

**GBEP Working Group on Capacity Building
Activity Group 5
Global Renewable Energy Atlas - Bioenergy
component**

A partnership with:



2015



Mandate

16th GBEP steering committee meeting, *the Activity Group will start working to develop guidance on how to interpret and use maps in light of the GBEP indicators and also to incorporate a component of the efforts on building the capacity of developing countries/institutes to use mapping as a tool to support good policy development*

- The Global Atlas will primarily act as a repository to access existing interactive maps of bioenergy assessments, and refer precisely to the report and methodology it originates from. The initiative will progressively interconnect existing data repositories, and act as a central repository of GIS datasets from existing bioenergy resource assessment studies.
- A second objective of the Global Atlas bioenergy component will be to educate the users on the issue of sustainability, in particular to facilitate the interpretation and use of maps in light of the GBEP sustainability indicators

Stream 1: development of a repository of resource maps

Task 1: identifying information sources.

- GBEP members and observers will be invited by the GBEP Secretariat to propose bioenergy datasets, and existing data repositories for referencing by the global atlas catalog, to the best of their knowledge.
- IRENA will compile the proposals, cross the information with previous surveys and make a preliminary analysis of the feasibility and challenges to integrate each individual dataset. The proposal will be put forward to the activity group for recommendations.

Task 2: review of the proposed information sources and establishment of the corresponding partnerships.

- The Activity Group will review the outcomes of Task 1, make amendments to IRENA's recommendations, and point at possibly missing material to the best of their knowledge. IRENA will compile the outcomes of the discussion. IRENA will then work on creating the necessary partnerships to reference the data through the system.

Task 3: creating maps and reviewing content

- IRENA will create maps of the individual datasets, with attached map description, reference to the methodology, and description of the individual layers. The map will be saved on a password-protected account.
- Before making the map public, the data provider will review the proposed map, and propose amendments to IRENA.

Outputs for stream 1

By 6th GBEP Working Group on Capacity Building (May/June 2014):

- **Task 1:** List of proposed datasets for referencing by the global Atlas catalog, and recommendations by IRENA for consideration by the Activity Group.
- **Task 2:** Revised list of proposed datasets for referencing by the global Atlas catalog.
- **Task 3:** First maps displayed at the 7th GBEP Working Group on Capacity Building (Nov/Dec 2014) and presented to the 17th GBEP Steering Committee. Announcement of the bioenergy component of the Global Atlas at the fifth IRENA Assembly.

Stream 2: simplified model for evaluating the technical information on the basis of the GBEP sustainability indicators

Task 4: displaying information on the GBEP sustainability indicators

- The purpose is to inform the users of the Global Atlas GIS of the existence of the GBEP indicators and provide the opportunity to access more detailed information currently accessible only from the GBEP website.

Output and Timeline:

- 6th GBEP Working Group on Capacity Building (May/June 2014): Concept for an upgraded GIS interface including reference to the GBEP sustainability indicators.
- 7th GBEP Working Group on Capacity Building and 17th GBEP Steering committee (Nov/Dec 2014): Demonstration of the integration of the GBEP indicators to the GIS interface.

Task 5: guidance to the end-users on how to interpret and use maps in light of the GBEP sustainability indicators

The guidance document, which builds on a workshop bringing together experts in the domain. The document would provide guidance on mapping bioenergy resource, the content should be discussed with the activity group. Topics could be:

- *Relevance and limitations of bioenergy resource mapping,*
- *Current processes to carry bioenergy resource assessments,*
 - *Explanatory section on the feedstock selection process,*
 - *Accounting for competing uses,*
 - *Factoring conversion systems.*
- *Influence of data gaps, consistency and resolution,*
- *From the lessons learnt from the ongoing demonstration projects, how could the environmental, social and economic pillars, themes or indicators of the GBEP sustainability indicators be best factored by the bioenergy resource assessment process?*

Timeline and outputs:

- 6th GBEP Working Group on Capacity Building (May/June 2014): outcomes of the expert workshop.
- 7th GBEP Working Group on Capacity Building and 17th GBEP Steering committee (Nov/Dec 2014): (draft) guidance document to interpret and use maps in light of the GBEP indicators.

Stream 3: communication and dissemination

- **Task 6: Global Atlas webportal**
- IRENA will modify entirely the design and concept of the Global Atlas. The website will contain *inter alia*:
 - A news section, which can be searched by renewable energy resource,
 - Links to conference proceedings,
 - Links to publications, tools and online materials.
- The GBEP secretariat is already making a large effort to compile such information for bioenergy and make it available online. IRENA and the GBEP Secretariat will define a suitable approach to link from the Global Atlas website to the GBEP toolkit, virtual library, news, and to other relevant content.
- On the other hand, the outcomes of the joined activity Group should be clearly visible from GBEP's website. IRENA and the GBEP Secretariat would seek for the appropriate solution to display the result of the joined activity group through the GBEP website.

Costs

- Maintenance and operation of the data infrastructure for referencing and disseminating information
- Development of an online GIS interface and website
- 1 expert workshop
- 1 report – writing, review, editing, design, printing
- Man power:

	IRENA	GBEP Secretariat	Activity Group	GBEP Members and Observer
Task 1	1 week	.5 week		.5 week
Task 2	1 week	.5 week	.5 week	
Task 3	1 month		1 week	
Task 4	1 month		1 week	
Task 5	1 month		1 month	
Task 6		1 week	1 week	
Total (man.months)	3.5	0.5	2	0.125

Budget

- For the Tasks listed in this proposal, the involvement of the activity group is voluntary, and at the own expenses of its members.
- Under the condition that the proposed budget for the Global Renewable Energy Atlas would be accepted by the Assembly of IRENA in January 2014, it is foreseen the following:
 - IRENA would be financing the development and maintenance of the data infrastructure enabling to create the repository of resource maps, as a component of the Global Renewable Energy Atlas, and used to valorize the outcomes of Tasks 1, and 3.
 - Provided the GBEP indicators can be referenced by the Global Atlas interface at reasonable costs, IRENA would be financing the technical developments required to display the outcomes of Task 4. If advanced developments are requested by the Activity Group, a shared-cost solution would be sought.

- The report and workshop proposed in Task 5 were recommended by the Activity Group. The members of the Activity Group are invited to contribute financially and in kind to the development of the report and to the workshop. If no external support can be sought, IRENA may not be in the position to fully fulfil the requirements proposed by the Activity Group, and may have to limit the depth of the analysis and scale of the workshop.
- IRENA would be financing the development of the bioenergy section of the Global Renewable Energy Atlas website at reasonable costs. If advanced developments are requested by the Activity Group, a shared-cost solution would be sought.

Foreseen costs:

- Report writing, editing, design and printing
- 1 workshop



www.irena.org/GlobalAtlas



Potentials@irena.org



IRENA Global Atlas



@GlobalREAtlas



GlobalAtlasSolarandWind

Issues

- The bioenergy data is of a different nature than solar or wind data
- Bioenergy maps out of context are potentially misleading
- The added value of the Global Atlas both for the bioenergy sector and for GBEP is unclear

Objective

- Demonstrate that the Global Atlas can display information on Bioenergy
- Provide an overview of Bioenergy data displayed through the online interface
- Show the interoperability with existing databases
- Present solutions to describe the context of each map
- Propose solutions to promote the GBEP sustainability indicators
- 3 examples :
 - Demo 1: spatial data infrastructure: Full data integration from geoserver to the interface – USA case
 - Demo 2: Integration of a complex project-related dataset – case of the FAO BEFS for Tanzania
 - Demo 3: Integration of data from a remote catalog – FAO / IIASA suitability maps¹³

Limitations

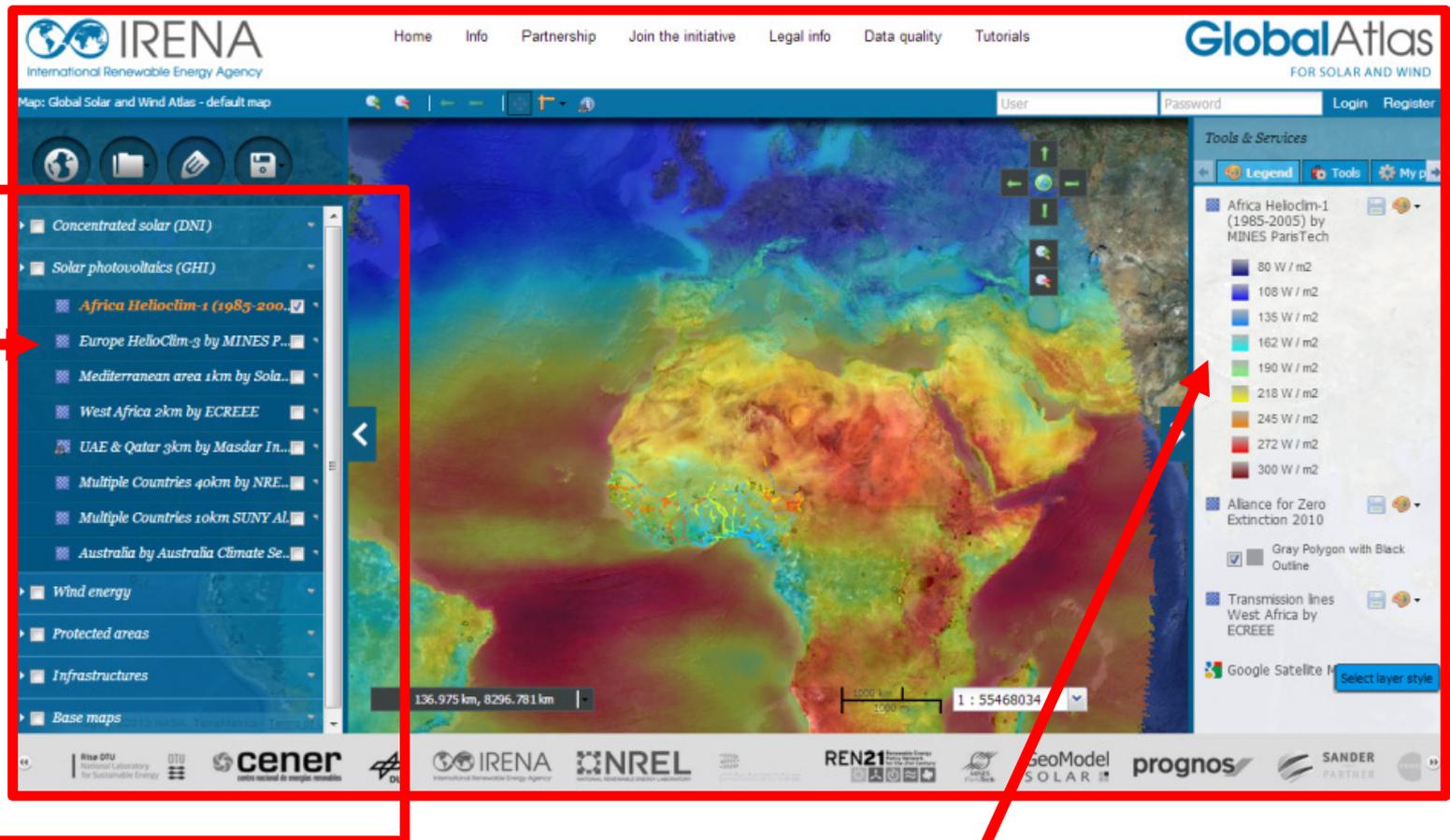
- No specific limitations found to read or display the information
- The need for precision leads to long descriptions of the maps and data layers currently difficult to read – specific development are needed
- The tools developed for solar and wind can not be deactivated for this demo
- Legends are not always well displayed
- The partner's logos were not adjusted.

Vocabulary

- The Atlas is the overall Spatial Data Infrastructure (SDI) operated by IRENA and its partners (interface + catalogue)
- Through its user interface, the Atlas displays 'maps'
- In this presentation, a 'map' is made of several activated 'layers' that are superposed ('overlayed') to be analysed
- A 'layer' contains geographic information

Vocabulary

User interface



Layer

Map = sum of activated layers

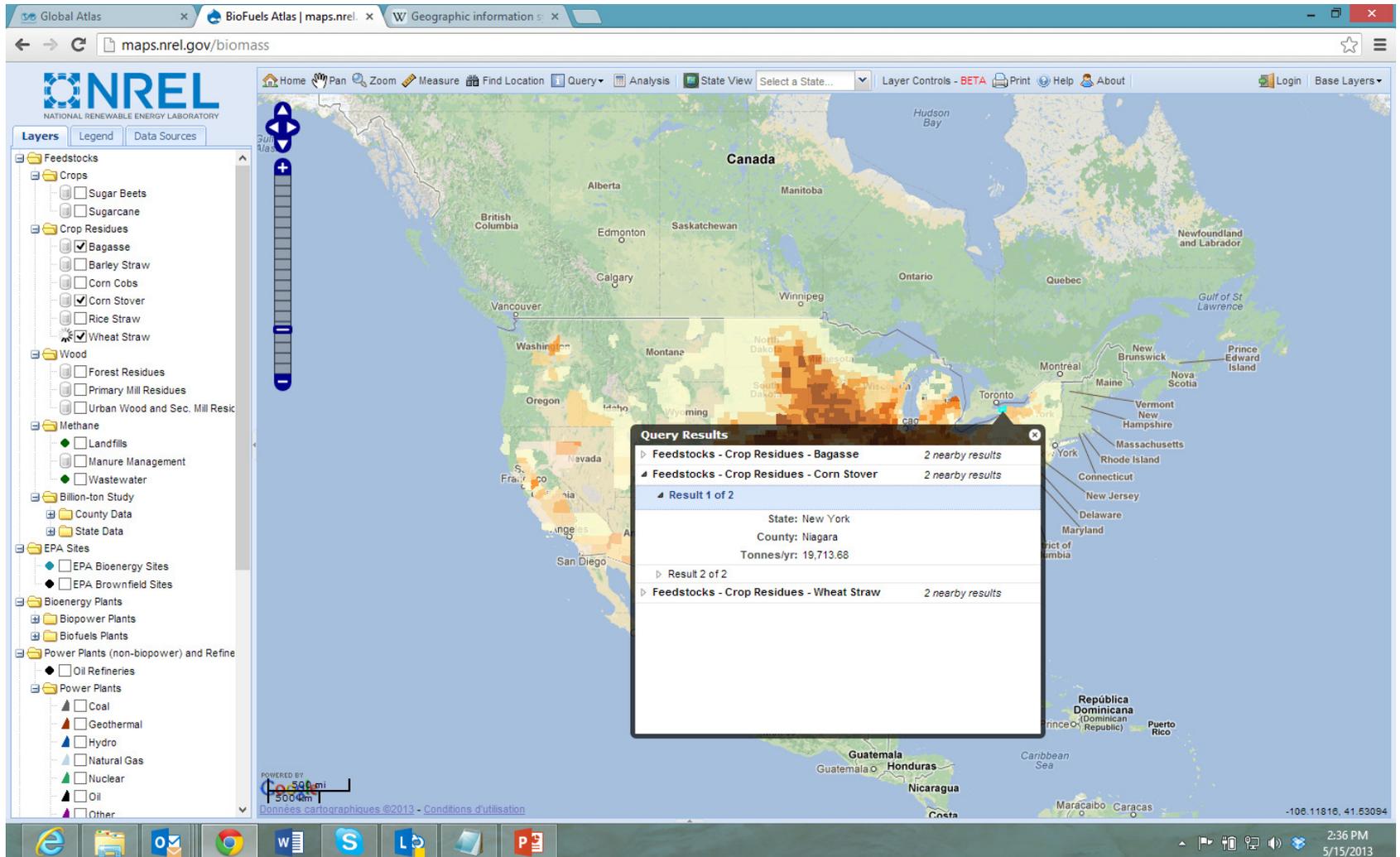
Legend

Demo 1

Spatial Data Infrastructure:

Full data integration from Geoserver to the interface – USA case

Existing application – maps.nrel.gov/biomass

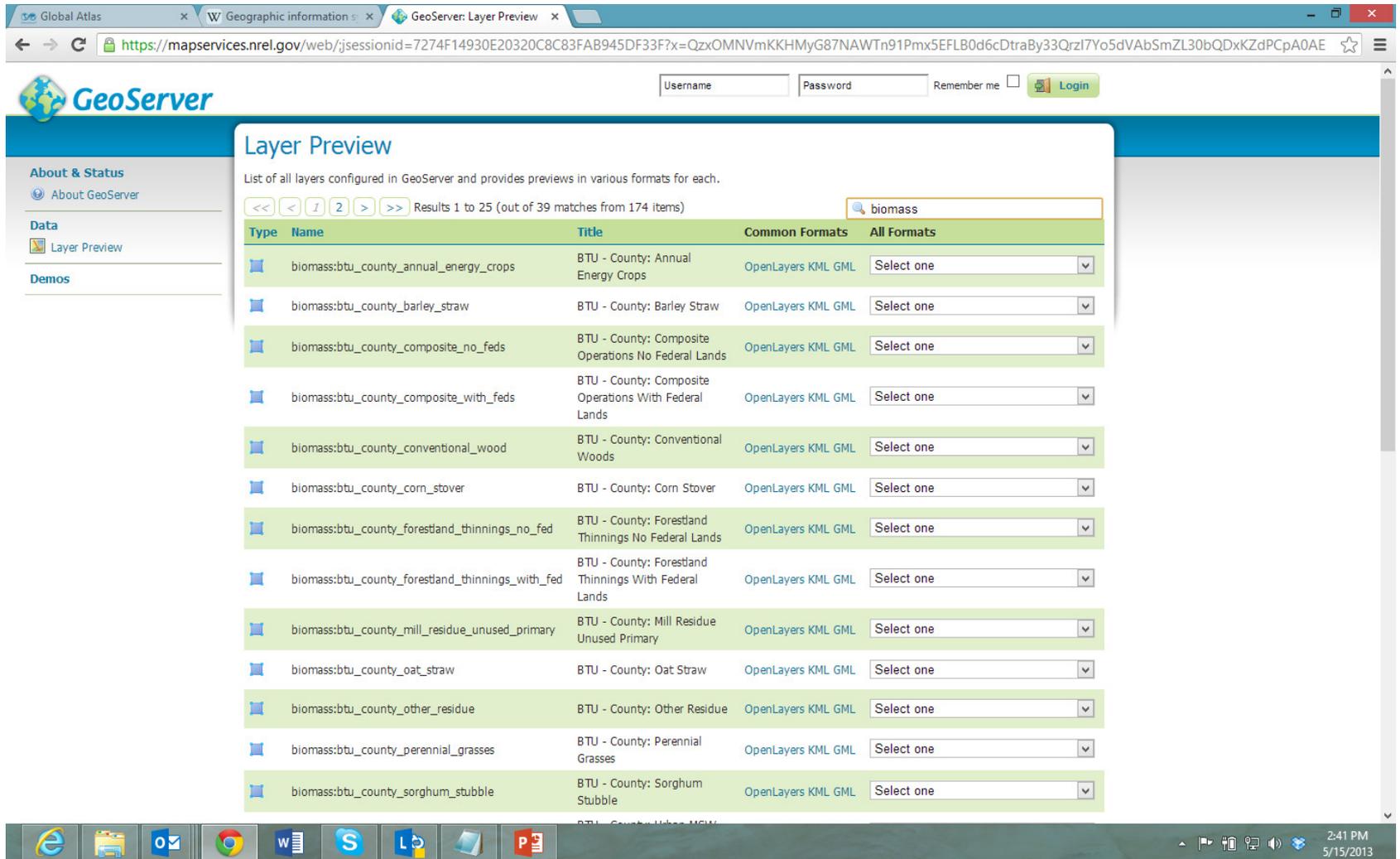


The screenshot shows the NREL Biomass Maps application interface. The main map displays biomass potential across North America, with a color-coded overlay indicating different levels of potential. A query results popup is visible, showing the following data:

Category	Results
Feedstocks - Crop Residues - Bagasse	2 nearby results
Feedstocks - Crop Residues - Corn Stover	2 nearby results
Result 1 of 2	<ul style="list-style-type: none"> State: New York County: Niagara Tonnes/yr: 19,713.68
Result 2 of 2	
Feedstocks - Crop Residues - Wheat Straw	2 nearby results

The interface includes a left-hand sidebar with a 'Layers' panel containing various categories such as Feedstocks (Crops, Crop Residues), Wood, Methane, EPA Sites, and Bioenergy Plants. The top navigation bar includes options like Home, Pan, Zoom, Measure, Find Location, Query, Analysis, State View, Layer Controls, Print, Help, and About. The bottom status bar shows the application is powered by Google Maps and includes a scale bar (500m/500ft) and coordinates (-108.11816, 41.53094).

Step 1: registering the data on NREL's geoserver



The screenshot shows the GeoServer web interface. The browser address bar displays the URL: <https://mapservices.nrel.gov/web/jsessionid=7274F14930E20320C8C83FAB945DF33F?x=QzxOMNVmKKHMyG87NAWTn91Pmx5EFLB0d6cDtraBy33QrzI7Yo5dVAbSmZL30bQDxKZdPcP0A0AE>. The page title is "Layer Preview".

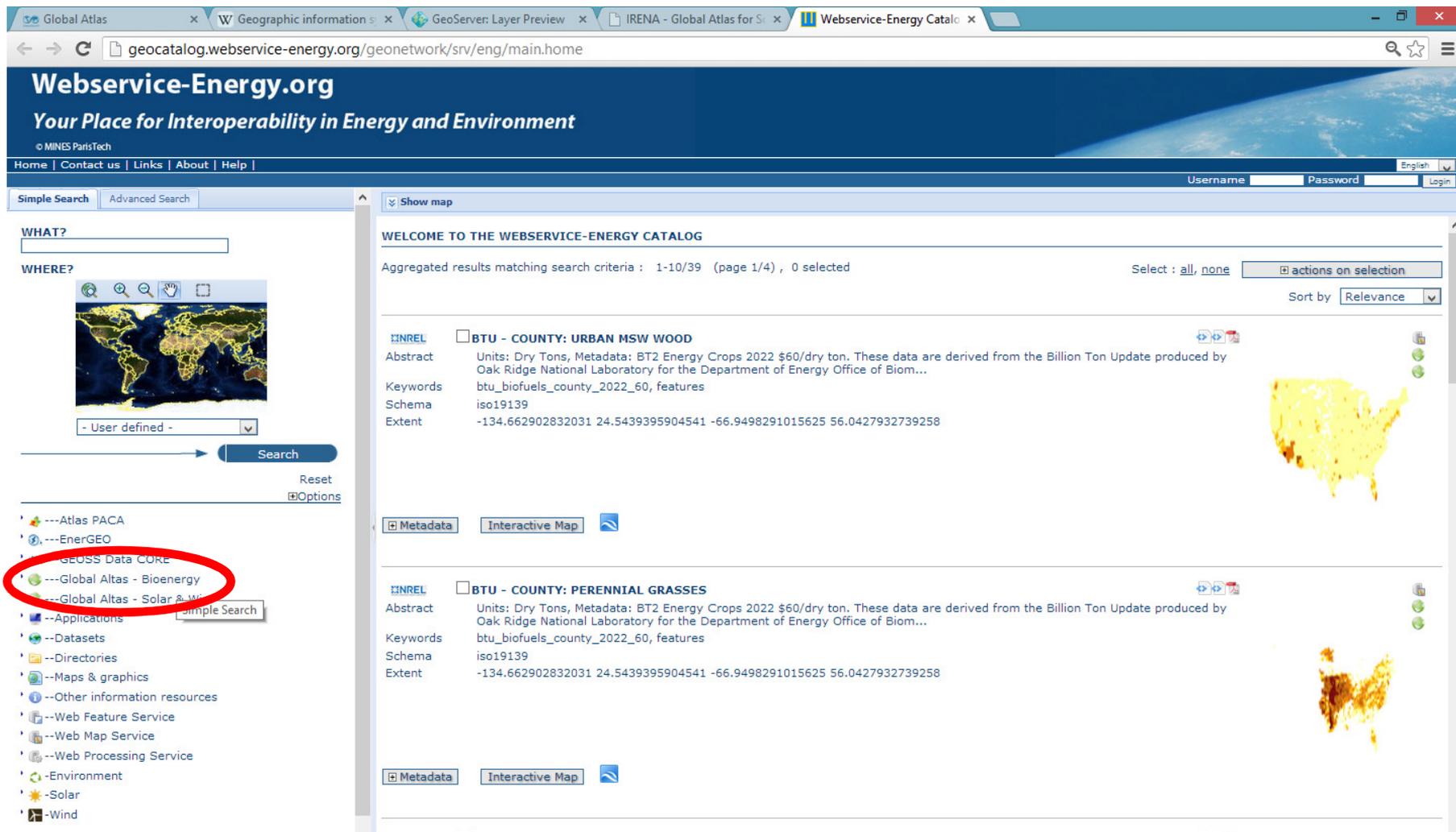
On the left sidebar, there are sections for "About & Status", "Data" (with "Layer Preview" selected), and "Demos".

The main content area shows a search for "biomass" with "Results 1 to 25 (out of 39 matches from 174 items)". Below the search bar is a table of layers:

Type	Name	Title	Common Formats	All Formats
	biomass:btu_county_annual_energy_crops	BTU - County: Annual Energy Crops	OpenLayers KML GML	Select one
	biomass:btu_county_barley_straw	BTU - County: Barley Straw	OpenLayers KML GML	Select one
	biomass:btu_county_composite_no_feds	BTU - County: Composite Operations No Federal Lands	OpenLayers KML GML	Select one
	biomass:btu_county_composite_with_feds	BTU - County: Composite Operations With Federal Lands	OpenLayers KML GML	Select one
	biomass:btu_county_conventional_wood	BTU - County: Conventional Woods	OpenLayers KML GML	Select one
	biomass:btu_county_corn_stover	BTU - County: Corn Stover	OpenLayers KML GML	Select one
	biomass:btu_county_forestand_thinnings_no_fed	BTU - County: Forestland Thinnings No Federal Lands	OpenLayers KML GML	Select one
	biomass:btu_county_forestand_thinnings_with_fed	BTU - County: Forestland Thinnings With Federal Lands	OpenLayers KML GML	Select one
	biomass:btu_county_mill_residue_unused_primary	BTU - County: Mill Residue Unused Primary	OpenLayers KML GML	Select one
	biomass:btu_county_oat_straw	BTU - County: Oat Straw	OpenLayers KML GML	Select one
	biomass:btu_county_other_residue	BTU - County: Other Residue	OpenLayers KML GML	Select one
	biomass:btu_county_perennial_grasses	BTU - County: Perennial Grasses	OpenLayers KML GML	Select one
	biomass:btu_county_sorghum_stubble	BTU - County: Sorghum Stubble	OpenLayers KML GML	Select one

The Windows taskbar at the bottom shows the system time as 2:41 PM on 5/15/2013.

Step 2: Remote registration to the catalog



The screenshot shows a web browser window with the URL `geocatalog.webservice-energy.org/geonetwork/srv/eng/main.home`. The page title is "Webservice-Energy.org" with the tagline "Your Place for Interoperability in Energy and Environment". The page includes a navigation menu with "Home", "Contact us", "Links", "About", and "Help". There is a search bar with "Simple Search" and "Advanced Search" options. A sidebar on the left contains a "WHERE?" section with a map and a "Search" button. Below the sidebar is a list of navigation items, with "Global Atlas - Bioenergy" circled in red. The main content area displays search results for "BTU - COUNTY: URBAN MSW WOOD" and "BTU - COUNTY: PERENNIAL GRASSES". Each result includes an abstract, keywords, schema, and extent. There are also "Metadata" and "Interactive Map" buttons for each result. The page footer includes "Reset" and "Options" links.

Global Atlas x Geographic information s x GeoServer: Layer Preview x IRENA - Global Atlas for S x Webservice-Energy Catalo x

geocatalog.webservice-energy.org/geonetwork/srv/eng/main.home

Webservice-Energy.org

Your Place for Interoperability in Energy and Environment

© MINES ParisTech

Home | Contact us | Links | About | Help |

Username Password English Login

Simple Search | Advanced Search

WHAT?

WHERE? 

Search

Reset
Options

- Atlas PACA
- EnerGEO
- GEUSS Data CORE
- Global Atlas - Bioenergy**
- Global Atlas - Solar & Wind
- Applications
- Datasets
- Directories
- Maps & graphics
- Other information resources
- Web Feature Service
- Web Map Service
- Web Processing Service
- Environment
- Solar
- Wind

WELCOME TO THE WEBSERVICE-ENERGY CATALOG

Aggregated results matching search criteria : 1-10/39 (page 1/4) , 0 selected

Select : all, none

Sort by Relevance

BTU - COUNTY: URBAN MSW WOOD

Abstract Units: Dry Tons, Metadata: BT2 Energy Crops 2022 \$60/dry ton. These data are derived from the Billion Ton Update produced by Oak Ridge National Laboratory for the Department of Energy Office of Biom...

Keywords btu_biofuels_county_2022_60, features

Schema iso19139

Extent -134.662902832031 24.5439395904541 -66.9498291015625 56.0427932739258

BTU - COUNTY: PERENNIAL GRASSES

Abstract Units: Dry Tons, Metadata: BT2 Energy Crops 2022 \$60/dry ton. These data are derived from the Billion Ton Update produced by Oak Ridge National Laboratory for the Department of Energy Office of Biom...

