SECOND SEMINAR ON WATER MANAGEMENT IN ISLANDS COASTAL AND ISOLATED AREAS

Koniambo Hydrological Data Acquisition Program

26th of May 2008

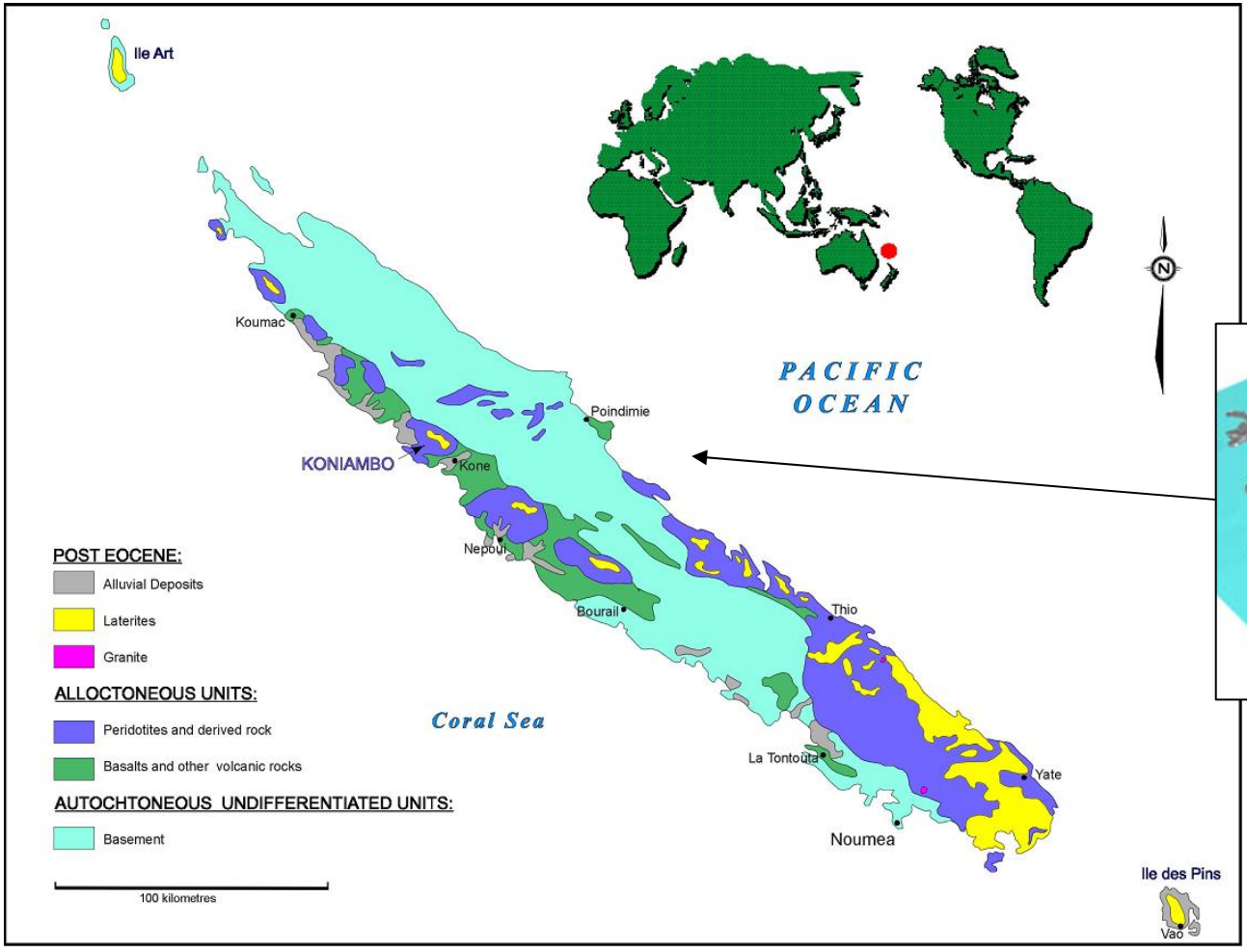
Frédéric CESA – Koniambo nickel SAS

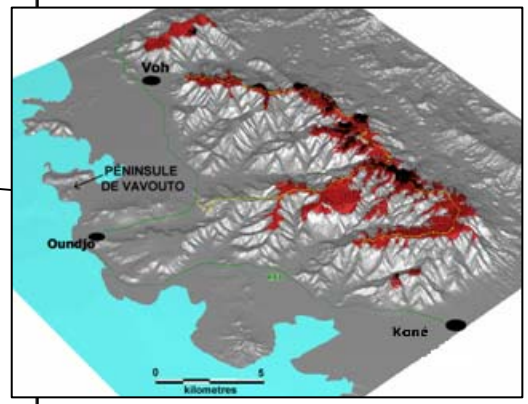
General overview of the Koniambo project

