the Countermeasure Works in the face of Landslide Movements (Landslides and other gravitational process) oriented to Metropolitan Areas. The activity includes the development calculus design specifications and implemented methods.
c. Technical specifications, quantity, and estimated budget of the proposed works.
d. Elaboration of the tender books.
e. Execution and monitoring (Inspectorate, supervision and reception of the works).
f. Development of the Design Manual of Countermeasure Works in the light of Landslide Movements (Landslides and other gravitational process) in Metropolitan Areas
g. Development of the Maintenance Manual for the Implemented Countermeasure Works that will be implemented as a result of the intervention of this project.

### 7.5.3 MANAGEMENT OF THE MEASURES IN LAND MANAGEMENT ORIENTED TO THE LANDSLIDE MOVEMENT ZONES (LANDSLIDES AND OTHER GRAVITATIONAL PROCESS) APPLICABLE IN THE METROPOLITAN AREAS

a. Accompaniment in the activities to develop, Equipment and Implementation of the SIMRET-DC (Integrated Only Risk Information Center
b. Creation, development and Implementation of the Municipal Monitoring Network in the light of Landslide Movements (Landslides and other gravitational process)
c. Creation, development and Implementation of the communal SAT (Early Warning Systems, initials in Spanish) (JICA-BOSAI) in the light of landslide movements. For it, it's estimated the use of provided information that will be created by the Municipal Monitoring Network in the light of Landslide Movements.
d. Creation of the Revision and actualization Guide for Vulnerability Maps and Hazard Inventory Landslide Movement (Landslides and other gravitational process) in the Metropolitan Area.
e. Creation of the Methodological Guide for the Zoning of the Metropolitan Area affected by Landslide Movement (Landslides and other gravitational process)/ Definition and establishment of the technical zoning Criteria.
f. Construction of the Proposal for the Municipal Ordinance of Zoning for the Metropolitan Area affected by Landslides (Landslides and other gravitational process), which lead to the proper planning of land use and the Spatial Planning.

### 7.5.4 STRENGTHENING OF THE CAPACITIES AND NATIONAL AND INTERNATIONAL INTERCHANGE

a. National and International level training of municipal technicians, university graduates and state actors about the methodologies for the development of the project components.

b. Accompaniment in the process of strengthening the communal capacities through the intervention of the BOSAI Project (COPECO, AMDC, JICA, incorporating, UPN-FM and UNAH).
c. Equipment and instrumentation strengthening oriented to complement the interventions of each component.
d. Elevate to governing board of SINAGER the developed tools and instruments, ensuring its formalization for national use.
e. Course/Workshop at national and Centro Americal level for the Implementation of the Evaluation, Analysis and Characterization of Hazard by Landslides (Landslides and other gravitational process) in the Metropolitan Areas Guide.
f. Course/Workshop at national and Centro American level for the Implementation of the Design Manual of Countermeasure Works in the light of Landslide Movements (Landslides and other gravitational process) for Metropolitan Areas.
g. Course/Workshop at national and Centro American level for the Implementation of the Revision and actualization Guide of the Vulnerability Maps and Hazard Inventory Landslide Movement (Landslides and other gravitational process) applied in Metropolitan Areas.
h. Course/Workshop at national and Centro American level for the Implementation of Methodological Guide for the Zoning of the Metropolitan Area affected by Landslide Movement (Landslides and other gravitational process)
i. Diploma at national and centro American level on "Gravitational Processes and their Impact on Spatial Planning of Metropolitan Areas"

j. Others:
   - Experience Interchange with JICA Central Tokyo (Japan)
   - National Congress
   - Central American Congress
   - Regional interchange Visits
   - Interchange between national and regional Universities
   - Interchange and/or internship between Capital Cities (Iber-American Capital Cities Union initials in Spanish UCCI)
   - Regional events sponsored by the Coordination Center for Prevention of Natural Disasters in Central America (initials in Spanish CEPREDENAC)
   - Regional Conferences through the national entities of Risk to Disaster Integral Management (Initials in Spanish GIRD) of Central America.
   - Virtual Courses or Trainings through various platforms
   - International Consortium on Landslides (ICL)
   - Etc.

