

Geospatial Analysis of Renewable Energy Potential

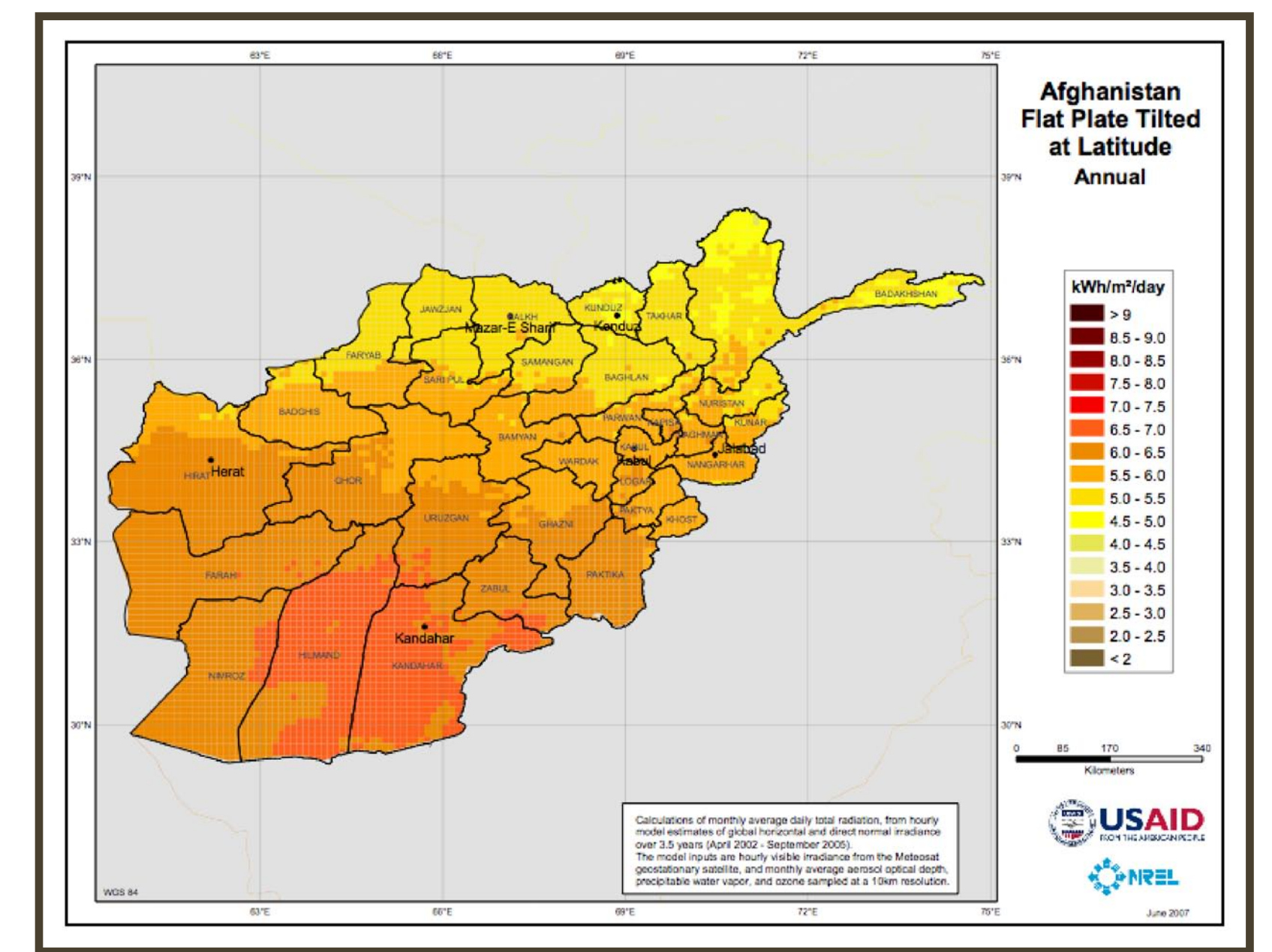
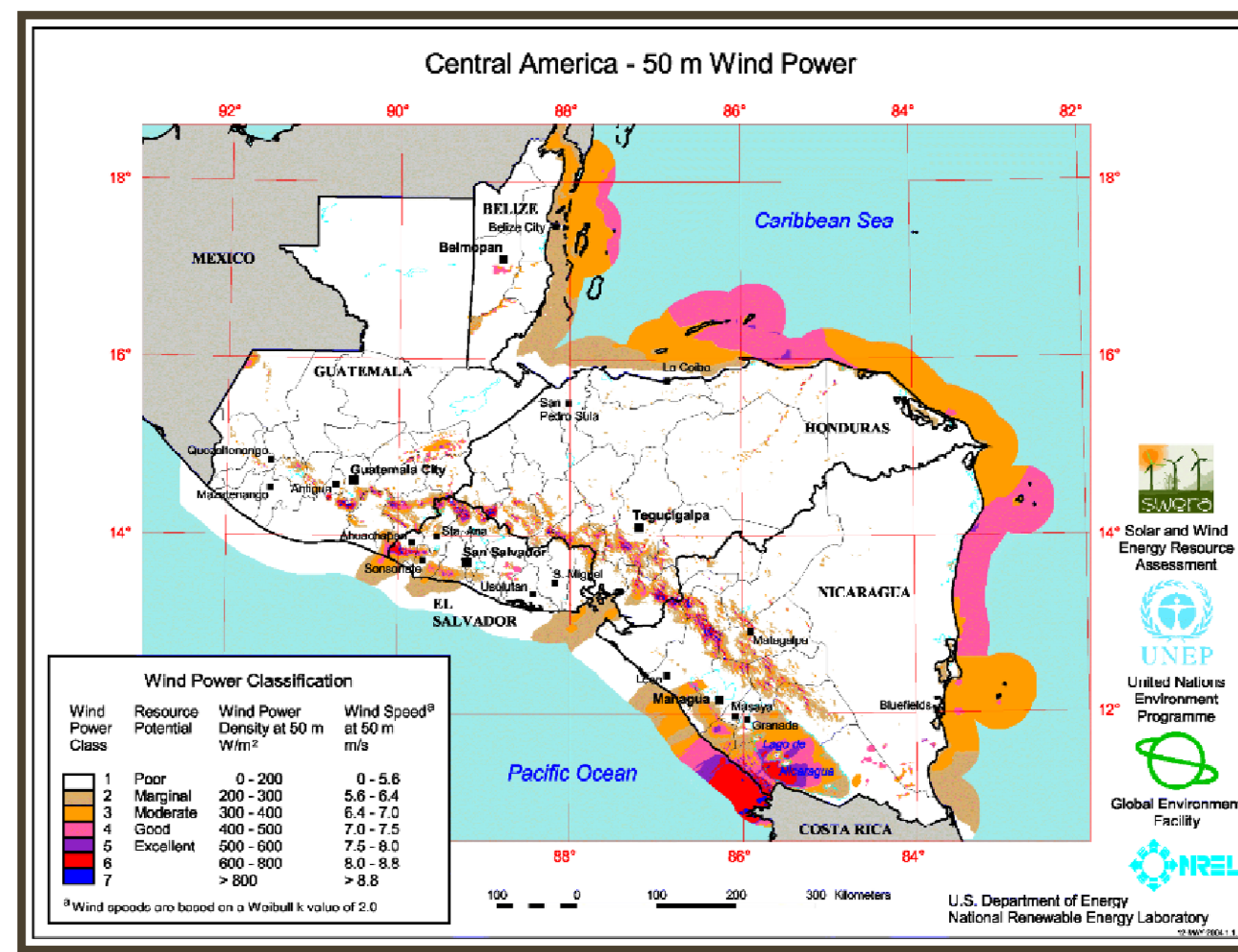
INTRODUCTION

