

Renewable Energy Resource Mapping

**ESMAP Knowledge Exchange Forum – Paris
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Energy Sector Management Assistance Program (ESMAP)
The World Bank

Resource mapping initiative

- New ESMAP initiative launched in October 2012
- Primary objective: Support renewable energy scale-up by...
 - Helping governments and utilities plan and guide investment through improved understanding of resource availability and constraints
 - Providing commercial developers with information on resource location
 - Shortening project development times and access to finance by providing ground-based datasets for resource validation purposes
- Secondary objectives:
 - Help improve the IRENA Global Solar and Wind Atlas
 - Provide tools and guidance in support of RE resource mapping projects carried out by clients and development partners

Meso-scale wind map

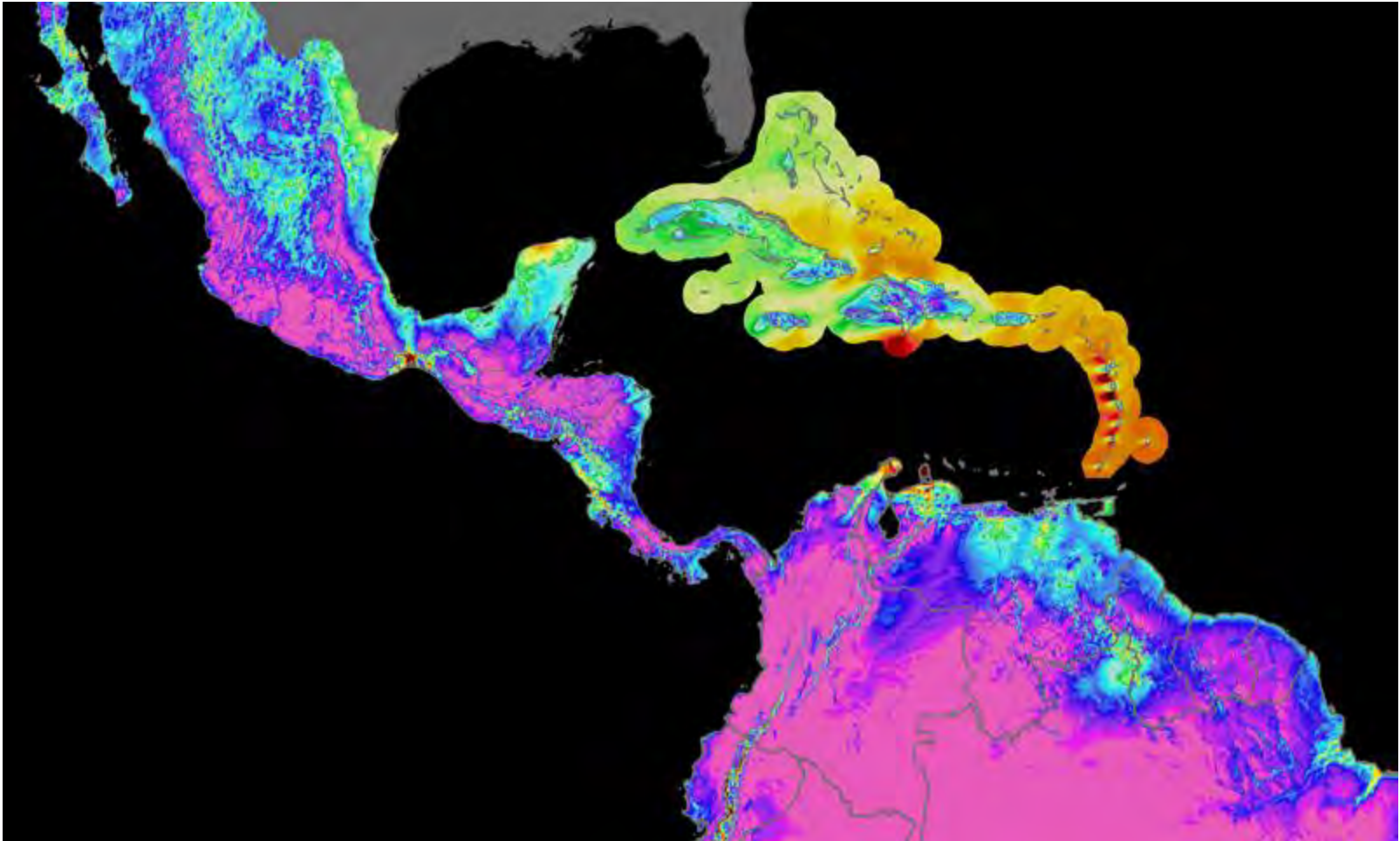


Image credit: AWS Truepower

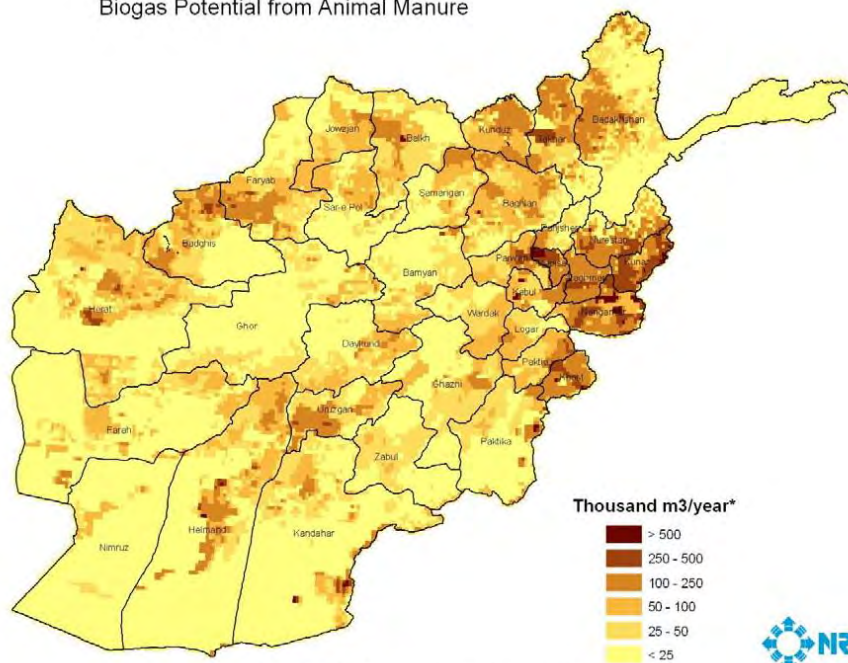
Importance of ground-based data



Image credit: GL Garrad Hassan

Atlas products

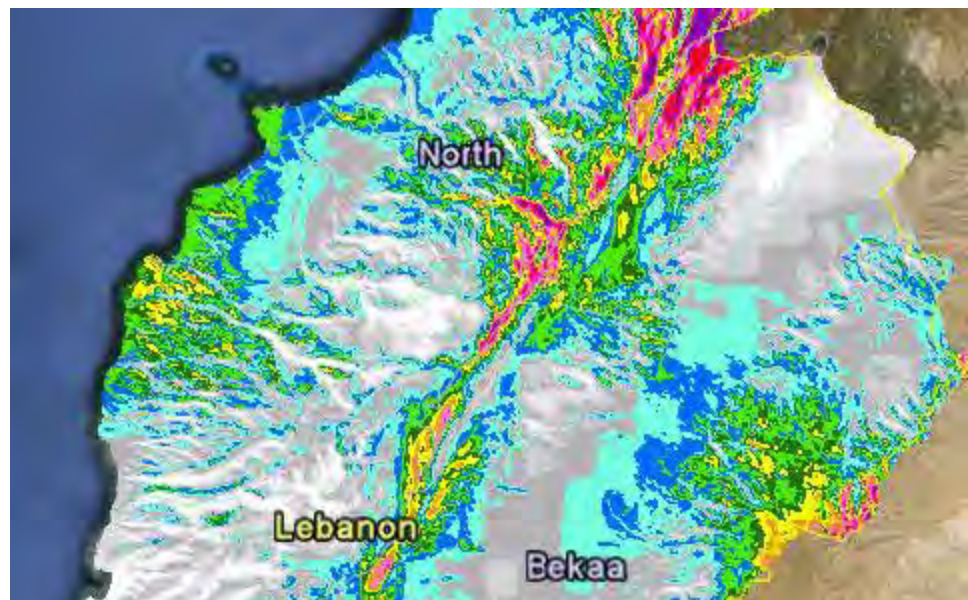
Biogas Potential from Animal Manure



* Biogas potential from cattle, sheep, goat, and poultry manure.



June 2010



Spatial planning

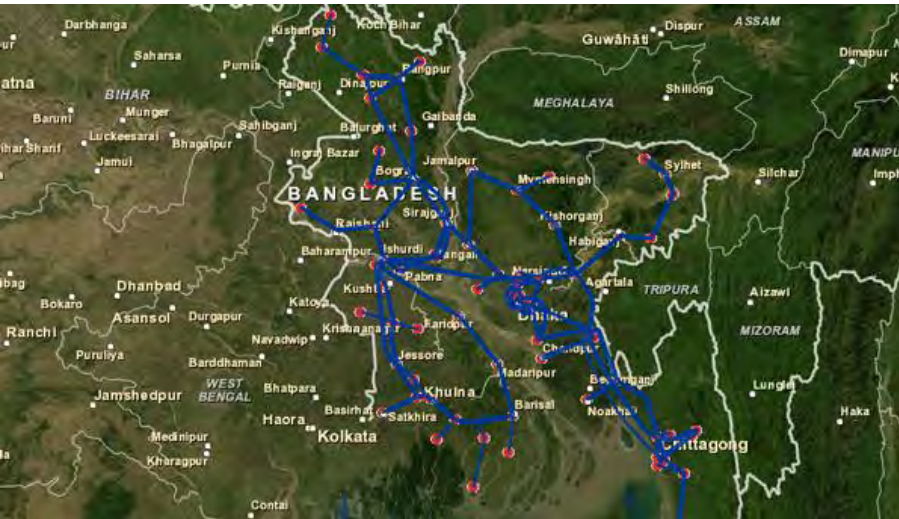
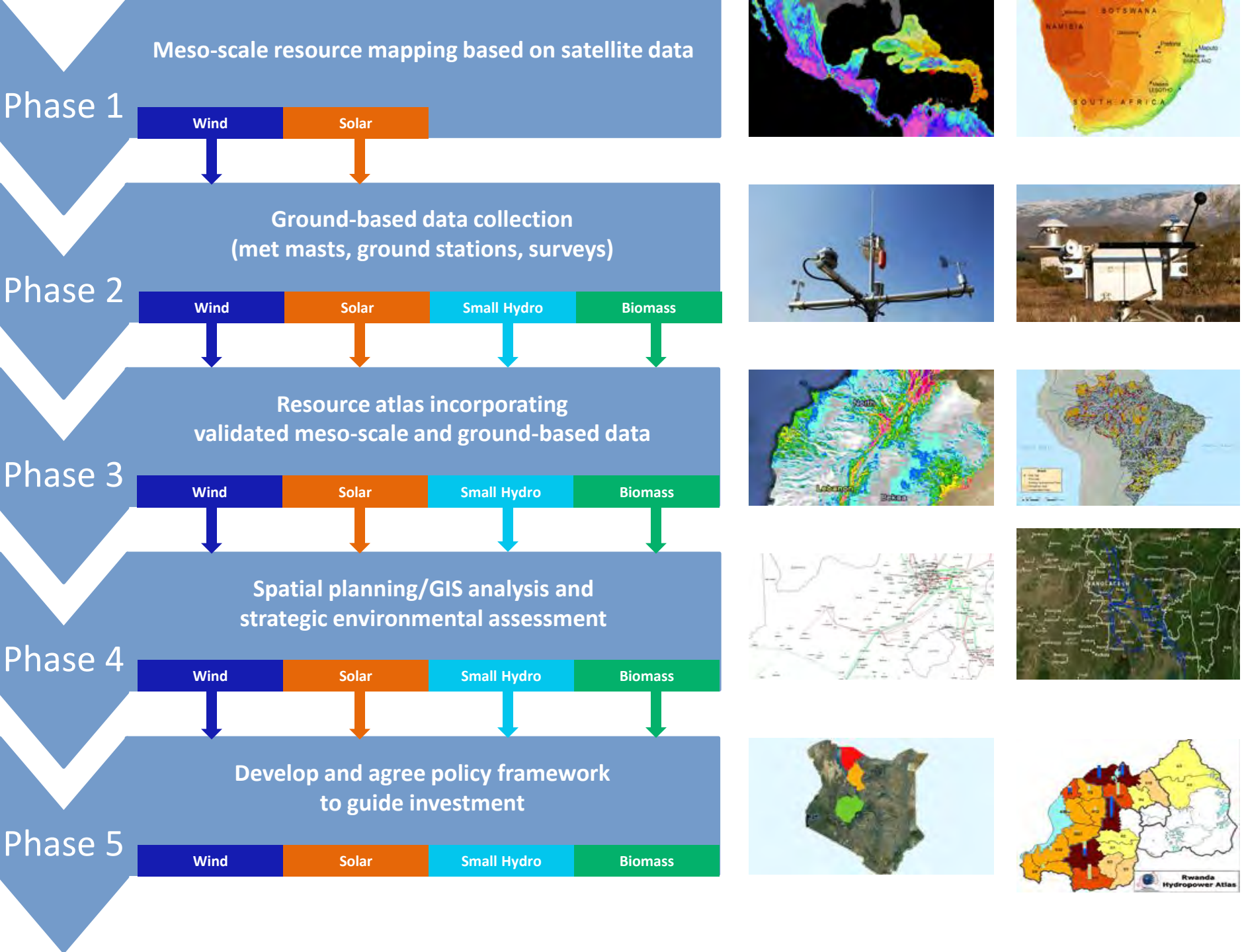