### 7.5.5 JICA 2E PROJECT SYSTEMATIZATION

a. Consolidated Accompaniment, register and synthesis of the processes, results and lesson obtained with the execution of JICA 2E project.

## 7.6 INPUT FROM THE RECIPIENT GOVERNMENT [Counterpart personnel (identify the name and position of the Project manager), support staff, office space, running expenses, vehicles, equipment, etc.]

a. The Project will be led from the Municipal Central District Municipal Office (initials in Spanish AMDC), through Mayor´s Office, whom with the assistance of the Integral Risk Management Municipal Unit (Initials in SpanishUMGIR-AMDC), will guaranty the effective development and implantation of JICA 2E Project, under the coordination of the

participation and collaboration of the rest of counterparts [Permanent Contingencies Commission (initials in Spanish COPECO), Autonomous National University of Honduras(initials in Spanish UNAH), and JICA].

b. Local-technical Counterparts assignation for the assistance and accompaniment of each of the Japanese experts. The AMDC will include the participation of the municipal technicians and professionals with higher experience in the evaluation and attention to events of landslide movements' cases, being between them personnel from the Risk Evaluation Management, Municipal Emergency Committee (Initials in Spanish CODEM-AMDC), UMGIR-AMDC and other that are required. Likewise, from COPECO, if it's considered and required, will include the assistance of hired technicians and specialists from the institutional strengthening project obtained from World Bank and Inter-American Development Bank (initials in Spanish BID). Finally, from the UNAH will be assigned personnel of Science of the Earth Honduran Institute (initials in Spanish IHCIT).

c. Assignation and availability of equipment and instruments for the analysis, exploration and recording of the physical-mechanical soil characteristics, that are available in the AMDC, COPECO and UNAH institutions, likewise any other within the framework of SINAGER, that can be handled with the other institutional entities. Within the equipment highlights the soil radar, landslide scanner, electrical and seismic refraction equipment, cone penetration testing CPT) equipment, structural scanner, remote sensing for recording the angle and structural crack monitoring (potentiometer, structural inclinometers, accelerometer, etc.), other that the country has available.

d. Local professionals' accompaniment that is required and form part of the institutions of COPECO and UNAH personnel.

e. Assignation of necessary resources according to the municipal availability for the execution of the project.

f. Assignation of necessary resources that according to COPECO´s availability can be incorporated to the execution of the project.

g. Availability of all the equipment and instruments from UNAH, likewise of all the generated and/ or strengthened capacities part of the "Assistance for Strengthening and Capacity Building of Professional techniques on Control and Mitigation in the light of Landslide in Tegucigalpa Metropolitan Area, Republic of Honduras (JICA1E)

h. Logistic accompaniment for the field visits 'development or other in framework of the project that are required, as well as immediate response equipment that will be available from CODEM-AMDC and from COPECO, to attend the Japanese personnel experts.

i. Office space assignment properly adapted and conditioned for the Japanese experts use.

j. Municipal Police protection and safeguard during every one of the field visits or any moment that is required by the Japanese experts.

### 7.7 INPUT FROM THE JAPANESE GOVERNMENT (Number and qualification of Japanese experts/consultants, contents of training in Japan and in-country) courses, seminars and workshops, equipment, etc.

a. Experts in specific areas of Science and Knowledge, with a high capacity to transfer knowledge and coordinated job with multidisciplinary heterogeneous group, preferably with experience on development of projects in Central America

A. Group Leader/ Specialized in characterization and evaluation of landslide movement events, with coordination capacities of multidisciplinary trained and intersectional representation

heterogeneous groups

B. Geologist with wide experience on investigation, evaluation and characterization of landslide movement events, preferably with local and/ or regional geology knowledge.

