



Master Universitario di II Livello
IV Edizione
Anno Accademico 2014/2015
Direttore: Prof. Ing. Salvatore Miliziano

Seminari Maggio 2015

1) Introduzione generale alla ingegneria delle dighe e degli impianti idroelettrici

Lezione 1 : IMPIANTI IDROELETTRICI - CRITERI di SCELTA del SITO





DIGHE RIGIDE

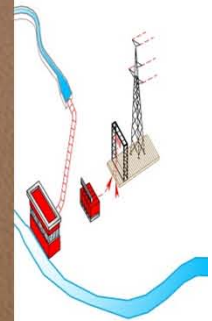
DIGA AD ARCO





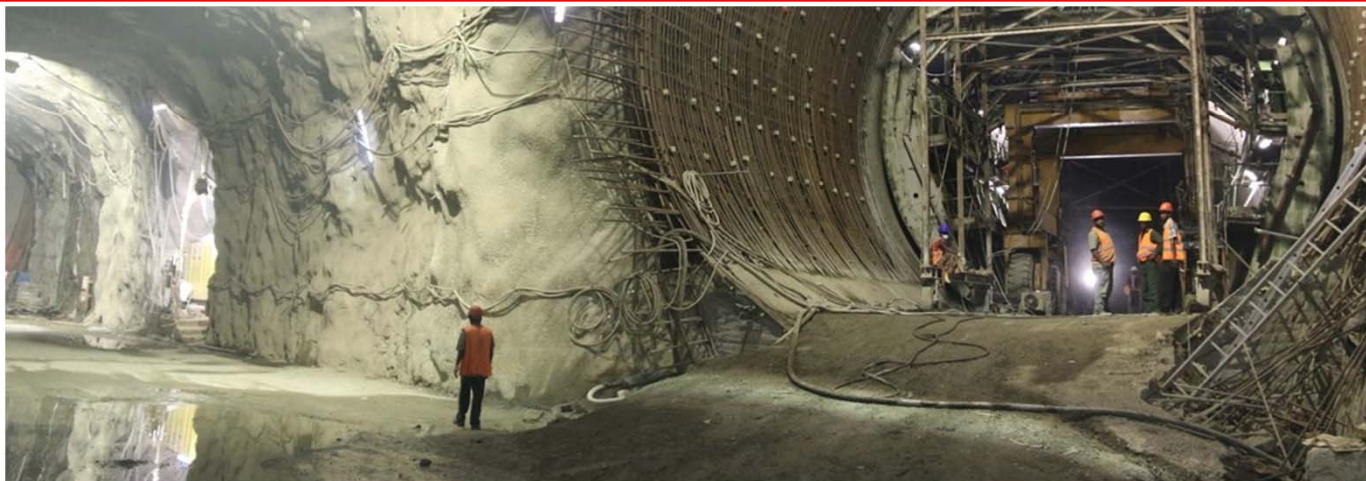


OPERE DI PRESA



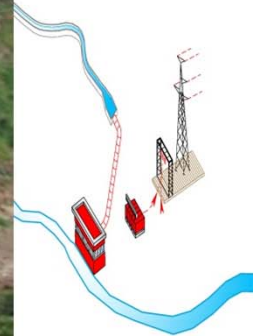


GALLERIA DI ADDUZIONE



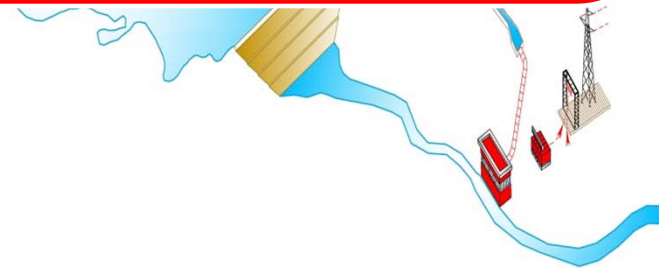


CONDOTTA FORZATA E CENTRALE IDROELETTRICA





Quali sono i criteri di scelta per un
potenziale SITO IDROELETTRICO ?





