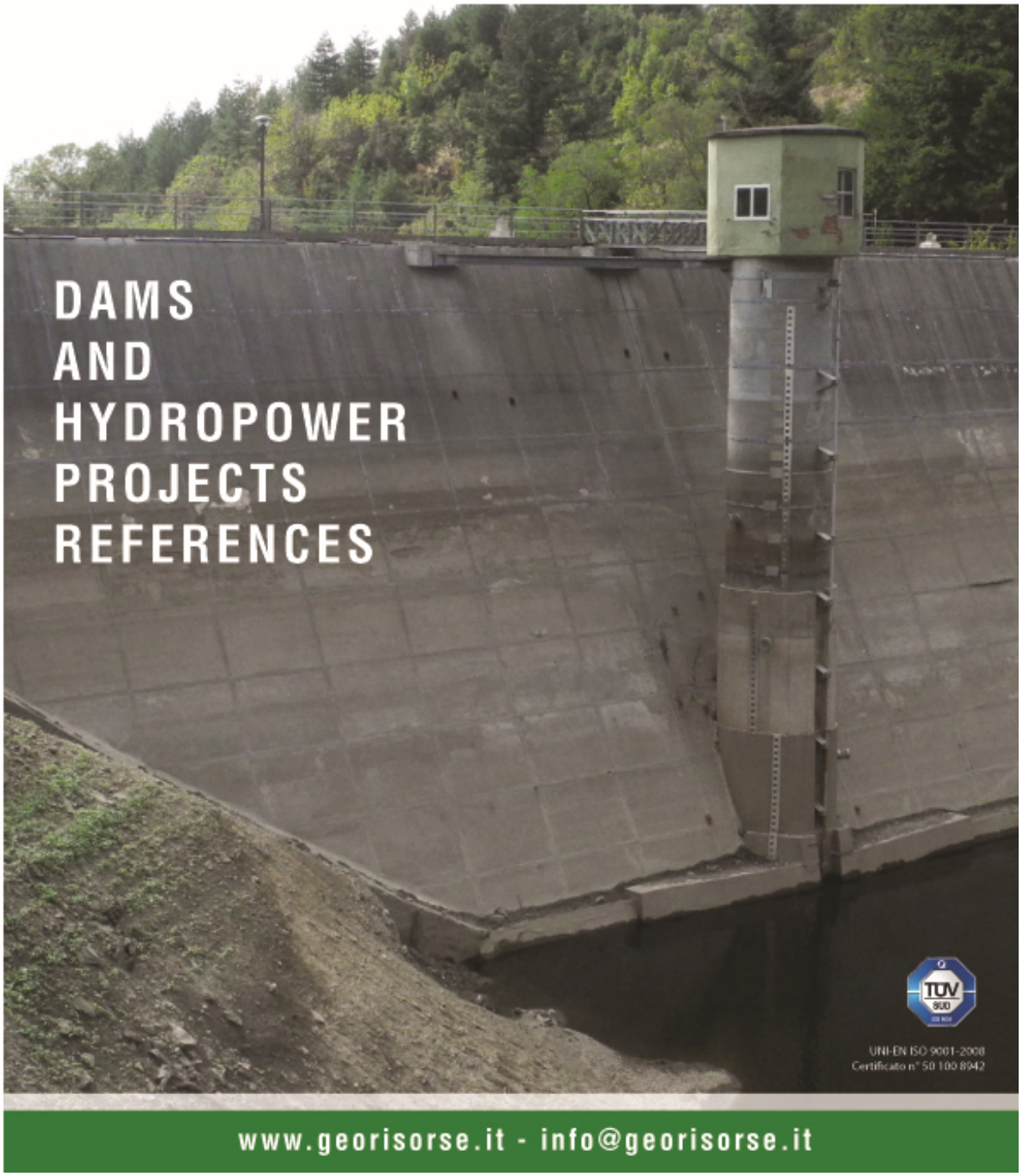
GEORISORSE ITALIA

GEOPHYSICAL SURVEYING
TO EXPLORE
STUDY AND CHARACTERIZE
THE UNDERGROUND



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GEORISORSE ITALIA is a geophysical surveying company founded in 1982 in Siena, Italy, by a Team of geologists and in the actual Company asset in 1986 by the director Gianfranco Censini.

The main activities of the Company are the prospection, exploration , study and characterization of the subsurface.

Actually Georisorse includes a team of six geologists and four people including technical and administrative.

Since 2008 Georisorse works in compliance to ISO 9001-2008 quality system standards, certified by TUV Italia.

