GEOGRAPHIC INFORMATION SYSTEMS
APPLICATIONS AND PRACTICES FOR USAID NATURAL RESOURCE MANAGEMENT PROGRAMS

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Applications and Practices for USAID Natural Resources Management Programs

The Natural Resources Information Clearinghouse

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ACRONYMS

ADS	Automated Directives System
CDC	U.S. Centers for Disease Control and Prevention
CTO	Cognizant Technical Officer
DAC	OECD's Development Assistance Committee
DEC	Development Experience Clearinghouse
EROS	Earth Resources Observation Systems
ESIP	Earth Science Information Partners
ESRI	Environmental Systems Research Institute
EO	Executive Order
EXO	Executive Officer
FOIA	Freedom of Information Act
FGDC	Federal Geographic Data Committee
GIS	Geographic Information Systems
GPS	Global Positioning System
GSDI	Global Spatial Data Infrastructure
ICT	Information Communication and Technologies
IRM	Office of Information Resources Management
IMS	Office of Information Management Services
IT	Information Technology
LDC	Less Developed Countries
LPA	Office of Legislative and Public Affairs
LRM	Land Resource Management
MDG	Millennium Development Goal
NGO	Non-Governmental Organization
NIMA	National Imagery and Mapping Agency
NOAA	National Oceanic and Atmospheric Administration
NRM	Natural Resources Management
NSDI	National Spatial Data Infrastructure
OE	Operating Expenses
OECD	Organization for Economic Cooperation and Development
PMO	Program Management Office
USAID	U.S. Agency for International Development
SDI	Spatial Data Infrastructure
SOT	Strategic Objective Team

EXECUTIVE SUMMARY

This report by the Natural Resources Information Clearinghouse (NRIC) assesses the use of GIS within all programs funded by the U.S. Agency for International Development (USAID). This assessment had several objectives: (1) to identify how USAID uses geospatial data and information for natural resources management; (2) to summarize challenges; and (3) to suggest opportunities for improving the use of GIS throughout the Agency. Although the Agency has invested heavily in geospatial information and related technologies, it has not documented many of its activities. Furthermore, missions, regional programs, and central USAID offices, increasingly use GIS to plan, monitor, and communicate their portfolios. While these initiatives demonstrate vital first steps toward tapping available technology for development, USAID would benefit from developing a strategy to improve and implement GIS use throughout the Agency.

Survey Methodology and Results

For the assessment, the NRIC team employed a methodology that included a literature review, the development and dissemination of a survey questionnaire, use of key informant interviews, and an analysis of the information gathered. Among the initial findings by the NRIC team was that GIS is a commonly used tool. The team found 109 current or recent (2000 to the present) GIS projects managed by 18 different USAID missions. This number is most likely higher as some projects do not highlight GIS activities or it plays a minor role. The team also found that GIS use is expected to grow over the next five years. This assumption is based on responses from the survey where nearly 95 percent of respondents said that they expect to use GIS at the same or increased level over the next five years. Finally, over 70 percent of those surveyed stated that GIS is "very important" to their work. While GIS support is not mission critical (development work can move forward without it), it is a tool that can assist in program planning, design, communication, and helping the agency evaluate the impact of its investments.

USAID uses GIS for a wide variety of purposes. The most common use is to create maps and graphics for reports. While the utility of these maps is important, the real power of GIS is to analyze and model information to make better decisions. It appears that USAID and its partners are just beginning to tap into this potential. The other most common uses (in order of declining frequency) are to: (1) view project/program locations; (2) analyze data for strategy or program development; (3) identify overlapping program and partner activities; (4) visualize program indicators for monitoring and evaluation; and (5) share information in a data clearinghouse. Section II provides more details about survey methodologies and results.

Survey findings suggest both opportunities and challenges for the Agency, particularly since GIS has not yet been integrated into all levels of programming within USAID. For example, policies and regulations exist for data management, but they are not fully implemented. While a great deal of GIS data exists, it lacks (1) adequate documentation to protect the initial investment and its continued use; (2) training to field personnel on its use; and (3) an administrative mechanism that can archive, coordinate, and disseminate requests for data and information. Moreover, USAID staff and contractors do not fully comply with existing USAID directives and federal regulations regarding GIS use. Section II summarizes survey methodologies and finding and Annexes A and B present specific survey questions and list respondents, respectively.

Regulations and Policies

Various federal regulations and policies govern the use of public GIS projects. These include Executive Orders (EOs) and Automated Directives Systems (ADS) and authorizations to follow several spatial data infrastructure initiatives such as the National Spatial Data Infrastructure (NSDI). CTOs, COs, legal officers, and technical personnel should know and understand these mandates and follow appropriate procedures in their professional duties. This is the simplest, best way to protect GIS investments and develop widely accepted best management practices for implementation and use.