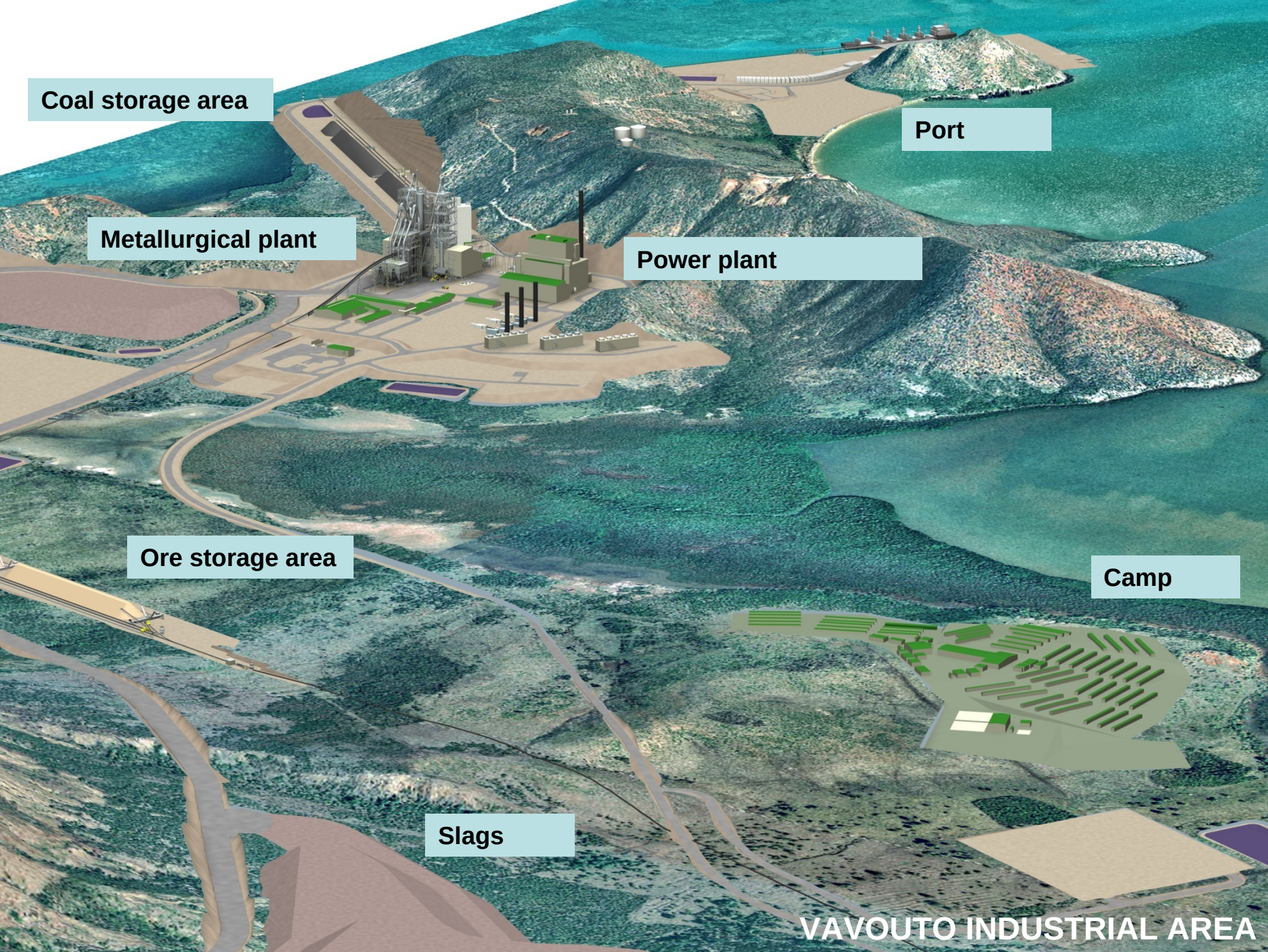
- One of the most important and richest unexploited Nickel deposits in the world.
- Project development by Koniambo Nickel SAS, joint venture of Société Minière du Sud Pacifique – SMSP (51%) and Xstrata Nickel (49%).
- Located near Koné, Province Nord capital, 270 km NW of Noumea.
- Total mineral reserves : 63 Mt at 2.4% Ni (with a 2.0% cutoff).
- Ore extracted in open pits and processed in a pyro-metallurgic plant with a production capacity of 60,000 tonnes of nickel.
- The current mine plan is for 25 years of exploitation.