SAPIENZA
UNIVERSITÀ DI ROMA

MASTER
Progettazione Geotecnica

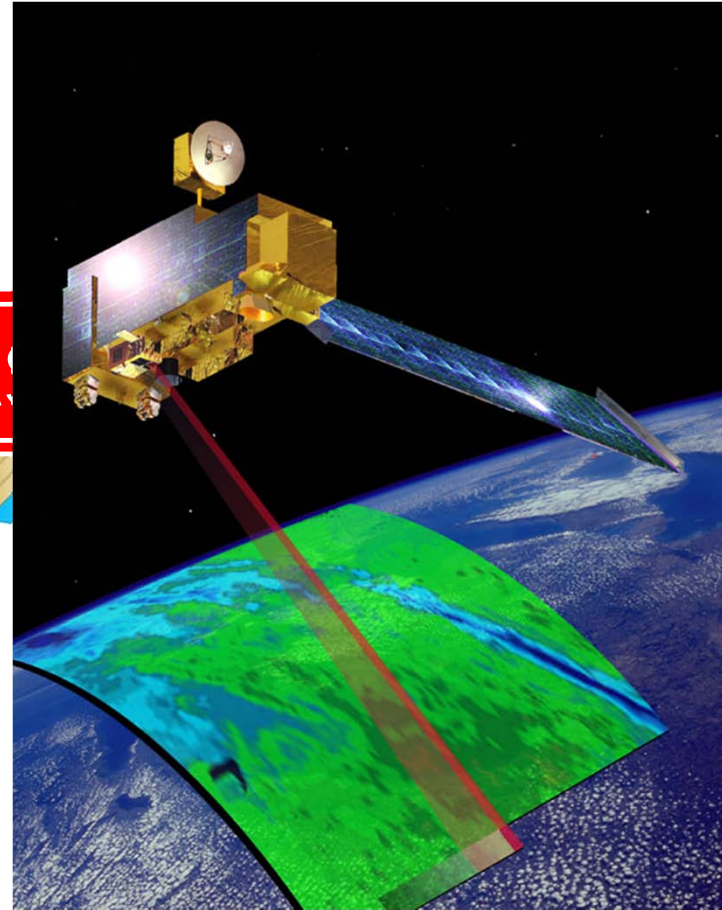


SAPIENZA
UNIVERSITÀ DI ROMA

SP studio pietrangeli
