THE GEOLOGICAL SURVEY OF ETHIOPIA AND ITS ACTIVITIES

- The Geological Survey of Ethiopia was established as a department within the Ministry of Mines and Energy in 1968.

- In 1984 it became an autonomous government organization named the “Ethiopian Institute of Geological Surveys (EIGS)” accountable to the Ministry of Mines and Energy.

- It was renamed the “Geological Survey of Ethiopia” in the year 2000.

- The Survey has about 800 staff members. Of these 185 are geoscientists, 20 chemists and 65 drillers.

VISION

• To facilitate the utilization of the geoscience data of Ethiopia for developing the country's mineral resources, so as to contribute as much as possible to its economic growth.

MISSION

• To carry out geoscientific surveys of Ethiopia so as to produce high quality geodata in a format suitable for easy utilization by end – users, thus enabling rapid development of the mining sector.

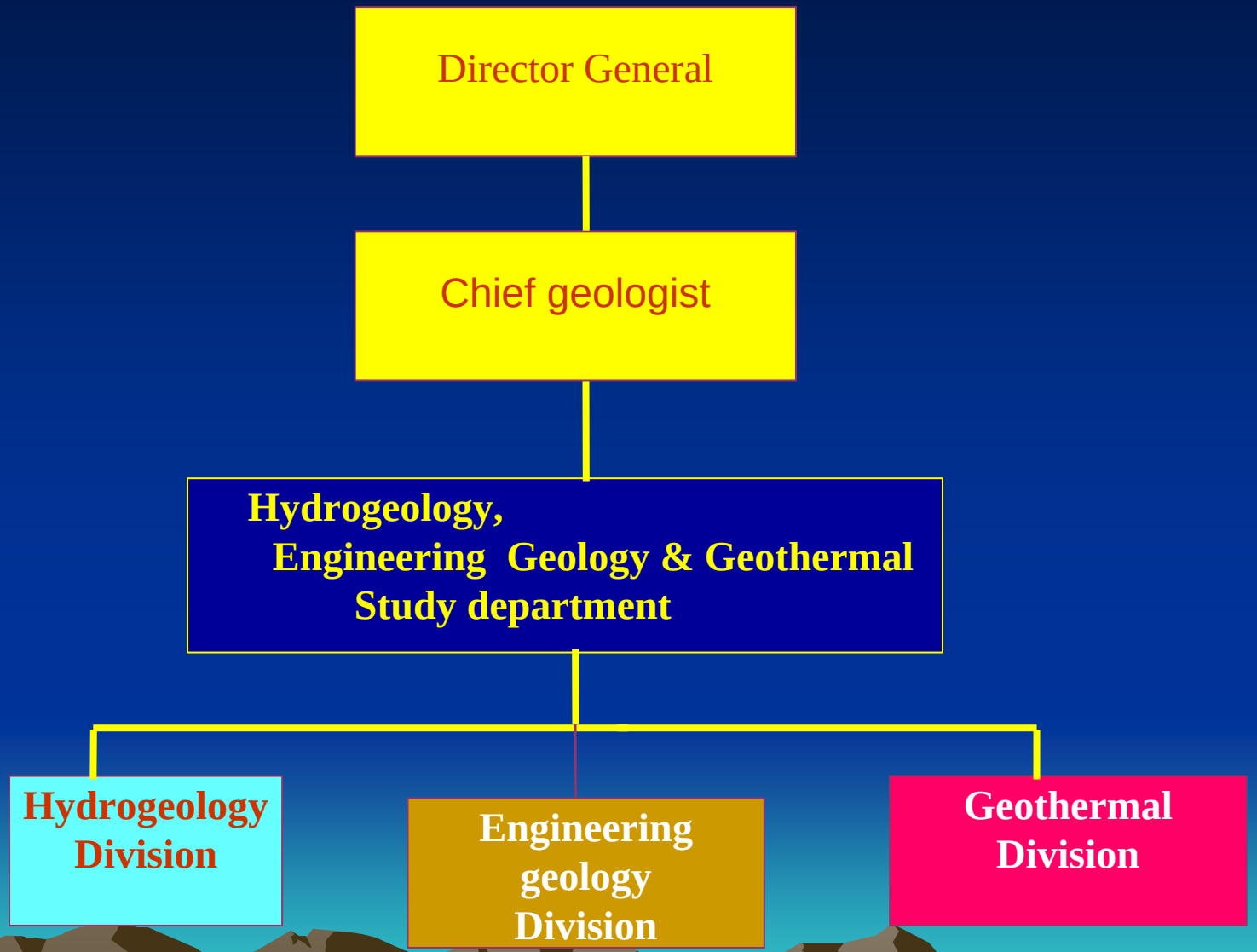
GOAL

• To improve the quality and coverage of the geoscience data of the country.

ORGANIZATIONAL CHART OF THE GEOLOGICAL SURVEY OF ETHIOPIA

HYDROGEOLOGY, ENGINEERING GEOLOGY AND GEOTHERMAL DEPARTMENT

STRUCTURE OF THE DEPARTMENT



GEOTHERMAL DIVISION

MAIN OBJECTIVE

- To explore the geothermal resource of the country for power generation and power uses

- To assess and determine the potential of identified geothermal resource

RESOURCE OF THE DIVISION

HUMAN RESOURCE

-2 Ph.D (Geothermal scientists)

- 4 M.Sc. (")

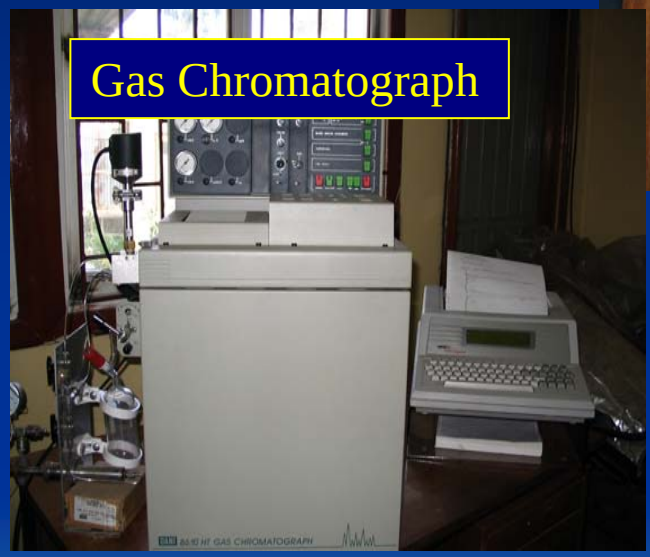
-9 B.Sc (Geologist/Physicist)

pH-Meter/EC-meter

FINANCE

- Government capital budget
- Foreign aid (German)

Gas Chromatograph



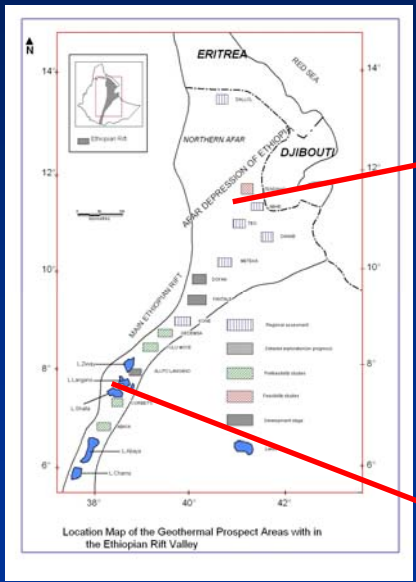
EQUIPMENT

- Computers/Printers/
- Gas Chromatograph
- EC/PH/DO meter
- GPS/
- Petrographic Microscope