The Koniambo Massif

Geographical location

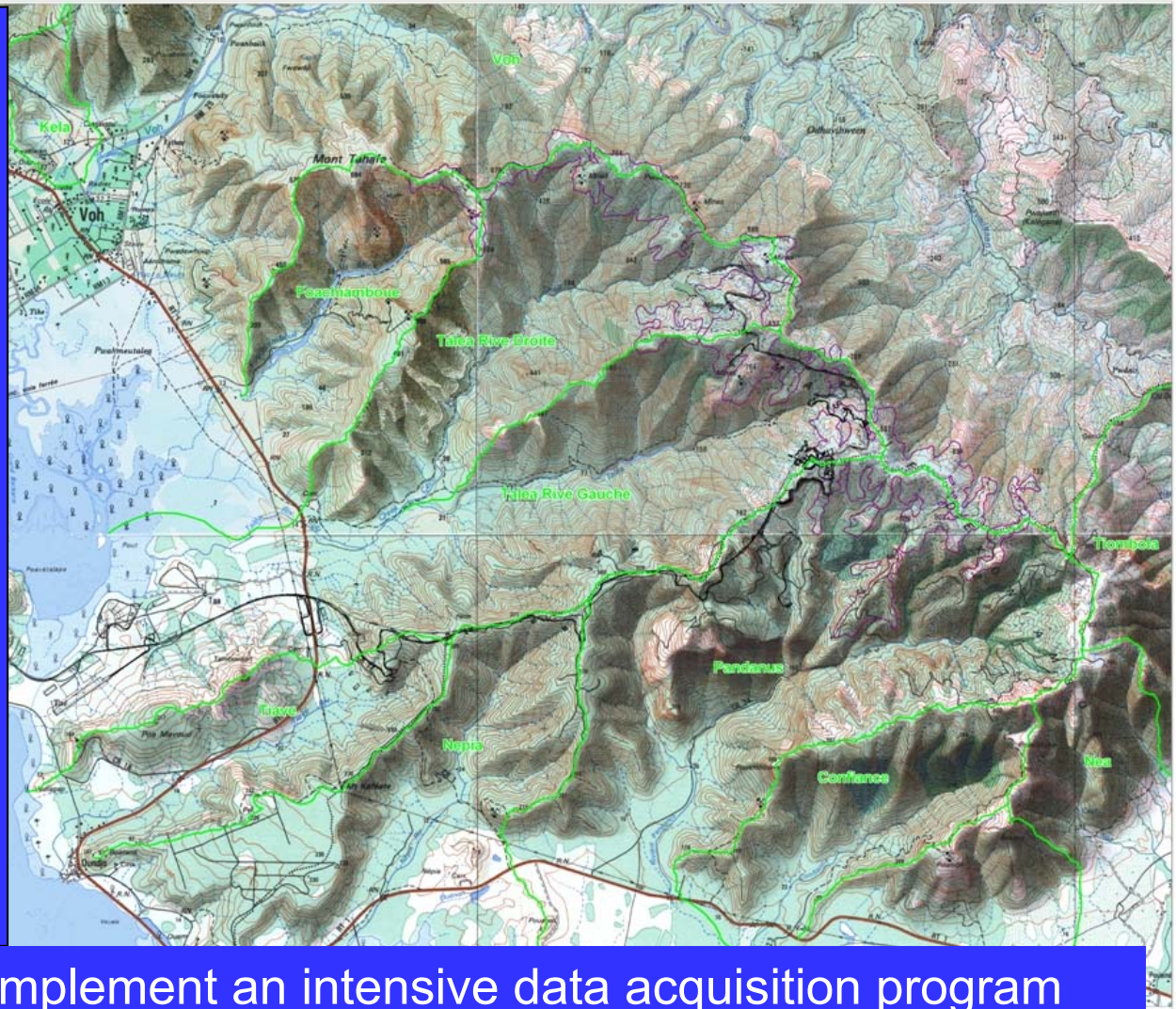





Coal storage area
Port
Metallurgical plant
Power plant
Ore storage area
Camp
Slags
VAVOUTO INDUSTRIAL AREA

Project presentation

- Vavouto peninsula to Massif
- Topographically variable (from sea level to 930 masl)
- Tropical climate
  - 1.0 - 2.5 m of rainfall
  - Cyclone and tropical depressions
- Lateritic soil



→ need to implement an intensive data acquisition program

Objectives of KNS hydrological program

- Define a pre-construction quantitative and qualitative baseline database to have a better understanding of the environment
- Identify the environmental aspects linked to mining activities
- Design of a comprehensive water and sediment management system
- Prepare the monitoring program for operational phase to achieve the legal requirements

To achieve these objectives

Rainfall:

Detailed network of rain gauges

Surface water:

Physical/chemical quality, flow, water levels, bed load,

Erosion control

Ground:

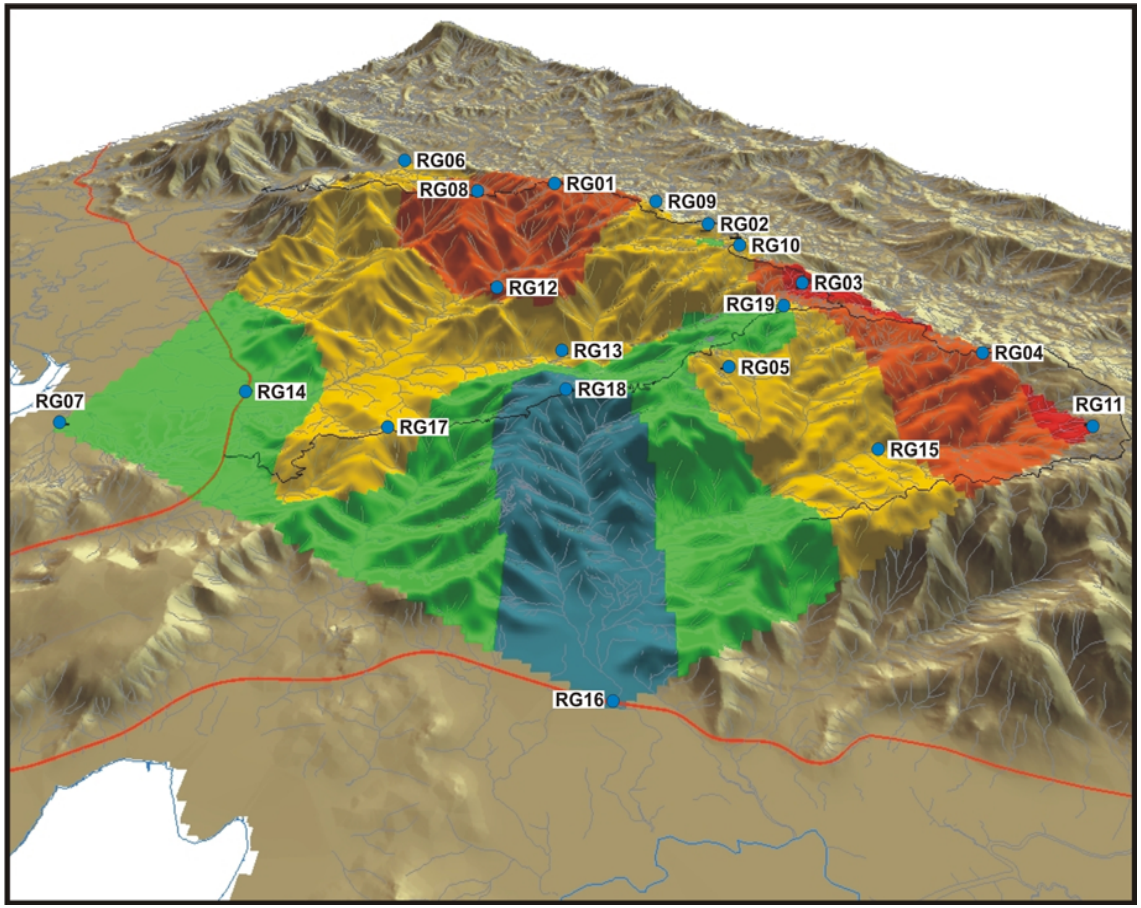
Erodibility, infiltration rates, erosion rates…

