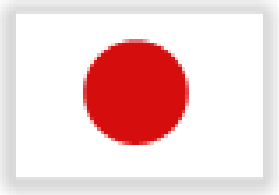
Japan International Cooperation Agency

« Cooperation Program with Mauritius »

Ms. Manoela RAZAFIMAHEFA
Mr. Hiroshi HASHIMOTO
Mr. Takeshi KUWANO

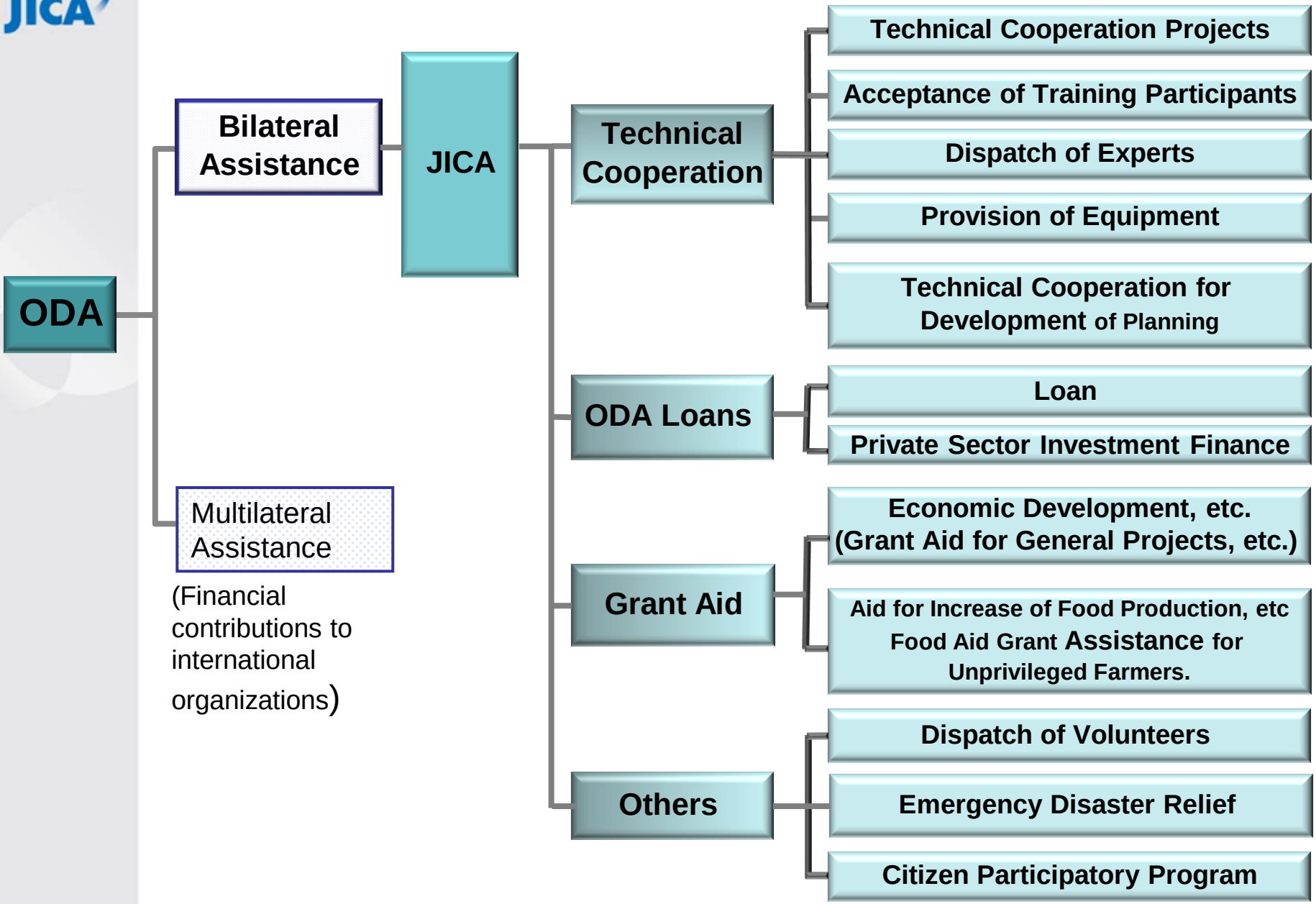


Mauritius, 29th October 2012

Outline

- Japan’s ODA and JICA
- Japan’s Cooperation Program for Mauritius
- Preliminary results of some projects
  (Coastal protection and Landslide management projects)