Dipper

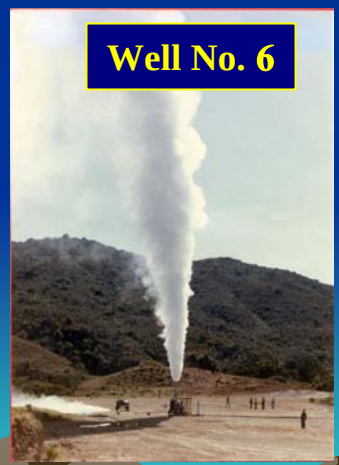
Work done so far

Geothermal



(1) Tendaho Geothermal Field

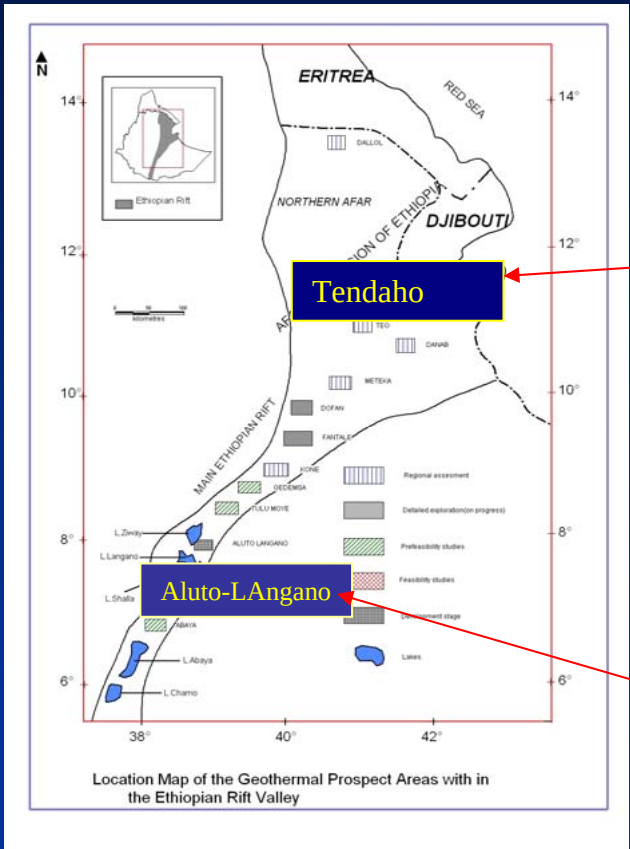
(2) Aluto-Geothermal Field



Geothermal Pilot Power plant

- (3) Reconnaissance to Semi-detailed surveys were carried out in about 14 geothermal prospect areas within the Ethiopian Rift Valley.

CURRENT ACTIVITY

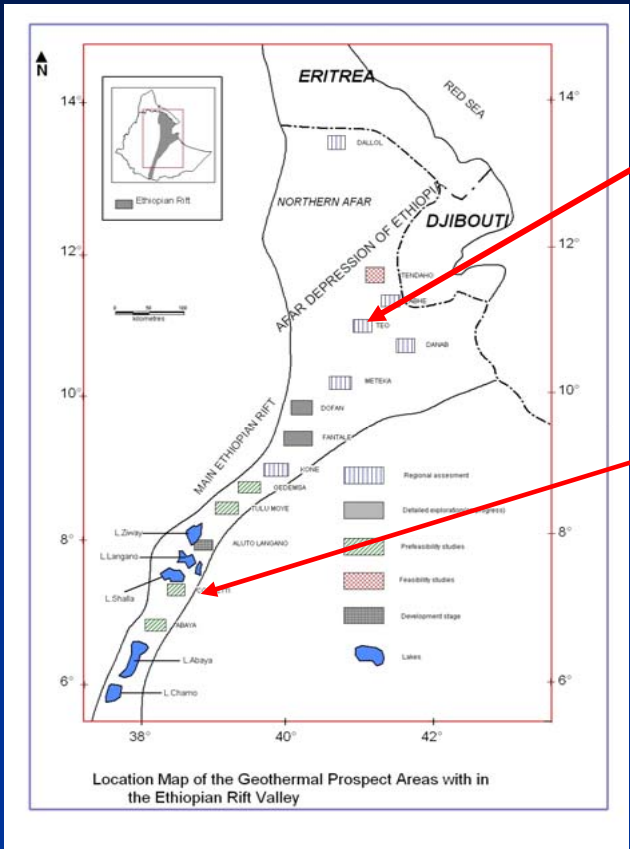


Location Map of the Geothermal Prospect Areas with in the Ethiopian Rift Valley

- Geochemical Monitoring and Reservoir Engineering studies and
- Geophysical investigation (MT and TEM) at the Tendaho (Dubti) Geothermal Field

- Collaboration with EEPCo in rehabilitation program of the Aluto Geothermal Pilot Plant.

THE WAY FORWARD



Location Map of the Geothermal Prospect Areas with in the Ethiopian Rift Valley

- Readying the Tendaho (Dubti)geothermal field to the development stage

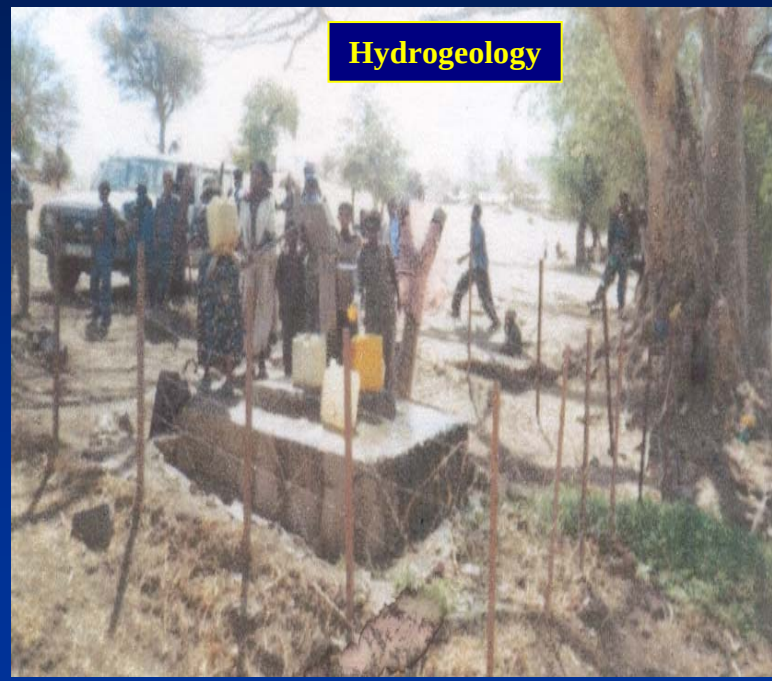
- Further detail exploration of the two identified geothermal prospect areas (Abaya and Corbetti) in the detail till advancement to the exploration stage.

- Collaboration with EEPco in Rehabilitation programme of the Aluto Geothermal Pilot Power Plant

HYDROGEOLOGY DIVISION

OBJECTIVE

- To collect and compile pertinent hydrogeological data of the country
- To asses ground water potential of the country
- To carry out hydrochemical study and identify areas of pollution
- To produce hydrogeological maps at 1:250,000 scale and accompanied reports



RESOURCE OF THE DIVISION

HUMAN RESOURCE

- 5 M.Sc. (Hydrogeologists)
- 7 B.Sc (Geologist/Hydrogeologists)

FINANCE

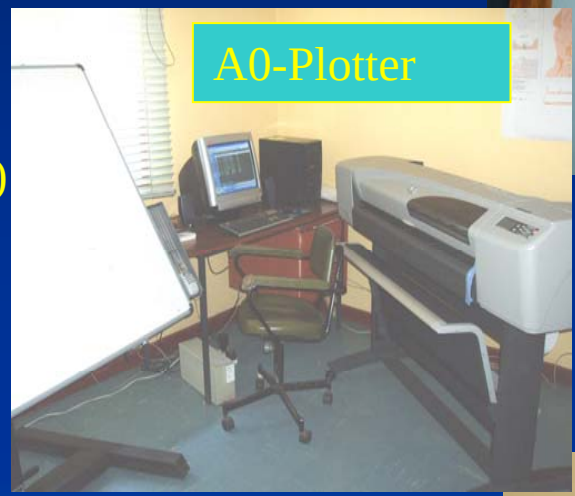
- Government capital budget
- Foreign aid (IAEA + Czech Republic)

EQUIPMENT

- Computers/Printers/Plotter
- EC/pH//dissolved O-meter
- Dipper
- GPS/GIS facilities