C. Geomorphologists with wide experience on investigation, evaluation and characterization of landslide movement events, preferably with local and/ or regional typical geomorphology knowledge.

D. Experienced Geophysicist on exploration in landslide movement affected areas; preferably in high densification sites of urban areas (experience on identifying of events originates by mankind such as broken pipes, waste water infiltration, lack of drainage systems, etc.)

E. Geotechnitian with experience on analysis and study of landslide movement events (incluiding monitoring, development and implementation of SAT in the light of landslide movements), with additional experience on the development of small, medium and large scale countermeasure works in the light of landslide movements.

F. Hydro geologist with wide experience on investigation, evaluation and characterization of landslide movement events, preferably with local and/ or regional typical hydrogeology knowledge.

G. Specialist in design and execution of countermeasure works in the light of landslide movements with experience on investigation, development of characterization studies, development of countermeasure designs in the light of landslide, collapse, rock and block fall, debris flows, sludge flows, soil creeping, etc.

H. Specialist in zoning and land management with experience in the development of regulation processes and/ or creation of laws oriented to attending cases in landslide movements affected areas.

I. Specialist in the creation of monitoring networks or systems for vigilance, observation and implementation of Early System Alert in the light of landslide movements.

J. Specialist in maps and digitization of geotechnical, geophysical, geological, hydrogeological, geomorphological information. That has participated before in other project evaluations, investigations, characterizations, stabilization of landslide movements' events.

K. Specialist in building local capacities who's able to generate and transmit the obtained knowledge from the generated experience on the project.

L. Legal specialist with experience on landslide movement cases that have affected high densification populated areas.

M. Specialist in systematization with experience on landslide movement cases.

b. Project cooperation period: 42 to 60 months.

c. Necessary equipment for the Project implementation: Within them area the high accuracy special data collection equipment, with high resolution images (unmanned autonomous airborne equipment, drones), geophysical and geotechnical exploration equipment with sample recovery, remote sensing monitoring of landslide movement events, special equipment for the evaluation, analysis and characterization of events (total station, GPS, differential submeters, distance meter, stereoscopes, etc.), software for analysis and post processing data, hardware for the implementation and use of the software, etc.

d. Counterpart training program in Japan: Mostly in topics of 1) Geotechnical and geophysical exploration for the designs of countermeasure structural works in the light of landslide movements, 2) Design of structural countermeasure works in the light of landslide movements

(Design methodologies). 3) Monitoring Networks for landslide movement control. 4) Early Alert Systems in the light of landslide movement events, and finally 5)Japanese experiences in land management (land use and advantage, likewise its restrictions and regulations)

e. Funding for the execution of the designed countermeasure works resulting from the implementation of the JICA 2E project. Through which the sites can be stabilized and at the same time will generate the activities to the building of tools and instruments.

## 8.- IMPLEMENTATION SCHEDULE

Beginning: June of 2017
Ending: January of 2021
Estimated execution: 42 months (minimum term)

## 9.- DESCRIPTION OF IMPLEMENTING AGENCY

**9.1. - (Budget allocated to the Agency, number of staff of the Agency, Department/ Division in charge of the T/C, etc.)**

The executing agency will be the **Central District Municipal Office (initials in Spanish AMDC)**, whom through the Mayor´s Office with the assistance of the Integral Risk Management Municipal Unit (Initials in SpanishUMGIR-AMDC), will coordinate the development and fulfillment of each and all of the programmed activities through this project.

