GEOGRAPHIC INFORMATION SYSTEMS:

Improving Management, Getting Results, and Communicating the U.S. Foreign Assistance Story

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EGAT/NRM Office

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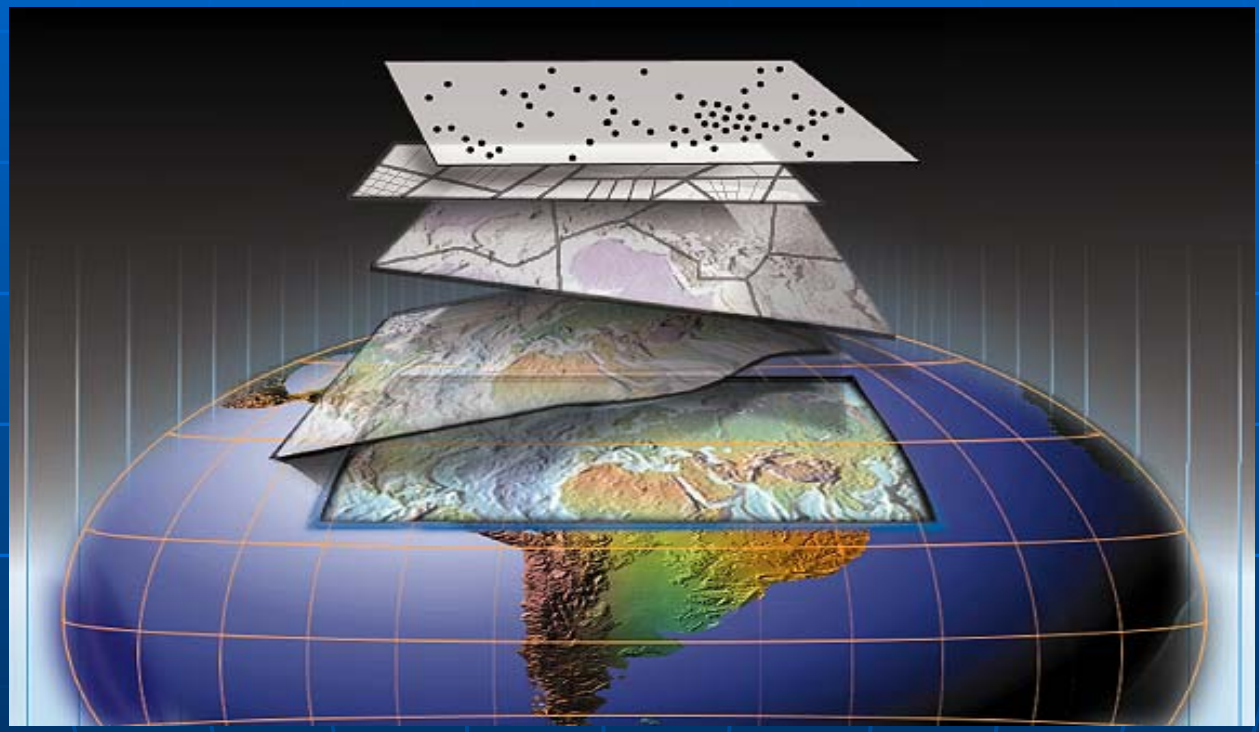
USAID
FROM THE AMERICAN PEOPLE

Geospatial Information Technology includes tools to collect, organize, analyze and display spatially related information:

- Remotely sensed data (satellite / aerial imagery)
- Global Positioning Systems
- Paper maps
- Statistical data
- Geographic feature data (roads, rivers, etc)
- Geographic Information Systems (GIS)

A Geographic Information System (GIS) is a computerized, decision-support system that includes software, hardware, people, and geographic information



It can create, query, analyze, and display data "layers" such as land cover, elevation, climate zones, forests, political boundaries, population density, per capita income, etc.

Measuring & Integrating the Parts …

Population Data

Socio-economic Data

Agriculture

Soils

Land Cover
Political Boundaries

. . . Means Seeing the Whole

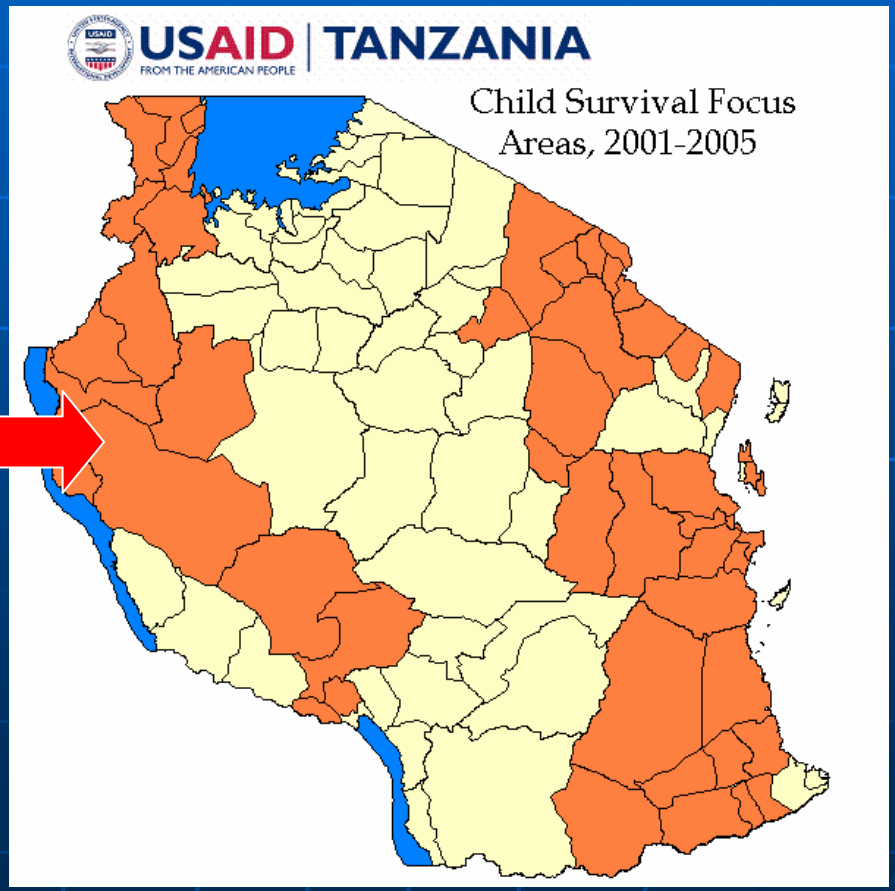
The Simple Definition of a GIS is:

It's a map with a database underneath,
or
It's a database that you can display on a map.

It can be used to visualize different kinds of information, conduct spatial analysis, and manage information