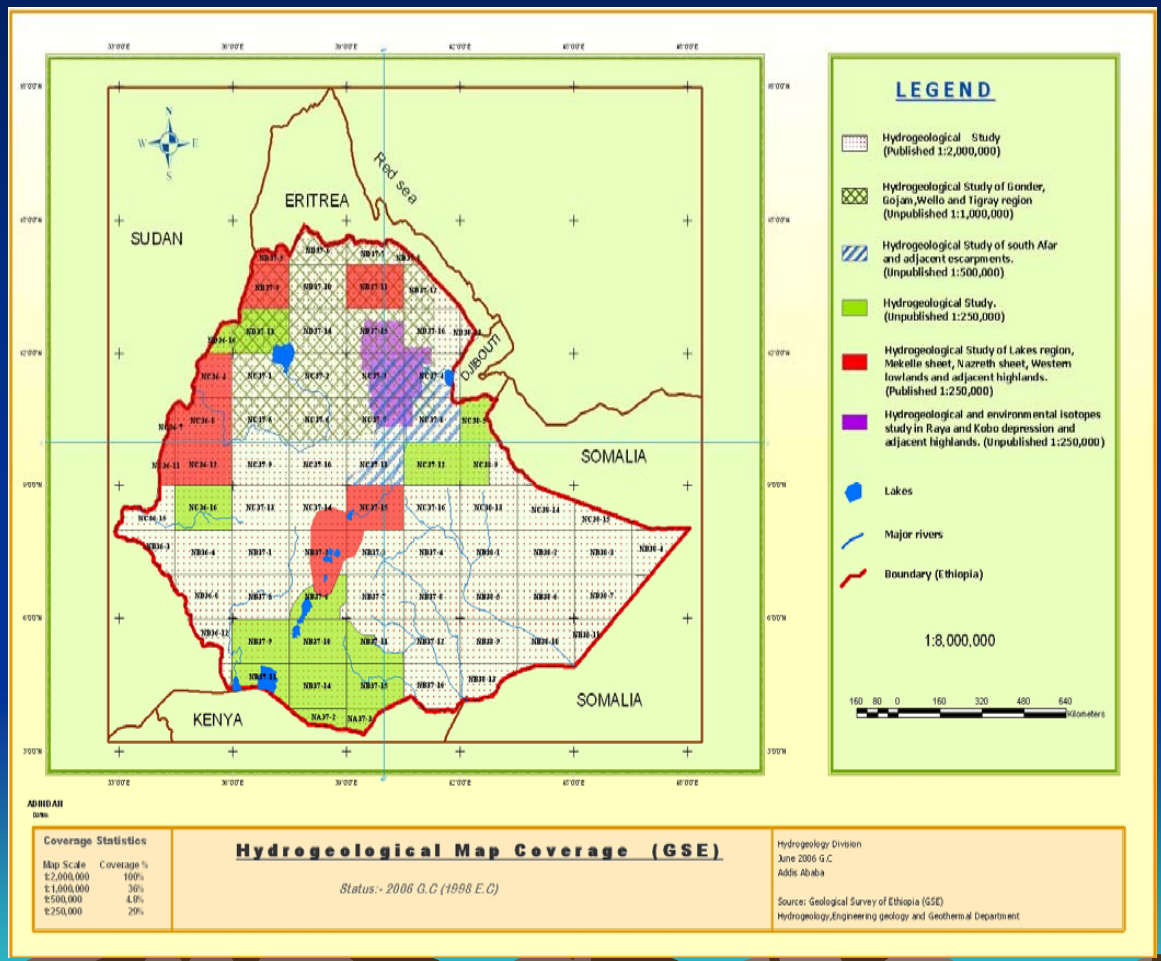
pH-EC meter

A0-Plotter



Dipper

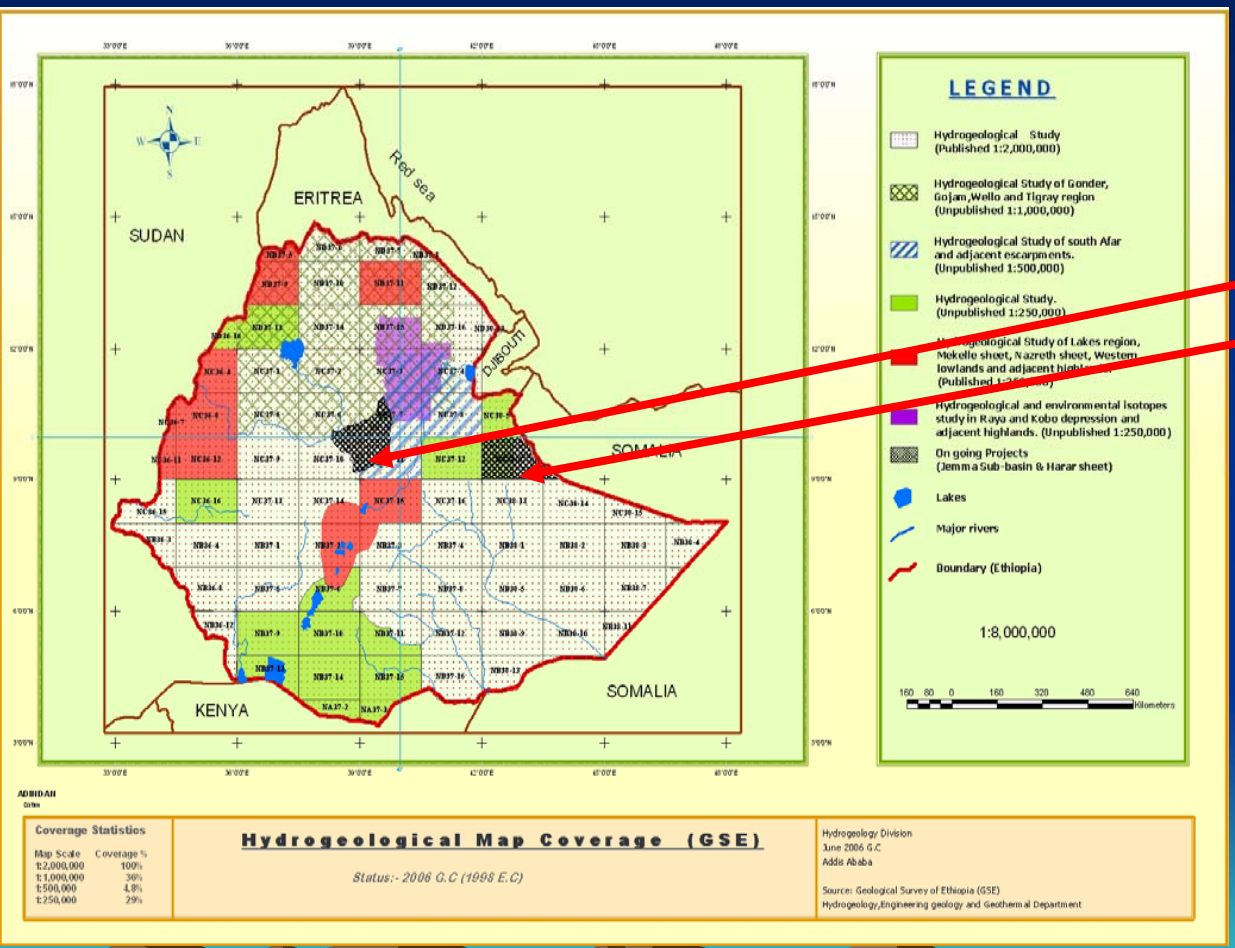
WORK DONE SO FAR



HYDROGEOLOGICAL MAP COVERAGE

- 1:250,000 = 29%
- 1: 500, 000 = 4.8%
- 1: 1,000,000 = 36.8%
- 1: 2,000, 000 = 100%