Image credit: Google Maps

ESMAP resource mapping support



- Four RE resources will be covered:
 - Biomass
 - Small hydro
 - Solar
 - Wind
- Projects implemented by World Bank Group operational units with ESMAP funding
- ESMAP core support:
 - Standardized procurement of specialist consulting services
 - Standardized project preparation materials
 - Staff time for project preparation and access to resource specialists
 - Knowledge products and research



Pipeline

Country	Biomass	Small Hydro	Solar	Wind	Project Cost
Indonesia		✓	✓	✓	\$3.0m
Lebanon				✓	\$1.0m
Lesotho				✓	\$0.2m*
Madagascar	✓	✓	✓	✓	\$1.5m
Maldives			✓	✓	\$2.0m
Morocco	✓	✓	✓	✓	\$1.5m
Niger			✓		\$0.7m
Pakistan	✓		✓	✓	\$3.0m
Papua New Guinea	✓	✓	✓	✓	\$1.5m
Tanzania	✓	✓	✓	✓	\$3.0m
Tunisia	✓		✓	✓	\$0.8m
Vietnam	✓	✓		✓	\$2.0m
Zambia		✓	✓	✓	\$3.0m

Interest from: Bangladesh, Honduras, Kazakhstan, Kenya, Mongolia, Myanmar, Namibia, Nepal, Somalia, South Sudan

Example – Pakistan (wind)

Baseline: Meso-scale wind map from satellite data conducted by NREL in 2007 with resolution of 10km at 50m hub height; 12 masts funded by GEF/UNDP in Sindh province plus access to private sector data