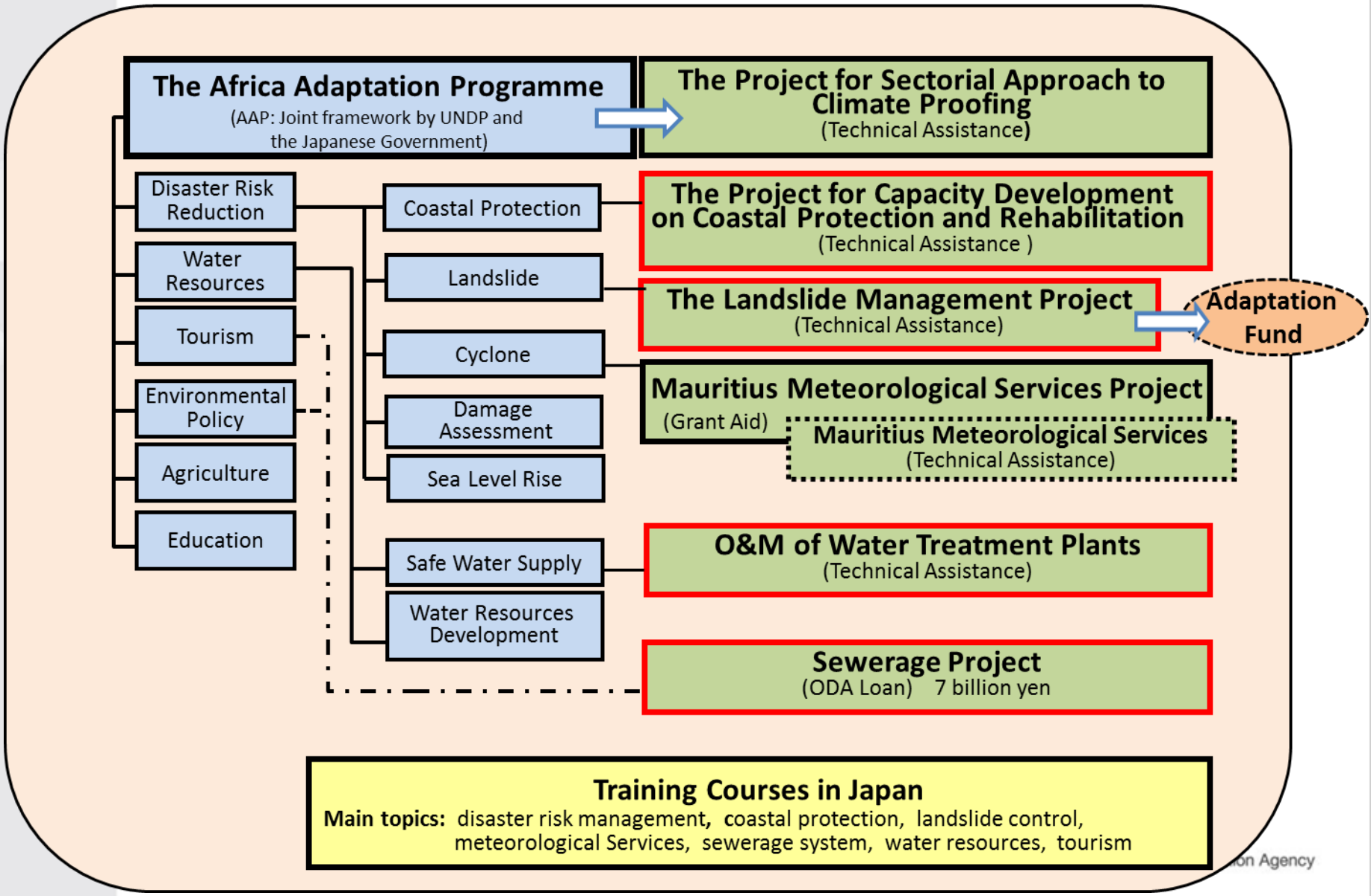
Japan's ODA and JICA



Japan's Cooperation Programme for Mauritius

October 2012

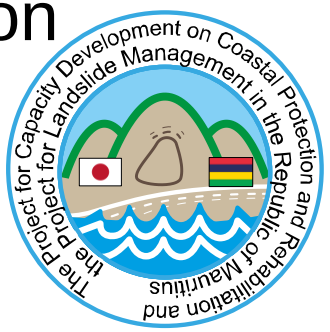
Climate Change Adaptation Programme



Preliminary results of some projects

Capacity Development for Coastal Protection and Rehabilitation

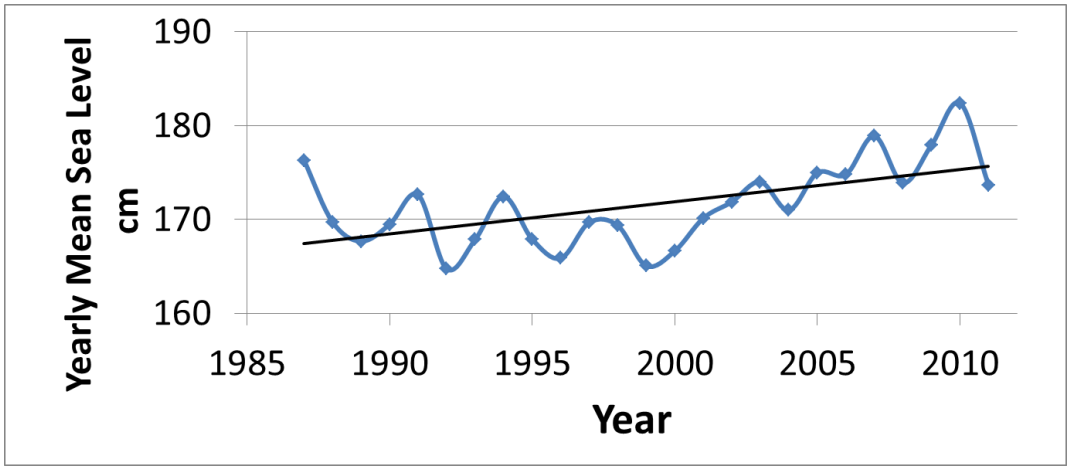
Outline of the Project



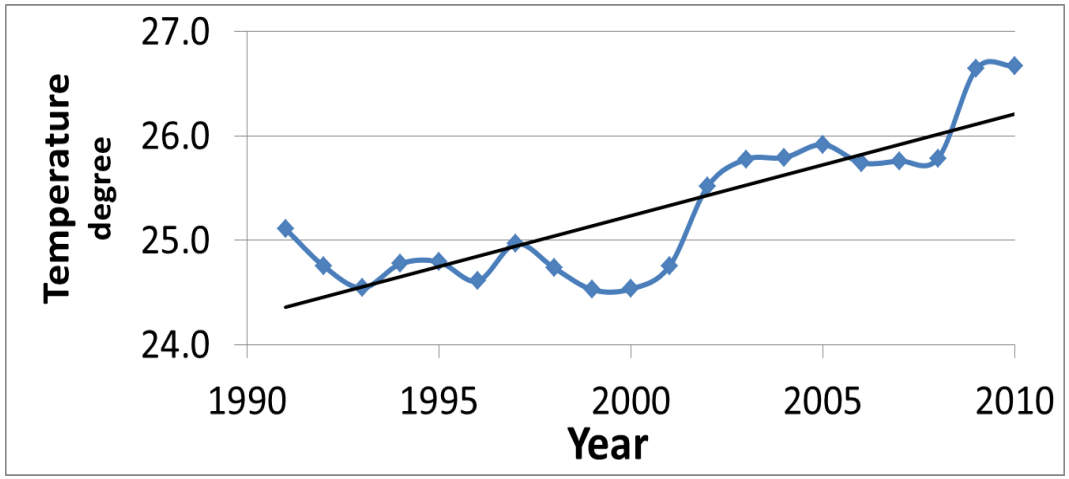
- 1) Overall Goal
  - Coastal conservation plan is approved by GoM
- 2) Objectives
  - To identify affected sites of coastal erosion
  - To formulate coastal conservation plans
  - To show the effectiveness of the conservation plan through demonstration projects
  - To enhance technical capacity in MoESD
- 3) Activities
  - Baseline survey, formulation of coastal conservation plan, implementation of demonstration project, technical transfer of coastal conservation management

Sea Level and Surface Temperature Rise in Recent Years

- 3.2 mm/year of sea level rise from 1987 to 2011 in Port Louis with rapid increase



- 0.1 degree/year of sea surface temperature rise from 1991 to 2010 around Mauritius
- Data from MMS



Coastal Erosion Problems

Long Term Erosion

30km long coastline was eroded from 1967 to 2008 in Mauritius. The maximum beach retreat was 20m.