CURRENT ACTIVITY AND THE WAY FORWARD



CURRENT ACTIVITY

2006

- Jemma Basin
- Harar Area

The Way Forward

2006-2010

- To increase the hydrogeological Map coverage by 15%

ENGINEERING GEOLOGY

MAIN OBJECTIVE

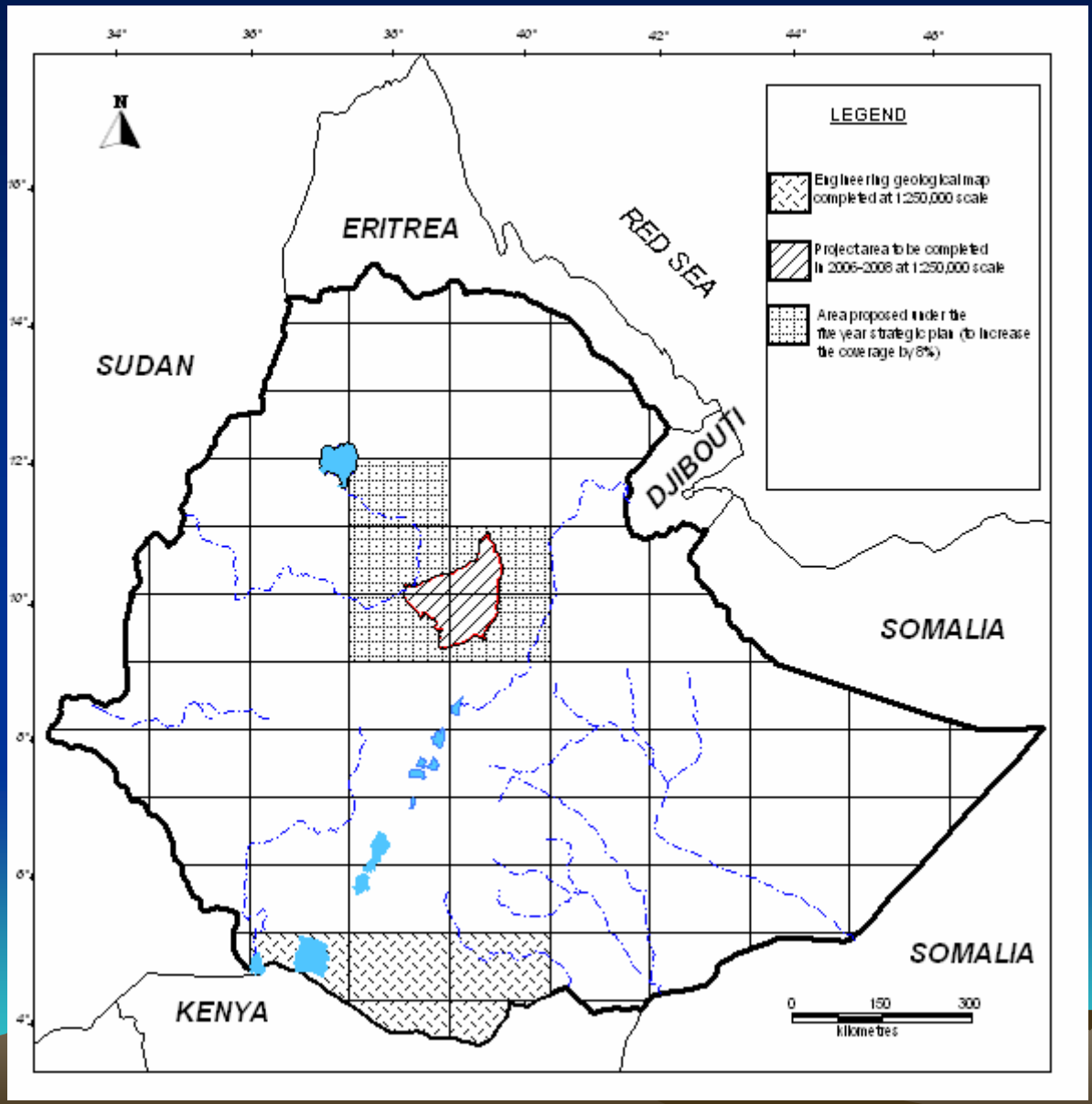
- Investigate the occurrence of natural hazards (earthquake hazard, slope stability hazard, flooding hazard,…etc.)

- Select and assess suitable sites for the construction of different structures (dams, buildings, bridges, roads,…etc.)

- Select suitable site for waste disposal in urban areas.

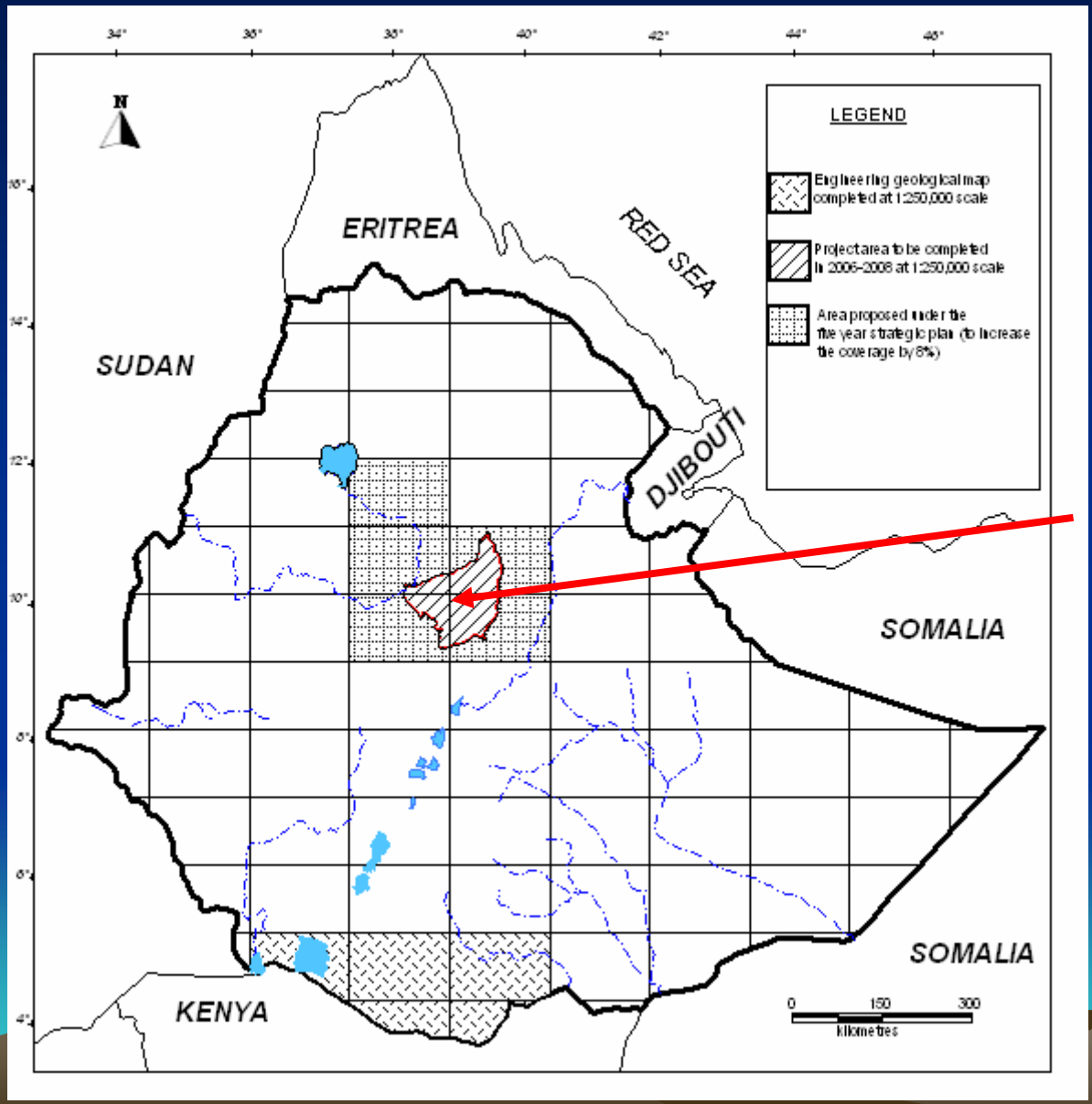
- Produce Engineering geological maps at 1:250,000 (or larger) scale with accompanying report.