Keywords btu_biofuels_county_2022_60, features

Schema iso19139

Extent -134.662902832031 24.5439395904541 -66.9498291015625 56.0427932739258

Full description and references are preserved

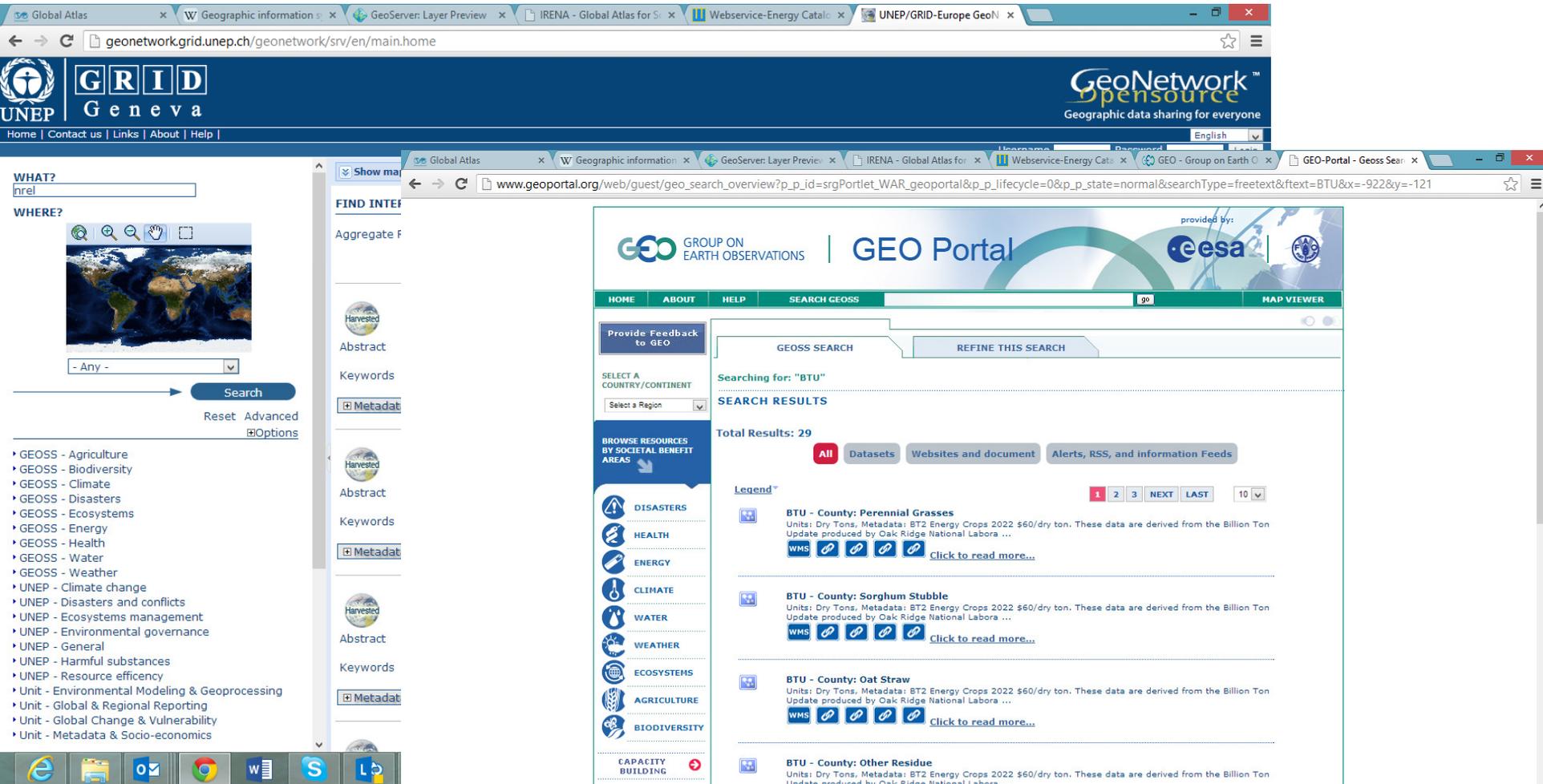
The screenshot shows the Webservice-Energy.org interface. The main content area displays metadata for a dataset, with a red oval highlighting the 'IDENTIFICATION INFO' section. The metadata includes:

- IDENTIFICATION INFO**
 - Title: BT2 Energy Crops 2022 \$60/dry ton
 - Date: 2013-05-02T16:42:47
 - Date type: Revision: Date identifies when the resource was examined or re-examined and improved or amended
 - Abstract: Metadata: BT2 Energy Crops 2022 \$60/dry ton. These data are derived from the Billion Ton Update produced by Oak Ridge National Laboratory for the Department of Energy Office of Biomass Program. More information about the Billion Ton Update can be found at the Office of Biomass Program website: (http://www1.eere.energy.gov/biomass/billion_ton_update.html)
 - Status: Completed: Production of the data has been completed
 - Point of contact:

Individual name	Dan Getman	City	Golden,
Organisation name	National Renewable Energy Laboratory	Administrative area	CO
Position name	Map Services Administrator	Postal code	80401
Role	Point of contact: Party who can be contacted for acquiring knowledge about or acquisition of the resource	Country	USA
		OnLine resource	http://geoserver.sourceforge.net/html/index.php
 - Descriptive keywords: bt2_billion_ton_update_2022_60_features.
 - Topic category code: Climatology, meteorology, atmospheric science
- Extent**
 - Geographic bounding box:

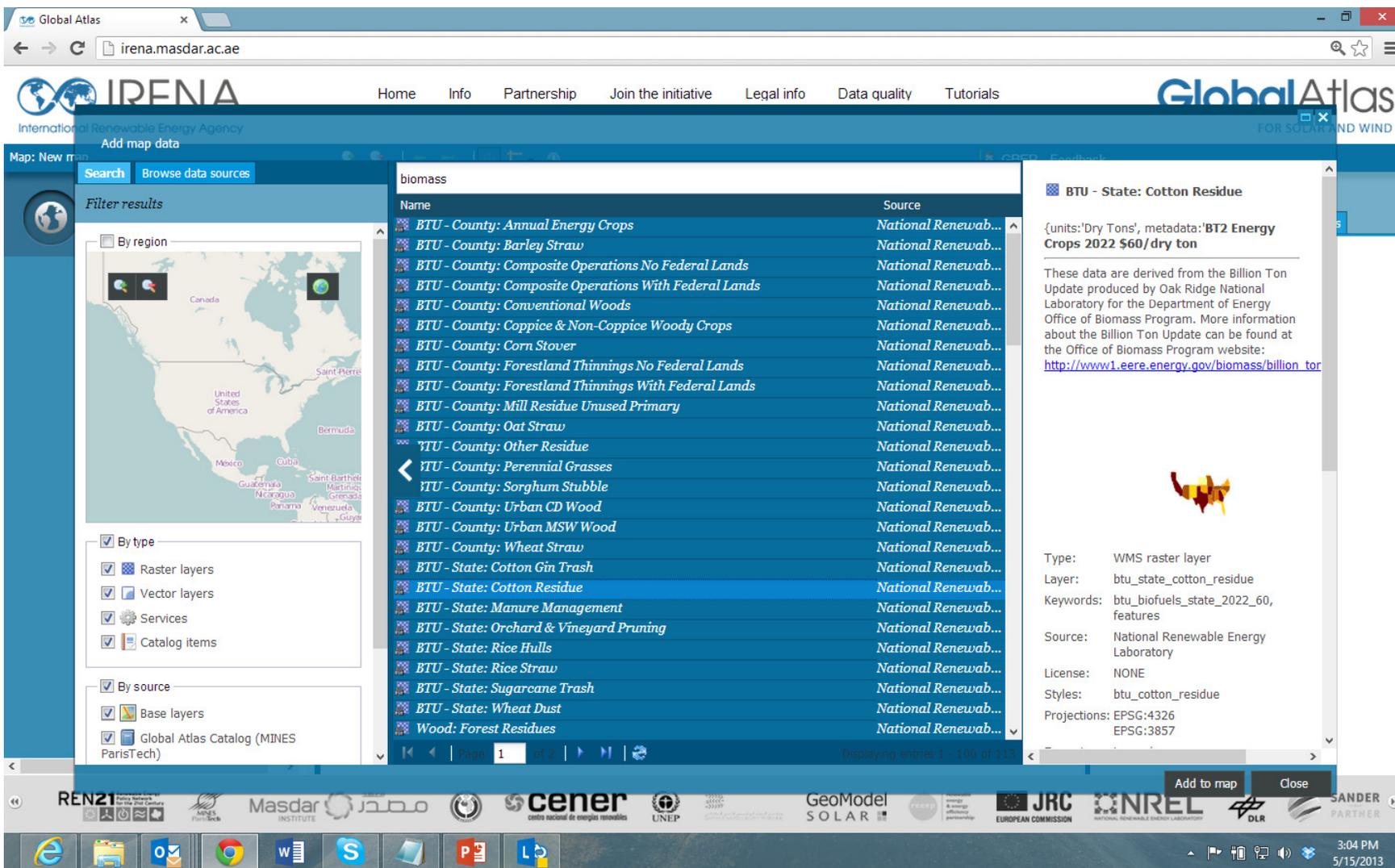
North bound	56.04279
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Consequence 1: larger data dissemination



The image displays two overlapping browser windows. The top window shows the GeoNetwork interface (www.geonetwork.grid.unep.ch) with the UNEP GRID Geneva logo and a search bar. The bottom window shows the GEO Portal interface (www.geoportal.org) with the Group on Earth Observations and ESA logos. The GEO Portal search results for "BTU" are visible, showing 29 total results and a list of categories including Disasters, Health, Energy, Climate, Water, Weather, Ecosystems, Agriculture, and Biodiversity. The results list includes entries for "Perennial Grasses", "Sorghum Stubble", "Oat Straw", and "Other Residue", each with a "Click to read more..." link.

Consequence 2: Data appear in interface library



The screenshot displays the Global Atlas web interface. The search results for 'biomass' are as follows:

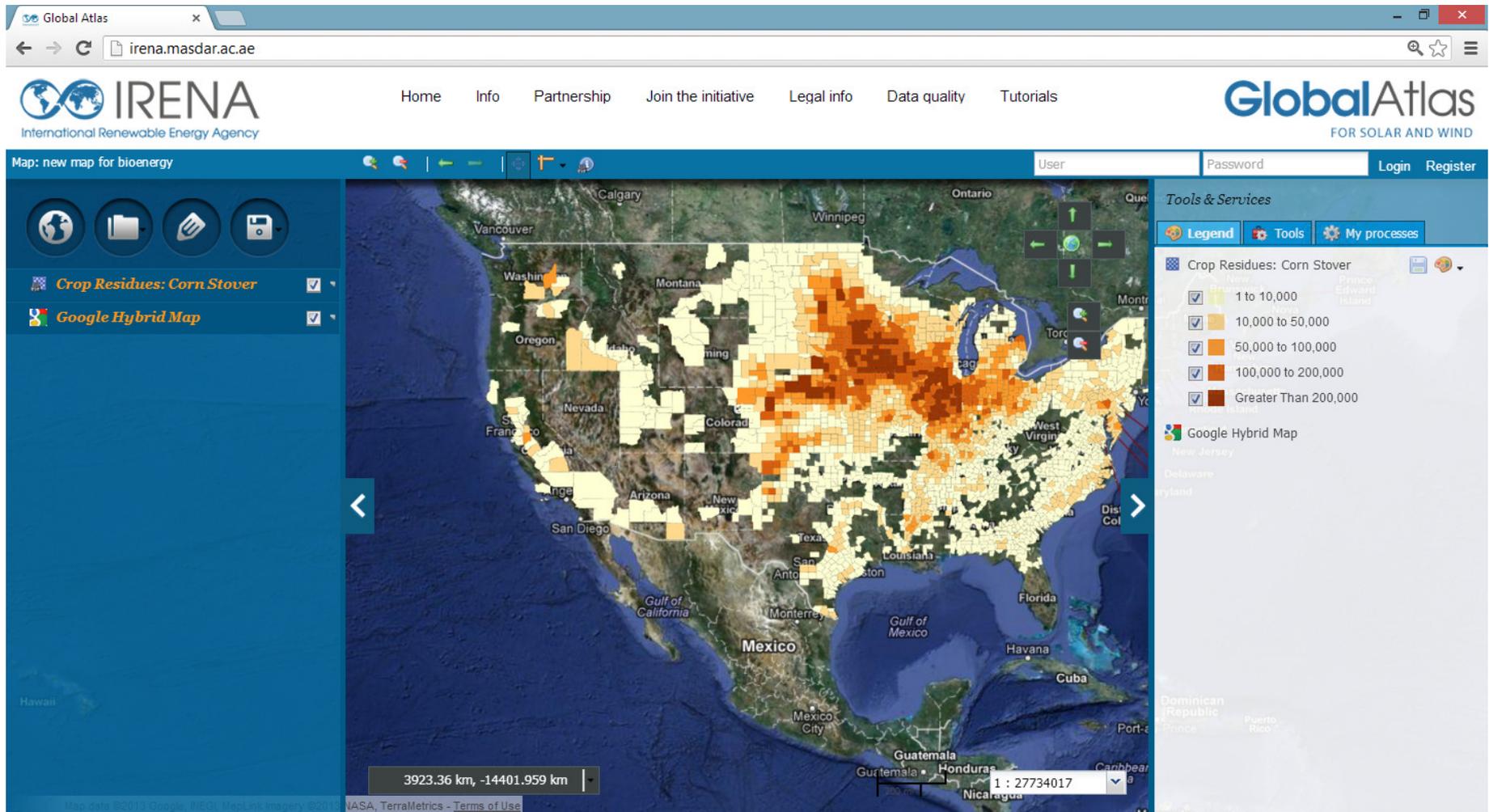
Name	Source
BTU - County: Annual Energy Crops	National Renewab...
BTU - County: Barley Straw	National Renewab...
BTU - County: Composite Operations No Federal Lands	National Renewab...
BTU - County: Composite Operations With Federal Lands	National Renewab...
BTU - County: Conventional Woods	National Renewab...
BTU - County: Coppice & Non-Coppice Woody Crops	National Renewab...
BTU - County: Corn Stover	National Renewab...
BTU - County: Forestland Thinnings No Federal Lands	National Renewab...
BTU - County: Forestland Thinnings With Federal Lands	National Renewab...
BTU - County: Mill Residue Unused Primary	National Renewab...
BTU - County: Oat Straw	National Renewab...
YTU - County: Other Residue	National Renewab...
YTU - County: Perennial Grasses	National Renewab...
YTU - County: Sorghum Stubble	National Renewab...
BTU - County: Urban CD Wood	National Renewab...
BTU - County: Urban MSW Wood	National Renewab...
BTU - County: Wheat Straw	National Renewab...
BTU - State: Cotton Gin Trash	National Renewab...
BTU - State: Cotton Residue	National Renewab...
BTU - State: Manure Management	National Renewab...
BTU - State: Orchard & Vineyard Pruning	National Renewab...
BTU - State: Rice Hulls	National Renewab...
BTU - State: Rice Straw	National Renewab...
BTU - State: Sugarcane Trash	National Renewab...
BTU - State: Wheat Dust	National Renewab...
Wood: Forest Residues	National Renewab...

The selected item, **BTU - State: Cotton Residue**, has the following details:

- Source:** National Renewable Energy Laboratory
- Type:** WMS raster layer
- Layer:** btu_state_cotton_residue
- Keywords:** btu_biofuels_state_2022_60, features
- License:** NONE
- Styles:** btu_cotton_residue
- Projections:** EPSG:4326, EPSG:3857

The interface also shows a map of the United States with a highlighted area in the southern region, and a sidebar with filter options for region, type, and source.