Rainfall Equipment

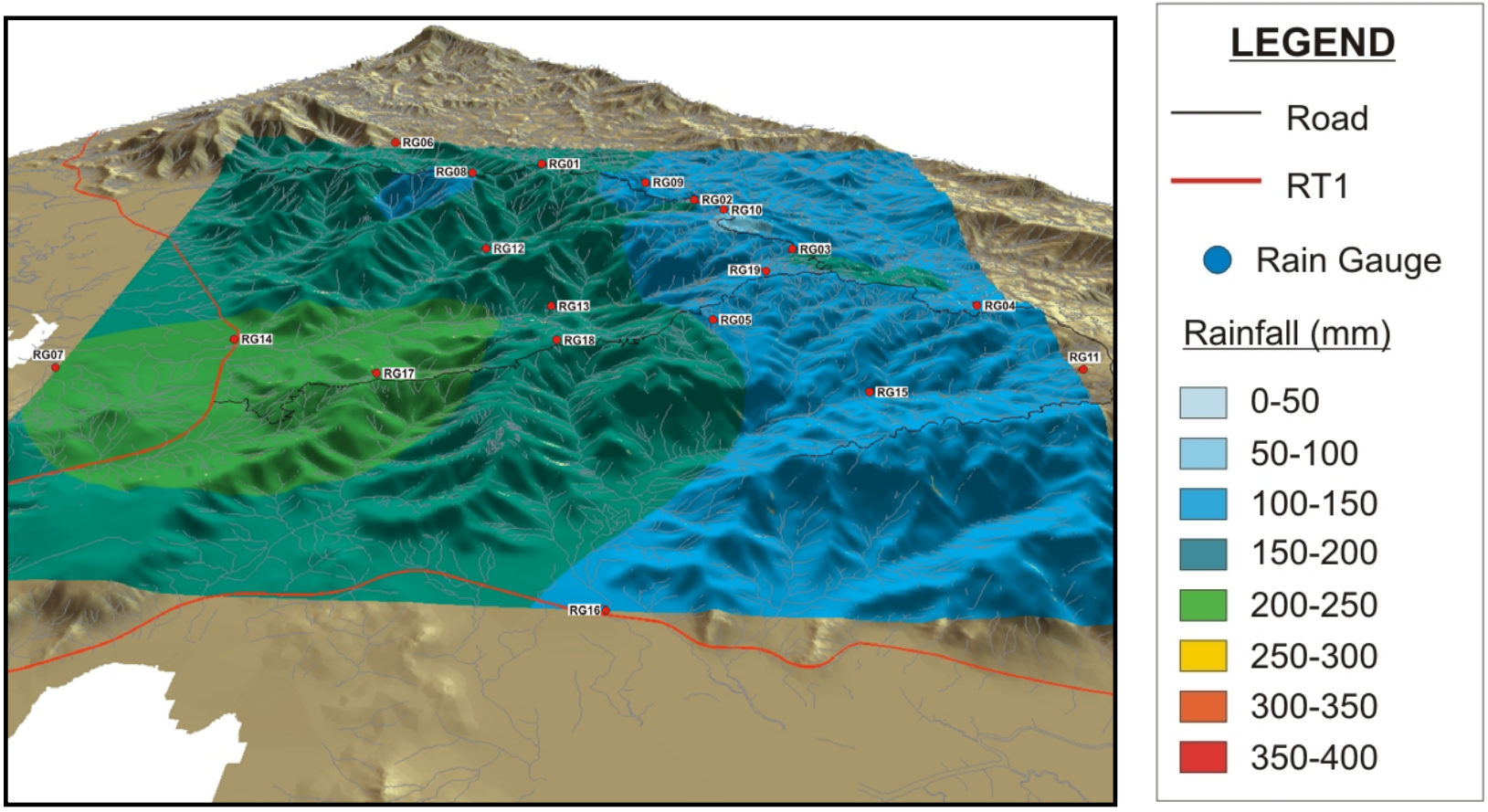
- Location considerations (topography, elevation, catchment sizes, land use, area extent…)
- Range of results used for analysis (monthly rain days, minimum, maximum, average annual, maximum, minimum daily, hourly range)

Type	Number
Tipping bucket	20 (+ 5 Meteo France stations)