WORK DONE SO FAR



- ❖Engineering geological map coverage at 1:250,000 scale = 6.9%
- ➢Land slide hazard assessment of Bonga town and the surrounding
- ➢Site selection for small scale dams in Abay basin
- ➢Engineering geological investigation of Awasa lake basin
- ➢Kobo-Kombolcha small scale dam site investigation
- ➢Engineering geological investigation for Melka-Wakena hydroelectric power site
  - •Landslide hazard assessment of Gofa area
- ➢Tendaho, Rib and Megech dam site geotechnical core drilling investigation

CURRENT ACTIVITY AND THE WAY FORWARD



CURRENT ACTIVITY

- **Engineering geological mapping AND INVESTAIGATION OF jemma basin**

Five year Strategic Plan 2006-2010

- To increase the Engineering Geological Mapping by 8 %

REGIONAL GEOLOGY AND GEOCHEMISTRY DEPARTMENT

The Geological Survey of Ethiopia, to meet its mission, has four technical Departments of which the Regional Geology and Geochemistry Department (RGGD) is the one.

Objective of RGGD:

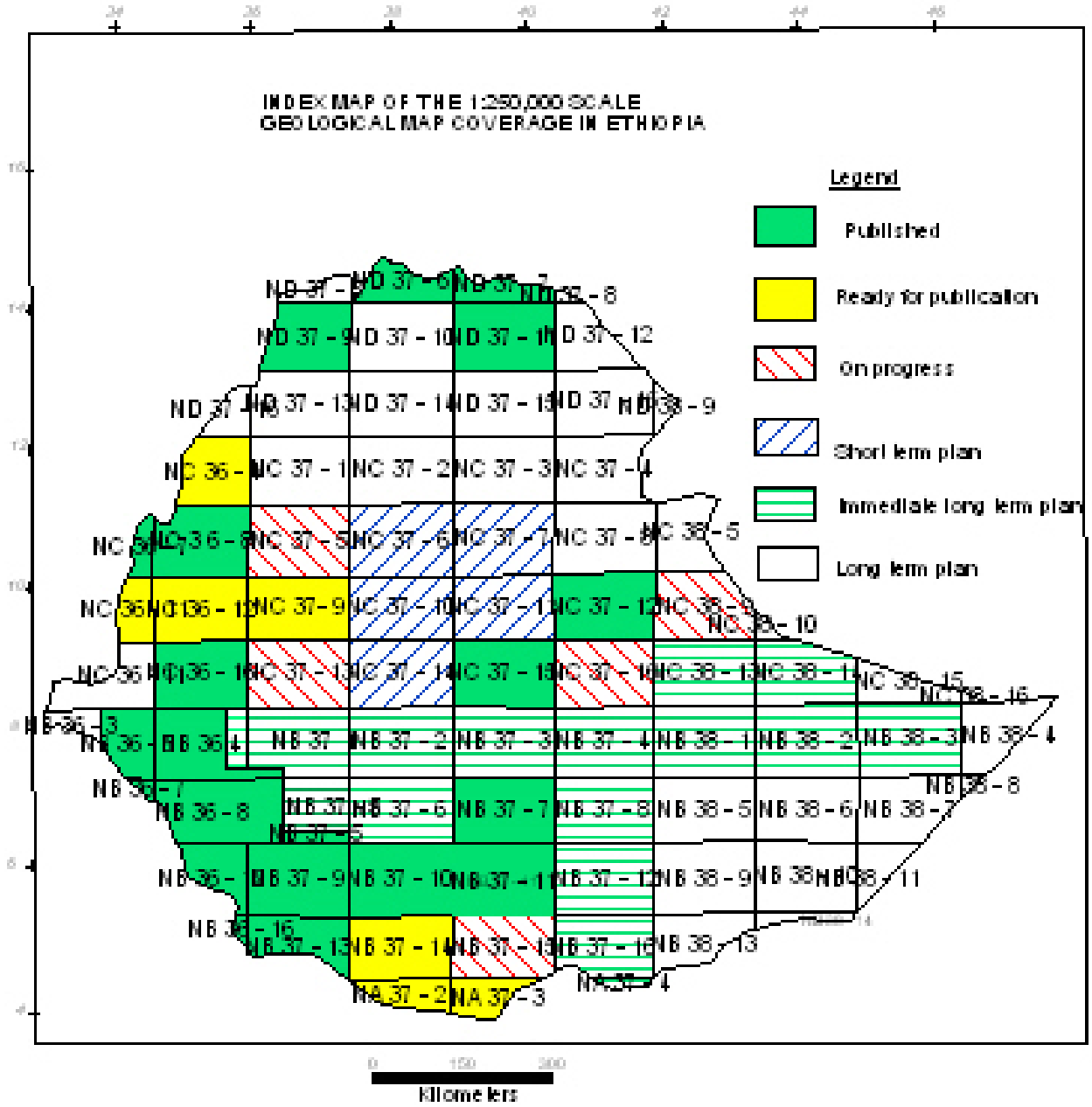
The broad objectives of the Department are to:

- Cover the country with 1:250,000 scale geological map and to prepare accompanied reports and

- Conduct geological and geophysical investigations to explore, evaluate and document the hydrocarbon potential of the country.

Work done so far:

The Regional Mapping, Photo Geology and Remote Sensing Division so far has covered about 39% of the country with 1:250,000 scale geological maps. The mapping scheme was done by giving priority mainly for areas covered by Precambrian rocks, which are presumed to be potential for gold and other base metal deposits. Besides, few volcanic and sedimentary terrains associated with the Precambrian terrain are mapped. Therefore, the Precambrian terrain is nearly completely mapped, whereas majority of the former two terrains are yet to be mapped in the future.


INDEX MAP OF THE 1:250,000 SCALE
GEOLOGICAL MAP COVERAGE IN ETHIOPIA
Legend
Published
Ready for publication
On progress
Short term plan
Immediate long term plan
Long term plan
Kilometers

2. The Hydrocarbon Exploration Division has so far explored and evaluated coal potential of four basins. These are:

Delbi-Moye Basin	41x106 ton
Mush Valley Basin	0.3x106 ton
Geba Basin	250x106 ton
Chilga Basin	20x106 ton

Moreover, a number of coal occurrences which need further exploration to evaluate their potential are also identified.

Petroleum exploration is also conducted in Bedesa and Humera and their surrounding areas.

Five year Strategic Plan (2006-2010):

1. The Regional Mapping Photo Geology and Remote Sensing Division has a strategic plan to cover 19% (about 214, 700 sq. km area) of the country land mass at a scale of 1:250,000. This work includes preparation of accompanying reports for each Map Sheet.

2. The Hydrocarbon Exploration Division has also a strategic plan to investigate and delineate the petroleum and coal potential of the country in selected areas. These are:
   - The Abay and east of Mekele Petroleum Exploration project, which covers about 50,000 km2 area,
   - Exploration of petroleum potential of the southern and central parts of the Main Ethiopian Rift to be evaluated from geophysical data reassessment and interpretation and
   - Exploration activity for coal potential in selected areas such as Sese river Basin, Limu-Nono, Bulen-Galesa and Kunzela areas covering about 4000 km2 area.

GEOPHYSICS DEPARTMENT

1. Objectives

The department carries out geophysical surveys for mineral , groundwater, hydrocarbon and geothermal exploration as well as for study of geological hazards and for geotechnical applications.

4. WORK DONE SO FAR
4.1 MINERAL EXPLORATION Geophysics

Most metallic mineral exploration has been done in the low grade Precambrian terrains in western, southern and northern Ethiopia. In sedimentary settings geophysical surveys have been conducted for petroleum and coal exploration.

60 detailed mineral exploration surveys have been carried out to aid in :

- Geological mapping
- Delineating mineralized zones
- Basin delineation (thickness of sedimentary units containing coals

4.2 Regional and Airborne Geophysics

Regional gravity coverage is 68% of the total area of the country at a scale of 1:500,000

The airborne geophysical surveys conducted for mineral, petroleum and geothermal exploration purposes are shown in figure 1.