Example of a new map with 1 information layer



The screenshot shows the GlobalAtlas web application interface. The main map displays a heatmap of crop residues (Corn Stover) across North America. The legend on the right side of the map indicates the following categories:

- 1 to 10,000
- 10,000 to 50,000
- 50,000 to 100,000
- 100,000 to 200,000
- Greater Than 200,000

The map also shows various geographical features, including cities like Vancouver, Calgary, Winnipeg, Toronto, and Mexico City, as well as bodies of water like the Gulf of California and the Gulf of Mexico. The interface includes a navigation menu at the top with options like Home, Info, Partnership, and a search bar. The bottom of the page features logos for various partners and organizations, including DLR, WindGuard, SANDER PARTNER, Masdar INSTITUTE, JRC EUROPEAN COMMISSION, UNEP, IRENA, GeoModel SOLAR, prognos, and REN21.

Final US map

Global Atlas | irena.masdar.ac.ae

IRENA International Renewable Energy Agency | Home | Info | Partnership | Join the initiative | Legal info | Data quality | Tutorials | GlobalAtlas FOR SOLAR AND WIND

Map: Bioenergy demo 1 - USA bioenergy data | GBEP Feedback

- Crops
 - Crop residues
 - Methane
 - Wood residues
 - US Billion Ton Study - State information
 - US Billion Ton Study - County informati...
 - Protected areas
 - Landcover
 - Elevation
 - Base maps - population - borders



Tools & Services

- Legend
- Tools
- My processes

West Hemisphere GLC 2000 shared by Geomodel

- Evergreen Broadleaved Forests
- Deciduous broadleaved forests, closed (> 40%)
- Deciduous broadleaved forests, open (15-40%)
- Evergreen needle-leaved forest
- Deciduous needle-leaved forest
- Mixed Forest
- Evergreen broadleaved - swamp forest
- Evergreen broadleaved - mangrove forest
- Mosaic - tree cover dominant with other vegetation component
- Burnt tree cover
- Evergreen shrubland
- Deciduous shrubland
- Grassland
- Sparsely vegetated cover
- Wetlands
- Croplands

5762.74 km, -14348.147 km | 1 : 27734017

Map data ©2013 Google, INEGI, MapLink Imagery ©2013 NASA, TerraMetrics - Terms of Use

Final US map: map description

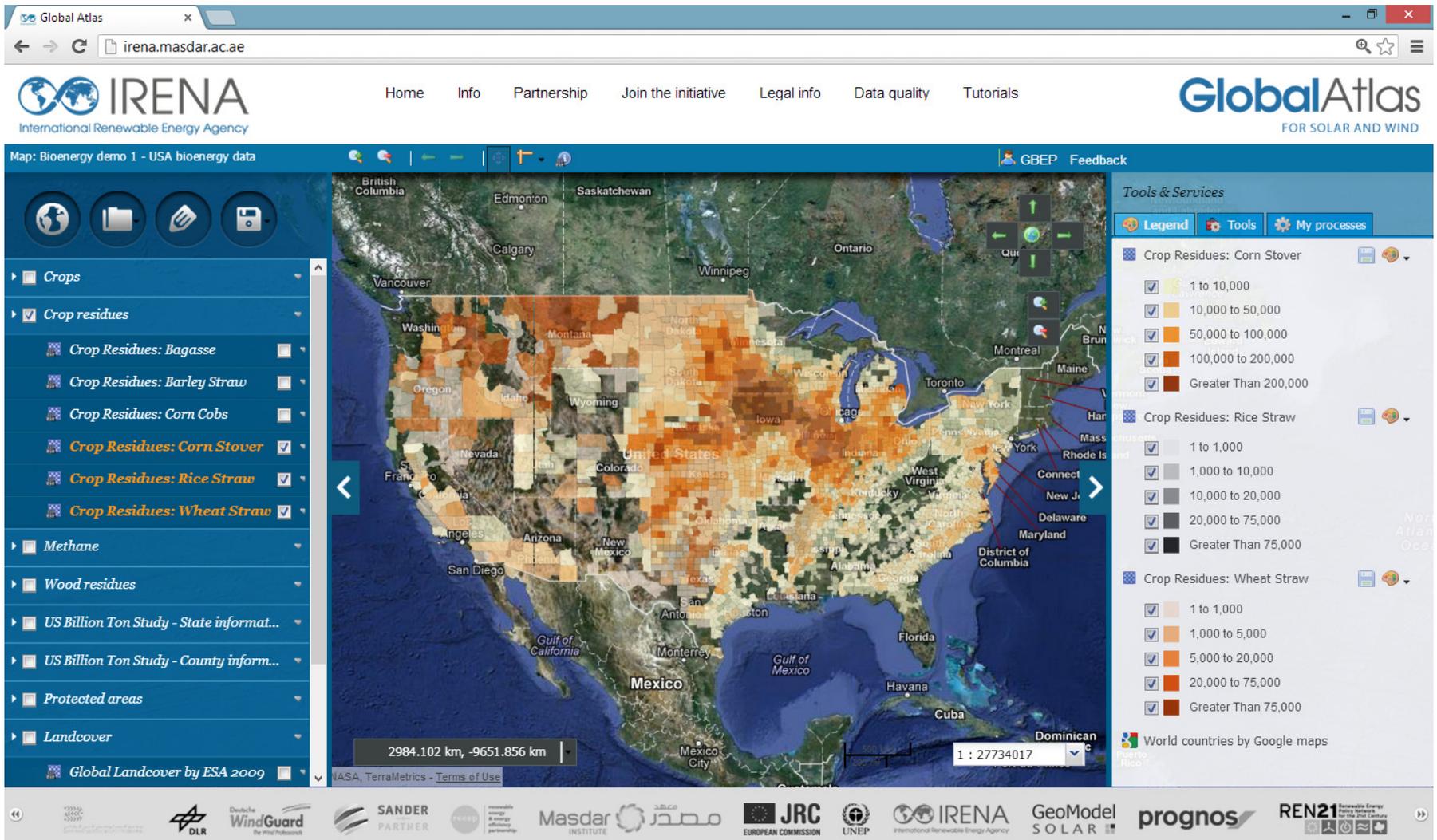
The screenshot shows the Global Atlas web application interface. The main map displays the United States with various data layers. A pop-up window titled "Map Bioenergy demo 1 - USA bioenergy data" is open, showing the following text:

Map: Bioenergy demo 1 - USA bioenergy data

Description: This map was developed with the support of the US National Renewable Energy Laboratory as an example of the Global Atlas to display bioenergy data. Two bioenergy datasets are presented in this map: data from USDA National Agricultural Statistics Service and the 2011 Billion Ton Update from the US Department of Energy. The bioenergy data presented in this demonstration are hosted by GBEP and available at: <http://maps.nrel.gov/biomass> WARNING: Bioenergy resource assessment is a complex nationally-driven process and resource maps shall be considered with caution. The development of sustainable bioenergy is promoted by the Global Bioenergy Partnership through the GBEP Sustainability Indicators for Bioenergy. <http://www.globalbioenergy.org/?id=25880>

The URL <http://www.globalbioenergy.org/?id=25880> is circled in red in the original image.

Final US map: 3 crop residues



Final US map: point query – sugarcane Louisiana

Map: Bioenergy demo 1 - USA bioenergy data

Tools & Services: Legend, Tools, My processes

Crops: Sugarcane

- 1,000 to 500,000
- 500,000 to 1,000,000
- 1,000,000 to 2,000,000
- 2,000,000 to 7,000,000
- Greater Than 7,000,000

World countries by Google maps

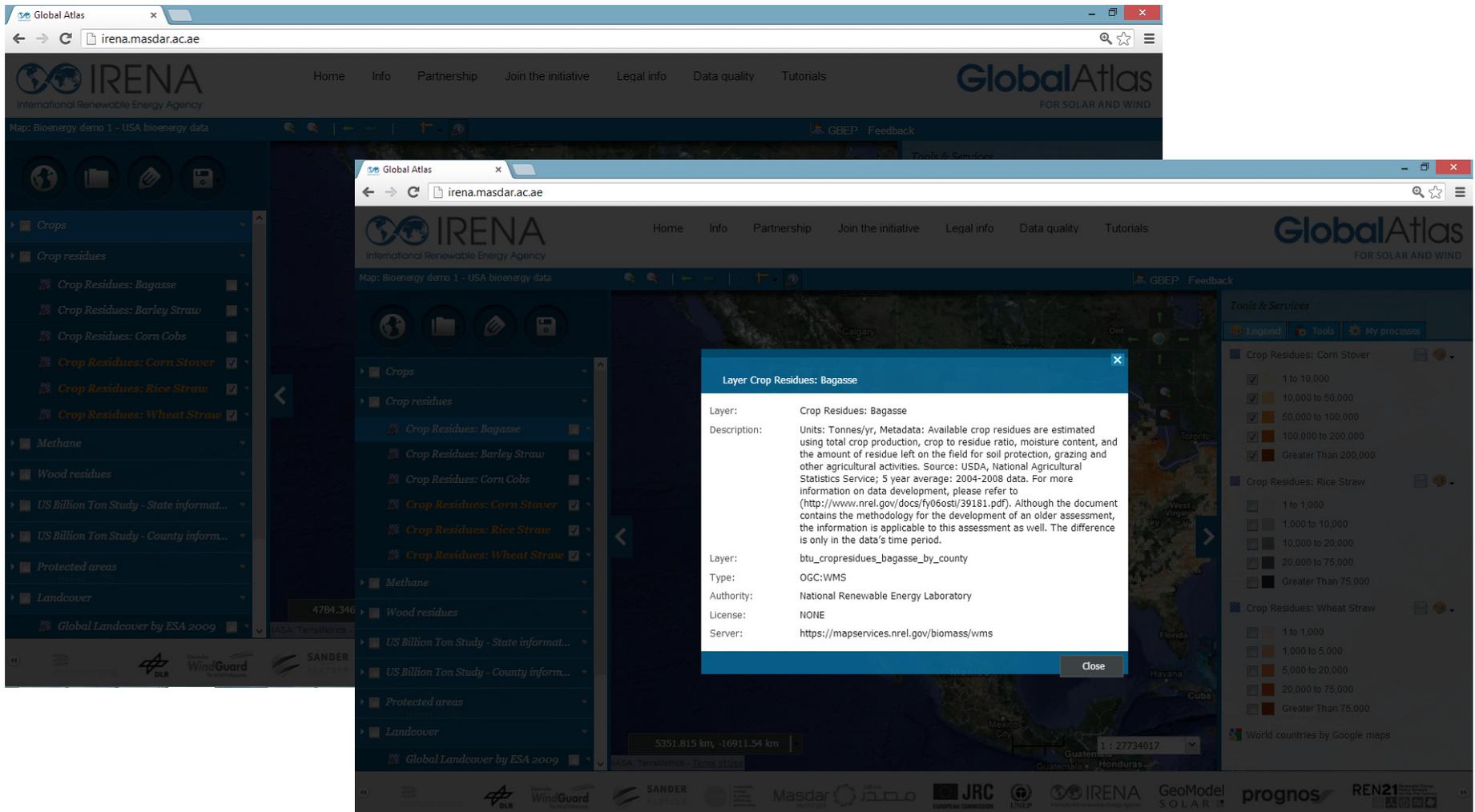
Point Query Results

ercorn:	0E-11
cruheat:	0E-11
crrice:	63561.1100000
crsgcane:	135903.640000
sc2004:	750000
sc2005:	625000
sc2006:	690000
sc2007:	730000
sc2008:	755000
scavage:	710000
sb2004:	0
sb2005:	0
sb2006:	0

4089.687 km, -13389.321 km

1 : 27734017

Final US map: group and layer descriptions



The screenshot displays the GlobalAtlas web application interface. The browser address bar shows the URL `irena.masdar.ac.ae`. The application header includes the IRENA logo and navigation links: Home, Info, Partnership, Join the initiative, Legal info, Data quality, Tutorials. The main content area features a map of the USA with a layer description popup for 'Crop Residues: Bagasse'.

Layer Crop Residues: Bagasse

Layer: Crop Residues: Bagasse

Description: Units: Tonnes/yr, Metadata: Available crop residues are estimated using total crop production, crop to residue ratio, moisture content, and the amount of residue left on the field for soil protection, grazing and other agricultural activities. Source: USDA, National Agricultural Statistics Service; 5 year average: 2004-2008 data. For more information on data development, please refer to (<http://www.nrel.gov/docs/fy06osti/39181.pdf>). Although the document contains the methodology for the development of an older assessment, the information is applicable to this assessment as well. The difference is only in the data's time period.

Layer: `btu_cropridues_bagasse_by_county`

Type: OGC:WMS

Authority: National Renewable Energy Laboratory

License: NONE

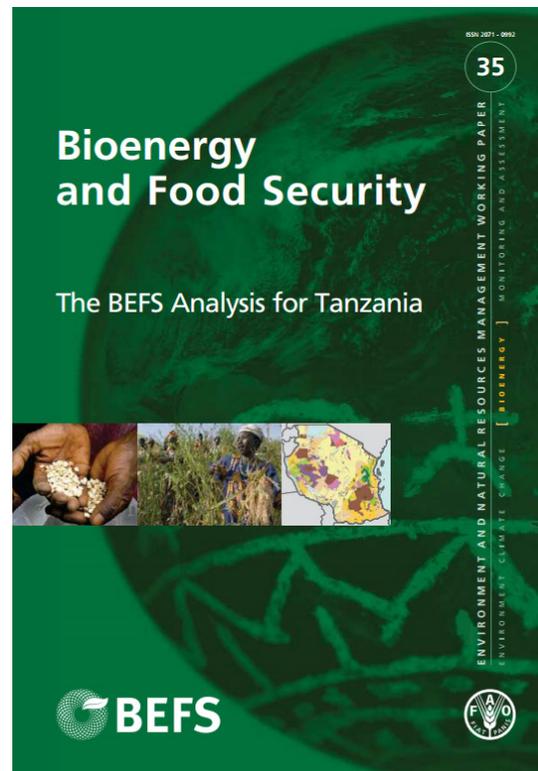
Server: <https://mapservices.nrel.gov/biomass/wms>

Close

The interface also shows a left-hand sidebar with a list of layers including 'Crops', 'Crop residues', 'Methane', 'Wood residues', 'Protected areas', and 'Landcover'. The 'Crop Residues' section is expanded, showing sub-layers like 'Crop Residues: Bagasse', 'Crop Residues: Barley Straw', 'Crop Residues: Corn Cobs', 'Crop Residues: Corn Stover', 'Crop Residues: Rice Straw', and 'Crop Residues: Wheat Straw'. The 'Crop Residues: Corn Stover' layer is currently selected on the map.