consulting engineers



ATABA



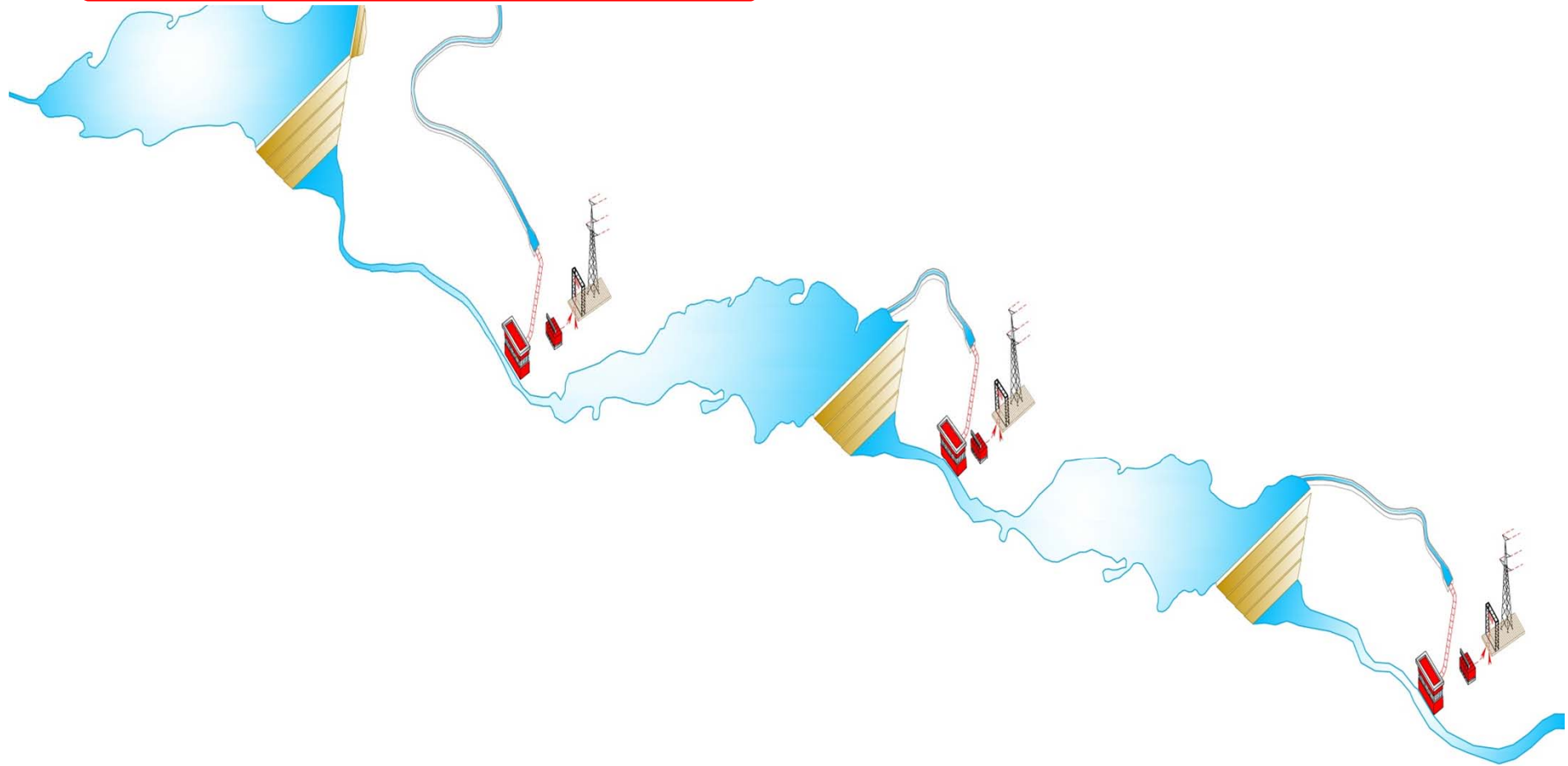
SRTM

ASTER



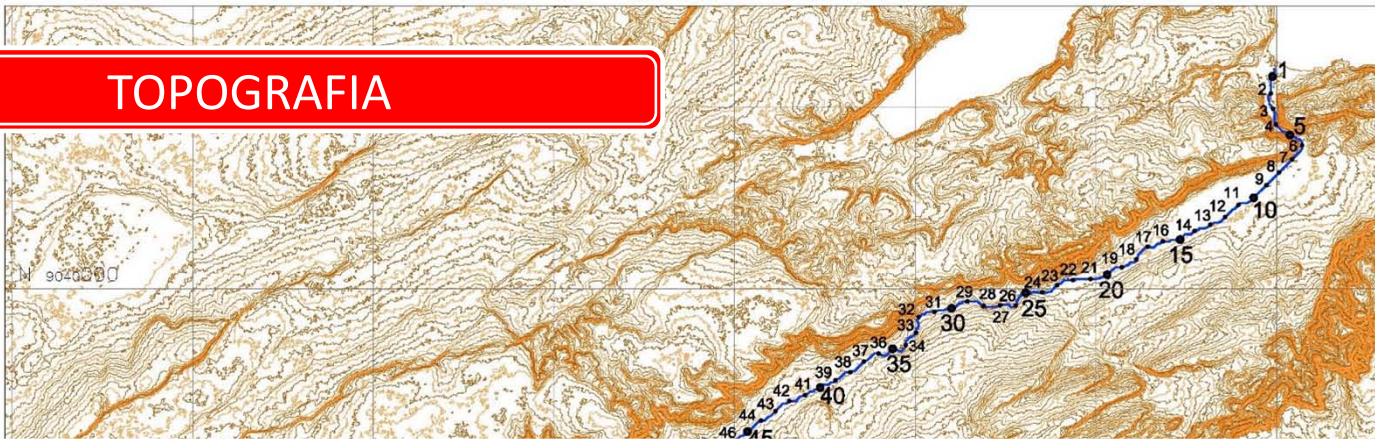