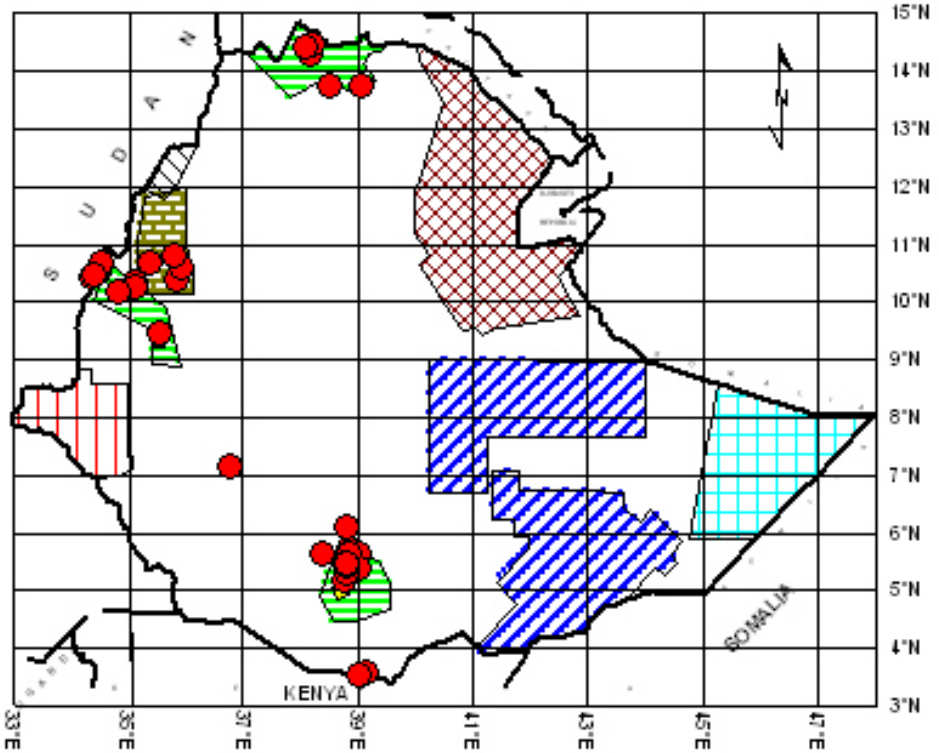


Figure 1

LEGEND

Airborne Geophysics with flight line intervals
(Survey data is available at GSE)

- 200 m. For mineral exploration, Magnetics, Radiometry and Electromagnetics
- 1km. For mineral exploration, Magnetics and Radiometry
- 1 & 2 km. For mineral exploration, Magnetics, Radiometry and Electromagnetics
- 3 km. For petroleum exploration, Magne
- 5 km. For petroleum exploration, Magnetic
- 7 km. For petroleum exploration, Magnetics
- 8 km. For Petroleum exploration/Magnetics
- 10 km. For Geothermal exploration, Magnetics
- 200m. For mineral exploration, Radiometry and Magnetics
- ground mineral exploraioin sites

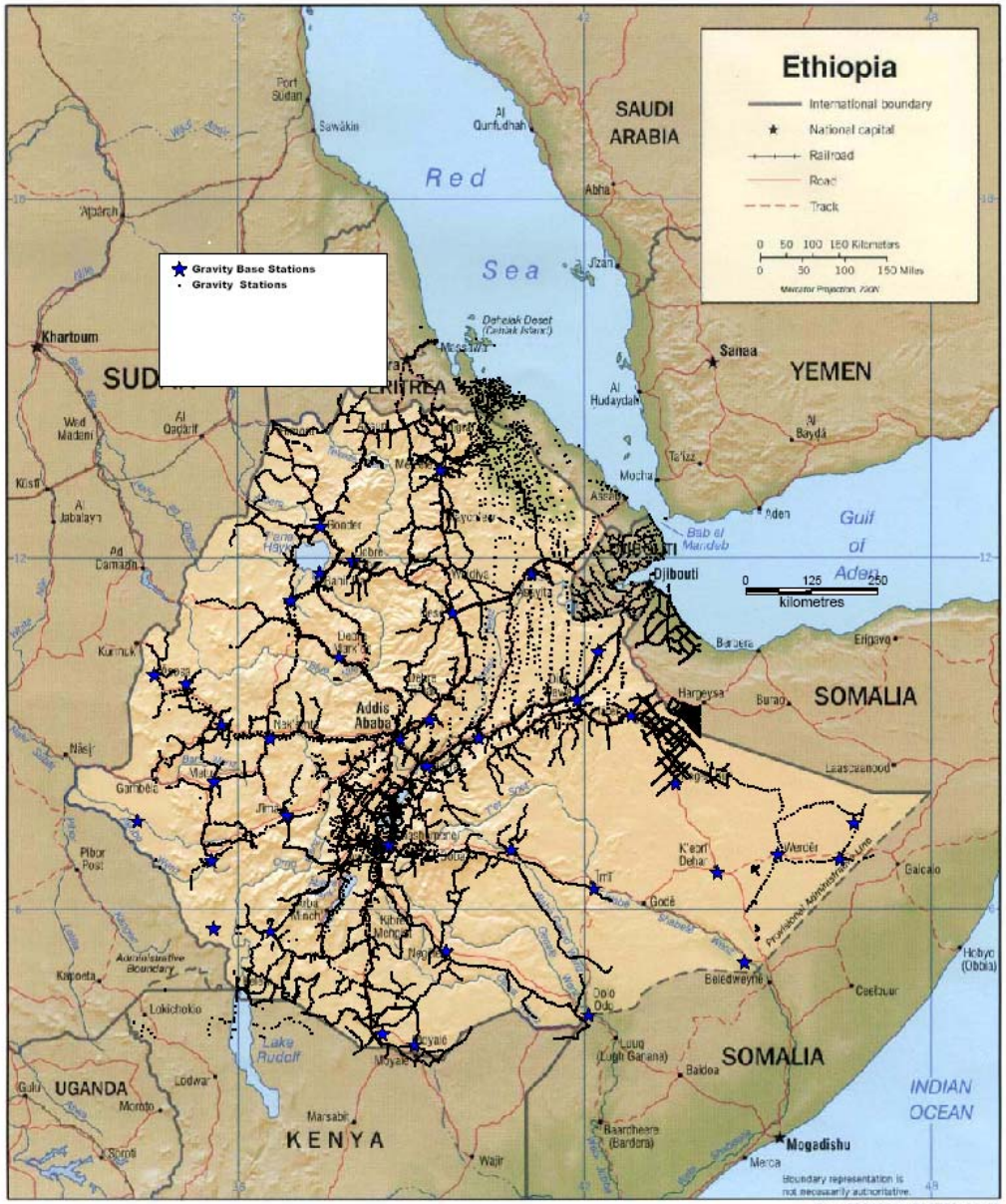
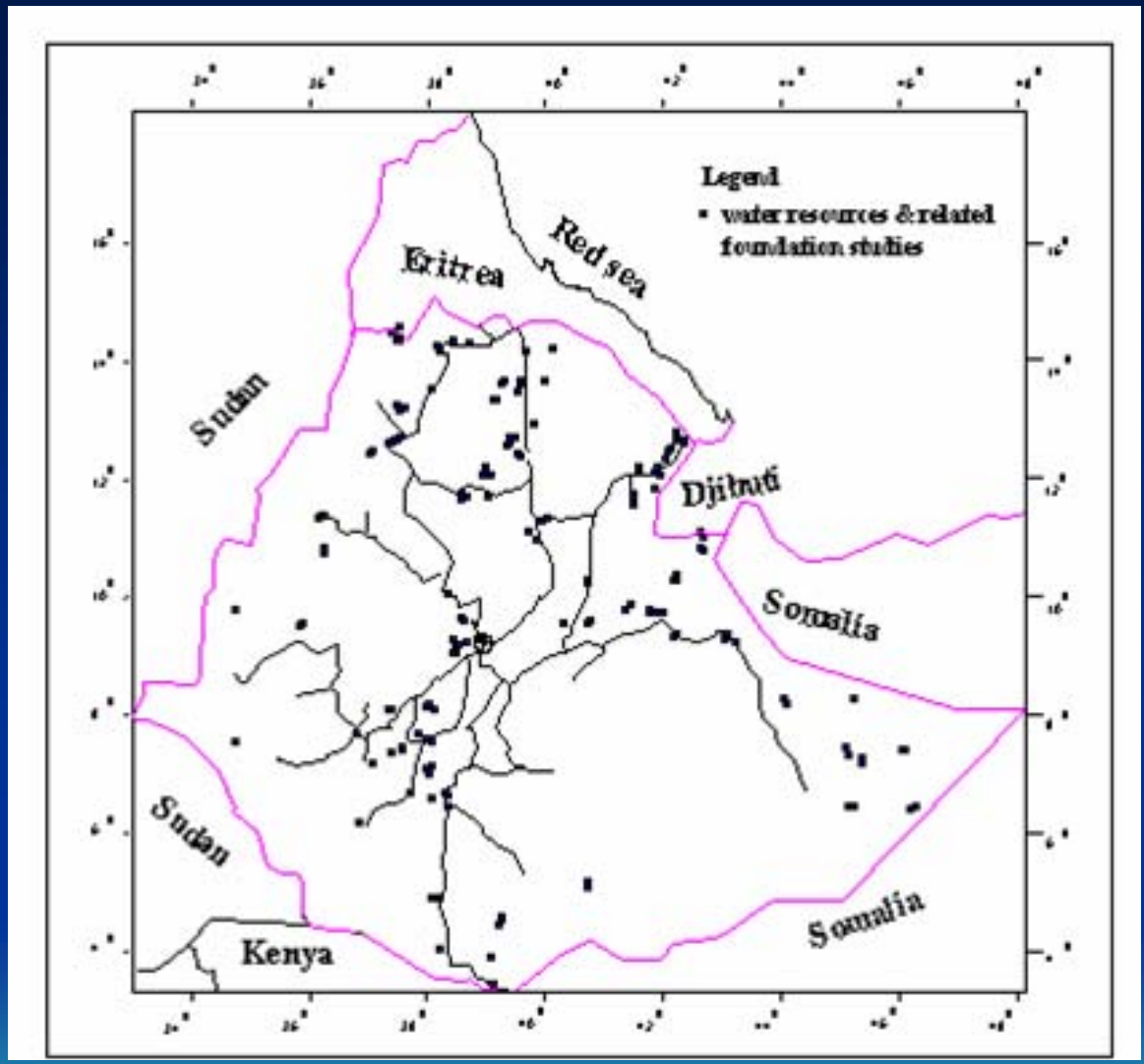