Demo 2

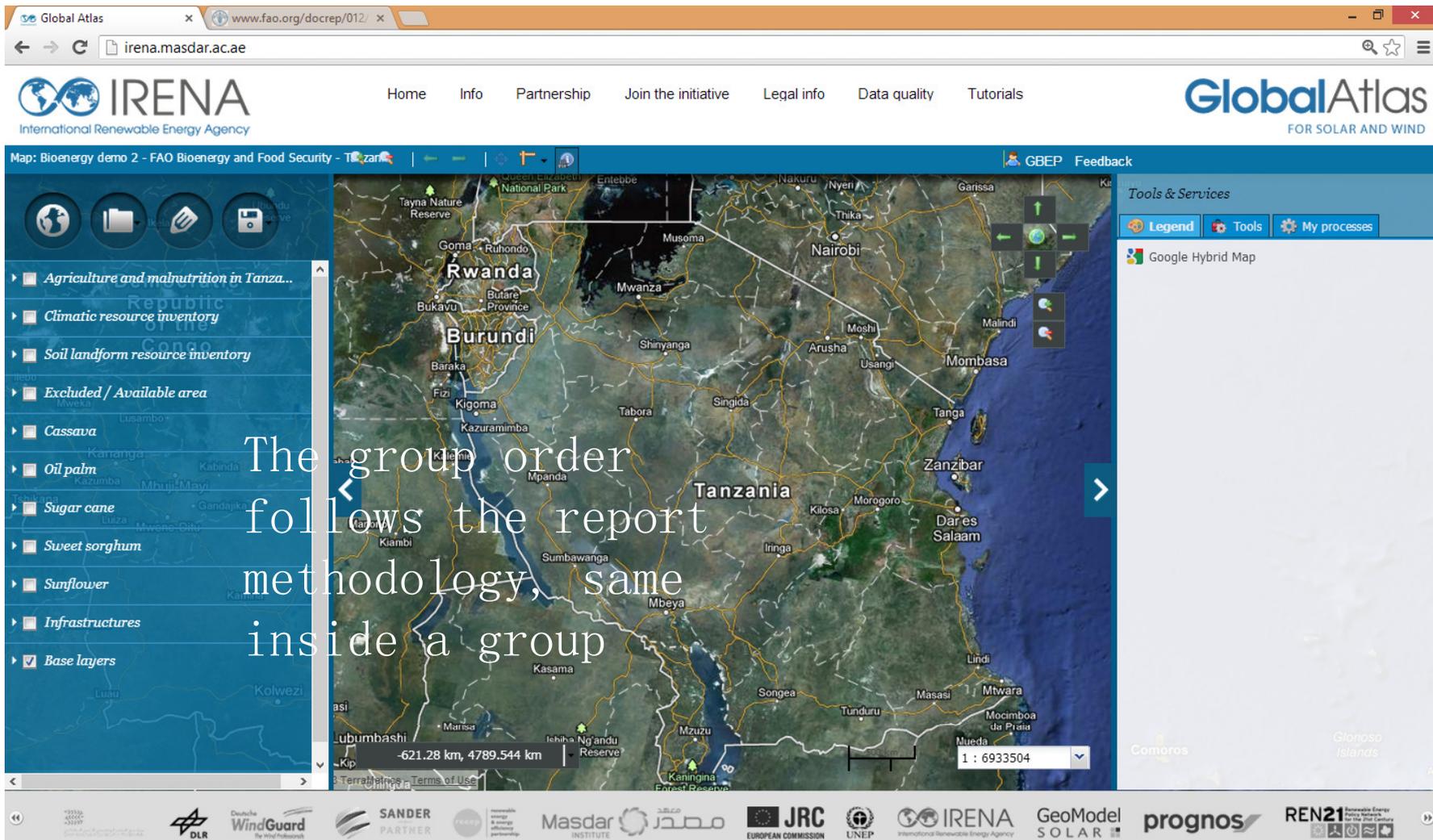
Integration of a complex project-related dataset
Case of the FAO BEFS for Tanzania



Complexity level

- The dataset contains 60 layers with different variables.
- The layers can not be interpreted out of context, but must be considered together with the report.
- The methodology is complex and needs to be described in the metadata, both at group level and layer level.
- The layers can not be displayed independently. Their order should reflect the methodology described by the report.

Final map: FAO BEFS Tanzania – group layers



The screenshot shows the GlobalAtlas web application interface. The browser address bar displays `www.fao.org/docrep/012/` and `irena.masdar.ac.ae`. The page header includes the IRENA logo and navigation links: Home, Info, Partnership, Join the initiative, Legal info, Data quality, and Tutorials. The main content area features a map of Tanzania with various layers overlaid. A sidebar on the left lists the layers, with a red arrow pointing to the list. The layers are:

- Agriculture and malnutrition in Tanza...
- Climatic resource inventory
- Soil landform resource inventory
- Excluded / Available area
- Cassava
- Oil palm
- Sugar cane
- Sweet sorghum
- Sunflower
- Infrastructures
- Base layers

The text overlay on the map states: "The group order follows the report methodology, same inside a group".

The footer of the application includes logos for DLR, WindGuard, SANDER PARTNER, Masdar INSTITUTE, JRC EUROPEAN COMMISSION, UNEP, IRENA International Renewable Energy Agency, GeoModel SOLAR, prognos, and REN21.

Final map: FAO BEFS Tanzania – map description

The screenshot shows the Global Atlas web interface. A map of Tanzania is displayed, with a pop-up window titled "Map Bioenergy demo 2 - FAO Bioenergy and Food Security - Tanzania". The pop-up has two tabs: "General" and "Publishing". The "Publishing" tab is active, showing a warning message and a URL. Two red arrows point from the left side of the pop-up to the "Map:" label and the "WARNING:" text.

Map Bioenergy demo 2 - FAO Bioenergy and Food Security - Tanzania

General Publishing

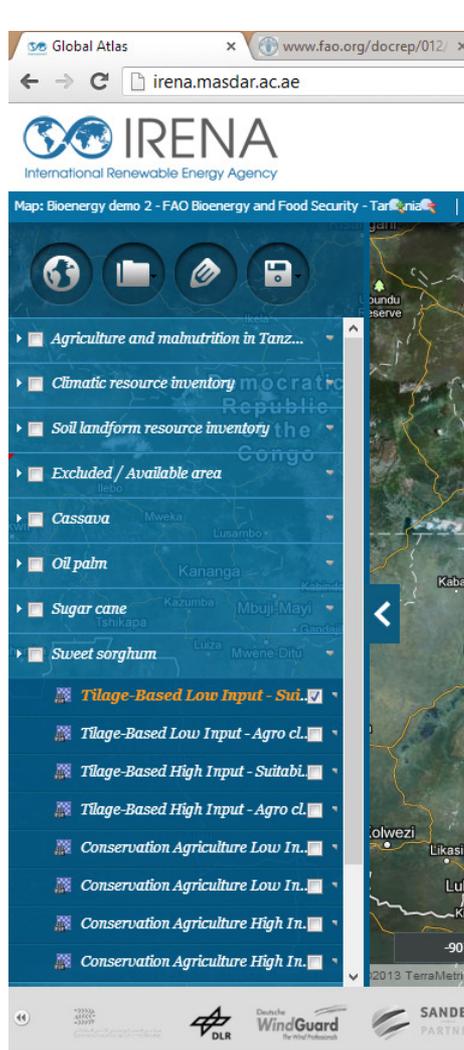
Map: Bioenergy demo 2 - FAO Bioenergy and Food Security - Tanzania

WARNING: The maps presented in this Atlas shall be consulted in parallel to the original report: FAO (2010). Bioenergy and Food Security - The BEFS Analysis for Tanzania. Edited by: Irini Maltsoglou and Yasmeen Khwaja. The Bioenergy and Food Security (BEFS) Approach of FAO supports countries in developing evidence based policies derived from country level information and cross institutional dialogue involving relevant stakeholders. The evidence collected is the result of technical analysis that assesses the interplay between natural resource availability, bioenergy production potential, rural development and food security. During this process the risks and opportunities are identified and the tradeoffs are defined thus supporting policy makers in the decision making process. <http://www.fao.org/energy/befs/en/>

WARNING: Bioenergy resource assessment is a complex nationally-driven process and resource maps shall be considered with caution. The development of sustainable bioenergy is promoted by the Global Bioenergy Partnership through the GBEP Sustainability Indicators for Bioenergy. <http://www.globalbioenergy.org/?id=25880>

Close

Sweet sorghum – tillage based low input



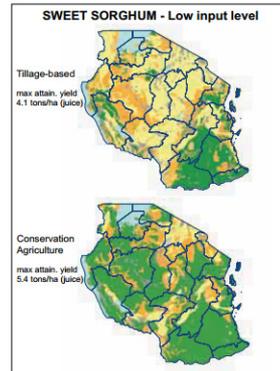
www.fao.org/docrep/012/i1544e/i1544e.pdf

Suitable land area for sweet sorghum

Configuration	Highly suitable area (HS) (ha)	Moderately suitable area (MS) (ha)	Total suitable area (HS+MS) (ha)
TA-L	32 797 044	14 793 760	47 590 804
TA-H	44 029 217	12 406 658	56 435 875
CA-L	59 585 708	9 367 269	68 952 977
CA-H	60 127 929	9 369 763	69 497 692

Figure 4.9
Land suitability assessment for sweet sorghum

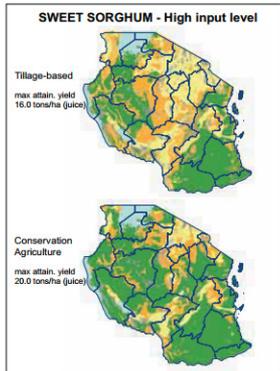
SWEET SORGHUM - Low input level



Tillage-based
max attain. yield
4.1 t/ha (juice)

Conservation
Agriculture
max attain. yield
5.4 t/ha (juice)

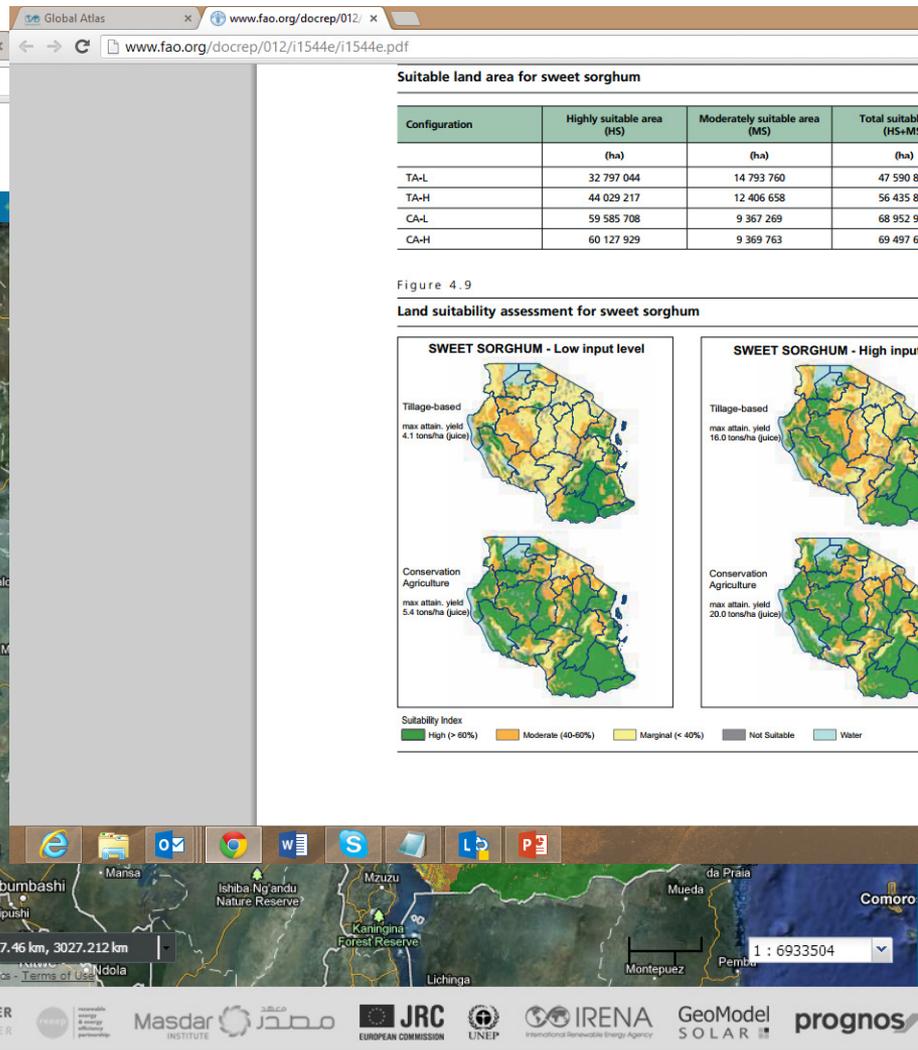
SWEET SORGHUM - High input level



Tillage-based
max attain. yield
16.0 t/ha (juice)

Conservation
Agriculture
max attain. yield
20.0 t/ha (juice)

Suitability Index
■ High (> 60%)
 ■ Moderate (40-60%)
 ■ Marginal (< 40%)
 ■ Not Suitable
 ■ Water





Final map: FAO BEFS – group & layer description

The screenshot displays the Global Atlas web interface. The browser address bar shows 'www.fao.org/docrep/012/' and 'irena.masdar.ac.ae'. The main content area features a map of Tanzania with a popup window titled 'Layer Tillage-Based Low Input - Suitability Index'. The popup contains the following information:

- Layer:** Tillage-Based Low Input - Suitability Index
- Description:** The suitability index categorizes, in percentage terms, the capability of a specific location to produce as a percentage of the maximum attainable yield. The maximum attainable yield is defined as the full potential yield achievable in the specific location being studied under a specific agriculture system and input level. Tillage-based system, low input (TA-L) - Subsistence-type production system with low capital input - Use of traditional or modern cultivars of crops - Tilling uses hand labour and traditional tools only - Tillage-based cultivation in rotation with bush, often referred to as 'slash and burn' - Excludes the use of: Synthetic mineral fertilizer or other agrochemicals and Large-scale conservation measures
- Layer:** tanzania:sweet_sorghum_tillage_low_input_suitability_index
- Type:** OGC:WMS
- Authority:**
- License:**
- Server:** http://irena.masdar.ac.ae:8080/geoserver/tanzania/wms

The background map shows various geographical features and labels in Tanzania, including Kampala, Kisumu, Nyeri, Garissa, Olwezi, Likasi, Lubumbashi, Mwanza, Mueda, Mombasa da Praia, and Pemba. The bottom of the screen features a footer with logos for DLR, WindGuard, SANDER, Masdar, JRC, IRENA, GeoModel SOLAR, prognos, REN21, and cener.

Each map can be accessed individually

The screenshot shows the IRENA Global Atlas web application interface. A map of Tanzania is displayed, showing various regions and cities. A dialog box titled "Map Bioenergy demo 2 - FAO Bioenergy and Food Security - Tanzania" is open, allowing users to share the map. The dialog box has two tabs: "General" and "Linking". The "Linking" tab is selected, and the URL <http://irena.masdar.ac.ae/?map=352> is highlighted with a red circle. Below the URL, there are options to select a size category (Medium) and set width and height. There are also radio buttons for "Fixed map view" (selected) and "Moveable map". At the bottom of the dialog box, there is a text area containing the HTML code for embedding the map: `<iframe style="border: none;" width="512" height="256" src="http://irena.masdar.ac.ae/iframe.html?map=352&mode=static"> </iframe>`. The dialog box has a "Close" button at the bottom right.