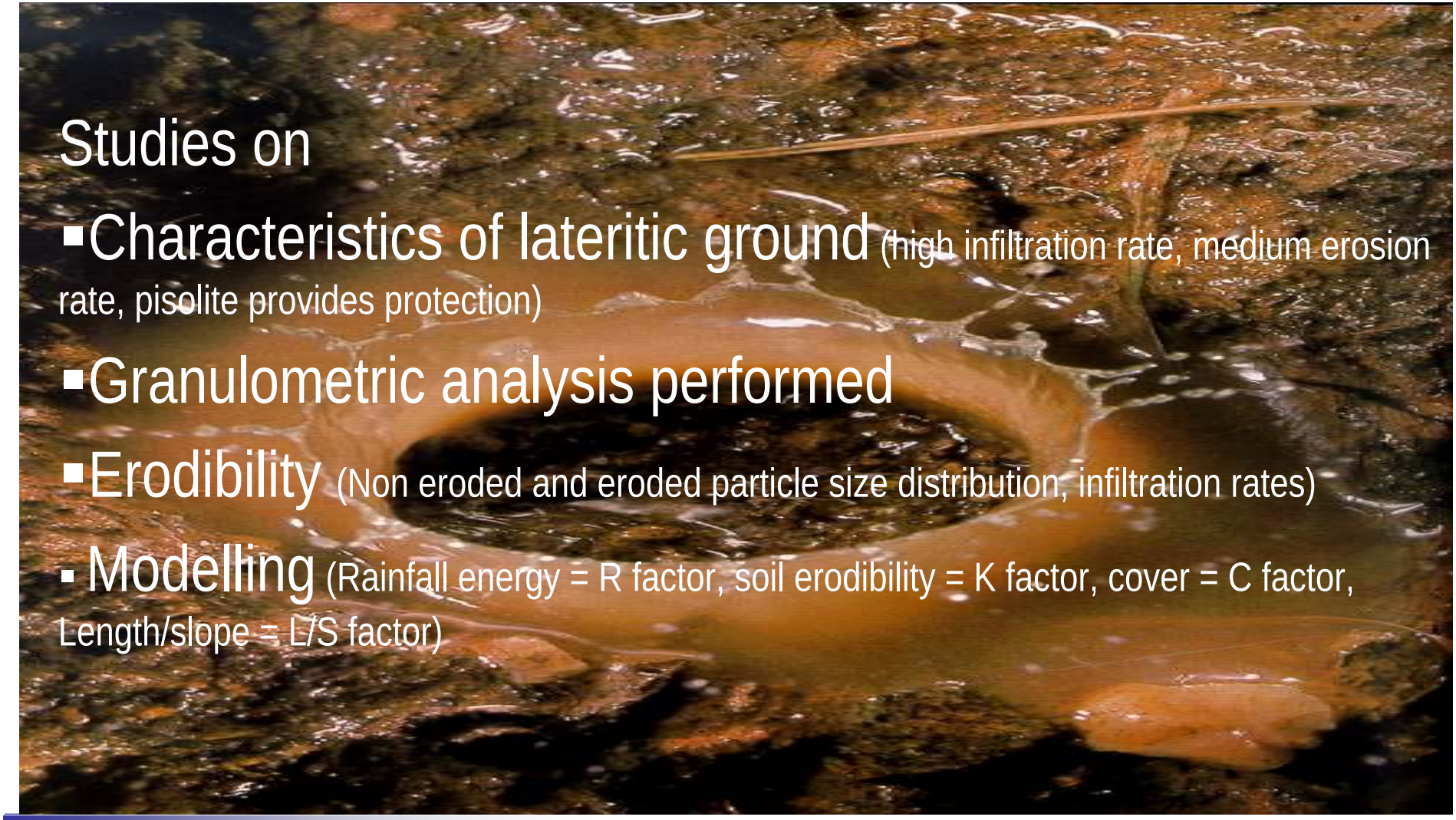
Spatial distribution results: Kriging (January 22, 2006)



Spatial distribution results: Kriging (June 28, 2007)



Soil



Studies on

- Characteristics of lateritic ground (high infiltration rate, medium erosion rate, pisolite provides protection)
- Granulometric analysis performed
- Erodibility (Non eroded and eroded particle size distribution, infiltration rates)
- Modelling (Rainfall energy = R factor, soil erodibility = K factor, cover = C factor, Length/slope = L/S factor)