The main activities in which Georisorse Italia has been involved, are:

- RESEARCH AND VALUATION OF WATER RESOURCES AND GEOTHERMAL LIQUIDS
- NATURAL RESOURCES EXPLORATION
- GEOMECHANICAL CHARACTERIZATION OF SOILS AND ROCKS FOR CIVIL ENGINEERING, HYDRAULIC AND TRANSPORT PROJECTS
- SUBSOIL EXPLORATION FOR LANDSLIDE STABILITY ASSESSMENT
- VALUATION OF EARTHQUAKE HAZARDS
- SUBSOIL EXPLORATION AND MAPPING FOR ARCHAEOLOGICAL RESEARCH AND CULTURAL HERITAGE
- EXLORATION FOR THE SAFEGUARDING OF ENVIRONMENTAL PROBLEMS.

During over 30 years of activity, Georisorse Italia sas, has carried out more than 2.000 exploration projects. Has been involved in the geotechnical studies, field investigations and technical supervision of the construction of several large international dam and hydropower projects.

Among these, in particular, the participation through all investigation and dam site study phases of the Gibe 3 hydroelectric project located along the Omo river in southern Ethiopia and, more recently, for the Grand Ethiopian Renaissance Dam (GERD) project along the Abay (Blue Nile) river in western Ethiopia. Studies have led to the exploration of more than 60 km of seismic profiles with tomographic processing, several Down-Hole and Cross-Hole, SASW and seismic velocity measurements on samples of rock outcrops and into inspection tunnels. These studies, which began in 2006, and in some respects still ongoing, led to design an RCC gravity dam 240 m height, which, once completed will, for this type of construction, the world's largest hydroelectric plant, and connected to it will have a capacity of nearly 2,000 MW.

The Project for GERD, however, once completed, will be the largest hydroelectric plant Africa with a capacity of about 6,000 MW.

Specific experience in Hydraulic works:

1 - NAMAKHVANI Cascade Hydropower Project (IP = 325 MV)
Year: 2014
Location: Georgia
Client: Studio Ing. G. Pietrangeli Srl : Beneficiary JSC Namakhvani - Tbilisi - Georgia
Main project features: A cascade of two Hydropower plant along the Rioni River (North/west of Kutaisi) including No. 2 dams and and powerhouses
Position held: Chief Geophysicist
Activities performed: Seismic refraction survey for about 5.100 m of profiles for the Feasibility Study. Design of survey plan, investigation supervision, processing and interpretation of results.

2 - LUFUBU Hydropower Project (IP = 325 MV)
Year: 2014
Location: Zambia
Client: Studio Ing. G. Pietrangeli Srl : Beneficiary LUFUBU Hydropower Company Ldt
Main project features: A cascade of three Hydropower plant along the Lufubo River (North/East of Zambia) including No. 3 RCC dams, canals, penstocks and powerhouses
Position held: Chief Geophysicist
Activities performed: Seismic refraction survey for about 10.000 m of profiles for the Feasibility Study. Design of survey plan, investigation supervision, processing and interpretation of results.

3 - LOWER DIAMPHWE Water Supply and Irrigation Project
Year: 2014
Location: Malawi
Client: Studio Ing. G. Pietrangeli Srl. Beneficiary: Ministry of Water Development and Irrigation
Main project features: Gravity Dam, Pumping Station, Water treatment plant, Pipeline form some 60 km
Position held: Engineering Geologist, Chief Geophysicist
Activities performed: Study of the dam site, Pumping Station, Water Treatment, Balancing Tanks and Pipeline. Seismic refraction survey for some 6.000 of profiles, for the Feasibility Study and excavation possibility along the pipeline. Design of interventions, investigation supervision, processing and interpretation of results.

4 - JAMFIVE Hydroelectric Project (IP = 8 MW)
Year: 2013
Location: Jamaica
Client: Studio Ing. G. Pietrangeli Srl : Beneficiary: Ministry of Energy
Main project features: Weirs, Canals, Penstock and Power houses in 3 sites
Position held: Chief Geophysicist
Activities performed: Study of the 3 weir sites, canals, penstocks and powerhouses over the Martha Brae river, Spanish River and Negro River. Seismic refraction survey over about 3.500 m of profiles for the Feasibility Study. Design of interventions, investigation supervision, processing and interpretation of results.

5 - CERVENTOSA DAM Project
Year: 2013
Location: Cortona, Italy
Client: Nuove Acque SpA
Main project features: Rockfill dam, 30 m high, with concrete facing for water storage.
Position held: Chief Geophysicist
Activities performed:Testing survey for compliance with the new seismic law. Seismic refraction study with P and SH waves (480m), 3D direct wave survey, Georadar of the dam site. Design of investigations and their supervision, data processing and interpretation of results.