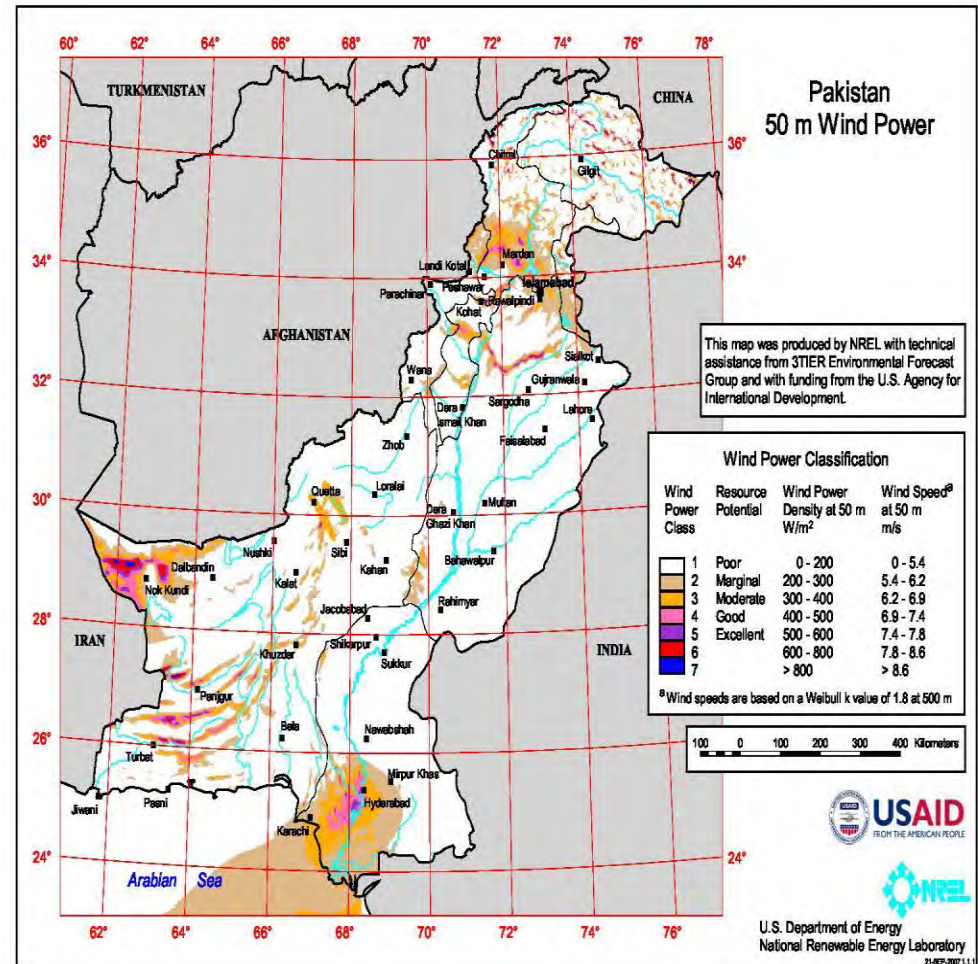
Phase 1: Carry out new meso-scale map with full access to data and assumptions

Phase 2: Install 6-8 additional masts across the country over two years

Phase 3: Carry out initial validation in Sindh province, then nationally; create wind atlas

Phase 4: Develop GIS layers from national data and carry out spatial analysis

Phase 5: Support development of a wind policy and planning framework



Example – Pakistan (solar)

Baseline: Low resolution meso-scale solar map (GNI) available from private vendor (GeoModel Solar)

Phase 1: Use existing map to plan placement of ground-based stations

Phase 2: Commission 20-30 ground-based data stations over a two year period, collecting high quality GHI and DNI data