The National Renewable Energy Laboratory's (NREL's) resource assessment group and its contractors have been developing methods for estimating solar, wind and biomass energy resources over large areas. The resulting data products are incorporated into Geographic Information System (GIS) software formats, which allow for flexibility in the way the resource data can be visualized. This capability allows overlaying the resource data with other critical geospatial information relevant to the siting and deployment of renewable energy technologies. These data sets include transmission

and transportation networks, load centers, existing power plant and substation facilities, protected areas, land use and terrain characteristics. In this way, it is possible to identify favorable areas for technology deployments. The data sets residing in the GIS environment can be conveniently linked to decision support tools, such as NREL's micropower optimization model, HOMER, to conduct actual prefeasibility assessments of hybrid energy projects.

RENEWABLE ENERGY RESOURCE ASSESSMENT

- Use satellite, weather, terrain and statistical data to develop reliable, high-quality databases and maps
- Determines available energy supply and feeds in to system performance calculations
- Distinguishing characteristics of renewable energy
 - Supplies vary over time (seasonally and daily)
 - Level of resource very important, especially for wind
 - Despite intermittency, resources are generally never depleted
 - Proper siting is important!



SOLAR AND WIND ENERGY RESOURCE ASSESSMENT (SWERA)

The United Nations Environment Programme's (UNEP's) Solar and Wind Energy Resource Assessment (SWERA) Project was an activity funded by the Global Environment Facility to provide high resolution, high-quality solar and wind resource products for 13 developing countries by an international team of resource assessment experts working directly with country partners. The assessment products were developed in GIS format for use in conducting renewable energy planning in each of the countries.