6 - MUCHINGA Hydroelectric Project (IP = 200 MW)
Year: 2012-2013
Location: Lunsemfwa River - Zambia
Client: LUNSEMFWA HYDRO POWER COMPANY ltd, Kabwe, Zambia,
Main project features: Main Dam and 2 small dams connected with interbasin tunnels and canals. Penstock and Power House.
Position held: Chief Geophysicist
Activities performed: Geophysical Investigation with 7.890 m of Seismic profiles for the feasibility study

7 - RUMAKALI Hydroelectric Project (IP = 525 MW)
Year: 2012
Location: Tanzania
Client: Studio Ing. G. Pietrangeli Srl. Beneficiary: Zarubezhstroy OJSC
Main project features: Main Dam and 4 small dams connected with tunnels and canals. Underground Power House.
Position held: Chief Geophysicist
Activities performed: Geophysical Investigation with 9.935 m of Seismic profiles for the feasibility study of 4 Dams and 3 tunnels.

8 - GRAND ETHIOPIAN RENAISSANCE DAM Hydroelectric Power Plant (IP = 6,000 MW)
Year: 2010 – in progress
Location: Abay River - Ethiopia
Client: Salini Costruttori S.p.A.; Beneficiary : EEPCO
Main project features: Hydroelectric power plant (IP = 6,000 MW). Main Dam: 2.000 m length and 160 m high RCC Dam; Saddle Dam: 5 km length, 50 m high Rockfill Dam with concrete facing
Position held: Engineering Geologist, Geophysicist
Activities performed: Geophysical survey with Tomography (more than 30.000 m), Cross-Holes (about 500m) and SASW (more than 300 tests) for Feasibility study, Basic Design, Final Design (Level 1), Construction Design (Level 2)

9 - KIDUNDA Water Supply Project
Year: 2010
Location: Ruvu River - Morogoro - Tanzania
Client: Studio Ing. G. Pietrangeli Srl. Beneficiary: DAWASA
Main project features - Feasibility design for two hypothesis of rock-fill dams for Dar Es Salam Water Supply
Position held: Chief Geophysicist
Activities performed: Geophysical survey with seismic tomography along 5.100 m of lines and Electrical resistivity tomography along 5.060 m of lines

10 - CHESPI Hydropower Plant (IP = 468 MW)
Year: 2009 - 2010
Location: Ecuador
Client: Association LPC - Quito. Beneficiary: Hidroequinoccio HEQ S.A.
Main project features: Chespi hydroelectric project (IP = 468 MW) - Concrete Arc Dam on the Guayllabamba River, Tunnel and Underground Power House, Tailrace Tunnel
Position held: Engineering Geologist, Geophysicist
Activities performed: Investigations with Refraction (1740 m) and Reflection (2660 m) Seismic Surveys, Electrical Resistivity survey (1370 m), Preliminary, Final and Detailed Design, Tender Documents

11 - GIBE V Hydroelectric Power Plant (IP = 660 MW)
Year: 2008 - 2009
Location: Ethiopia
Client: Salini Costruttori S.p.A.; Beneficiary : EEPCO
Main project features: Gibe V (IP = 660 MW) is the 5th stage of the Gibe-Omo cascade
Position held: Chief geophysicist
Activities performed: Reconnaissance Project, Feasibility Study - Seismic Tomography and electrical resistivity tomography along the river bed

12 - GIBE IV Hydroelectric Power Plant (IP = 1,480 MW)
Year: 2008 - 2009
Location: Ethiopia
Client: Salini Costruttori S.p.A., Beneficiary : EEPCO
Main project features: Gibe IV (IP = 1,480 MW) is the 4th stage of the Gibe-Omo cascade Position held: Chief geophysicist
Activities performed: Reconnaissance Project, Feasibility Study - Seismic Tomography on both sides

13 - GIBE III Hydroelectric Power Plant (IP = 1,870 MW)
Year: 2006 - 2011
Location: Ethiopia
Client: Salini Costruttori S.p.A., Beneficiary : Ethiopian Electric Power Corporation
Main project features: Gibe III (IP = 1,870 MW) is the 3rd stage of the Gibe-Omo cascade and will become the world's highest RCC dam.
Position held: Geotechnical Expert, Chief geophysicist responsible for the seismic, geoelectric and electromagnetic investigation campaigns
Activities performed: Geophysical survey with Seismic Tomography (more than 30.000m of profiles for various, power houses, diversion tunnels, road and bridges) alternatives , Down-Hole (some 300 m), Cross Hole inside Tunnels and Adits, SASW (more than 300 tests) for the Reconnaissance study, Investigations, Feasibility Study, Basic Design, Final Design, Construction Design, Technical Supervision during Foundation Excavation

14 - CUMBIDANOVU Dam, Water Supply Project
Year: 2004 - 2005
Location: Cedrino River, Nuoro, Italy
Client: IRA Costruzioni Generali. Beneficiary: Consorzio di Bonifica Alto Cedrino
Main project features: Concrete Gravity Dam (80 m high).
Position held: Chief Geophysicist
Activities performed: Geophysical investigations for the new project after the suspension. Seismic refraction profiles along 3.900 m of lines, and cross-hole measurements on over 100 m, of the dam site. Design of investigations, investigation supervision, data processing and interpretation of results.