TOPOGRAFIA

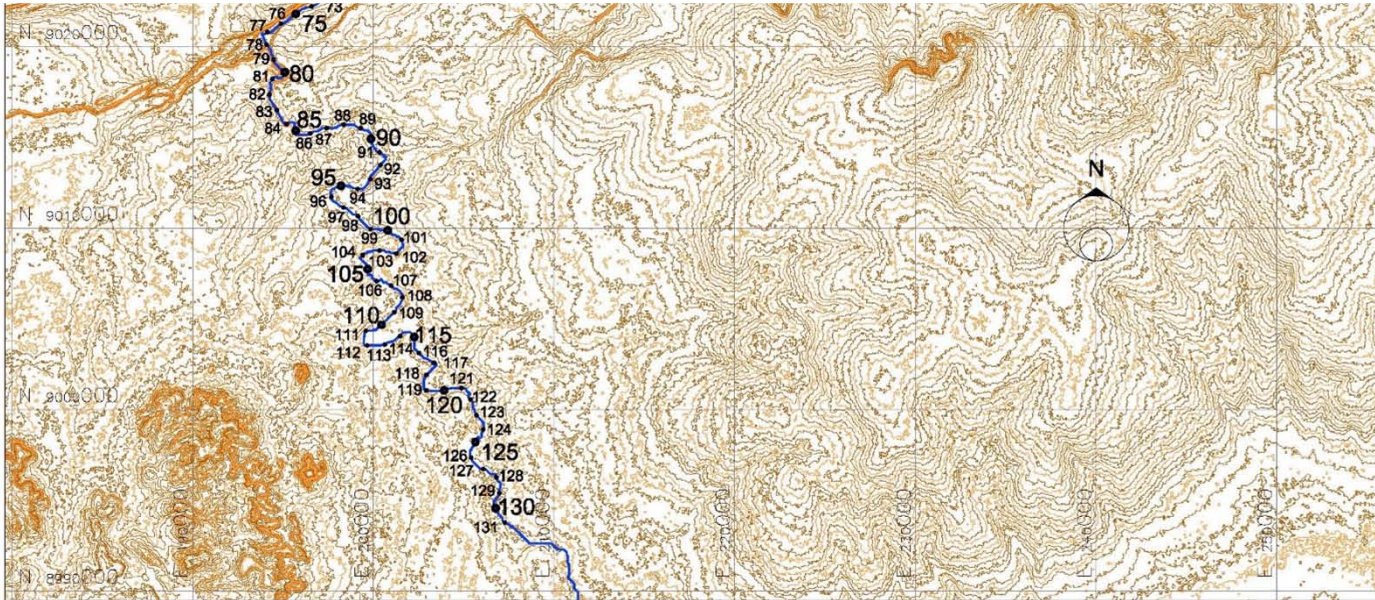




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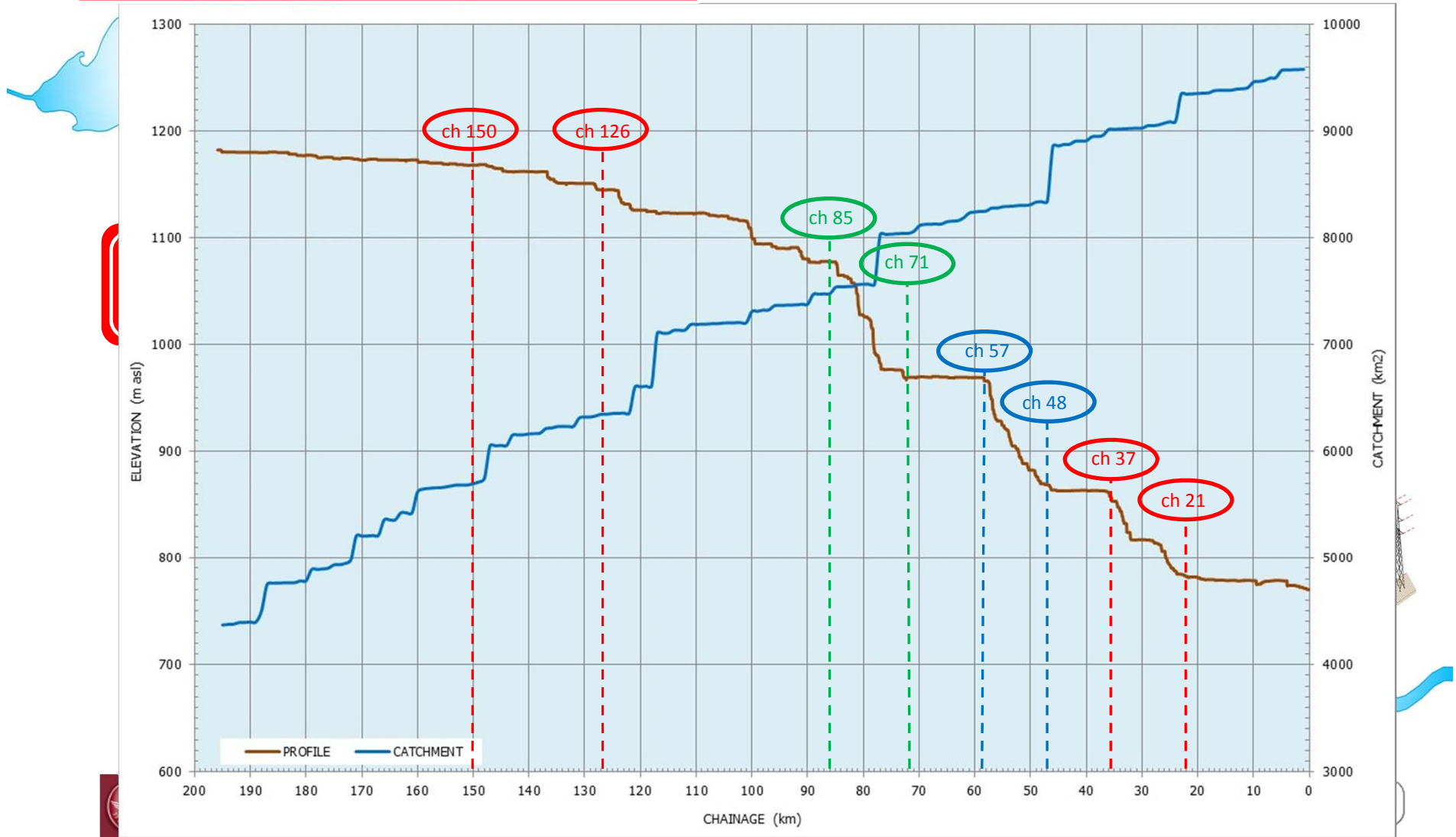