Figure 1Regional Gravity Coverage of Ethiopia

4.3 Hydro Geophysics

26 groundwater projects in various parts of the country have benefited from geophysical surveys carried out by the department. (VES, electrical profiling and magnetics).

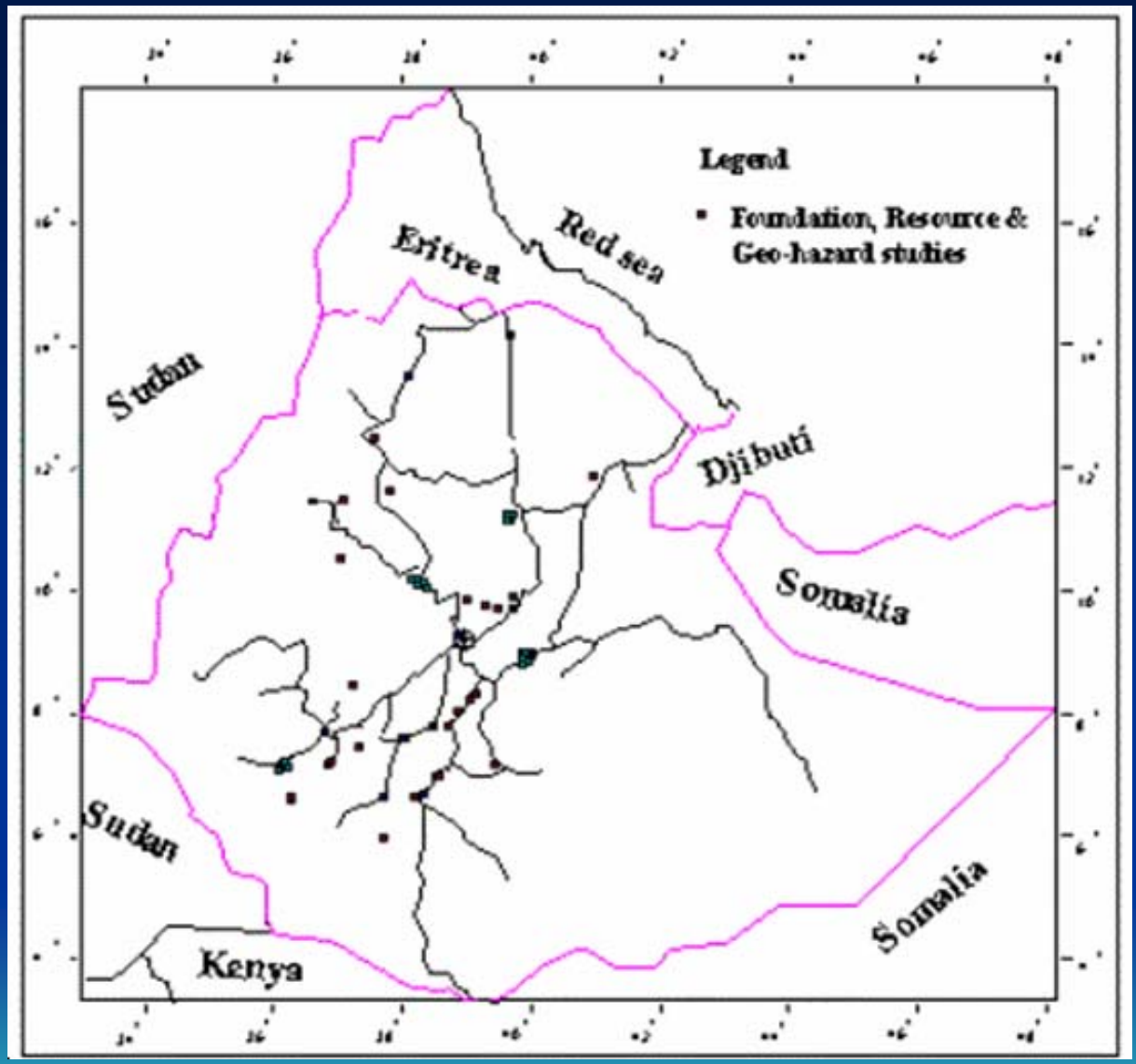


Hydro-geophysical Survey inventory Map (1973 – 2005)

4.4 Engineering Geophysical Investigations

Engineering geophysical investigations have been carried out for foundation rock studies of hydroelectric and water supply dams, tunnels, large factories, airport terminals and geo-hazard investigations
Major investigations were for Melka Wakana, Gilgel Gibe, Gojeb, Aleltu, Helele-Werabessa hydropower projects, Dire water supply dam project and the Abay River basin and Wabe-Shebele Master Plan projects.

The main geophysical methods employed were Seismic Refraction, Vertical Electrical Sounding (VES), Electrical Profiling and Magnetics.
The locations of all engineering geophysical investigations are shown in the following map.



Engineering Geophysical and Geo-hazard Survey inventory map (1973-2005)

5. Current activities

The department is currently involved in the following projects:

- Central and western Ethiopia gravity survey
- Borena hydrogeophysical exploration
- Werri uranium exploration
- Dugi-Mambuk gold and base metal exploration

6. Five year strategic plan (2006 – 2010)

The regional gravity coverage of the country (1: 500,000 scales) will increased from 68% to 83%.