**9.2.- (If implementing agency plans to take some (future) actions in connection with this proposed project please describe the concrete plans/action and enter the funding sources for the plans and actions.)**

a. It's expected the municipal adoption by means of the institutionalization of all the tools and instruments generated by this project, allowing through them to generate specific regulation frameworks for the administration of the Central District land.

b. It´s expected with this Project to replicate the generated experience, in the numerous identified affected sites by landslide movement events on Central District Municipality, directing from UMGIR-AMDC, strategies and policies of boarding oriented to the reduction of risk of disasters and the climate change adaption.

c. The Central District Municipality with the generated and strengthened capacities by this project (knowledge, equipment, instruments, tools, etc.), will undertake institutional actions aimed to the consolidation of internal procedures that allow to generate control, prospects and indicators to improve the land administration and measure the impacts in reduction of risks to disasters, considering for it the inclusion of the climate change effects.

d. The Central District Municipality will accompany the execution of this project, with the funding and development of small scale works that are oriented to complement the medium and large scale works defined and identified by this project, which JICA 2E will finance as a solution to the mitigation and stabilization of affected areas by landslide movements in sites of interest.

## 10. RELATED INFORMATION

**10.1.- (Prospects of further plans and actions/ expected funding resources for the project)**

a. The Central District Municipality may broaden its participation in the execution of this project,

with the funding and development of additional works that are oriented to complete the defined and financed by JICA 2E for this project.

b. The Central District Municipality foresees to generate synergies between this project and other municipal initiatives that are oriented to reducing the risk to disasters and the climate change adaptation, specifically in landslide movement themes, as well as to the land use regulation and land management.

c. At municipal and national level, such for the Central District Municipality Office (AMDC) as for the Permanent Contingencies Commission (COPECO), exists the perspective to strengthen the local and national capacities as a systematic effort in which allows the development of tools and instruments that can be elevated to the SINAGER governing board, and with it generate national regulatory actions for landslide movement management and land management of the affected territory.

d. It is expected to have the possibility of using all information and data available to the region and are generated through the Global Facility for Disaster Reduction and Recovery (GFDRR)

e. It is expected to have the possibility to use the information and data as well as World Bank support, specifically h

f. Through its programmes oriented to Climate Change and Early Warning System

**g.** It is expected for the possibility of having the support of the Inter-American Development Bank (IDB) with financing to countermeasures works under this project are designed and required execution.

**10.2.- Activities in the sector by the other donor agencies, the recipient government and NGOs and others:**

The Central District Municipality Office (AMDC) through this section lets the Japanese Cooperation know the following:

a. The AMDC hasn´t made any other action or request of formal support directed to any other external cooperation entity, which is related with the JICA 2E Project.

b. The AMDC presents the development of a Project that give continuity to the results obtained by JICA on its previous projects: 1) Master Plan "Study of Floods Control and Landslide Prevention in the Metropolitan Area of Tegucigalpa, Republic of Honduras, and 2) Assistance for Strengthening and Capacity Building of Professional techniques for the Control and Mitigation of Landslide in the Metropolitan Area of Tegucigalpa, Republic of Honduras.

c. The AMDC, specifically dealing with landslide movement events, currently doesn´t have any funding, support or collaboration of any national or international nature, or country friends or others that have been defined to accompany the municipal efforts for the attention to this problematic.

d. The AMDC requested the development of this project as a continuity to the former projects that were accompanied by JICA in the Central District (mentioned in subsection b of this part), seeking to use the obtained results, through the integration of them in the construction of the final solutions that allow to close the attention cycles and interventions initiated by JICA. Likewise, taking from this process the necessary contents and experiences generating the tools and instruments that will lead to a generation land use laws and regulations affected by landslide movement events, as a part of to land management municipal actions focused to climate change adaption. According to what is described, it's important to point out that the former projects have represented highly significant contributions to the community of Central District, which have substantially strengthened our technical and scientific capacities, with technology transfer

and other contributions, however, it's important to the municipality to generate greater capacities to self-manage the attention to this events and its solutions, therefore, this project seeks to follow-up and continue JICA´s previous initiatives, which making use of all the products and results, but extending the range to the generation of local capacities to self-manage the landslide movements events, will propitiate and enable the undertaking actions leaning to the territory planning with land management measures under the focus of climate change adaptation.

e. The AMDC wants the Japanese Cooperation to know, that their exists different previous studies on landslide movement matter, and that most of them, undertaken with the support of the Japanese Cooperation in the years of 2001-2001, 2007-2011, 2012-2013, and finally 2014-2016. Additionally, in 2011 the United Nations Development Programme (UNDP) generated studies that gave place to the creation of the multi-hazard map (map of the susceptibility analysis in the light of landslide movement in the Central District urban area), and in 2014 the Inter-American Development Bank (IDB), through the Emerging and sustainable cities initiative made a new susceptibility analysis in the light of landslide movement, which is still not official.