CURVE di LIVELLO





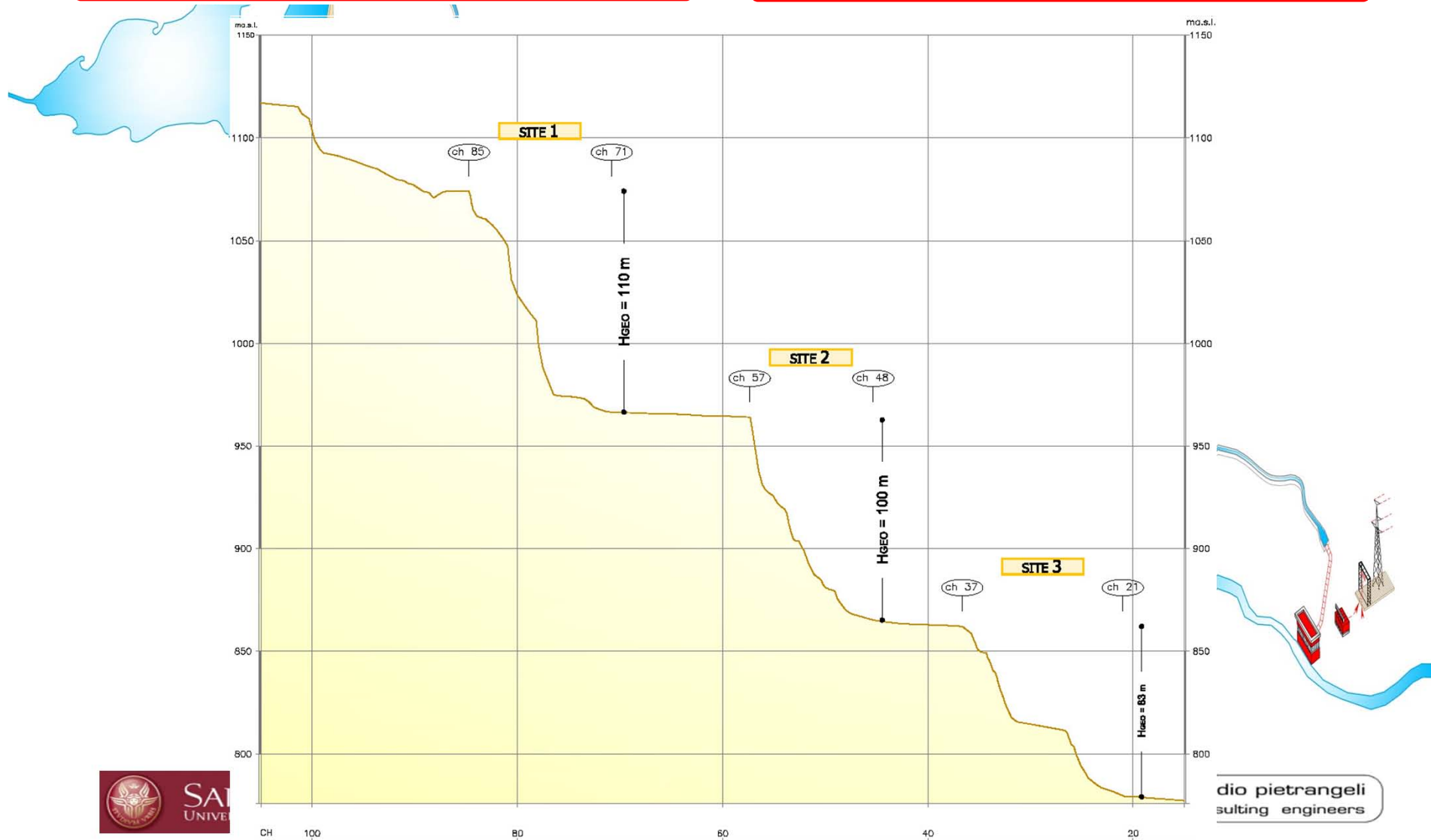
TOPOGRAFIA

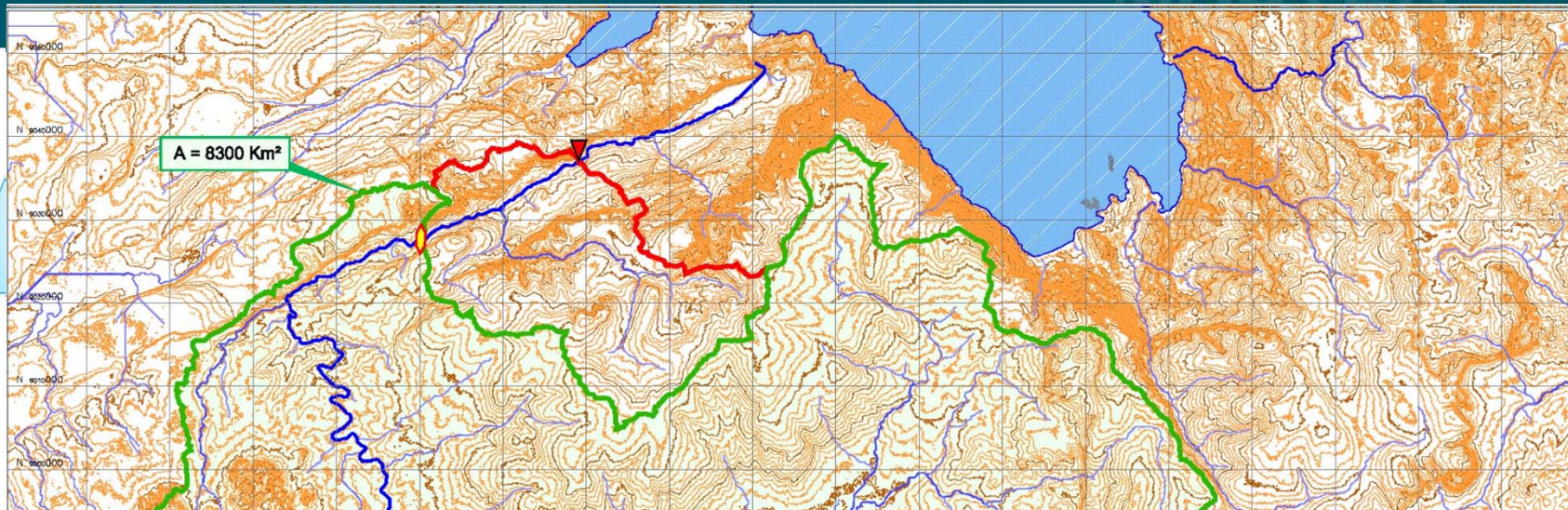




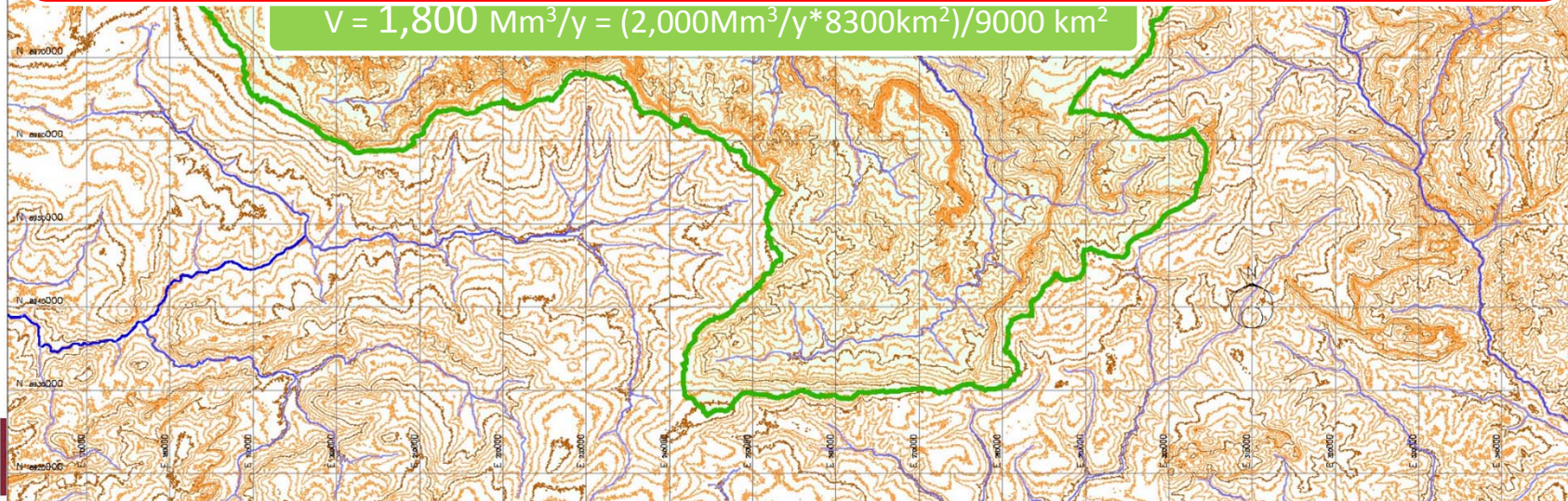
TOPOGRAFIA

PROFILO del FIUME





DISPONIBILITA' IDRICA





QUANTITY **X**



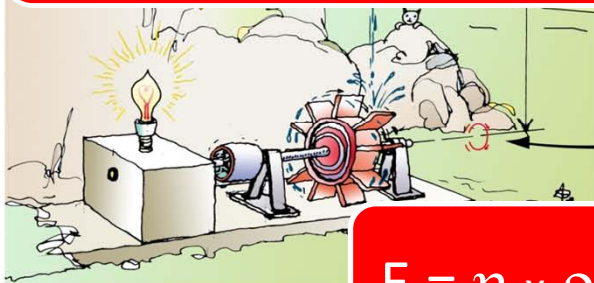
1 m³

1Mm³

$X = 1,800 \text{ Mm}^3/\text{y}$

ENERGIA e POTENZA

400 m



ENERGY **E**
 $= \frac{X \times Y}{400}$

1 kwh

1 MkwH
= 1GWh

$E = 450 \text{ GWh/y}$

$E = \eta \times \rho \times g \times V/T \times H \times T$

$P = E/8.76 = 50 \text{ MW}$

1 m³ of water
falling from 400 m of height (QUALITY) Y
produces 1 kwh (ENERGY) E

How can we calculate the Hydro-Electric ENERGY ?
Multiplying QUANTITY x QUALITY and dividing by 400!





QUANTITY **X**



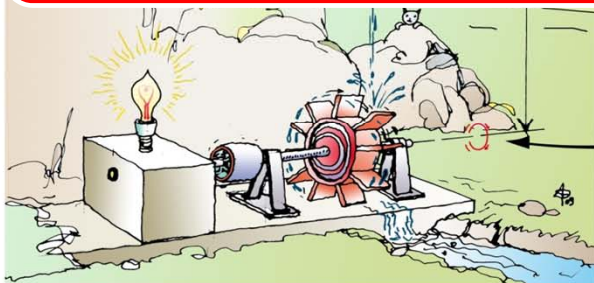
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INCASSO e VALORE ATTUALE NETTO