Maps Can be Linked to Statistical Information in a Database

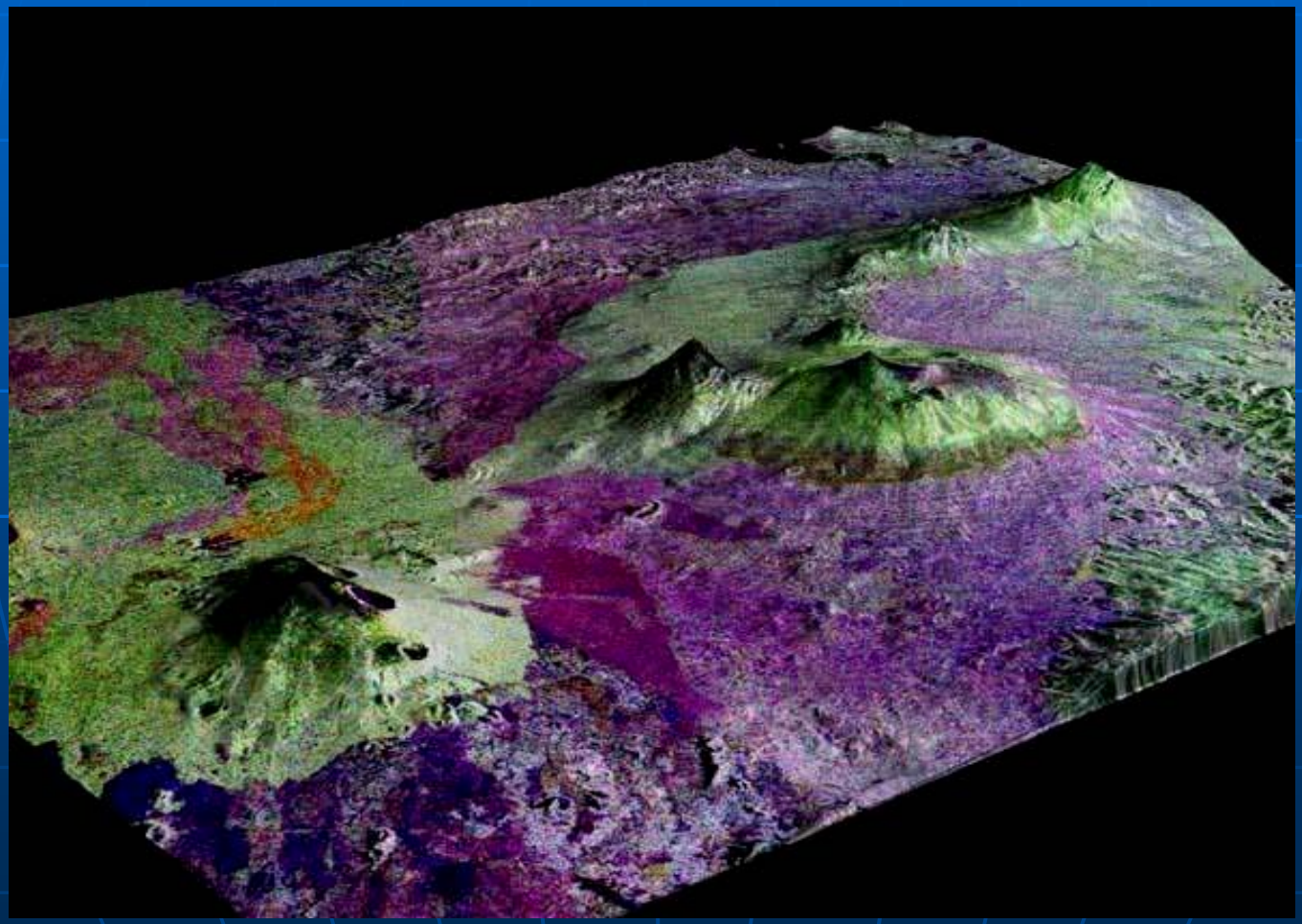
	District	Region		District	Region
☐	*Regional coverage*	*Arusha Region*	☐	*Regional coverage*	*Kilimanjaro*
☐	Arumeru	Arusha	☐	Hai	Kilimanjaro
☐	Arusha Urban *(Municipality)*	Arusha	☐	Moshi Rural	Kilimanjaro
☐	Babati	Arusha	☐	Moshi Urban	Kilimanjaro
☐	Hanang-Katesh	Arusha	☐	Mwanga	Kilimanjaro
☐	Karatu	Arusha	☐	Rombo	Kilimanjaro
☐	Kiteto	Arusha	☐	Same	Kilimanjaro
☐	Mbulu	Arusha	☐	*Regional coverage*	*Lindi Region*
☐	Monduli	Arusha	☐	Kilwa Masoko	Lindi
☐	Ngorongoro	Arusha	☐	Lindi Rural	Lindi
☐	Simanjiro	Arusha	☐	Lindi Urban *(Town Council)*	Lindi
☐	Ilala *(Municipality)*	Dar es Salaam	☐	Liwale	Lindi
☐	Kinondoni *(Municipality)*	Dar es Salaam	☐	Nachingwea	Lindi
☐	Temeke *(Municipality)*	Dar es Salaam	☐	Ruangwa	Lindi
☐	*Regional coverage*	*Dodoma Region*	☐	*Regional coverage*	*Mara Region*
☐	Dodoma Rural	Dodoma	☐	Bunda	Mara
☐	Dodoma Urban *(Municipality)*	Dodoma	☐	Musoma Rural	Mara
☐	Kondoa	Dodoma	☐	Musoma Urban *(Town Council)*	Mara
☐	Kongwa	Dodoma	☐	Serengeti	Mara
☐	Mpwapwa	Dodoma	☐	Tarime	Mara
☐	*Regional coverage*	*Iringa Region*	☐	*Regional coverage*	*Mbeya Region*
☐	Iringa	Iringa	☐	Chunya	Mbeya
☐	Iringa Urban	Iringa	☐	Ileje	Mbeya



The Database Can Include Ground Activity Information and Aerial Imagery

Microenterprise Activities				
Date	City	District	# trained	# of which women
2/14/2005	Bagamoyo	Bagamoyo	323	121
3/1/2005	Giyankula	Chunya	119	50
3/4/2005	Mbeya	Mbeya	213	77

Imagery Can Be Draped Over Elevation Models for 3-Dimensional Viewing of the Terrain

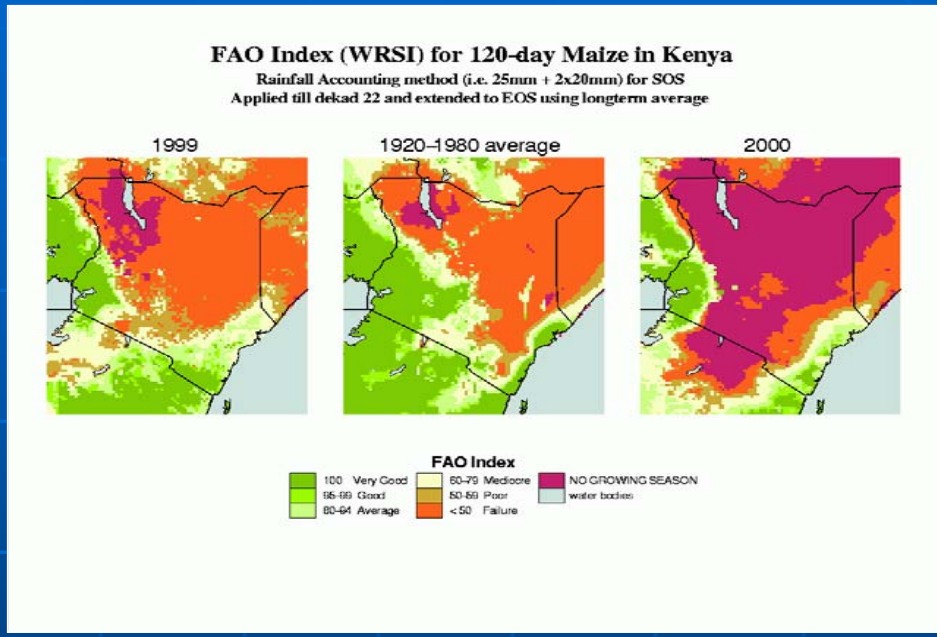


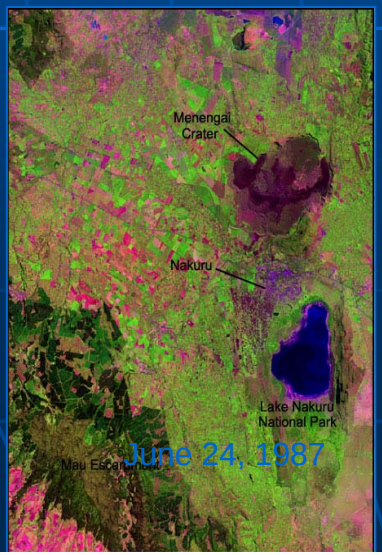
In Terms of Spatial Analysis, a GIS Can Determine for Each Village:

- Distance to the nearest market town
- Average rainfall within a 20km radius
- Demographic indicators
- Village level estimates of income poverty

Famine Early Warning System

***Water Requirement Satisfaction Index*: Forecasts the potential crop yield based on the availability of water supply and crop demand throughout the growing season using rainfall, evapotranspiration, soil type, crop specific information.**