Rainfall Simulator on laboratory

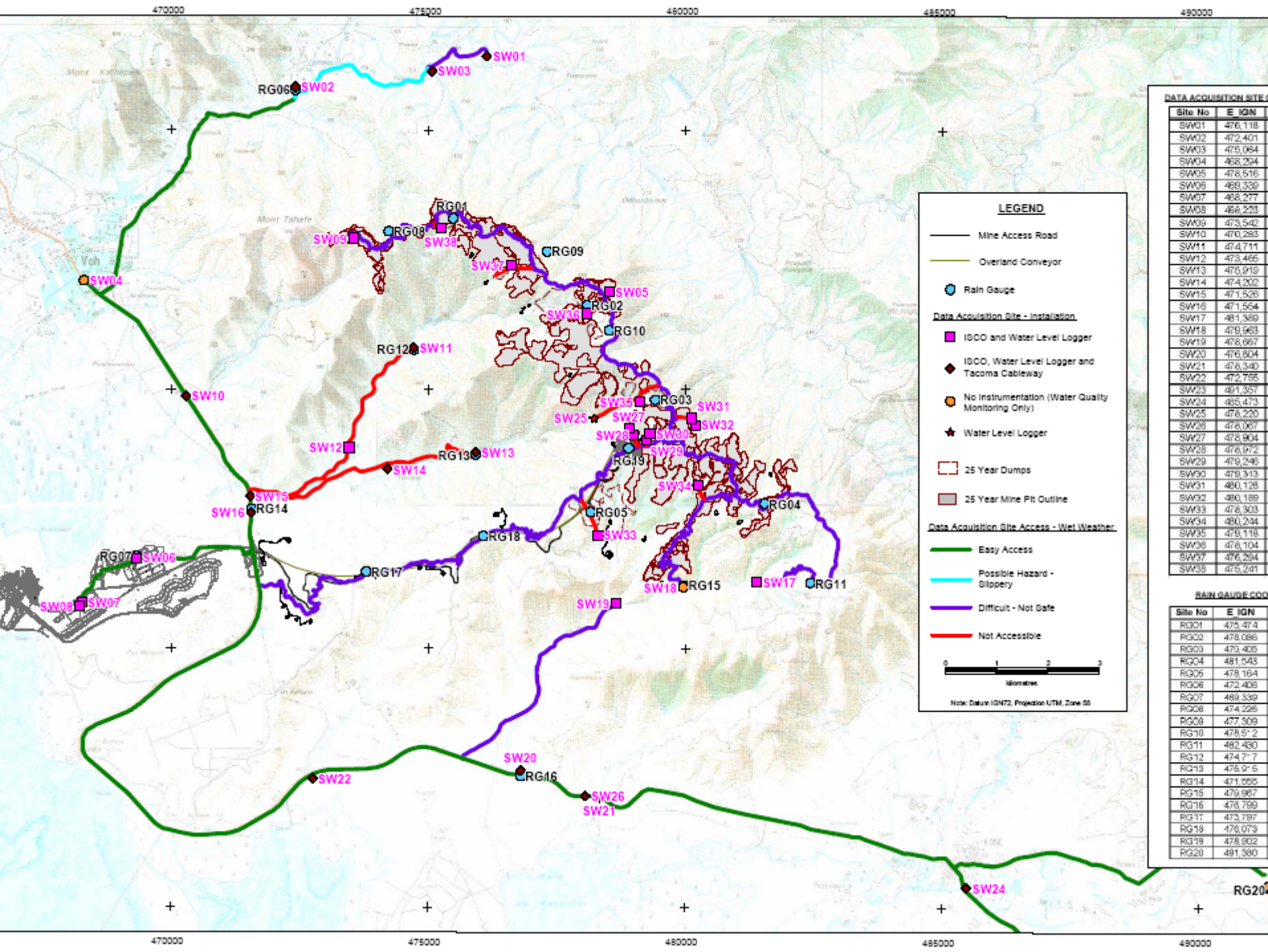
Field Rainfall Simulation

The hydrological network installation

Date installation	Total number of stations
1999-2004	6
Oct 04 – Jun 05	10
Aug 05 – Feb 06	26
March 06 – May 06	38

Until completion of ESIA

Knowledge improvement for design perspective



DATA ACQUISITION SITE

Site No	E IGN
SW01	476,118
SW02	472,401
SW03	475,064
SW04	468,294
SW05	478,516
SW06	469,339
SW07	468,277
SW08	468,223
SW09	473,542
SW10	470,283
SW11	474,711
SW12	473,466
SW13	476,919
SW14	474,202
SW15	471,526
SW16	471,564
SW17	481,389
SW18	479,963
SW19	478,697
SW20	476,804
SW21	476,340
SW22	472,755
SW23	491,357
SW24	485,473
SW25	476,220
SW26	476,067
SW27	478,904
SW28	476,972
SW29	479,246
SW30	479,313
SW31	480,126
SW32	480,189
SW33	478,303
SW34	480,244
SW35	479,118
SW36	476,104
SW37	476,234
SW38	475,241

RAIN GAUGE COO

Site No	E IGN
RG01	475,474
RG02	478,086
RG03	479,405
RG04	481,543
RG05	478,164
RG06	472,406
RG07	469,339
RG08	474,226
RG09	477,309
RG10	478,5[illegible]2
RG11	482,480
RG12	474,7[illegible]7
RG13	476,9[illegible]5
RG14	471,555
RG15	479,967
RG16	478,799
RG17	473,787
RG18	476,079
RG19	478,902
RG20	491,380

Why those sites?

- Regional historic mining contributions

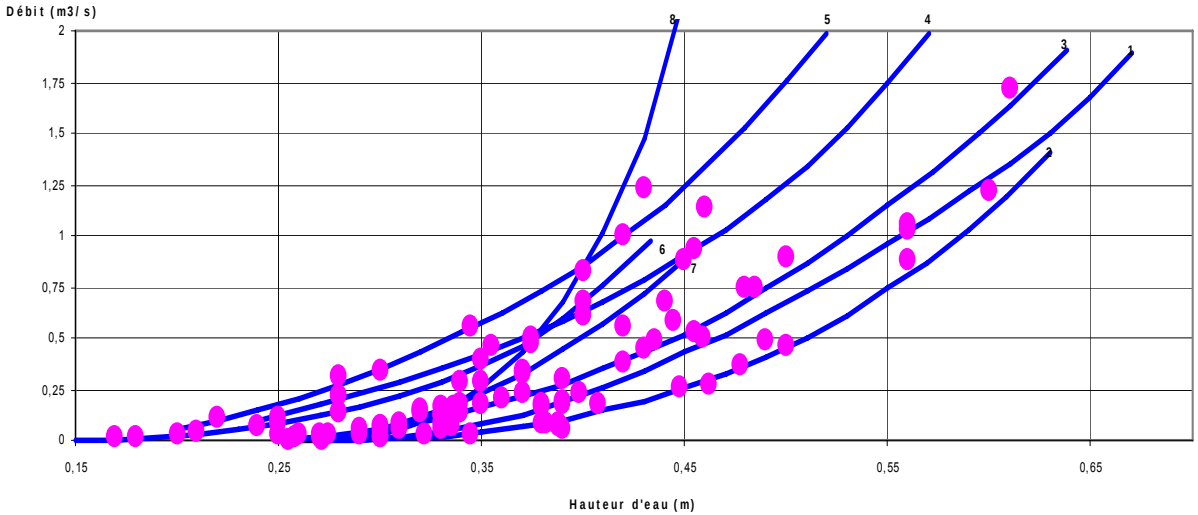
- Streamflow and sediment concentrations
  - prior to entrance to lagoon
  - From LOM portion of the massif (natural and historical)
  - From non LOM catchment

Surface water – Runoff

- Flow from automatic water level

(stilling well)

- Flumes
- Rating curves



- Flow measured manually on the field (swoffer, rivercat)