## 11. Global Issues (Gender, Poverty, Climate change, etc.).

**11.1. - (Any relevant information of the project from global issues (Gender, Poverty, Climate change, etc.) perspective.**

a. Honduras is the most affected country in the world in the light of Extreme Climate Events, according to table of the ten most affected Countries since 1994 to 2013 (annual average), with a 10.33 score on the Long Term Climate Risk Ranking (CRI)[6].

b. The Central District holds between its geographical limits the most important city of the country, its political- administrative capital, Tegucigalpa.

c. At least 11% of the Central District population is least 11% of the population is settled in high risk land in the light of landslide movements and floods. In these sense, the estimated annual loss for Central District as a consequence of disasters and damages originated by the effects of natural events are equivalent to $105 millions of American Dollars a year[7].

d. On Municipal Statistics, in 2016, 156 Slums and/ or colonies are located in risk places, with at least 350,000 people exposed to live in them.

e. In the country, of an estimated population of 8,576,532 inhabitants, almost six millions of the people are poor (5,892,077). In percentage, a 68.70% of the population is found in poor conditions, however, a 44.70% of the population is found in extremely poor conditions, according to the National Statistics Institute in the year 2015.

f. From the total of the Central District Population. (1,276,620 inhabitants), at least 435,000 citizens live in relatively poor conditions and other 82,650 in extremely poor conditions, represented this in percentage figures, around 35% in relatively poor conditions and 6.5% in extremely poor conditions. According to the National Statistics Institute in the year 2015.

g. Particularly for the Central District, in general terms, is estimated that in the total national population, 47.86% are men and 52.13% are women. According to the National Statistics Institute in

[6] *Germanwatch*
[7] The Inter-American Development Bank, in its recent Action Plan for Tegucigalpa y Comayagüela (development Plan undertaken by the of Emerging and sustainable Cities Initiative

the year 2015.

**12. Environmental and Social Considerations.**

**12.1.- (In case of technical cooperation project/ Technical Cooperation for Development Planning, Please Fill in the attached screening format).**

Note: If JICA considers that the environmental and social considerations for the project of technical cooperation be disclose, the applicants must agree on it, allowing the public audience according to JICA´s guideline for the environmental and social considerations, just as indicated in question number 11 in attached screening format.

a. The project is oriented to the Technical Cooperation for the development request, so the attached screening format will be completed.

**12. - Others.**

The institutional counterparts' participation of the country in this project has been defined by the understanding agreements framework between the Central District Municipality Office (AMDC) and the Science of the Earth Honduran Institute of the Autonomous National University of Honduras (IHCIT-UNAH) in 2016, likewise, through the inter-institutional Cooperation Agreement between the ADMC and the Permanent Contingencies Commission (COPECO) in 2014. However, having sharing interests for generating local and national tools and instruments, that will allow to improve the methods and procedures for managing landslide movement events, we have undertaken the joint process of formulation and development of this proposal.

| | |
|---|---|
| Signed: | |
| Title: | Alcalde Municipal del Distrito Central |
| On behalf of the Government of: | Alcaldia Municipal del Distrito Central |
| Date: | |

## Screening Format（Environmental and Social Considerations）

Please write "to be advised (TBA)" when the details of a project are yet to be determined.

Question 1: Address of project site

Question 2: Scale and contents of the project (approximate area, facilities area, production, electricity generated, etc.)

2-1. Project profile (scale and contents)

2-2. How was the necessity of the project confirmed?