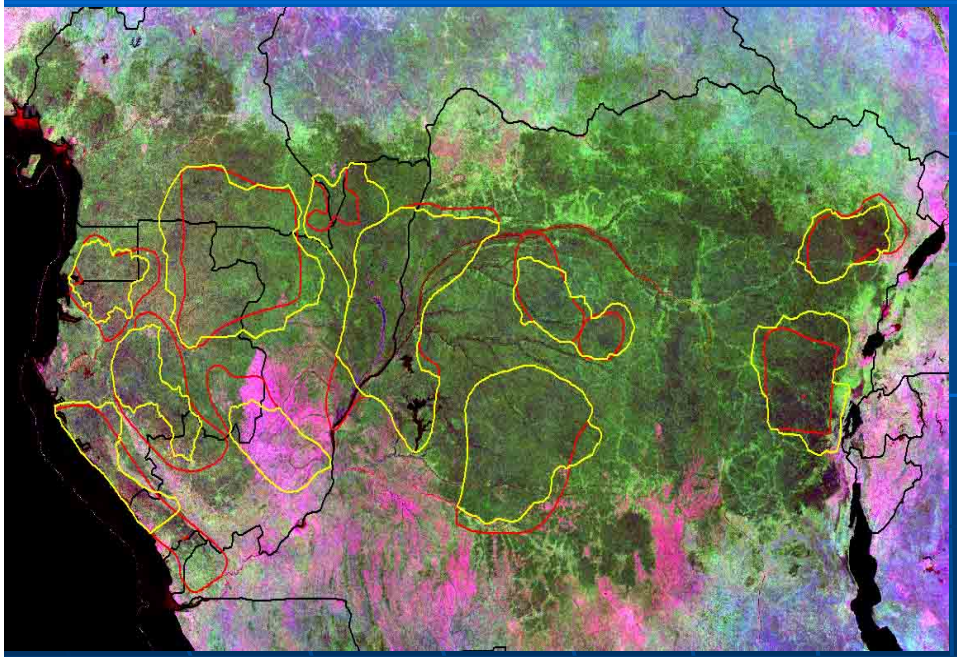
USGS

National Mapping Division EROS Data Center

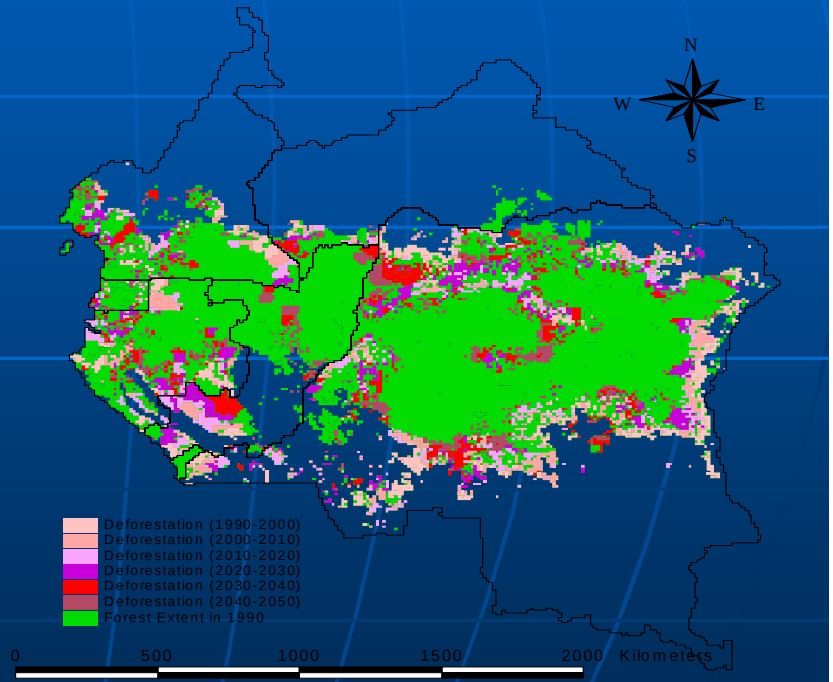
Landsat images (30 m res) show ag. conditions in Kenya during a year of good rains (left) with those of the drought of 2000 (right). Light green portrays healthy crops, dark green parcels are tea. Pink tones are associated with bare soil.

Forest Management and Conservation

Identifying Protected Areas and Logging Concessions



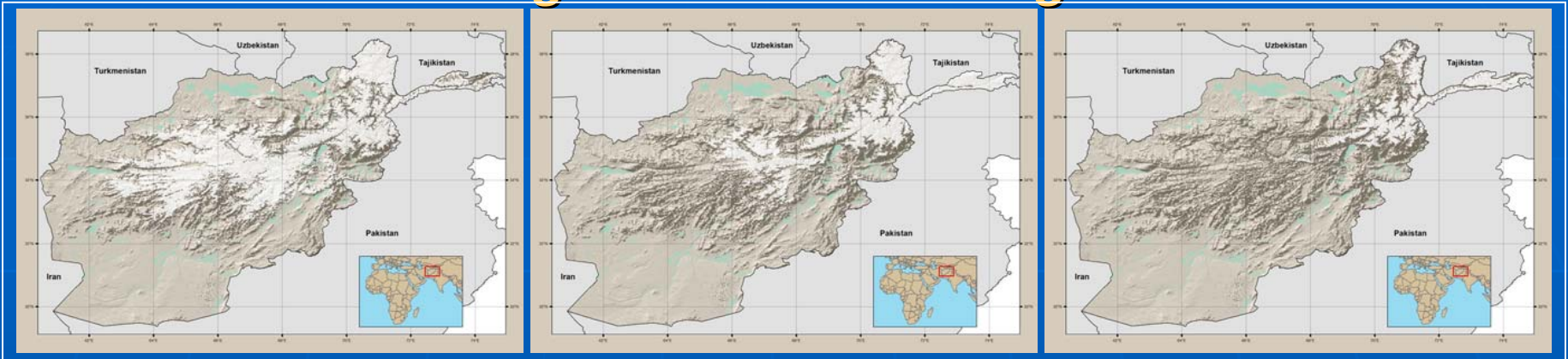
Assessing Deforestation Trends



NASA

CARPE

Monitoring Snow Cover in Afghanistan



February 10 - 17 2003 | **April 07 -14 2003** | **May 25 – 01 June 2003**

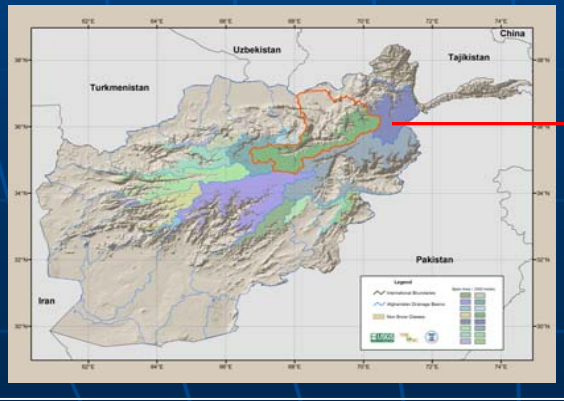
Source:
MODIS 8-day Snow Cover Extent provided by the National Snow and Ice Data Center (NSIDC)
Major irrigation areas derived from the 1993 Agricultural Land Cover provided by FAO, UNDP, and the Afghan Geodesy and Cartography Office.
Maps produced by USGS/EROS Data Center

MODIS 8-day Snow Cover Extent

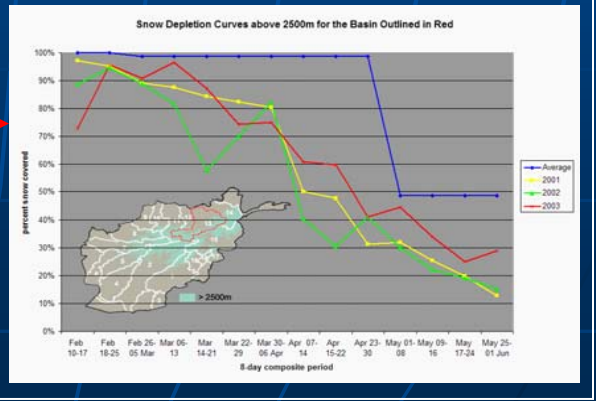
Major Irrigation Areas

Using MODIS 8-day snow cover extent products from the National Snow and Ice Data Center (NSIDC), USGS/SAIC International Program scientists were able to monitor snow cover depletion for Afghanistan in support of Famine Early Warning System Network (FEWS NET) activities in the region. Approximately 80% of Afghanistan's annual wheat crop is dependent on irrigation, much of which is supplied through snowmelt. Using a basin delineation derived from the USGS HYDRO 1K Global Topographic Database, this analysis concentrated on watersheds upstream of important irrigation areas. An elevation threshold of 2500 meters was applied to identify areas, within each basin, where historical average snow extent is approximately 100 percent in March. Monthly averages (1966 – 2001) of snow cover extent were taken from the NSIDC historical snow cover database at 25-kilometer resolution. The NASA MODIS 8-day snow cover extent product, at 500-meter resolution, was used to track incremental changes in snow cover extent throughout the snowmelt season.