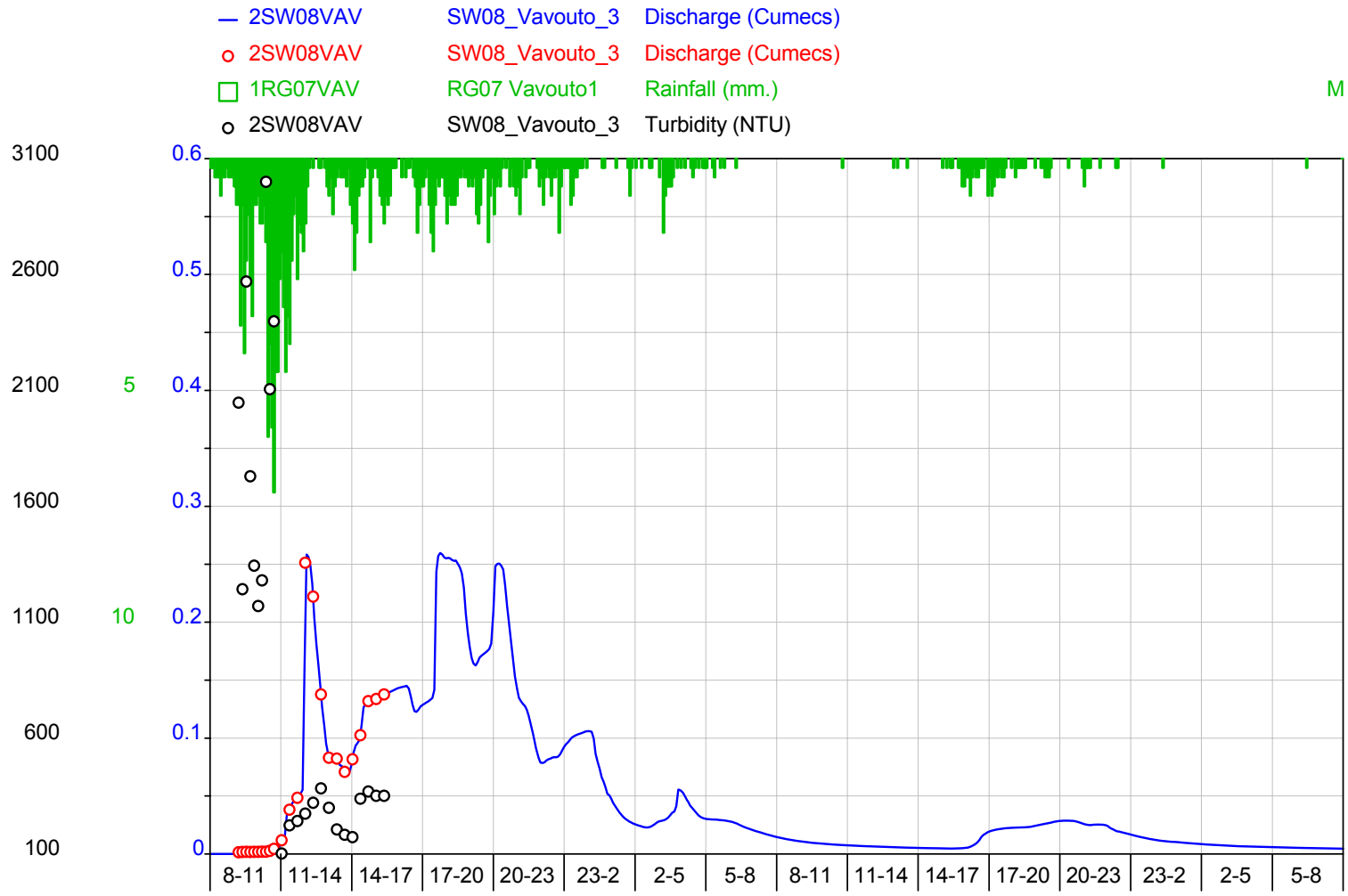
Surface water - TSS

- Manual samples
- Automatic samples

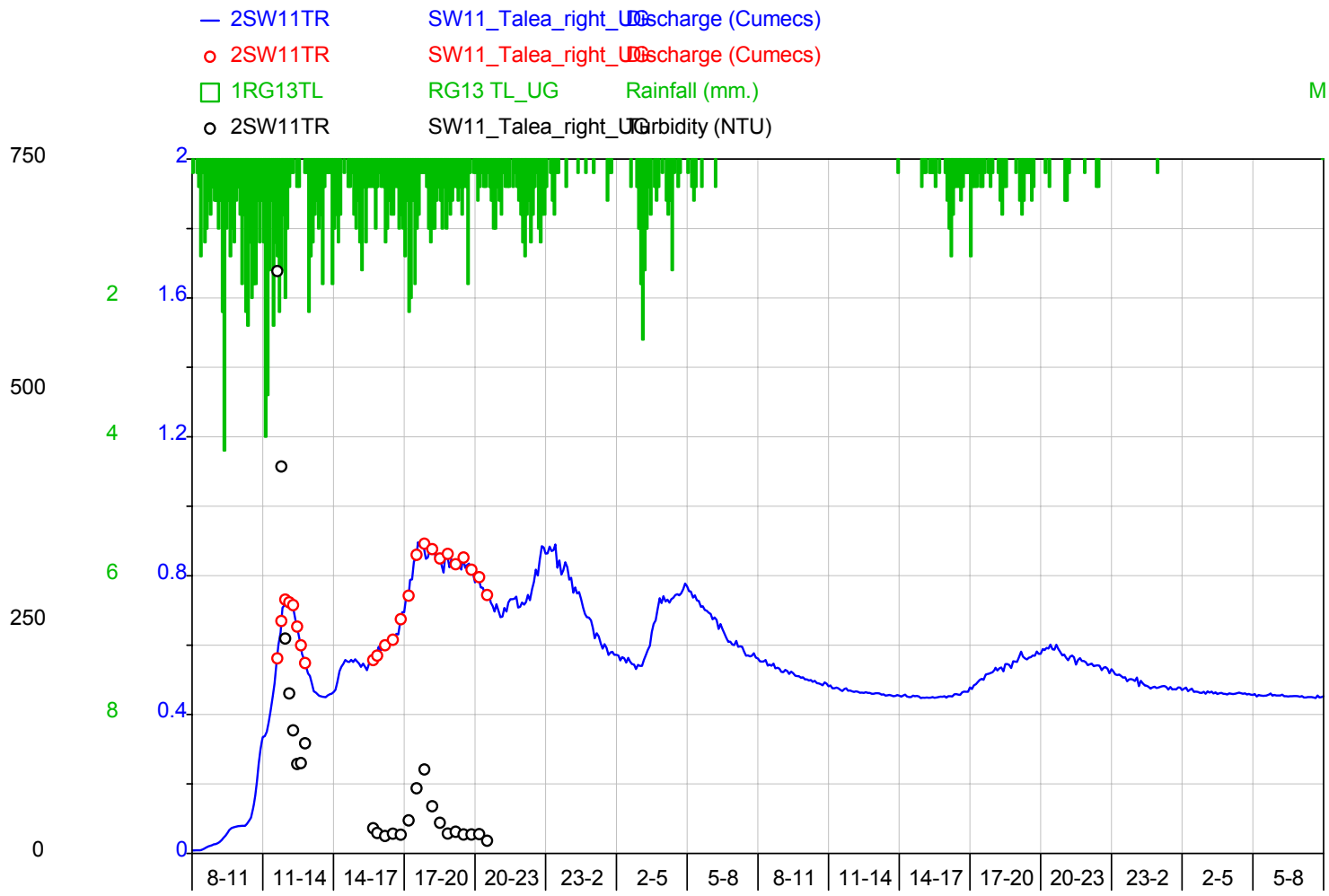
- ISCO automatic pump sampler
- Triggered by water level
- 24 x 1 liter bottles
- Programmed to fill at 10 minute intervals for first 100 minutes, then at 20 minute intervals

- Automatic recording (Turbidity and general parameters)

Vavouto - 28 June 2007



Talea Right – 28 June 2007

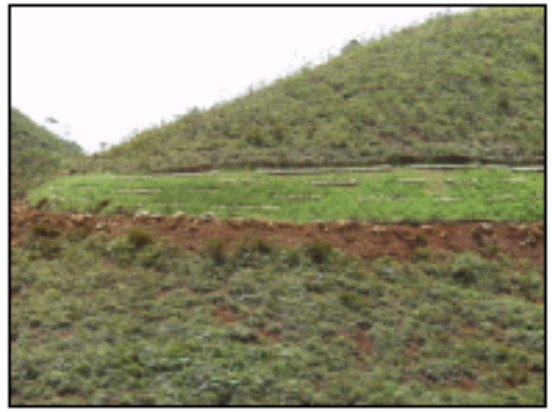


Erosion Controls Devices

- Level 1 (near source of erosion)
  - Best Management Practices (BMP = Minimize disturbed areas, Divert runoff from up-gradient natural areas)