At Pte. D'Esny 12m of erosion at an average (right)

Erosion Caused by Cyclone

High waves bring temporally erosion of 30 m at its maximum.

Beach scarp at Flic en Flac (left)

Coral Degradation

★ **Long-term decline in coverage of living corals**

Year	2000	→	2010
Coverage	52%		19%

By AFRC

★ **Present condition of coral coverage**

2012 Total 33 sites
Av. Coral coverage
= 27 %

By JICA & MoESD

Except for few sites, it is apparent that decrease of living corals in Mauritian reefs.

By global worming (coral bleaching) & eutrophication?

Coastal Conservation Plan Applicable in Mauritius

- Plan Includes several measures

- Structural Measures
  - Sand nourishment, rock armoring, groyne
- Non Structural Measures
  - Set back, EIA, land use control, early warning
  - Management of coastal space
- Adaptive management is the key with monitoring

Outline of the Project

The project of landslide management in the Republic of Mauritius

- MPI: Ministry of Public Infrastructure, National Development Unit, Land Transport and Shipping
- JICA: Japan International Cooperation Agency

(1) Overall Goal

- To mitigate landslide disasters in Mauritius

(2) Objectives of the Project

- To establish a landslide monitoring system by developing a landslide countermeasure plan and activity plans for Landslide Management Unit
- To implement the Feasibility Study and Pilot Project in high risk area
- To develop the capacity of government agencies involved in landslide management through the activities

Component 1: Basic Survey

Component 2: Formulation of a Landslide Management Plan

Component 3: Implementation of the Feasibility Study (F/S)

Component 4: Implementation of the Pilot Project

Landslide Disaster in Mauritius


Damaged house


Distorted house


Cracked floor

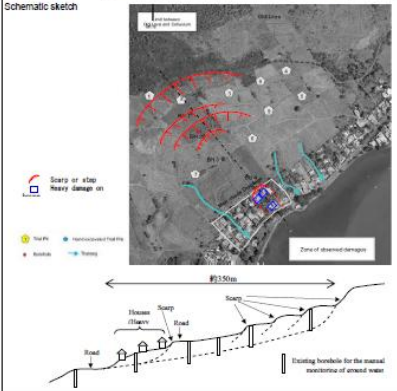

Main cliff

Results of Basic Survey

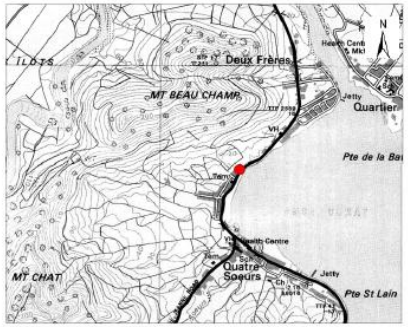
General Information Sheet (Slope)

Management number	0 0 0 0 0 0 0 0 2 7		Reporter's name	Tomoharu IWASAKI	Date of report	June 18, 2012
Address	Quatre Soeurs, Marie Jeanne, Jhummah Streert, Old Grand Port	Type*	Landslide	latitude	-20.424294	longtude	57.417514

Schematic sketch



Location map (Scale: 1:25,000)



* Description of "Type"

Rock fall

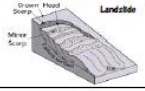
Rock Fall : Rock fall is a phenomenon where foliated rocks and gravel due to enlarged cracks in the bedrock or outcropped rocks start to fall down a slope.

Slope failure

Slope Failure : The slope failures mass detached from steep slope/cliff along surface with little or no shear displacement. Compared to landslides, the quick slope moves on a small-scale, the inclination angle of the slope failure is a relatively high angle (over 30 degrees).

Landslide

A landslide is a phenomenon where the soil mass on failure surfaces deep in the ground gradually shifts downward, triggered by heavy rain or earthquake, river erosion, earthworks. Compared to slope failure, the gentler slope moves on a large, the inclination angle of the landslides slope is a relatively low angle (about 5-30 degrees).