Basin areas above 2500 meters



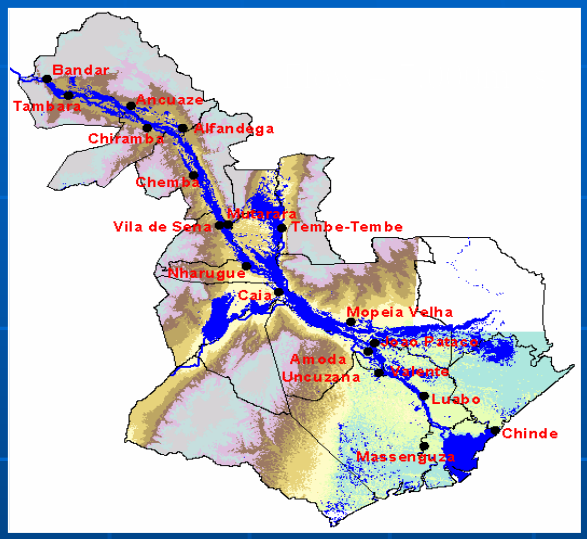
Seasonal Snow Depletion

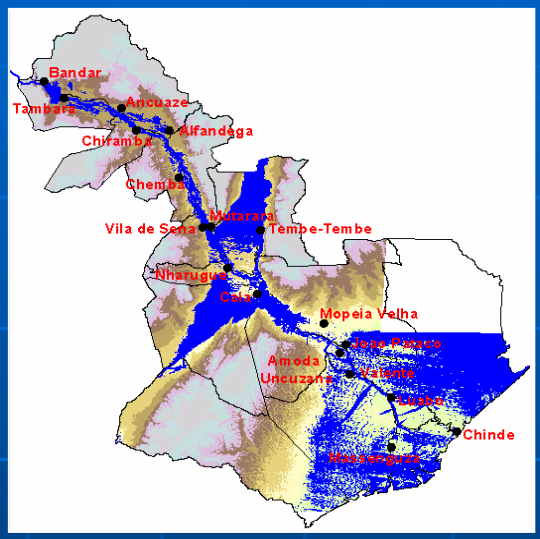


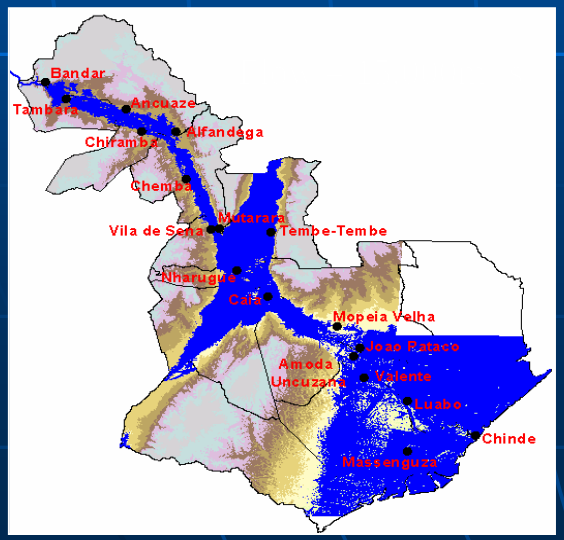
USGS science for a changing world

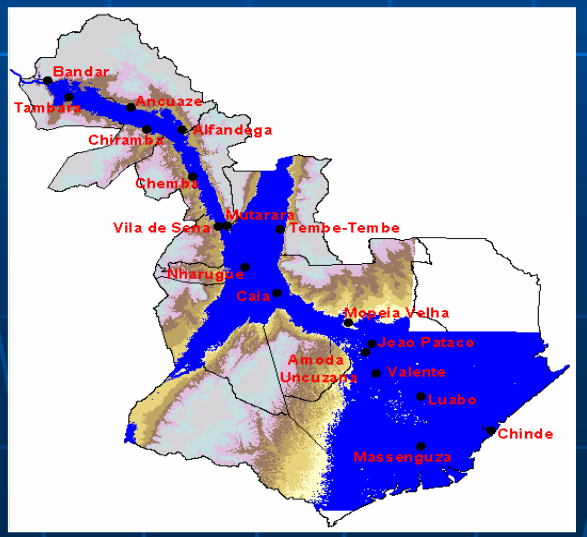
FEWS NET

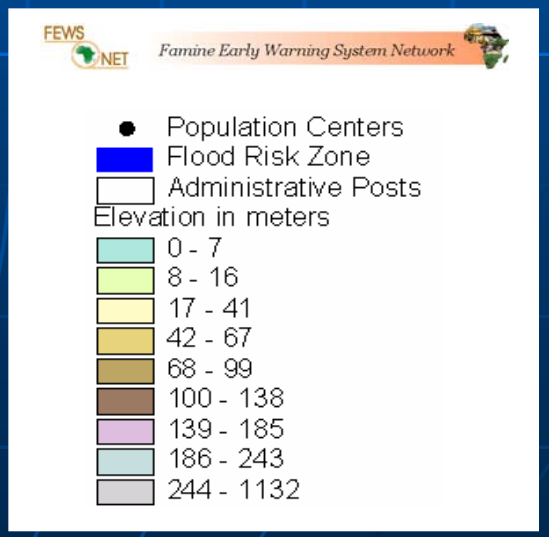
Modeling the Effects of a Dam Release









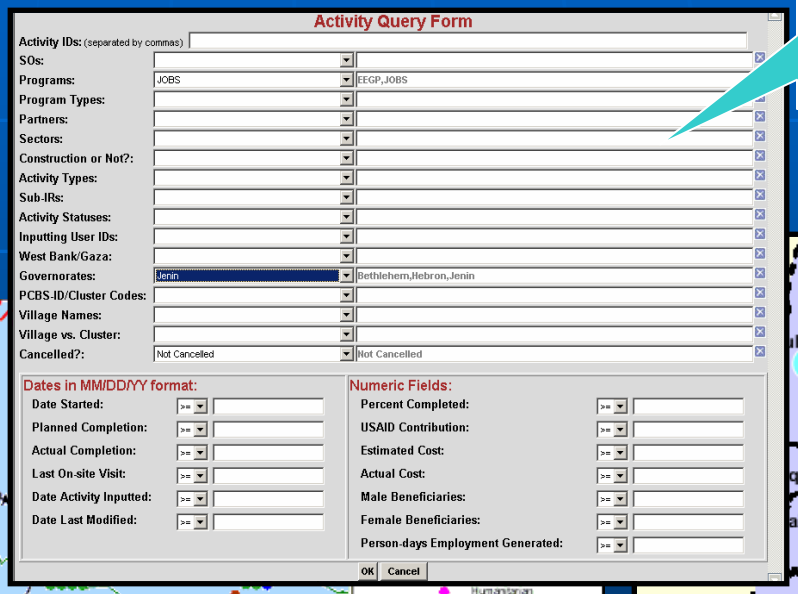


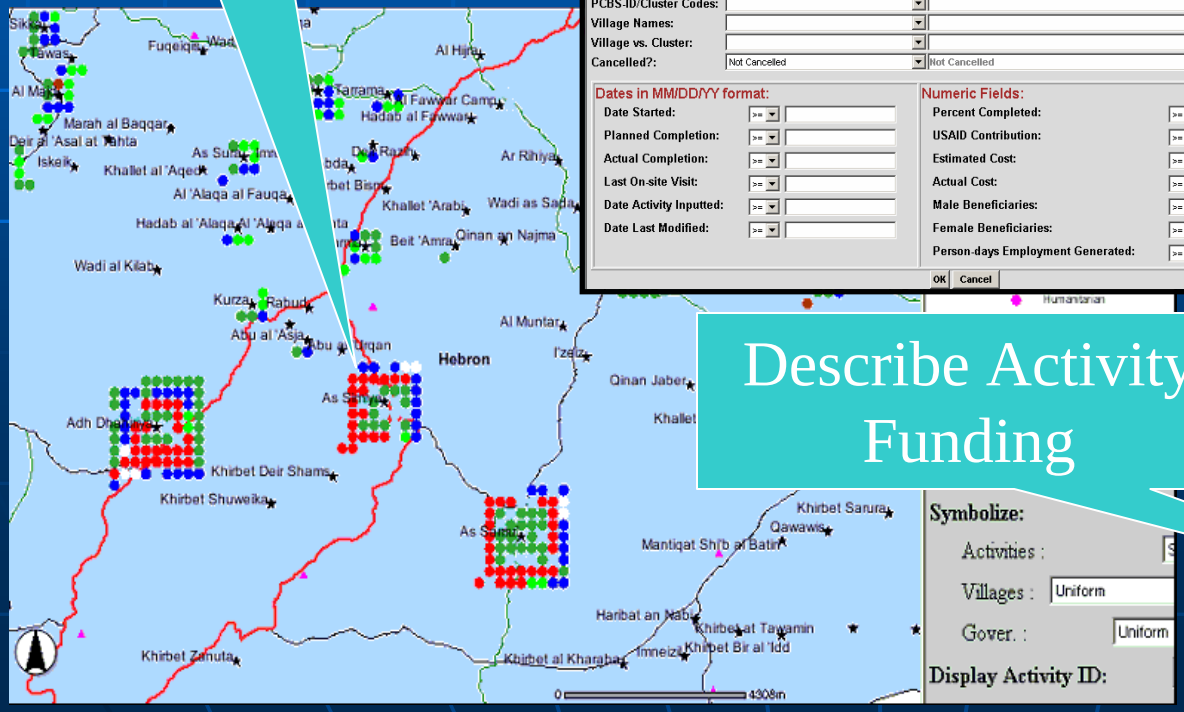
Using GIS as a Management and Communication Tool for USAID