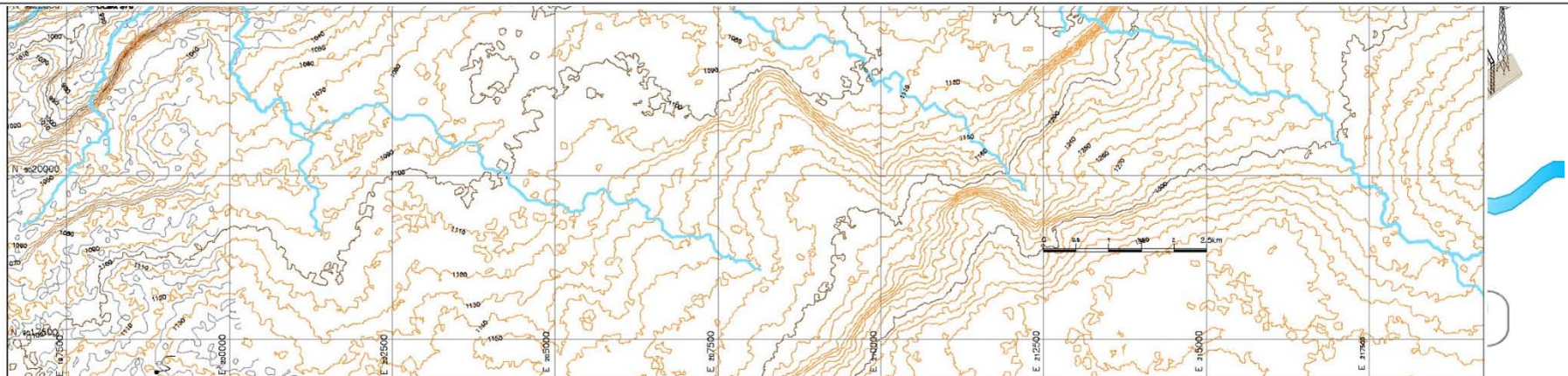
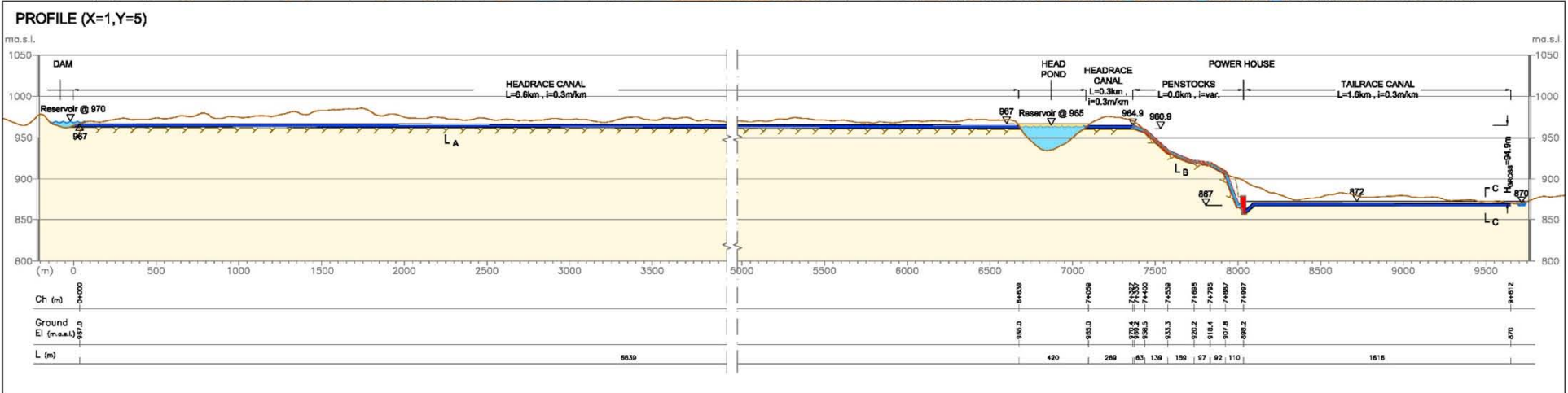
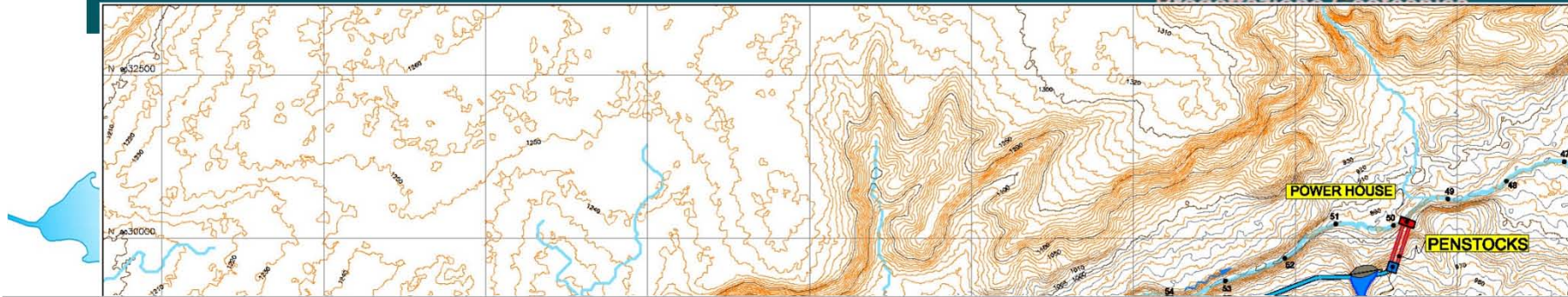
INCASSO

$$22,5 \text{ M\$/y} = 450 \text{ GWh/y} \times 5 \text{ USD} / 100$$

VALORE ATTUALE NETTO

$$225 \text{ M\$} = 22,5 \text{ M\$} \times 10 \text{ (Coefficiente empirico)}$$







Airbone Laser Scanning

Quali di questi DATABASE TOPOGRAFICI hanno un'accuratezza sufficiente per uno studio CONCETTUALE?

Rilievo con GPS differenziale

ASTER





TEST

TOPOGRAFIA

1 mm

Qual'è l'accuratezza dei database SRTM e ASTER?

5 / 7 m

100 m





TEST

10 m / km

Quale PENDENZA del fiume scegliereste per un impianto idroelettrico?

0.1 m / km





TEST

Considerando:

- Disponibilità idrica di 100 Mm³/y

PRODUZIONE DI ENERGIA

- Salto di 400 m

$$E = 100 \text{ GWh/y}$$

$$P = 11 \text{ MW}$$