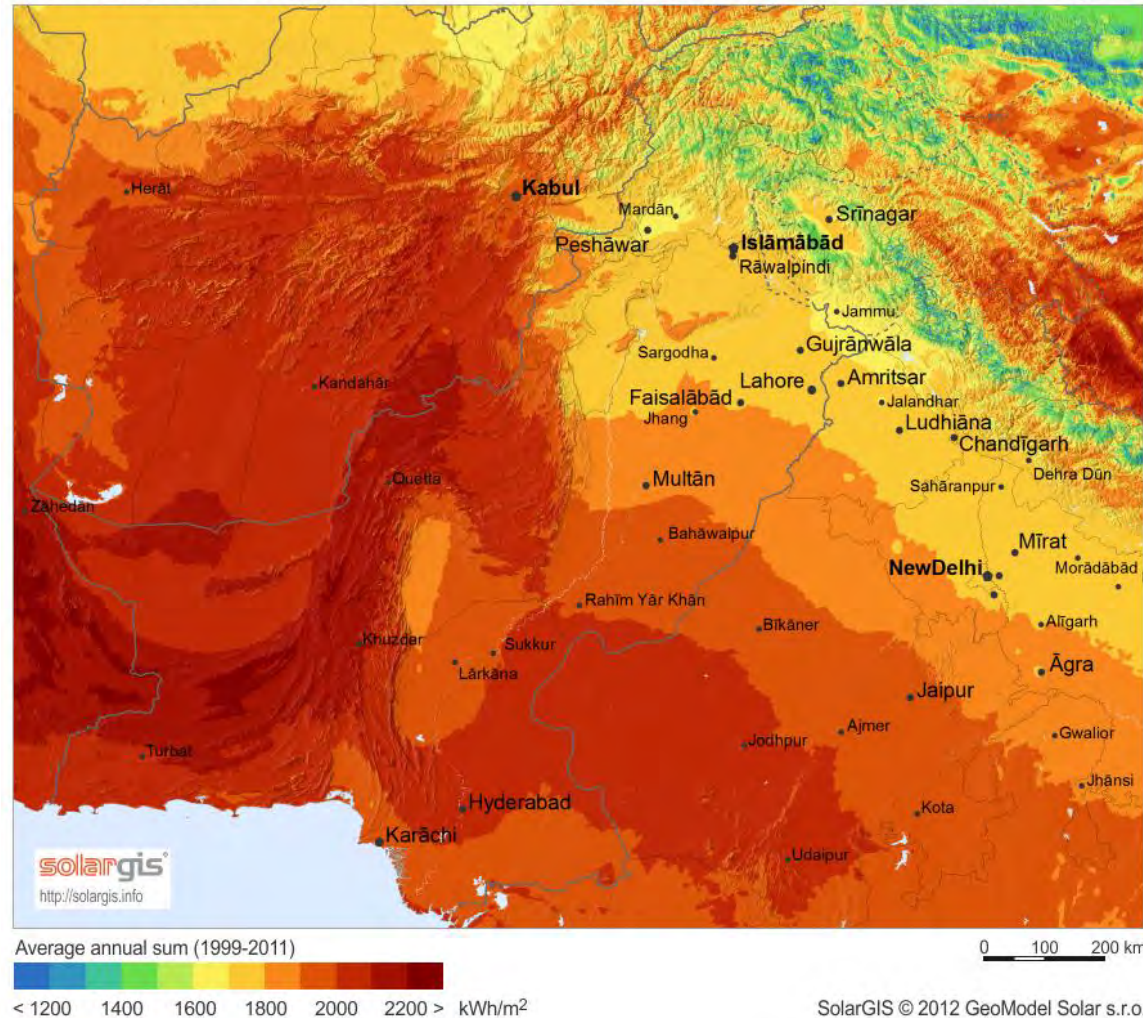
Phase 3: In two years, produce a validated solar atlas

Phase 4: Develop GIS layers from national data and carry out spatial analysis

Phase 5: Support development of a solar policy and planning framework

Global Horizontal Irradiation

Pakistan And Surrounding Regions



Example – Pakistan (biomass)

Baseline: No known biomass mapping, although wealth of national and provincial data available