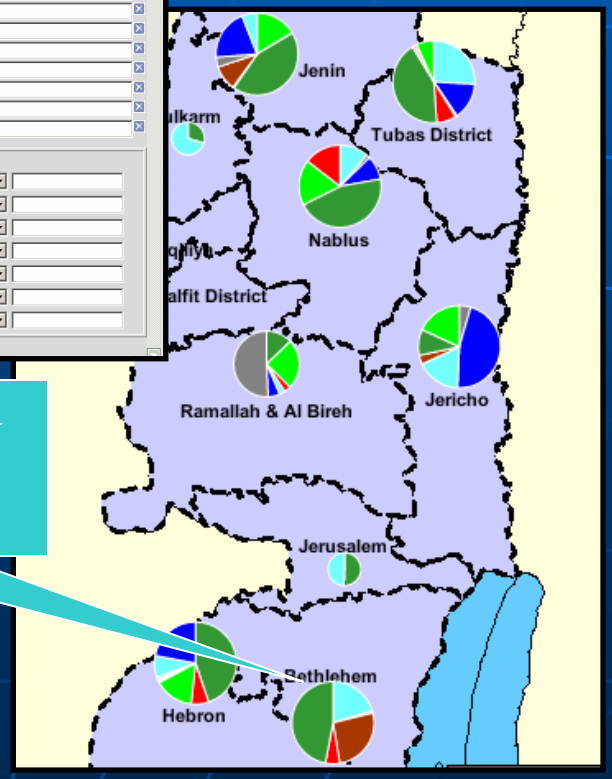
Data Query

Locate Activities

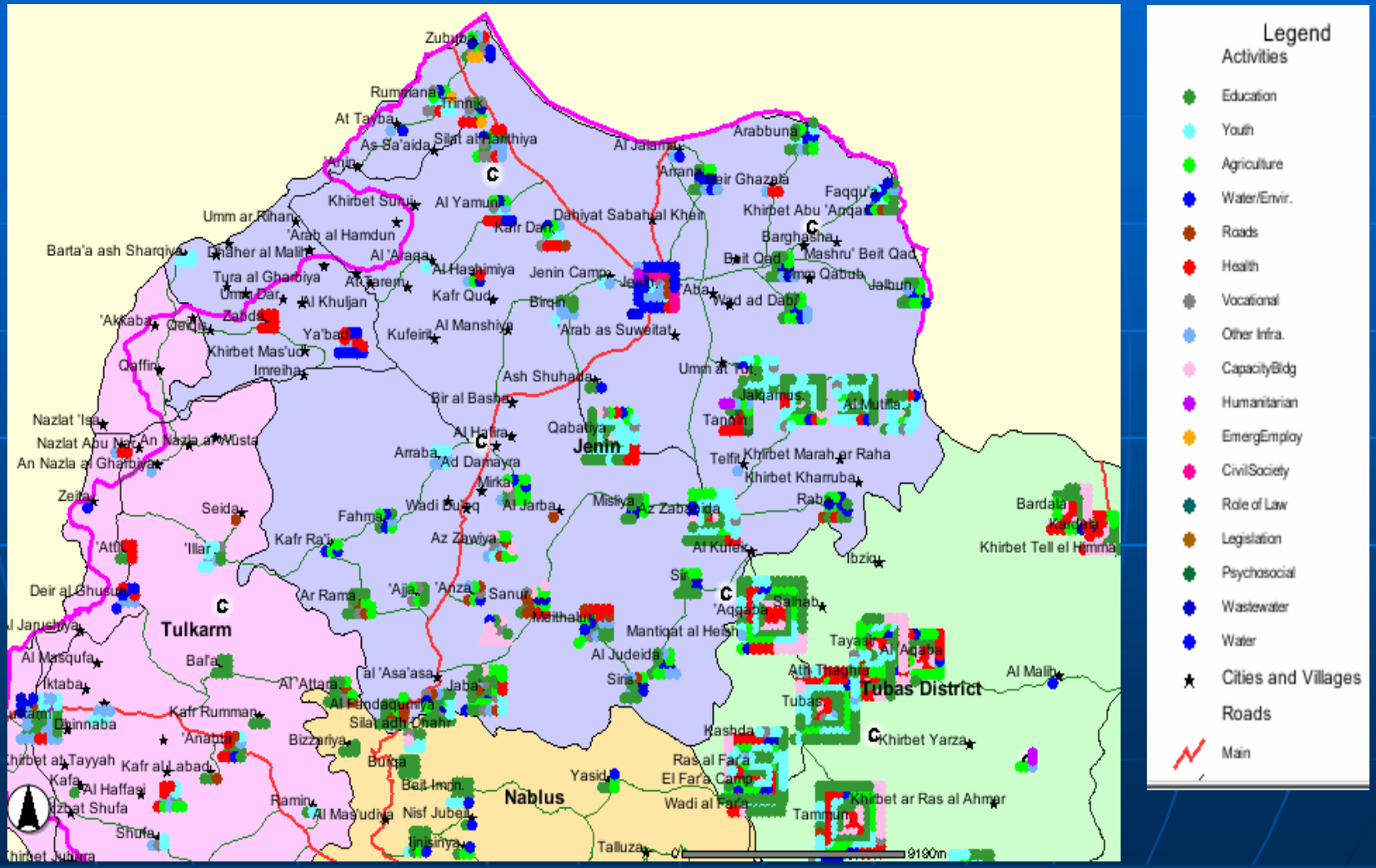
Describe Activity Funding







Track Ongoing Activities



Review Activity Status: Road Building Project

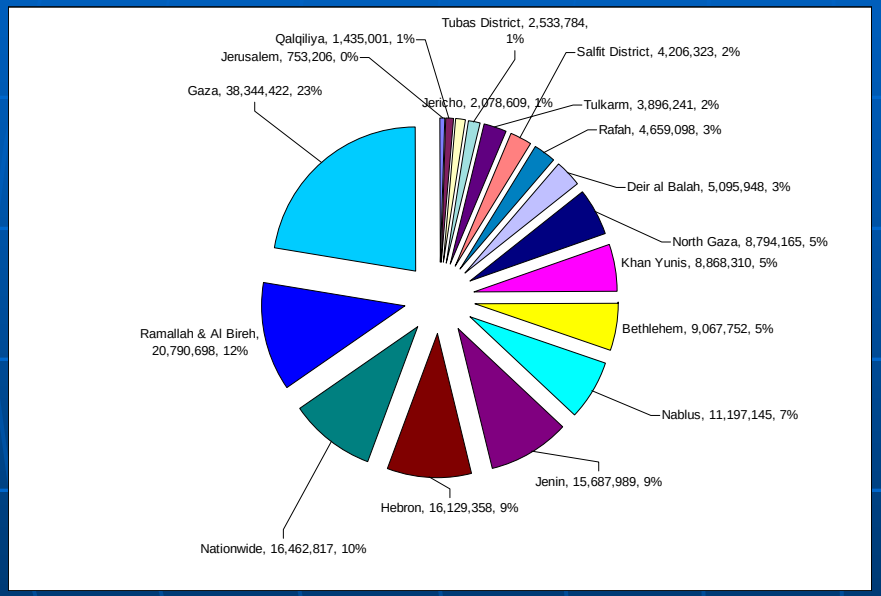
Act. Details - Microsoft Internet Explorer provided by USAID

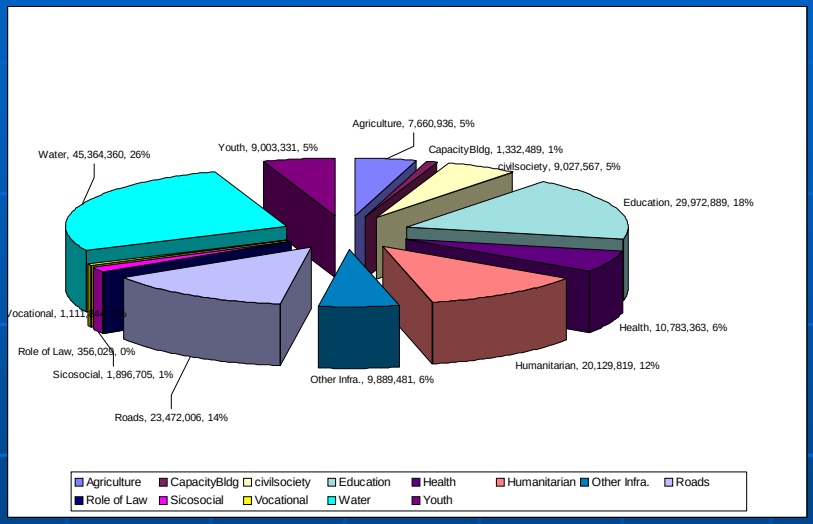
Update Activity

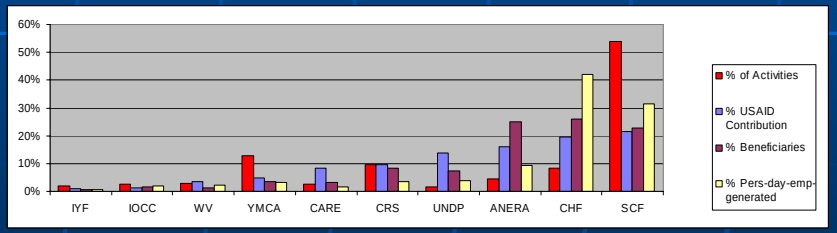
		Activity ID:	4824
SO:	SO2	Partner:	MUNI
PCBS ID or Cluster Code:	151090	Village Name or Cluster Name:	Beit Furik
Program:	Cash_T1		
AT Code:	SO8-A051	Sector Code:	Roads
Activity Type Description:	Construction / improvement of interior and connecting roads (other than agricultural)		
Activity Description:	Rehabilitation & paving of internal roads		
Activity Status:	On Time	Percent Completed:	80 %
Estimated Cost:	200000	USAID Contribution:	200000
Actual Cost:	0		
Start Date:	09/12/2003 set clear	Planned Completion Date:	12/31/2003 set clear
Last On-site visit:		Actual Completion Date:	set clear
Comments:			
Specific UM#1:	No. of Linear meters of interior and connecting roads constructed		
UM#1 Planned Qty:	8000	UM#1 Actual Qty:	0
Specific UM#2:	No. of square meters of side walks		
UM#2 Planned Qty:	0	UM#2 Actual Qty:	0
Specific UM#3:	No. of linear meters of retaining walls, fences, and terraces		
UM#3 Planned Qty:	0	UM#3 Actual Qty:	0
Male Beneficiaries:	0	Person-days Employment Generated:	0
Female Beneficiaries:	0	Interpreting Beneficiaries	