  - Surface protection (General disturbed areas, Slopes, Roads)

C = .95

C = .25

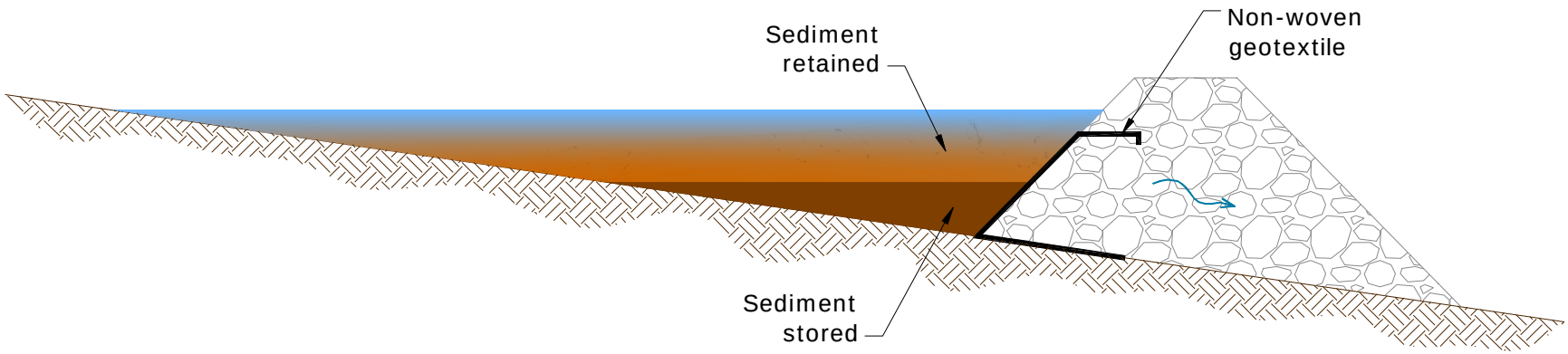


Erosion Controls Devices

- Level 1 (near source of erosion)
  - Small scale sediment controls (Decanters (sediment traps), Check dams, Temporary earthen berms, Weep berms)

Erosion Controls Devices

- Level 2
  - Sediment control structures
  - Embankments and/or excavations to detain runoff water and trap sediment



Synthesis

- A project influenced by significant rainfall event
- Data acquisition program that meets the objectives
- Further investigation to develop and / or continue to improve our knowledge

THANK YOU FOR YOUR ATTENTION