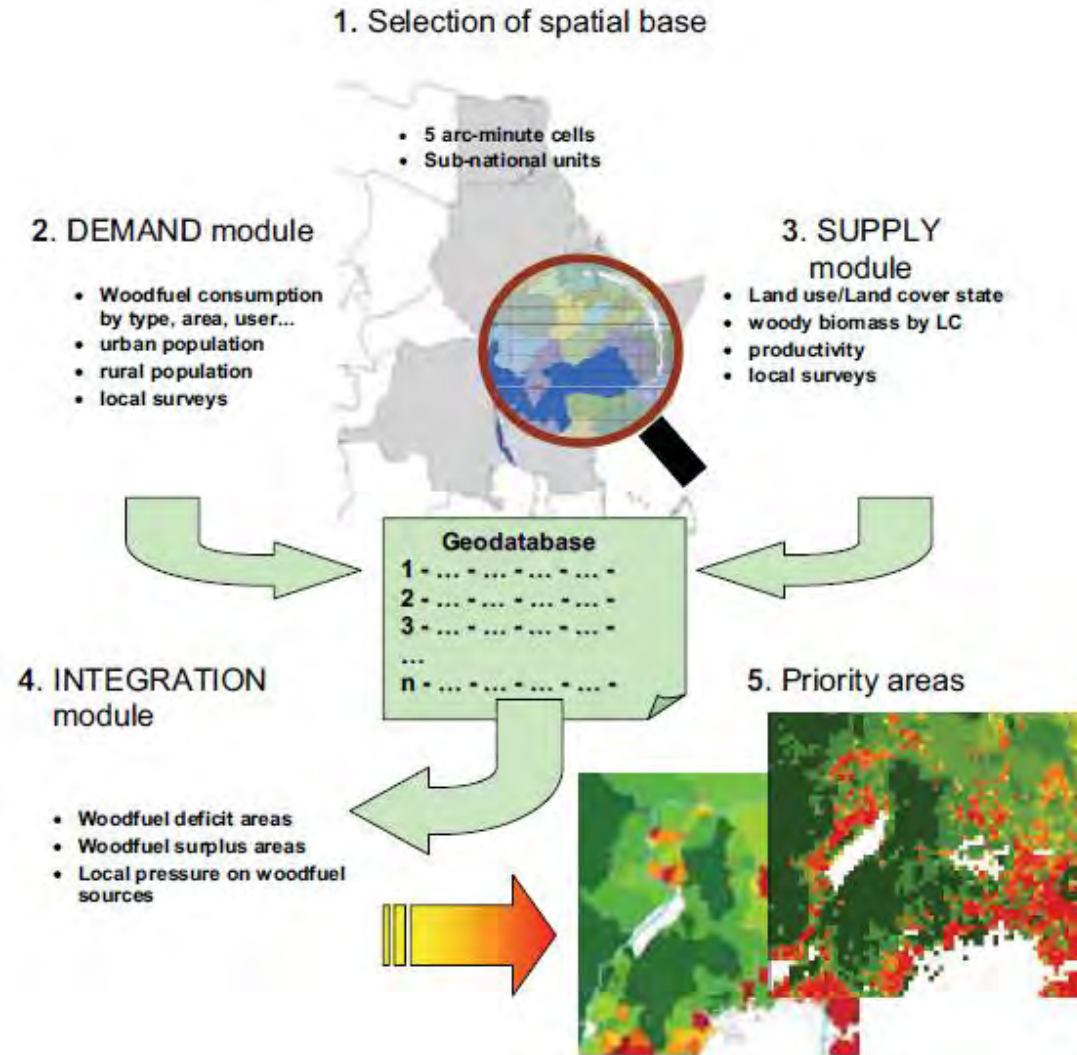
Phase 1: Carry out data inventory for biomass mapping in Punjab province

Phase 2: Commission surveys or data collection for any missing datasets; carry out data analysis

Phase 3: Use FAO's WISDOM model to produce a biomass atlas for Punjab province

Phase 4: Develop GIS layers from national data and carry out spatial analysis

Phase 5: Support development of a biomass policy and planning framework



Questions? Comments?

For further information: www.esmap.org/RE_Resource_Mapping

Or contact:

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