Before Working

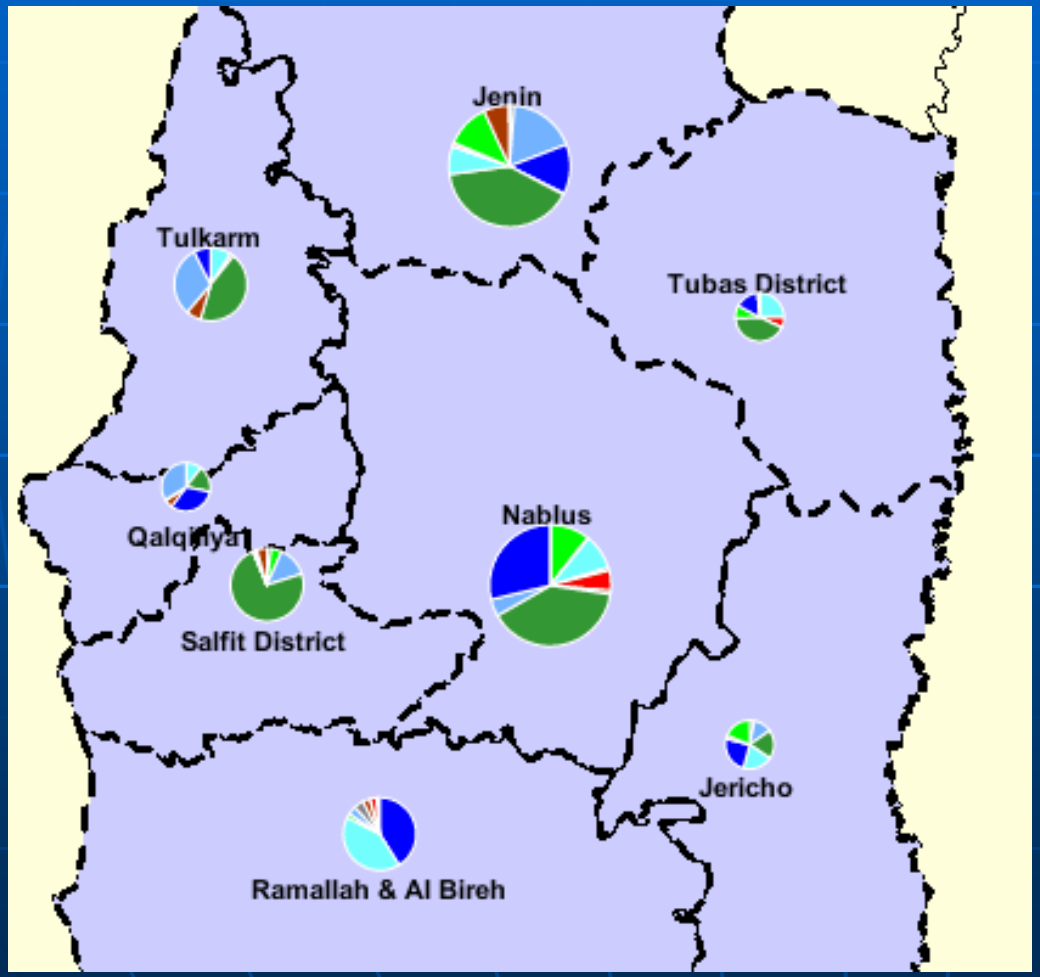
Measure Output Results



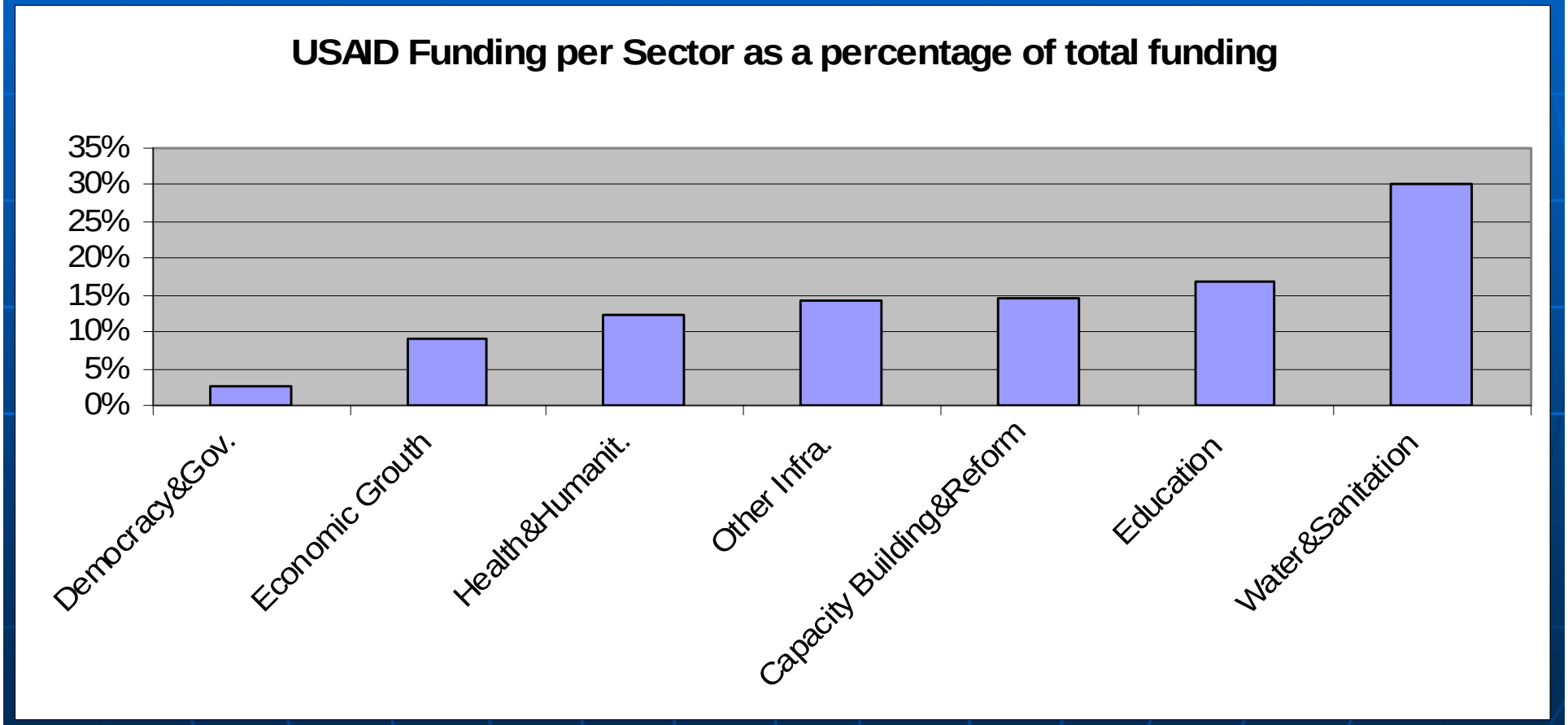