Is the project consistent with the higher program/policy?

□YES: Please describe the higher program/policy.

（ ）

■NO

2-3. Did the proponent consider alternatives before this request?

□YES: Please describe outline of the alternatives
（ ）

■NO

2-4. Did the proponent implement meetings with the related stakeholders before this request?

□Implemented ■Not implemented

If implemented, please mark the following stakeholders.
□Administrative body
□Local residents
□NGO
□Others（ ）

Question 3:

Is the project a new one or an ongoing one? In the case of an ongoing project, have you received strong complaints or other comments from local residents?

■New ☐Ongoing (with complaints) ☐Ongoing (without complaints)

☐Other

Question 4:

Is an Environmental Impact Assessment (EIA), including an Initial Environmental Examination (IEE) Is, required for the project according to a law or guidelines of a host country? If yes, is EIA implemented or planned? If necessary, please fill in the reason why EIA is required.

☐Necessity (□Implemented □Ongoing/planning)

(Reason why EIA is required: )

■Not necessary

☐Other (please explain)

Question 5:

In the case that steps were taken for an EIA, was the EIA approved by the relevant laws of the host country? If yes, please note the date of approval and the competent authority.

| | | |
|---|---|---|
| ■Approved without a supplementary condition | ☐Approved with a supplementary condition | ☐Under appraisal |

(Date of approval: Competent authority: )

☐Under implementation

☐Appraisal process not yet started

☐Other ( )

Question 6:

If the project requires a certificate regarding the environment and society other than an EIA, please indicate the title of said certificate. Was it approved?

☐Already certified

Title of the certificate: ( )

☐Requires a certificate but not yet approved

■Not required

☐Other

Question 7:

Are any of the following areas present either inside or surrounding the project site?

☐Yes ■No

If yes, please mark the corresponding items.

☐National parks, protection areas designated by the government (coastline, wetlands, reserved area for ethnic or indigenous people, cultural heritage)

☐Primeval forests, tropical natural forests

☐Ecologically important habitats (coral reefs, mangrove wetlands, tidal flats, etc.)

☐Habitats of endangered species for which protection is required under local laws and/or international treaties

☐Areas that run the risk of a large scale increase in soil salinity or soil erosion

☐Remarkable desertification areas

☐Areas with special values from an archaeological, historical, and/or cultural points of view

☐Habitats of minorities, indigenous people, or nomadic people with a traditional lifestyle, or areas with special social value

Question 8:

Does the project include any of the following items?

☐Yes ■No

If yes, please mark the appropriate items.

☐Involuntary resettlement (scale: households persons)

☐Groundwater pumping (scale: m3/year)

☐Land reclamation, land development, and/or land-clearing (scale: hectors)

☐Logging (scale: hectors)

Question 9:

Please mark related environmental and social impacts, and describe their outlines.

☐Air pollution
☐Water pollution
☐Soil pollution
☐Waste
☐Noise and vibrations
☐Ground subsidence
☐Offensive odors
☐Geographical features
☐Bottom sediment
☐Biota and ecosystems
☐Water usage
☐Accidents
☐Global warming

☐Involuntary resettlement
☐Local economies, such as employment, livelihood, etc.
☐Land use and utilization of local resources
☐Social institutions such as social infrastructure and local decision-making institutions
☐Existing social infrastructures and services
☐Poor, indigenous, or ethnic people
☐Misdistribution of benefits and damages
☐Local conflicts of interest
☐Gender
☐Children's rights
☐Cultural heritage
☐Infectious diseases such as HIV/AIDS
☐Other ( )

Outline of related impact:

Question 10:

In the case of a loan project such as a two-step loan or a sector loan, can sub-projects be specified at the present time?

☐Yes ■No

Question 11:

Regarding information disclosure and meetings with stakeholders, if JICA's environmental and social considerations are required, does the proponent agree to information disclosure and meetings with stakeholders through these guidelines?

☐Yes ■No