Agenzia nazionale per le nuove tecnologie,
l'energia e lo sviluppo economico sostenibile

Mapping of renewable energy potential in Lesotho

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Who we are

- ENEA is the Italian National Agency for New Technologies, Energy and Sustainable Economic Development.
- It is a public Research and Technology Organization operating in the fields of energy, environment and new technologies to support Country's competitiveness and sustainable development.
- ENEA's mission is to search for new technological solutions to meet the societal challenges, fostering transition towards Green Economy.
- The institutional mandate of the Agency is to disseminate and transfer knowledge, innovation and technology to industry, institutions and civil society at large.

Motivation and background

- An updated and comprehensive energy sector database forms the basis for any policy formulation and development program
- The last comprehensive assessment of the energy sector situation in Lesotho was carried out in 1985 during the development of the Lesotho Energy Master Plan (LEMP)
- Later, a Lesotho Energy Information System (LEIS) energy model, has been developed in agreement with the LEMP. The LEIS was used as the national energy planning model for projections of supply and demand of energy up to 2010.
- A Southern African Development Community (SADC) Regional Energy Planning Network (REPN) model replaced LEIS, but it had several technical problems and crashed losing the entire Lesotho energy sector baseline data.
- Therefore, there is a strong motivation for building an up-to-date baseline energy data in Lesotho

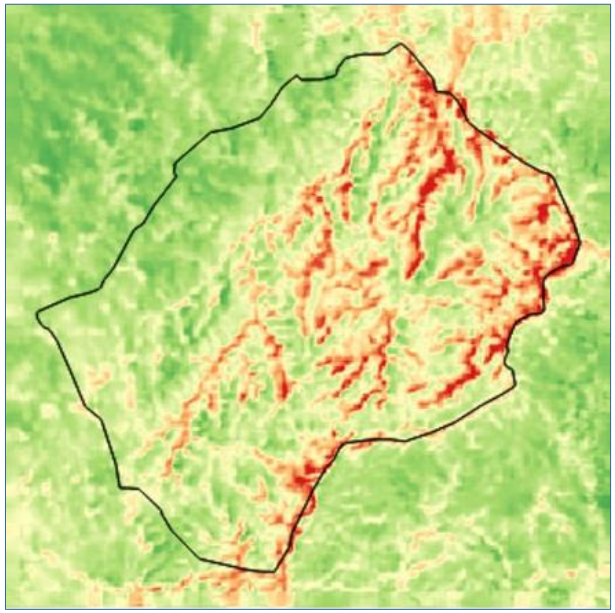
Main goals of the project

- Producing renewable energy potential maps for Lesotho in order to facilitate the Government in the planning and development of renewable energy exploitation and for achieving a concrete step towards a low-emission development pathway.
  - to develop a **hydrological map** of Lesotho, useful to identify potential sites for power generation;
  - to develop a **wind energy map** for Lesotho, useful to identify specific sites with the most potential for wind energy generation;
  - to develop a **solar energy map**, to define the different levels of radiation intensity over Lesotho, useful to localize sites for photovoltaic plants.

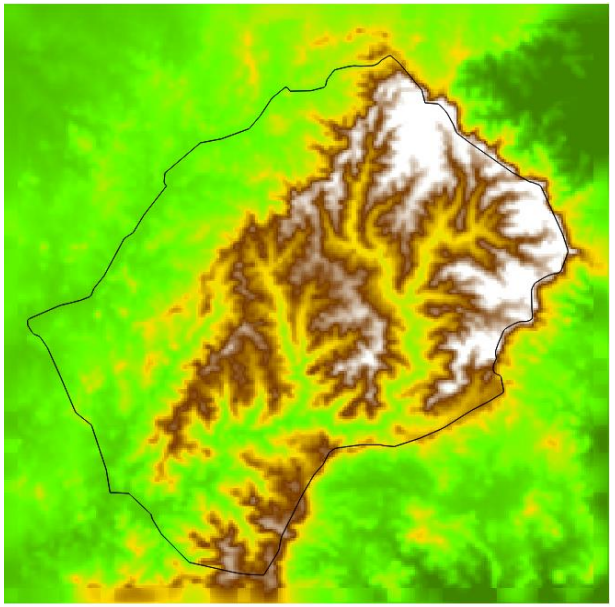
Steps for building the wind energy map in Lesotho

- Collection of all available meteorological data over recent years, to be used for model tuning
- Model tuning: perform several model simulations over at least one year in order to chose the best model configuration based on agreement with observations
- Perform a **multi-annual** simulation using the best model configuration (~**1km resolution**) and build a wind energy map for Lesotho