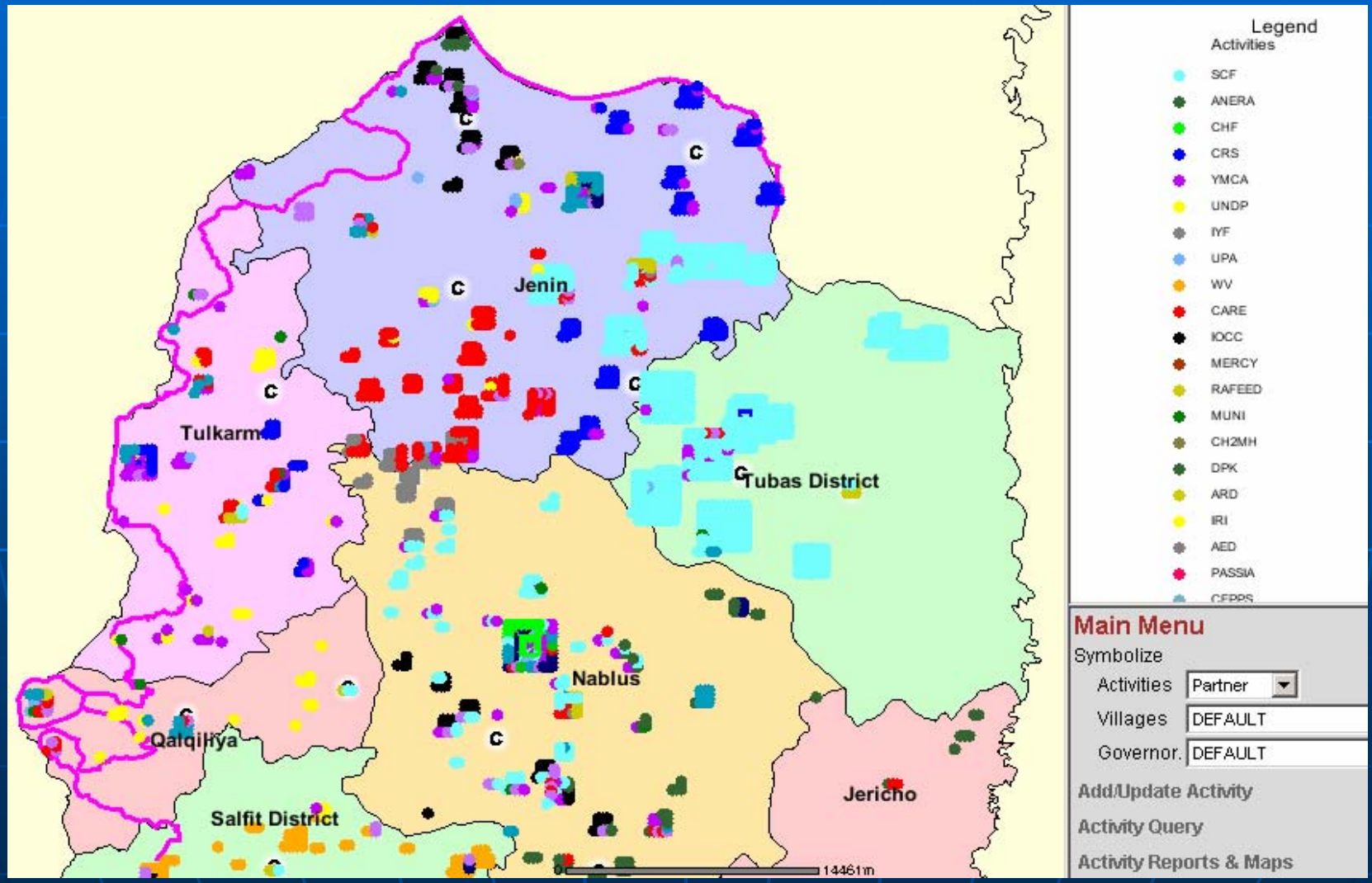
Proportionate Funding by Sector and Region