What is the value? The the Atlas in its webpor

130515_GlobalAtlas - Bioenergy demo - PowerPoint

FILE HOME INSERT DESIGN TRANSITIONS ANIMATIONS SLIDE SHOW REVIEW VIEW

file:///C:/Users/nfichau/Desktop/page.html

IRENA International Renewable Energy Agency

GlobalAtlas FOR SOLAR AND WIND

Map: Swaziland map - example

Map data ©2013 Google, Inet/Geosistemas SRL, MapIT, MapLink, ORION/ME Imagery ©2013 NASA, TerraMetrics - Terms of Use

prognos SANDER PARTNER GeoModel SOLAR JRC EUROPEAN COMMISSION

SLIDE 26 OF 36

Global Atlas x Bioenergy Policy Support x Uganda Biofuel Atlas x Bioenergy

www.fao.org/energy/befs/en/

english français español

Bioenergy and Food Security (BEFS)

send by email

Food and Agriculture Organization of the United Nations for a world without hunger

Google Custom Search

FAO Home

FAO Energy Home

BEFS Approach

BEFS Rapid Appraisal

Definitions and Principles

Assessment of Bioenergy Potential

Risk Prevention and Management

Investment Screening

Monitoring and Evaluation

Smallholders and Certification

Bioenergy Sustainability Initiatives

Regional Support

Association of Southeast Asian Nations (ASEAN)

South Asia

Southern African Development Community (SADC)

Country support

Malawi

Peru

Sierra Leone

Tanzania

Thailand

Publications

Technical Consultations

Contact us

BEFS

BEFS Approach

The Bioenergy and Food Security (BEFS) Approach of FAO supports countries in developing evidence based policies derived from country level information and cross institutional dialogue involving relevant stakeholders. The evidence collected is the result of technical analysis that assesses the interplay between natural resource availability, bioenergy production potential, rural development and food security. During this process the risks and opportunities are identified and the tradeoffs are defined thus supporting policy makers in the decision making process.

More specifically, the BEFS Approach consists of a multidisciplinary and integrated set of tools and guidance that can support countries throughout the following key steps of the bioenergy policy development and implementation process:

- Establishment of an institutionalized dialogue among relevant national stakeholders in order to identify the key issues surrounding bioenergy and food security, based on the conceptual foundation provided by the BEFS Analytical Framework;
- Assessment of the sustainable bioenergy potential, based on an assessment of land suitability and production costs, and through an analysis of the environmental and socio-economic dimensions and implications of different bioenergy development pathways, with particular emphasis on food security;
- Risk prevention and management, through good environmental and socio-economic practices and related policy instruments;
- Investment screening, through an assessment of the sustainability of proposed bioenergy investments/projects;
- Impact monitoring, evaluation and response at both national and project levels; and
- Capacity building both at technical and policy level through training on the above technical tools and guidance.

The BEFS Approach helps countries design and implement sustainable bioenergy policies and strategies, by ensuring that bioenergy development fosters both food and energy security, and that it contributes to agricultural and rural development in a climate-smart way.

IRENA International Renewable Energy Agency

GlobalAtlas FOR SOLAR AND WIND

Home Info Partnership Join the initiative Legal info Data quality Tutorials

Map: Bioenergy and Food Security - Tanzania

Tools & Services

- Agribusiness and value chains in focus
- Climate resource mapping
- Food and bioenergy resource mapping
- Excluded / Available area
- Classical
- Oil palm
- Agribusiness
- Joint effort
- High yield Low input - High yield
- High yield High input - Agribusiness
- High yield High input - Agribusiness
- Optimistic Agribusiness Low Yield
- Optimistic Agribusiness Low Yield
- Optimistic Agribusiness High Yield
- Optimistic Agribusiness High Yield

Legend

- High (more than 40%)
- Medium (30-40%)
- Low (less than 30%)
- Not available or excluded
- Google Hybrid Map

Operator Level Food Security Assessment Tool

Key publications

- Bioenergy and Food Security - The BEFS Analytical Framework
- Good Environmental Practices in Bioenergy Feedstock Production
- Two-page overview
- Good Socio-Economic Practices in Modern Bioenergy Production
- Policy Instruments to Promote Good Practices in Bioenergy Feedstock Production
- A Compilation of Tools and Methodologies to Assess the Sustainability of Modern Bioenergy
- Two-page overview
- Smallholders in Global Bioenergy Value Chains and Certification

Demo 3

Integration of base data from a remote catalog
FAO / IIASA GAEZ suitability maps



Global Atlas x GAEZ Global Agro-Ecolog x

webarchive.iiasa.ac.at/Research/LUC/GAEZ/index.htm

Back

- Home
- Presentation
- Summary
- GAEZ FAQ
- Introduction
- Methodology
- Land Resources
- Results
- Data
- Limitations
- What's to come
- Bibliography
- Index
- Help

IIASA
Science for Global Insight

Global Agro-Ecological Zones (Global - AEZ)
CD-ROM FAO/IIASA, 2000

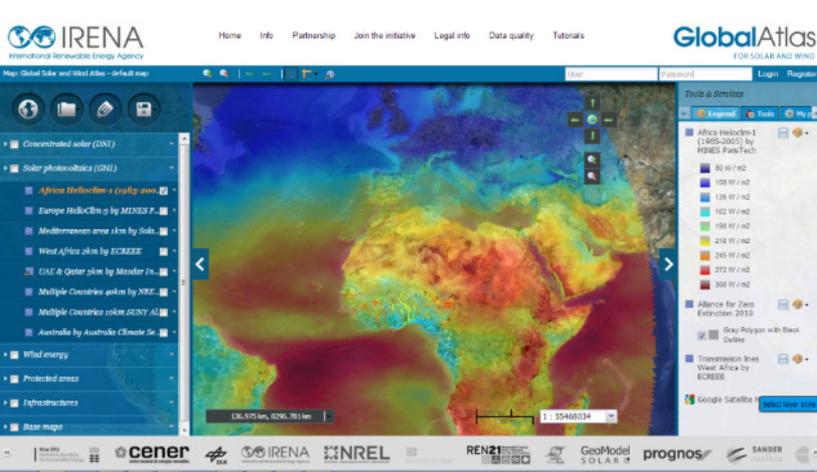
FAO
FIAT PANIS

Global Agro-Ecological Zones - 2000
*Food and Agriculture Organization of the United Nations
Rome, Italy*
*International Institute for Applied Systems Analysis
Laxenburg, Austria*

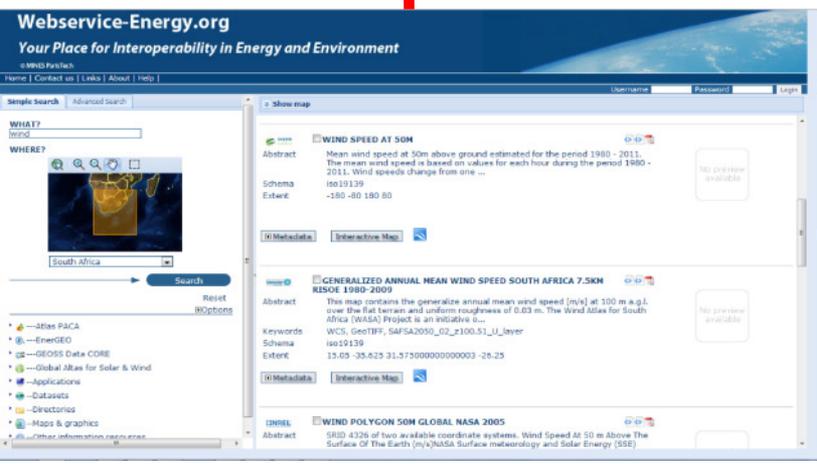
This CD-ROM presents methodology and results of the Global Agro-Ecological Zones Model.

Copyright Foreword Acknowledgements Authors Disclaimer

Version: 1.0

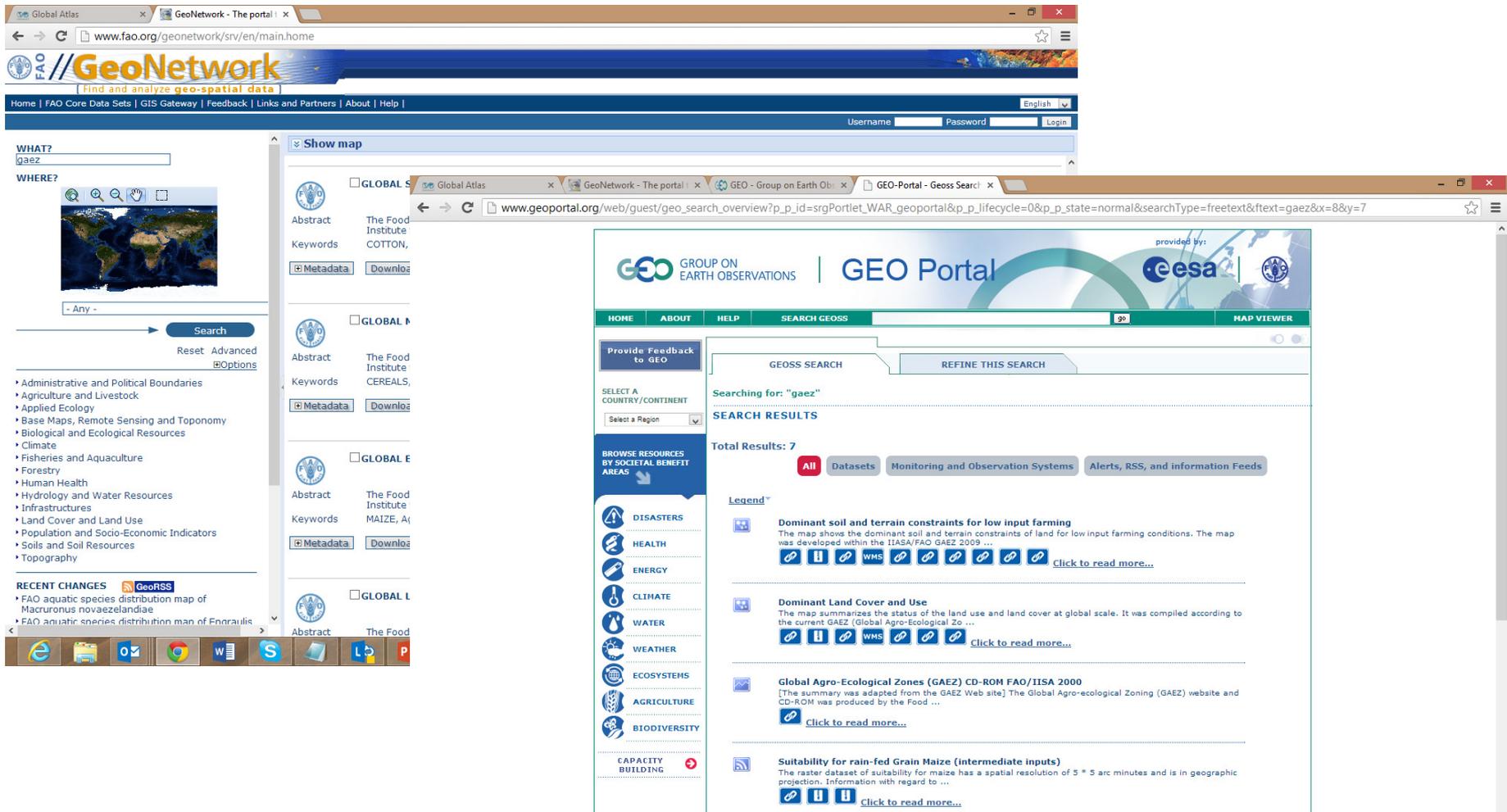


UNEP Grid Geocatalogue (simulation)



FAO Geocatalogue (simulation)

FAO Geocatalog

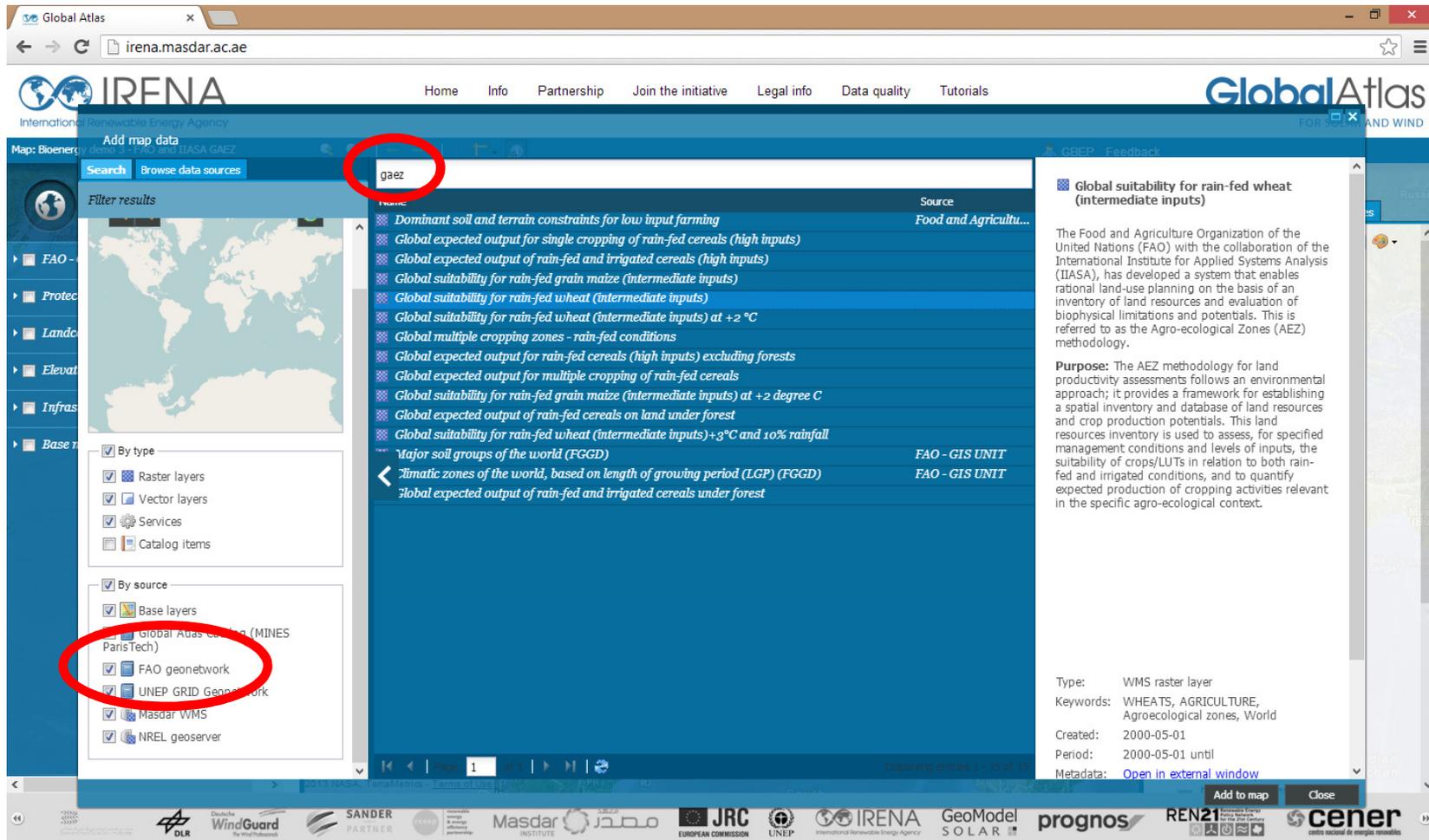


The screenshot displays the FAO Geocatalog interface. The top navigation bar includes the 'GeoNetwork' logo and the tagline 'Find and analyze geo-spatial data'. Below this, there are links for 'Home', 'FAO Core Data Sets', 'GIS Gateway', 'Feedback', 'Links and Partners', and 'About | Help |'. A search bar is visible with the text 'gaez' entered. The main content area shows search results for 'gaez', with a total of 7 results. The results are listed as follows:

- Dominant soil and terrain constraints for low input farming**
The map shows the dominant soil and terrain constraints of land for low input farming conditions. The map was developed within the IIASA/FAO GAEZ 2009 ...
[Click to read more...](#)
- Dominant Land Cover and Use**
The map summarizes the status of the land use and land cover at global scale. It was compiled according to the current GAEZ (Global Agro-Ecological Zo ...
[Click to read more...](#)
- Global Agro-Ecological Zones (GAEZ) CD-ROM FAO/IISA 2000**
[The summary was adapted from the GAEZ Web site] The Global Agro-ecological Zoning (GAEZ) website and CD-ROM was produced by the Food ...
[Click to read more...](#)
- Suitability for rain-fed Grain Maize (intermediate inputs)**
The raster dataset of suitability for maize has a spatial resolution of 5 * 5 arc minutes and is in geographic projection. Information with regard to ...
[Click to read more...](#)

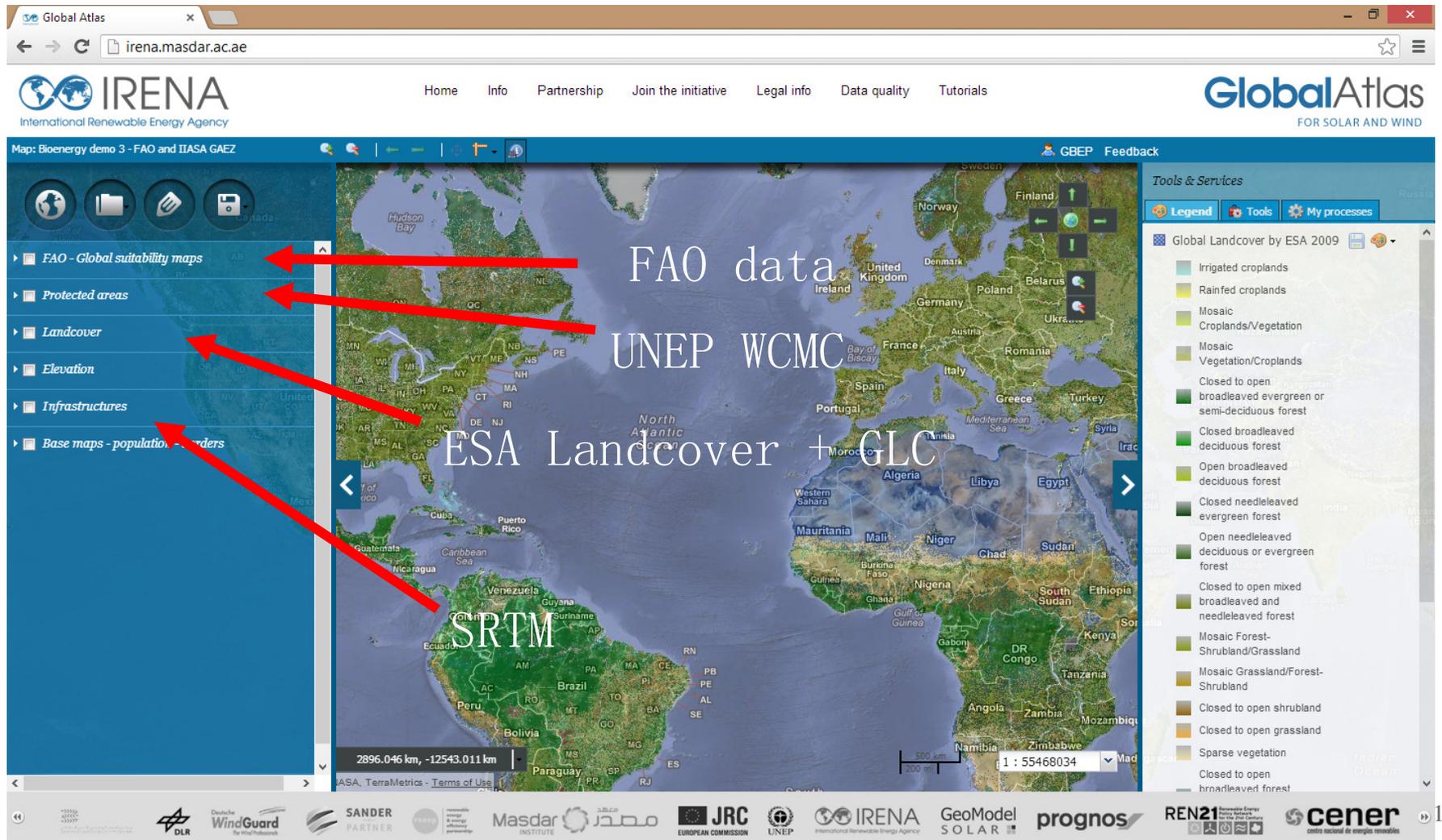
The interface also features a sidebar with various resource categories such as DISASTERS, HEALTH, ENERGY, CLIMATE, WATER, WEATHER, ECOSYSTEMS, AGRICULTURE, and BIODIVERSITY. The bottom of the page shows a Windows taskbar with several application icons.

Step 1: linking to the FAO geocatalog



The screenshot shows the GlobalAtlas web interface. The search bar at the top contains the text 'gaez'. Below the search bar, a list of search results is displayed, including various agricultural suitability and output maps. On the left side, there is a 'Filter results' panel with two sections: 'By type' and 'By source'. In the 'By source' section, 'FAO geonetwork' is selected and circled in red. The main content area shows a list of search results with columns for 'Name' and 'Source'. The first result is 'Dominant soil and terrain constraints for low input farming' from 'Food and Agricultu...'. The second result is 'Global expected output for single cropping of rain-fed cereals (high inputs)'. The third result is 'Global expected output of rain-fed and irrigated cereals (high inputs)'. The fourth result is 'Global suitability for rain-fed grain maize (intermediate inputs)'. The fifth result is 'Global suitability for rain-fed wheat (intermediate inputs)'. The sixth result is 'Global suitability for rain-fed wheat (intermediate inputs) at +2 °C'. The seventh result is 'Global multiple cropping zones - rain-fed conditions'. The eighth result is 'Global expected output for rain-fed cereals (high inputs) excluding forests'. The ninth result is 'Global expected output for multiple cropping of rain-fed cereals'. The tenth result is 'Global suitability for rain-fed grain maize (intermediate inputs) at +2 degree C'. The eleventh result is 'Global expected output of rain-fed cereals on land under forest'. The twelfth result is 'Global suitability for rain-fed wheat (intermediate inputs)+3°C and 10% rainfall'. The thirteenth result is 'Major soil groups of the world (FGGD)' from 'FAO - GIS UNIT'. The fourteenth result is 'Climatic zones of the world, based on length of growing period (LGP) (FGGD)' from 'FAO - GIS UNIT'. The fifteenth result is 'Global expected output of rain-fed and irrigated cereals under forest'. On the right side, there is a detailed view of the selected result, 'Global suitability for rain-fed wheat (intermediate inputs)'. It includes a description of the methodology, the purpose of the assessment, and metadata such as 'Type: WMS raster layer', 'Keywords: WHEATS, AGRICULTURE, Agroecological zones, World', 'Created: 2000-05-01', 'Period: 2000-05-01 until', and 'Metadata: Open in external window'.

FAO / IIASA GAEZ – final map



The screenshot displays the GlobalAtlas web interface. The main map shows the Americas with several data layers overlaid. Red arrows point from text labels to specific layers in the legend:

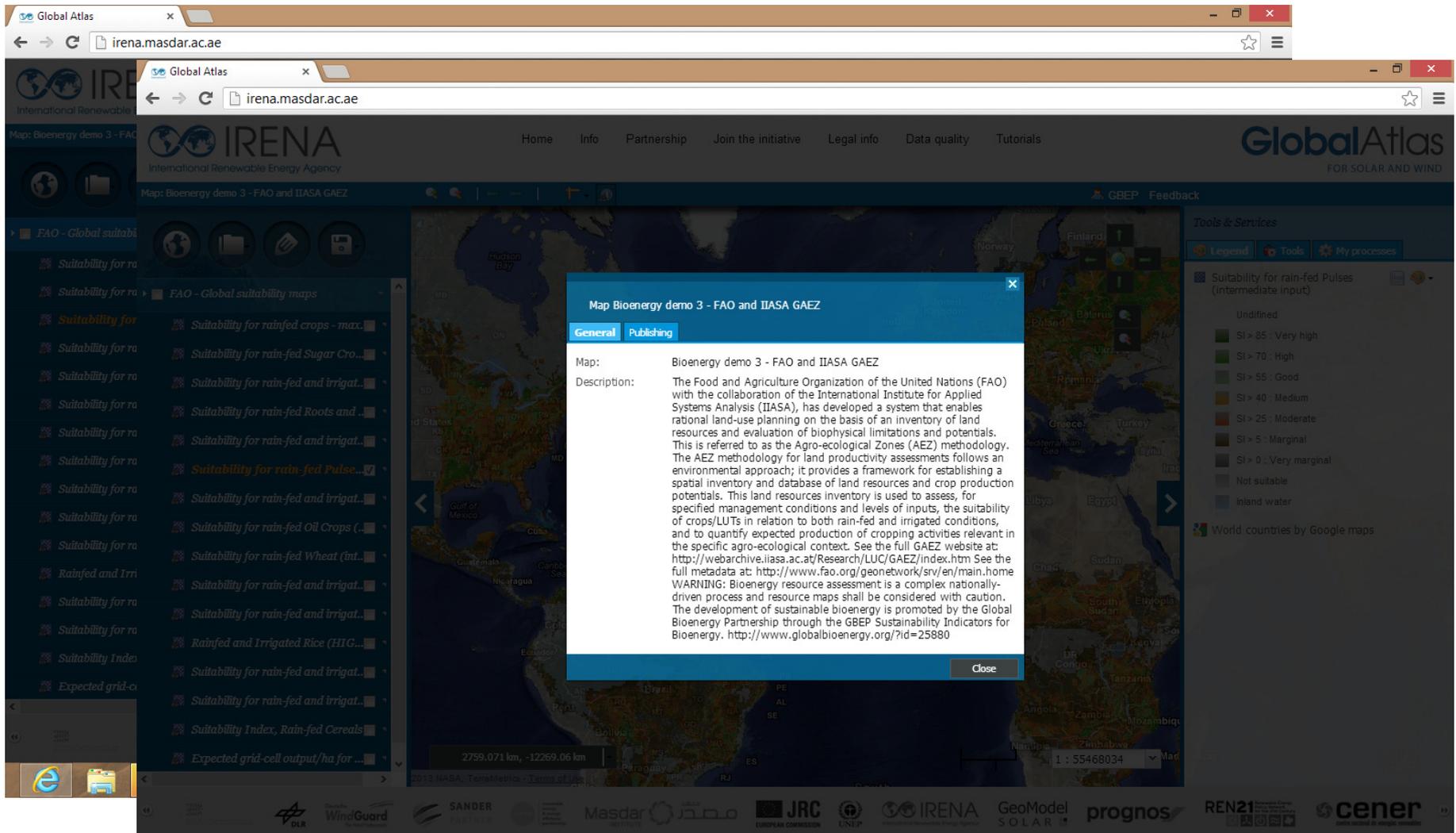
- FAO data** points to the **FAO - Global suitability maps** layer.
- UNEP WCMC** points to the **Protected areas** layer.
- ESA Landcover + GLC** points to the **Landcover** layer.
- SRTM** points to the **Elevation** layer.

The legend on the right side of the map lists various land cover types, including:

- Irrigated croplands
- Rainfed croplands
- Mosaic Croplands/Vegetation
- Mosaic Vegetation/Croplands
- Closed to open broadleaved evergreen or semi-deciduous forest
- Closed broadleaved deciduous forest
- Open broadleaved deciduous forest
- Closed needleleaved evergreen forest
- Open needleleaved deciduous or evergreen forest
- Closed to open mixed broadleaved and needleleaved forest
- Mosaic Forest-Shrubland/Grassland
- Mosaic Grassland/Forest-Shrubland
- Closed to open shrubland
- Closed to open grassland
- Sparse vegetation
- Closed to open broadleaved forest

The bottom of the page features a row of logos for partner organizations: DLR, WindGuard, SANDER PARTNER, Masdar INSTITUTE, JRC EUROPEAN COMMISSION, UNEP, IRENA International Renewable Energy Agency, GeoModel SOLAR, prognos, REN21 Renewable Energy Policy Network for the 21st Century, and cener centro nacional de energias renovables.

Map / group info



The screenshot displays the GlobalAtlas web interface. The browser address bar shows the URL `irena.masdar.ac.ae`. The main navigation menu includes Home, Info, Partnership, Join the initiative, Legal info, Data quality, and Tutorials. The page title is "GlobalAtlas FOR SOLAR AND WIND".