Steps for building the wind energy map in Lesotho



Example of Wind speed field over Lesotho at 1km horizontal resolution (10 days average)



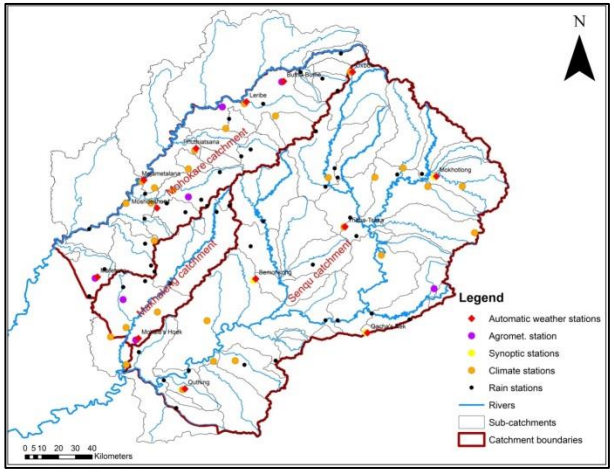
Digital elevation model of Lesotho at 1km resolution (from green lowest to white highest altitude)

Steps for building the solar radiation map in Lesotho

- Collection of all available in situ radiation data over recent years, to be used for model tuning
- Model tuning: performing several model simulations over at least one year in order to chose the best model configuration according with the observations
- Perform a **multi-annual** simulation using the best model configuration (~**1km resolution**) and build a solar production potential map for Lesotho.

Steps for building the Hydrological map for Lesotho

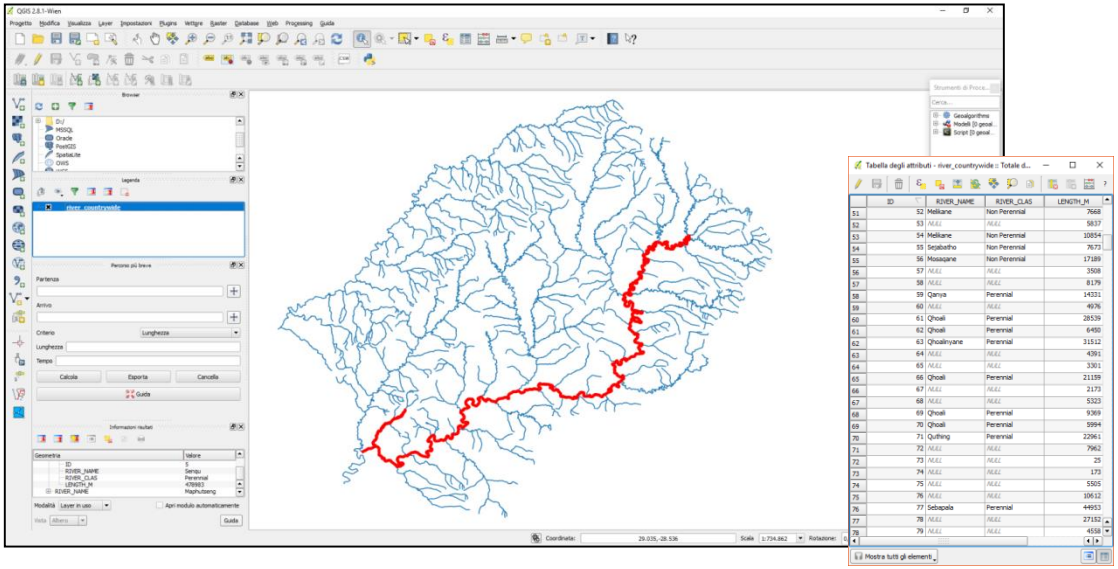
- Data collection and overview of methodology
- River network reconstruction
- Elevation, hydrologic and geographical data processing



Implementation of a GIS database for managing and planning renewable resources exploitation

- Integration of the potential energy maps in an Open Source GIS-based tool for managing and planning renewable energy resources exploitation

- The tool will be enriched with additional layers including all the available data suitable for the identification of sites which are promising for renewable energy exploitation such as topography, electricity network grid, roads, rivers/basins, land cover, population distribution, etcetera.



Human Capacity Building

- Training of local operators on the methodology used (model simulations, data processing)
- Training of local operators on the use of GIS database illustrate functioning, setting and maintenance to manage the developed database.

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Thank you for your attention