Debris flow

A Debris flow is a phenomenon where soil and boulders are liquefied by surface water or groundwater and tend to flow downward rapidly through a mountain torrent.

Evaluation sheet

Mangement number	0 0 0 0 0 0 0 0 2 7	Reporter's name:	Tomoharu IWASAKI

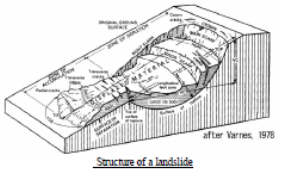
[check Point]

	Category		Check✓
Phenomenon on the Site	Scarp (Main or Minor , Horse shoe shape)		✓
	Transverse Cracks (Tension or Compression)		✓
	Pond and Swamp		
	Spring Water		
	Topography with the Step		✓
	Eembankment at the upper		
	Cut Slope at the toe		✓
	Wash out by rivers		
	Damage on construction and houses	obvious (number : 5 houses)	✓
		Slight (number :)	
		None	
	Monitoring Equipment	There is it (name: Borehole for Ground Water Level, number: 6)	✓
		There is it (name: , number:)	
		none	
History	Existing record of Landslide (documents or patrimony)	Obvious (Document, 2011)	✓
		slight	
		none	
Countermeasure	There is no Countermeasure		✓
	Effectiveness of Countermeasure	No effect	
		Some effect	
		High effect	

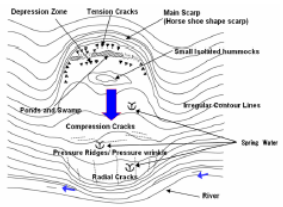
[Description]

Landslide activity has been confirmed at the Quatre Soeurs area where many houses have been damaged. This landslide shows some typical characteristics as follows,
(1) Scarps (Horse shoe Scarp),
(2) Steps on Tension Cracks.
(3) Cut Slope at toe (for road and house)
The groundwater level at the lower part of the landslide is high and is causing instability in the landslide. Drilling investigation and monitoring have been carried out, but not sufficiently. Further investigation and monitoring are necessary while the countermeasures are expected in future.
L=350m ,W=400m

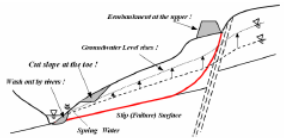
Existing record of Landslide(documents) : GEOTECHNICAL REPORT FOR SUSPECTED LANDSLIDE AT QUATRE SOEURS, MPI, 2011