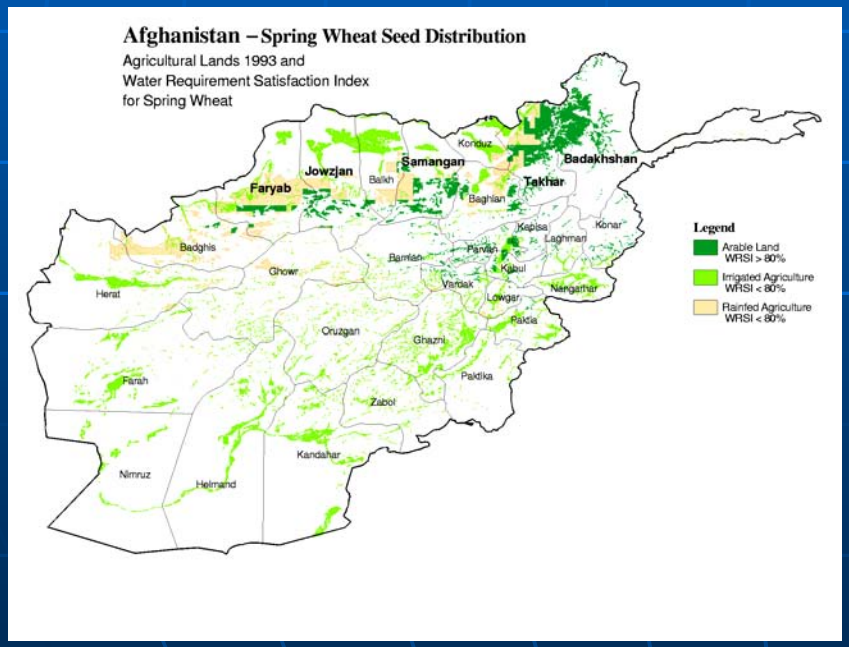
Generate Summary Reports

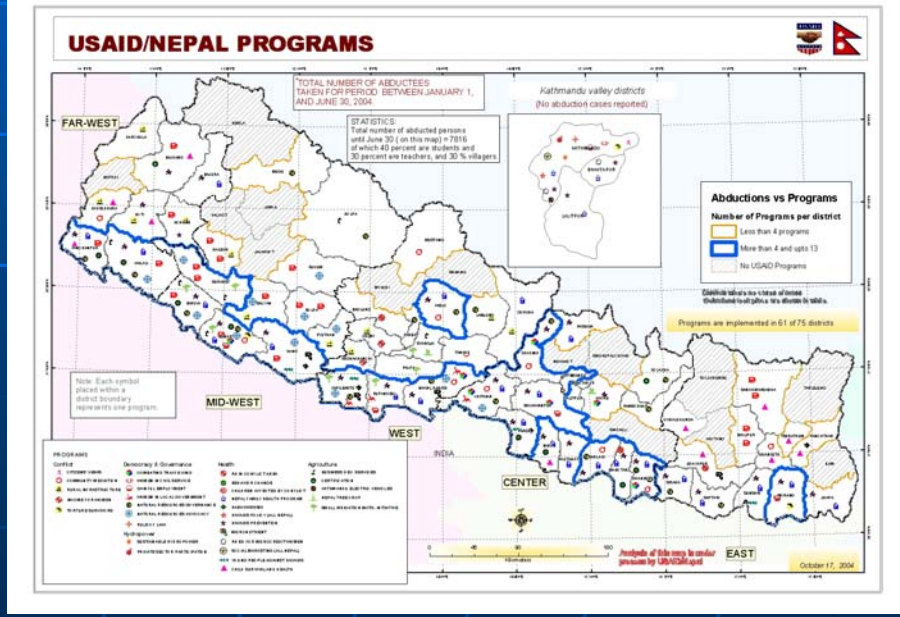


Show Distribution of Partners



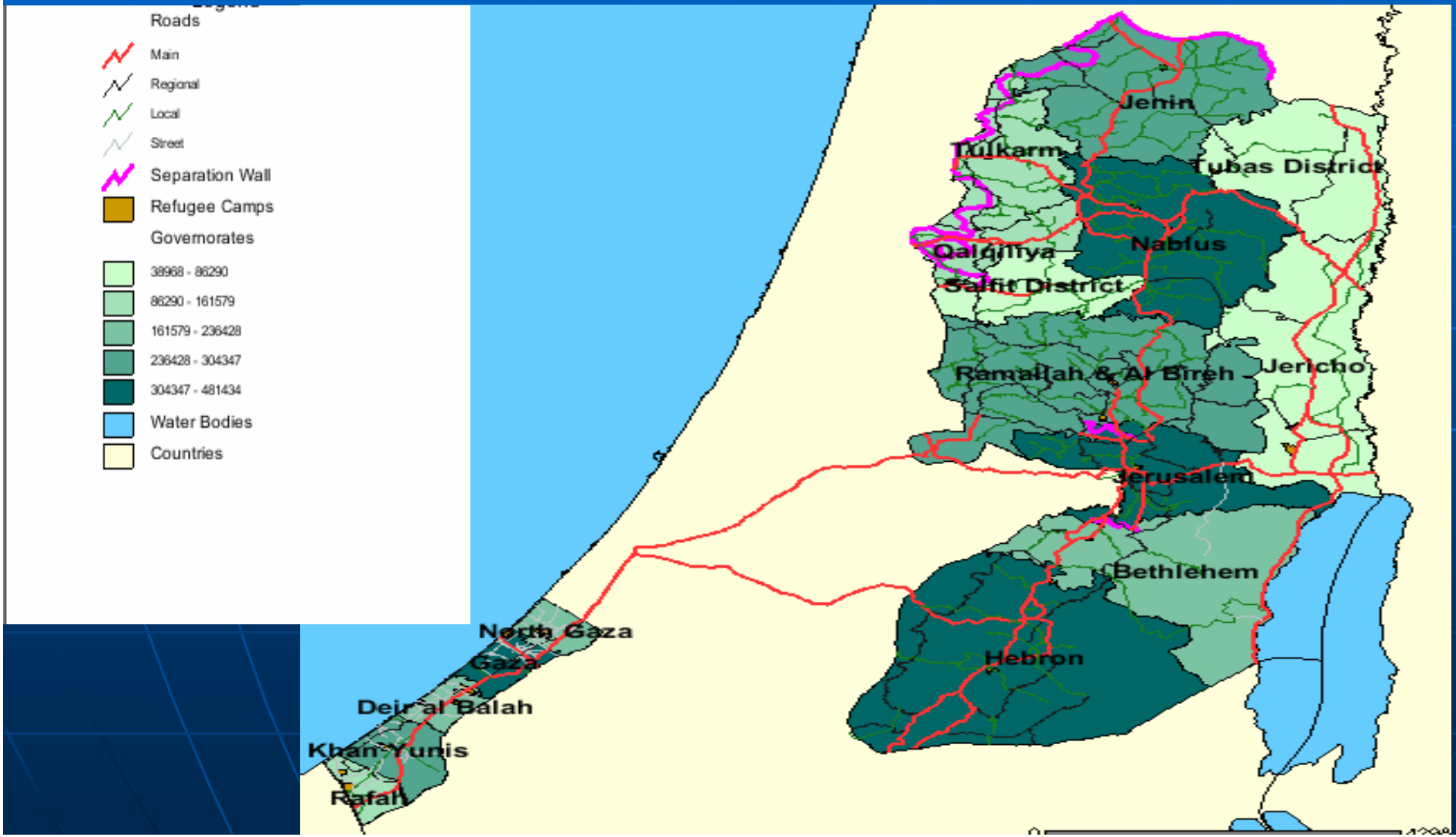
Summarize Programs





Strategically Plan: Use Demographic and Infrastructure Information to Determine Where to Put New Projects

Population Density per Governorate



Additional Uses of GIS for Development

Ivory Coast

- **Tax assessment and collection in Abidjan boroughs by combining geo-information on land, population, & economic activity**

- **Placement of new village health care centers based on population locations**

- **Improved allocation of revenues to local jurisdictions with more precise info of size and boundaries of nearby forest concessions**

GIS Use for Development

Mozambique

Determines spatial distribution of land mines for removal and safe passage

Senegal

Census data and village location data monitors progress of national poverty alleviation program

Gambia

Land use data combined with human settlement info to determine waste disposal facility sites

South Africa

Data on population centers, rivers, roads, mountain ranges combined to delineate boundaries of electoral wards for 1999 elections

Geospatial Information Technology allows us to integrate different sources of information to better understand our world and show us how interconnected we really are...