All SWERA data and products can be viewed at <http://swera.unep.net>. Through a series of country studies and regional workshops the SWERA products have been widely distributed and used by energy planners and project developers alike.



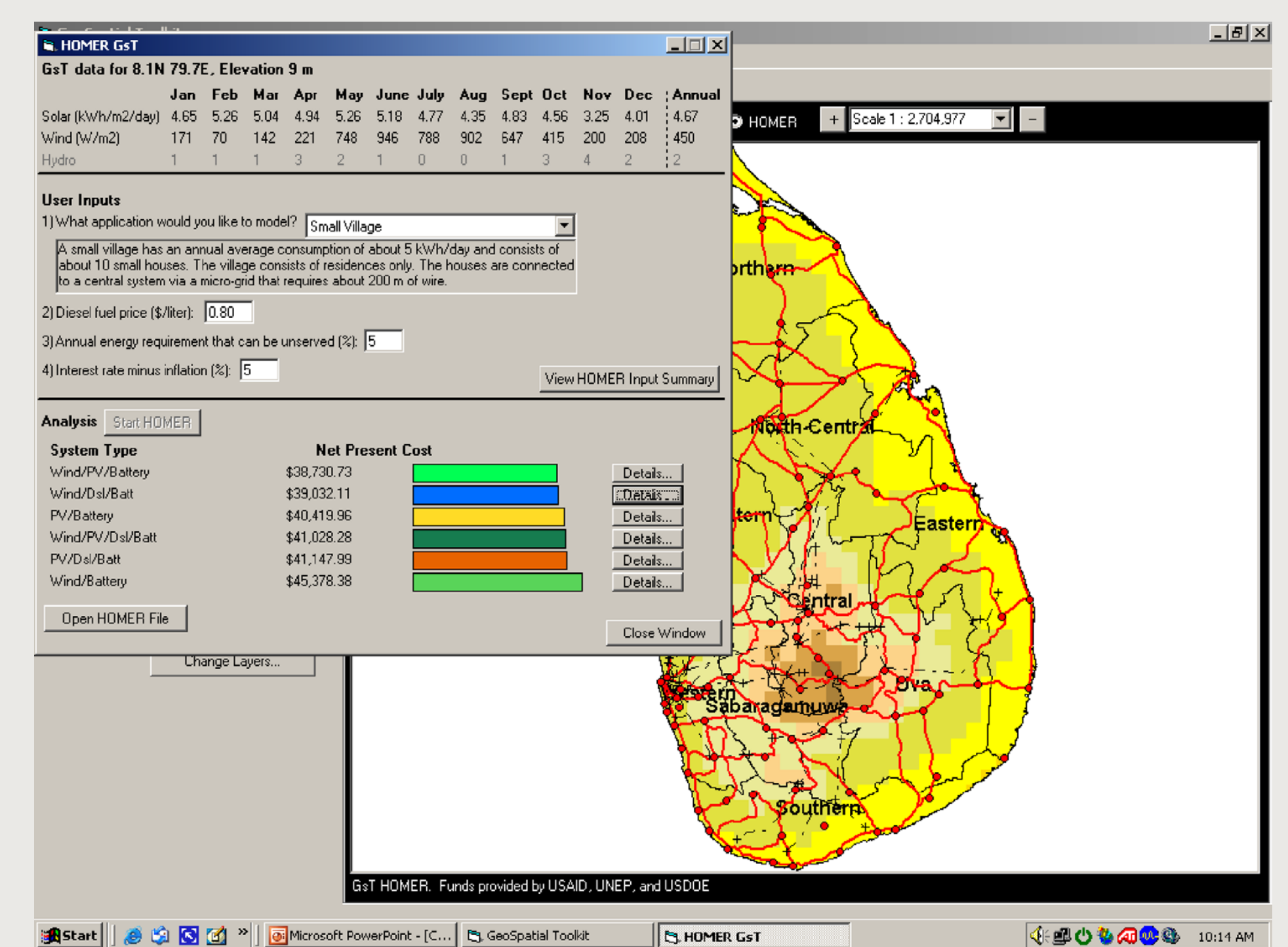
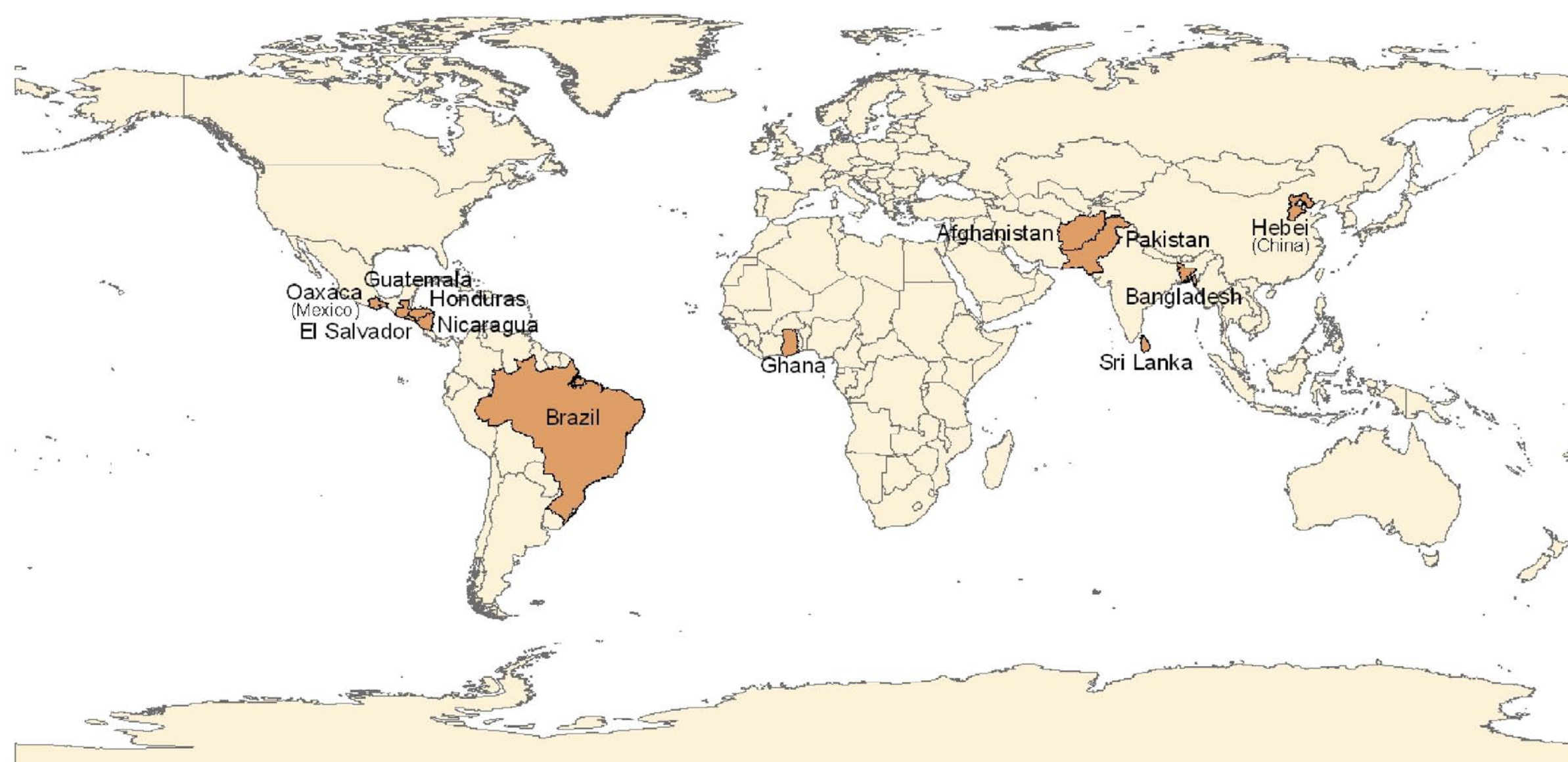
The SWERA (Solar and Wind Energy Resource Assessment) Programme core mission is to provide online high quality renewable energy resource information at no cost to the user for countries and regions around the world. Renewable energy maps, atlases, and assessments can be downloaded. Likewise, GIS and time series data along with energy optimization tools needed to apply these data can be downloaded to facilitate renewable energy policy and investment.

IMPACTS OF SWERA

- Increases awareness of renewable energy potential in several countries.
- Contributes to policy changes (e.g. Nicaragua, China)
- Leads to further studies (e.g. anemometry, country-specific grid-wind analysis)
- Stimulates private sector development
- Supports rural electrification project planning
- Used by Energy Planners to incorporate greater use of renewables in energy plans

GEOSPATIAL TOOLKIT (Gst)

- Developed as part of the UNEP SWERA
- Extended and enhanced with funding from AID and DOE
- Builds on geospatial resource data, global and country-specific data
- Allows decision makers to select and display solar and wind resource data along with other relevant data
- Simple, easy to use. No GIS expertise or software required. Free download
- Help understand the resources and the potential for a country
- Intended for planners and decision makers
- Basic renewable energy analysis, e.g. choosing optimal candidate sites for RE applications
- Not intended for detailed analysis requiring more information, e.g. detailed site analysis, analysis of environmental impacts



Resource data can be fed directly from a point on the map into optimization or engineering models such as HOMER.

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