Structure of a landslide



Schematic diagram of landslide landforms



Schematic cross section of inducing factor and artificial cause

Photo sheet

Management Number	0 0 0 0 0 0 0 0 2 7	Date	June 18, 2012

Ph-1 Full view

Ph-2 Scarps of the landslide upper part

Ph-3 Scarps of the landslide upper part

Ph-4 Head crack of a small landslide of the lower part

Ph-5 Existing borehole for the manual monitoring of ground water level

Ph-6 Heavy damage on house

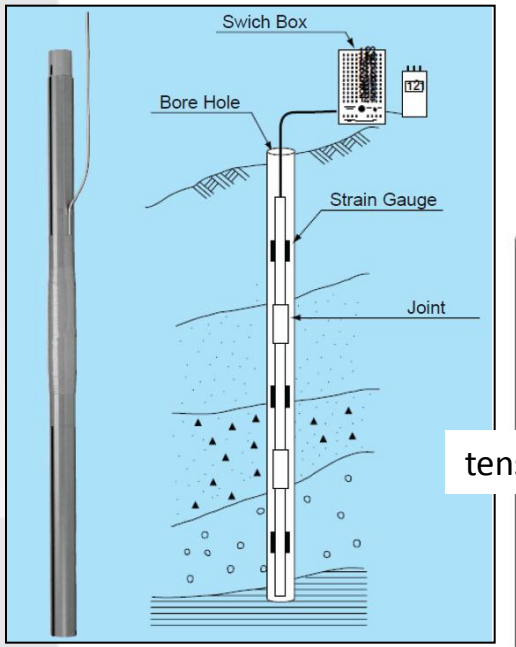
Ph-5

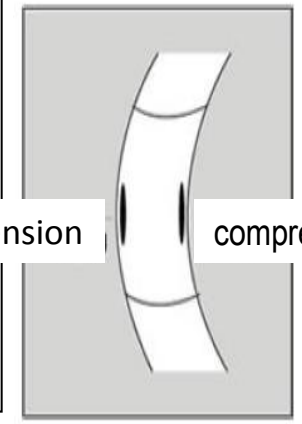
Example of Quatre Soeurs

Japan International Cooperation Agency

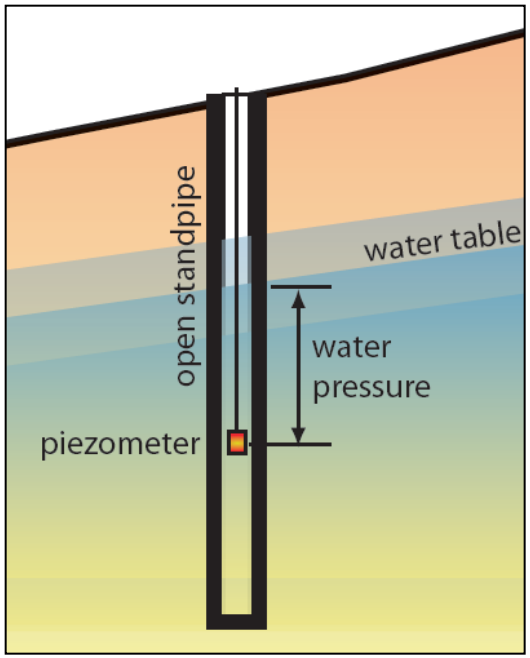
Instrumentation and Monitoring

Strain gauge



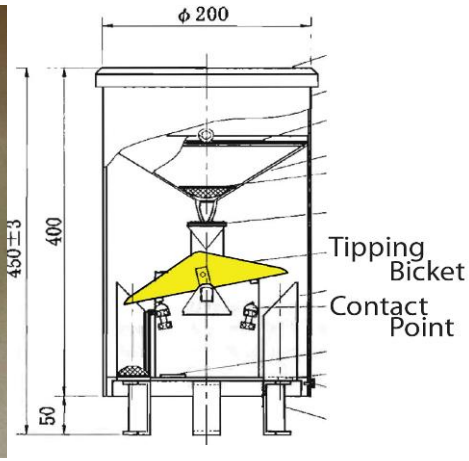


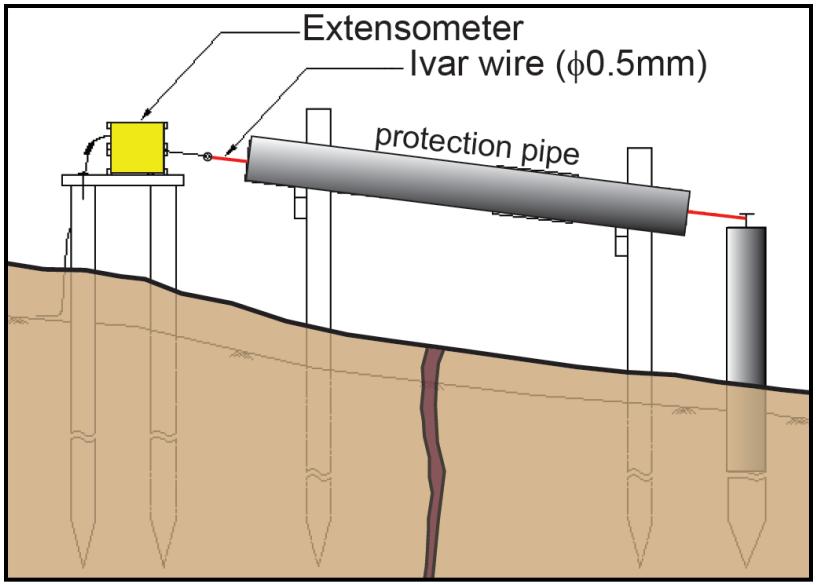
Piezo meter



Variable water table

Rain gauge





Action Plans

1. Hazard evaluation of landslide
2. Design/implementation of landslide countermeasure
3. Proposal of early warning/evacuation
4. Proposal of revision of Planning Policy Guidance
5. Formulation of organizational reinforcement
6. Preparation of guideline/manual

Thank you for your attention

jicamr-ad@jica.go.jp

http://www.jica.go.jp/madagascar/french/