The central map area shows a geographical map of the Middle East region. A pop-up window titled "Map Bioenergy demo 3 - FAO and IIASA GAEZ" is open, displaying the following information:

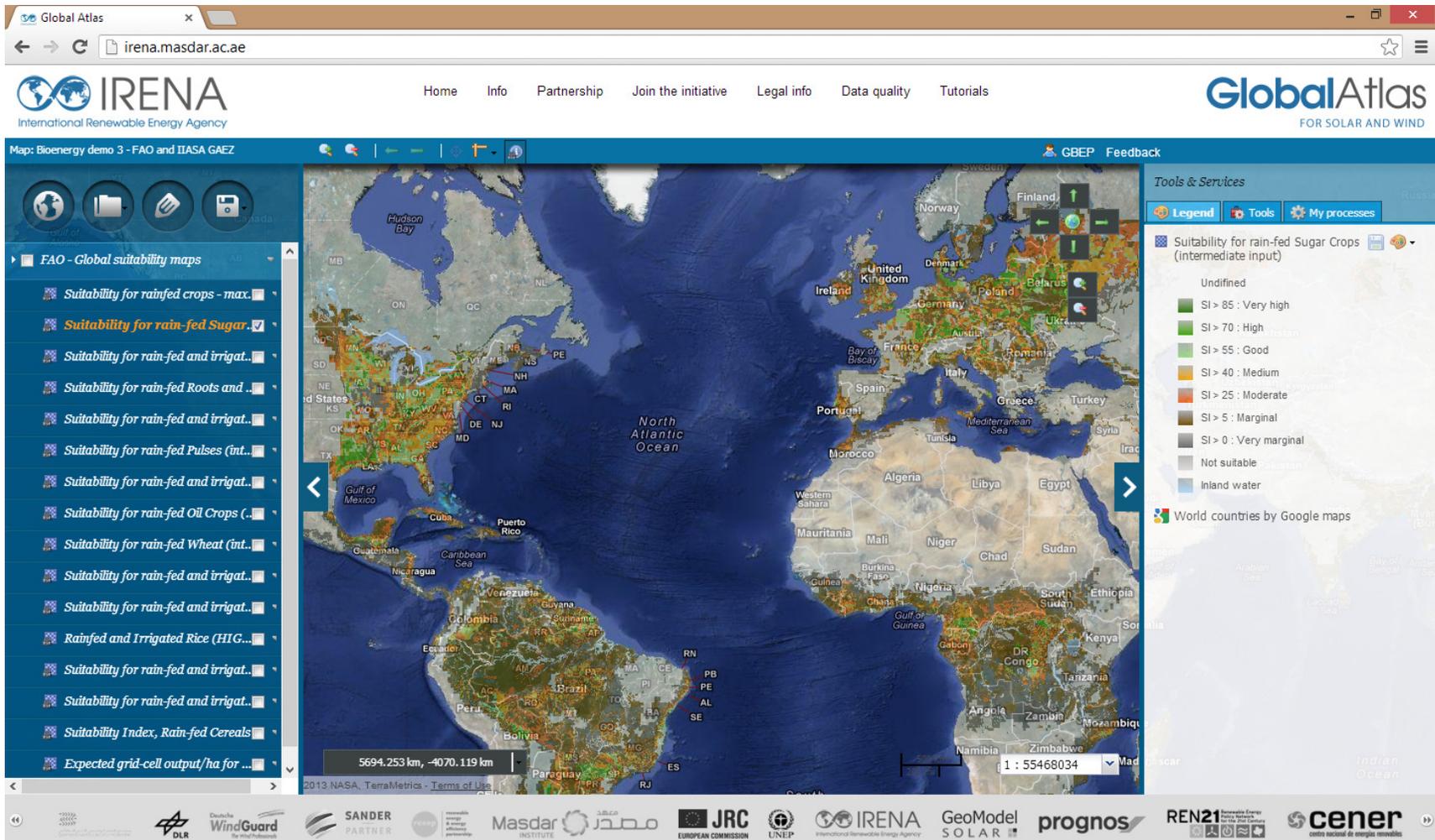
- Map:** Bioenergy demo 3 - FAO and IIASA GAEZ
- Description:** The Food and Agriculture Organization of the United Nations (FAO) with the collaboration of the International Institute for Applied Systems Analysis (IIASA), has developed a system that enables rational land-use planning on the basis of an inventory of land resources and evaluation of biophysical limitations and potentials. This is referred to as the Agro-ecological Zones (AEZ) methodology. The AEZ methodology for land productivity assessments follows an environmental approach; it provides a framework for establishing a spatial inventory and database of land resources and crop production potentials. This land resources inventory is used to assess, for specified management conditions and levels of inputs, the suitability of crops/LUTs in relation to both rain-fed and irrigated conditions, and to quantify expected production of cropping activities relevant in the specific agro-ecological context. See the full GAEZ website at: <http://web.archive.iiasa.ac.at/Research/LUC/GAEZ/index.htm> See the full metadata at: <http://www.fao.org/geonetwork/srv/en/main.home> **WARNING:** Bioenergy resource assessment is a complex nationally-driven process and resource maps shall be considered with caution. The development of sustainable bioenergy is promoted by the Global Bioenergy Partnership through the GBEP Sustainability Indicators for Bioenergy. <http://www.globalbioenergy.org/?id=25880>

The right-hand side of the interface features a "Tools & Services" panel with a legend for "Suitability for rain-fed Pulses (intermediate input)". The legend categories are:

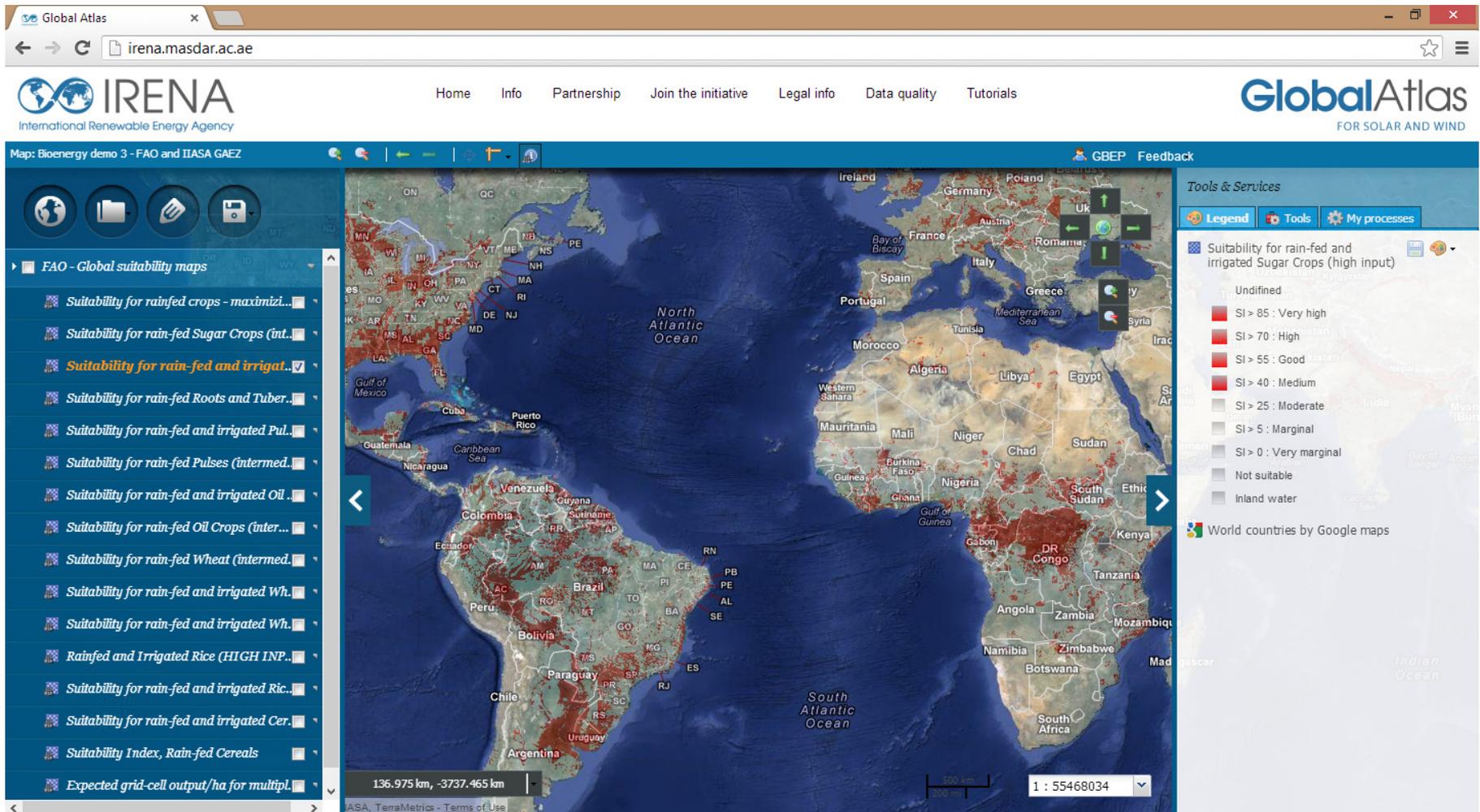
- SI > 85 - Very high
- SI > 70 - High
- SI > 55 - Good
- SI > 40 - Medium
- SI > 25 - Moderate
- SI > 5 - Marginal
- SI > 0 - Very marginal
- Not suitable
- Inland water

The bottom of the page contains a footer with logos for various partners: DLR, WindGuard, SANDER, Masdar, JRC, UNEP, IRENA, GeoModel SOLAR 3, prognos, REN21, and cener.

Map result – suitability rain fed + irrig sugar crops



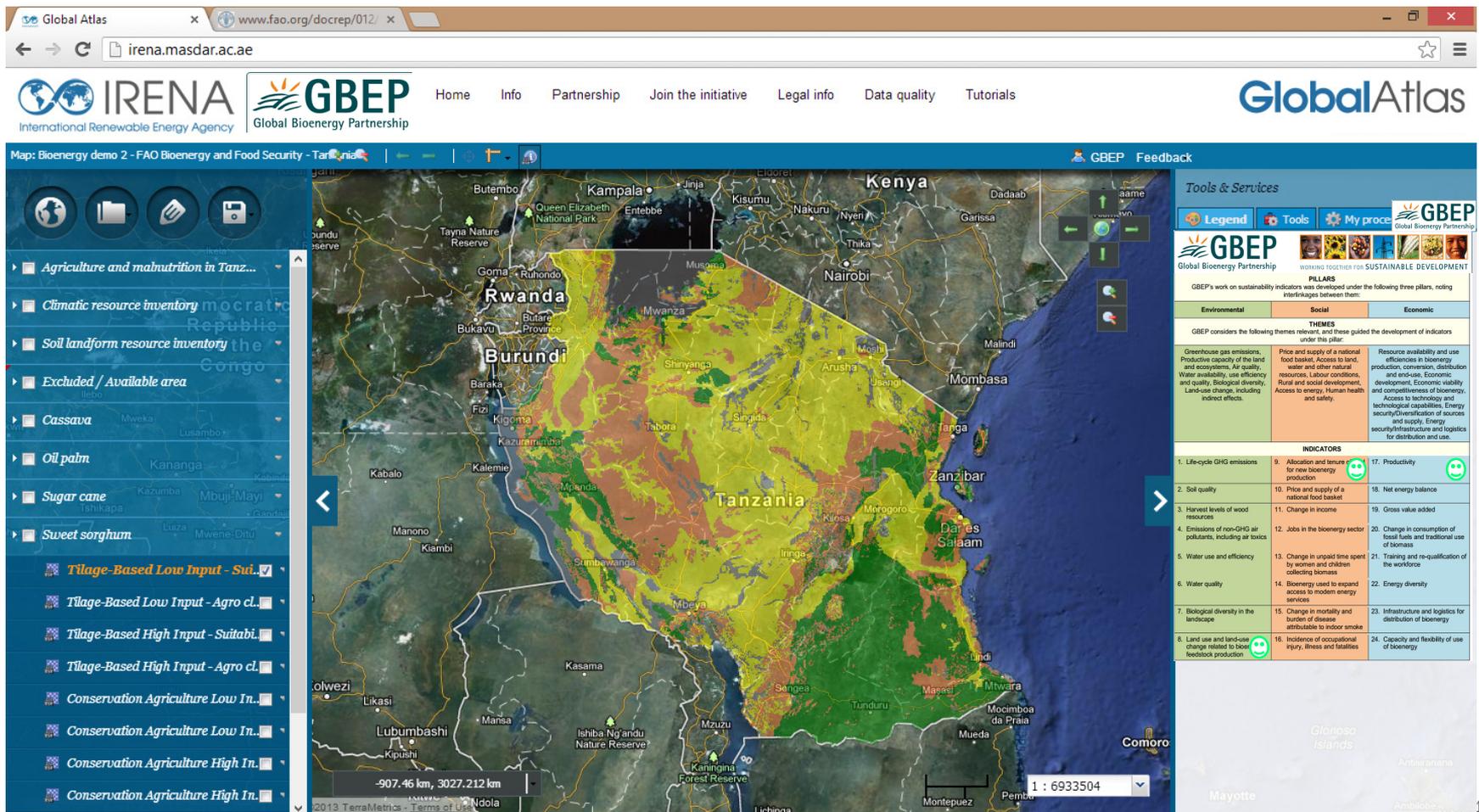
Map result – suitability rain fed + irrigig sugar crops



Summary – added value of the Atlas for the bioenergy sector?

- There is no central place to access bioenergy datasets. The information is highly scattered, and mostly accessible in non-interactive formats. NREL is an exception.
- Several geonetworks exist, but with limited access to actual maps. However major networks are already interoperable.
- Large datasets are confined to specific applications and not disseminated further. The information is forgotten / lost after the project ends.
- By extensively detailing the metadata, it is possible to keep track of the origin of the data.
- It is possible to promote the use of the sustainability indicators through the descriptions.
- Most datasets are attached to a single project, and the information may need to remain grouped under a single map.

Moving forward: further promoting GBEP sustainability indicators?



The screenshot displays the GlobalAtlas web application interface. At the top, there are logos for IRENA, GBEP, and GlobalAtlas. The main content area features a map of Tanzania with various sustainability indicators overlaid in different colors (green, yellow, red). A navigation menu on the left lists categories such as 'Agriculture and malnutrition in Tanz...', 'Climatic resource inventory', 'Soil landform resource inventory', 'Excluded / Available area', 'Cassava', 'Oil palm', 'Sugar cane', and 'Sweet sorghum'. Below these are specific indicator names like 'Tillage-Based Low Input - Sud...', 'Tillage-Based Low Input - Agro cl...', 'Tillage-Based High Input - Suitabi...', 'Tillage-Based High Input - Agro cl...', 'Conservation Agriculture Low In...', 'Conservation Agriculture Low In...', 'Conservation Agriculture High In.', and 'Conservation Agriculture High In.'. On the right side, there is a 'Tools & Services' panel with a legend, tools, and a 'My process' section. Below this, there is a table of GBEP sustainability indicators, organized into three pillars: Environmental, Social, and Economic. Each pillar has a list of indicators with corresponding icons and descriptions.

PILLARS		
Environmental	Social	Economic
THEMES GBEP considers the following themes relevant, and these guided the development of indicators under this pillar:		
Greenhouse gas emissions, Productive capacity of the land and ecosystems, Air quality, Water availability, use efficiency and quality, Biological diversity, Land-use change, including indirect effects.	Price and supply of a national food basket, Access to land, water and other natural resources, Labour conditions, Rural and social development, Access to energy, Human health and safety.	Resource availability and use efficiencies in bioenergy production, conversion, distribution and end-use, Economic development, Economic viability and competitiveness of bioenergy, Access to technology and technological capabilities, Energy security/Identification of sources and supply, Infrastructure and logistics for distribution and use.
INDICATORS		
1. Life-cycle GHG emissions 2. Soil quality 3. Harvest levels of wood resources 4. Emissions of non-GHG air pollutants, including air toxics 5. Water use and efficiency 6. Water quality 7. Biological diversity in the landscape 8. Land use and land-use change related to bio- feedstock production	9. Allocation and tenure for new bioenergy production 10. Price and supply of a national food basket 11. Change in income 12. Jobs in the bioenergy sector 13. Change in unpaid time spent by women and children collecting biomass 14. Bioenergy used to expand access to modern energy services 15. Change in mortality and burden of disease attributable to indoor smoke 16. Incidence of occupational injury, illness and fatalities	17. Productivity 18. Net energy balance 19. Gross value added 20. Change in consumption of fossil fuels and traditional use of biomass 21. Training and re-qualification of the workforce 22. Energy diversity 23. Infrastructure and logistics for distribution of bioenergy 24. Capacity and flexibility of use of bioenergy

Thank you for your attention