Economic Minerals Exploration and Evaluation Department

1. Objectives of the Department

- To conduct mineral exploration in various parts of the country.
- The department conducts geological and geochemical exploration from reconnaissance to detailed level including test bore holes, for precious and base metals, industrial and construction materials,.
- Geodata obtained is provided to mineral exploration companies and others for further follow-up.

4. Work done

- During the last four years the department has conducted:
- Stream sediment surveys at the 1:100,000 scale in the basement rocks of Ethiopia covering an area of 8,500 km^2
- 15 areas were delineated for follow-up geological and geochemical surveys.
- 15 prospects were covered by follow up and detailed geological, geochemical and geophysical surveys for gold and base metals, industrial minerals and uranium in various parts of the country.

5. Current activity

- The department is engaged in four mineral exploration projects for base metals, gold and uranium, one gemstone exploration project, and a survey of construction materials around Adama and Awasa.

6. Five year Strategic Plan 20006-2010

- Within the next five years the department plans
- To conduct reconnaissance stream sediment surveys at the scale of 1:100,000 covering 15,750 km^2 in the metamorphic belts of the country.
- To carry out follow-up and detailed geological, geochemical and geophysical exploration so as to delineate 25 for metallic, industrial minerals and construction materials prospects..

CENTRAL GEOLOGICAL LABORATORY (CGL)

- Main functions are
  - Conduct analyses of various geological materials such as rocks, stream sediments, soils, coal, water, industrial minerals, ore samples etc.
  - Generate reliable analytical data for GSE, governmental and non-governmental organizations and others.

Manpower

- The activities of the laboratory are carried out by a staff of 71 consisting of chemists, geologists, chemist technicians, laboratory technicians and supporting personnel

Laboratory Instruments

- Major instruments of CGL are:
  - Atomic Absorption Spectrometer ``````````
  - X-Ray Fluorescence spectrometer
  - UV-visible spectrometer
  - Emission Spectrograph
  - Rock cutting, slabbing and polishing machines
  - Electromagnetic separator
  - X-Ray Diffractometer
  - Petrographic, ore and stereo microscopes
  - pH and Conductivity meters
  - Sedimentation unit
  - Compressive strength machine
  - Cone pentrometer
  - Elemental Analyzer
  - Bomb Calorimeter

Structure

- The CGL is organized in five laboratories and one support unit.
  - These are:
    - Geochemical Laboratory
    - Mineralogy and petrography Laboratory
    - Water and geothermal Laboratory
    - Physical Laboratory
    - Hydrocarbon laboratory and
    - Methods development, research and quality control Team

DRILLING DEPARTMENT

OBJECTIVES

- The main objectives of the Department are to carry out core drilling, water well drilling, geothermal deep well drilling and conducts geo-technical work.

.The department has three divisions, namely

1.Core drilling

2.Water well and deep well drilling

3.Equipment maintenance

RESOURCE

Manpower:

The department has fourdrilling engineers, one mechanical engineer, two geologists and 86 drillers and other technical staff.

Equipment:

The department his equipped with two water well drilling rigs, seven core drilling rigs, two deep well drilling rigs, one soil sample drilling rig, and hole surveying instruments

CURRENT ACTIVITIES

- Core drilling for coal exploration at Yayu(near Bedele), western Ethiopia
- Core drilling and geotechnical work around lake Tana for four dam sites.

Five Year Strategic Plan 2006-2010

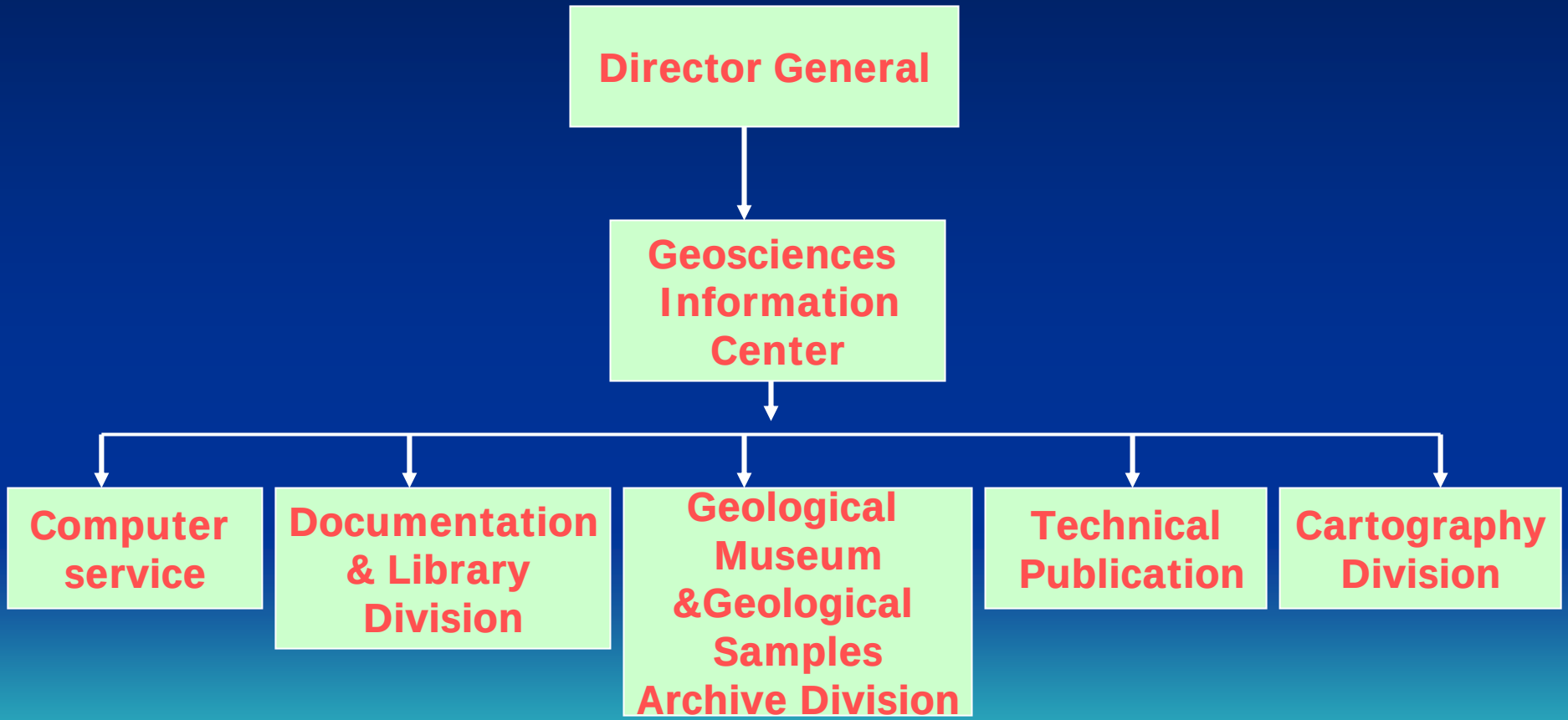
During the plan period, the department has plans to drill

- **18,000** meters for rock coring and geo-technical work
- **2,000** meters for water well drilling
- **8,500** meters for geothermal wells.

GEOSCIENCE INFORMATION CENTER

- **Objective**
  - **Collecting, classifying, displaying, publishing and disseminating earth science information**
  - **Implementing ITC infrastructure for efficient use of geoscience data**

Structure


Director General
Geosciences Information Center
Computer service
Documentation & Library Division
Geological Museum &Geological Samples Archive Division
Technical Publication
Cartography Division

Work done so far

- 2,600 bibliographic records on the geology of Ethiopia computerized (now available in GSE library and at www.sigafric.net
- 2, 835 metadata on the geology of Ethiopia computerized using ENRAEMED software; Available in GSE library and at http://geoinfo.uneca.org/geoinfo
- 875 mineral occurrences of Ethiopia made available in SIG Afrique mineral resources database

- 600 rock, fossil and mineral samples were collected from different parts of Ethiopia
- 150 rock samples are now displayed in the Geological Museum
- Various mineral and dimension stone samples printed on Ethiopian postal stamps to promote these resources
- Cores from 201 bore holes (45,448 meters) organized in the core archive
- Produced digital maps at various scale