The federal government established a NSDI for the U.S. that sets standards and guidelines for U.S. GIS users and data collectors. To achieve international compatibility and to leverage GIS investments with partner governments and NGOs, USAID should consider supporting federations of regional or national spatial data infrastructures (SDIs). Moreover, USAID could improve international coordination and support global SDIs by embracing the Global Information Infrastructure Commission (GIIC) goals. These goals include strengthening the private sector's role in developing a diverse, affordable, and accessible information infrastructure; promoting developing countries' involvement in building and using a global and open information infrastructure; and facilitating activities and identifying policy options that foster effective applications of telecommunications, broadcasting and information technologies and services. Section III outlines federal regulations and policies and Annex C provides greater details.

Best Management Practices

The Agency should develop and adopt current best management practices and disseminate them in a GIS Resource Guide. By setting standards of excellence across all levels in the organization, the Agency can better manage data and maps and improve data sharing among different offices and partner organizations. At the minimum, these stakeholders should implement federal regulations and create metadata according to the protocol of the Federal Geographic Data Committee (FGDC). By implementing and following state-of-the-art best management practices, the Agency will save money and time in GIS technology and services.

The federal government provides many resources, policies, and guidelines to improve the efficiency and usefulness of information and Internet-based technologies. For example, the e-government act of 2002 (HR.2458/S.803) codifies the role of OMB and other federal agencies in reducing redundancy that provides the best services to citizens and businesses (see www.egov.gov). Due to this initiative, the government established a Geodata Portal (see www.geodata.gov) that serves as geospatial one-stop Internet sites for downloading federal, state, and local data sets. The Geodata Portal supports the goals of the NSDI and provides tools for better inter-agency coordination and collaboration related to geospatial resources. It allows users to search and access data through the Internet and it promotes the use of standards and best management practices for GIS implementation. Section III identifies sample best management practices and suggests ways to the Agency to implement them.

Opportunities and Recommendations

Many opportunities exist to improve the efficiency and effectiveness of GIS and geospatial data use both within the Agency and for host government beneficiaries. These include creating an agency-wide vision and strategic plan, providing agency-wide training and giving technical assistance to missions, enforcing existing regulations, establishing and following best management practices, implementing spatial data infrastructure, and embracing the e-government initiative to improve and standardize data access.

The main opportunity for expanding application of GIS technology to further USAID's development goals lies in creating a vision supported by a strategic plan for institutionalizing the appropriate policies

and practices. When this report was written, USAID's vision about GIS implementation was unclear. This vision should reflect the objectives of the Office of Management and Budget's Circular A-16 that provides direction for federal agencies that produce, maintain, or use spatial data to carry out their work.

To encourage widespread use of GIS technology, the Agency must implement a full-scale training initiative to help Contract Officers (COs) and Cognizant Technical Officers (CTOs) understand the key roles that they play in implementing an Agency-wide GIS strategic plan. CTOs and COs need to be aware of basic GIS-related regulations so that they can be enforced. CTOs should also be reminded that data financed by USAID are in the public domain and must be documented with metadata. Implementing ADS regulations and best practices will also help with local development and strengthen local institutions. Section IV describes opportunities and recommendations in more detail.

There is widespread and increasing use of geospatial data within the Agency to meet its development goals. Many federal and Agency regulations, however, which improve implementation and use of GIS are not being followed. Using a set of "best practices" can help realize and promote geospatial data use within the Agency. GIS is not just software, hardware, and data; it is also about the people who make and use GIS. As GIS technology is maturing, so must be the practices used to manage it. The biggest challenge will be finding a leader within the Agency to champion institutionalizing GIS within USAID. Without this, successful adoption and diffusion of GIS use will not occur.

Acknowledgments

I. INTRODUCTION

Geographic information systems (GIS) are a powerful set of tools for collecting, storing, and analyzing spatial data and giving valuable information to natural resource managers. GIS is more than a map-making technology. It offers strong analytical capabilities and data storage models that complement other geospatial technologies such as remote sensing and geographic positioning systems (GPS). GIS business is booming worldwide. One study describes GIS software sales at about $US 1 billion annually with another $US 15 billion in associated professional services and related technologies (Longley et al 2001). Other statistics suggest that there are about two billion GIS users worldwide and this figure is growing at about 20% per year (Foresman, 1997). USAID has become an important stakeholder in GIS with application in over 100 projects worldwide since 2000 (NRIC, 2005). As an innovative information technology, GIS has become an important tool for international development and many USAID partners, including governments, non-governmental organizations (NGOs), research institutions, businesses, and local communities share GIS projects and data with the Agency.

With so many GIS projects worldwide, USAID has developed a varied portfolio that covers many disciplines. This report, however, focuses on GIS use in natural resource management (NRM) and it spotlights applications relevant to land management, water, biodiversity, and forestry projects.

This report contends that GIS technology presents many advantages for development work and that USAID could significantly advance its overall development agenda through a concerted and integrated application of the technology. Even with a varied portfolio of NRM projects, USAID lacks a coherent strategic plan or data framework to guide overall activities. This report considers ways to improve GIS effectiveness and suggests recommendations for Agency action. Among other conclusions, the report recommends adherence to existing federal standards and guidelines and implementation of best management practices to manage software, hardware, data and the people who make GIS work. It also suggests that USAID should develop a strategic plan to coordinate activities and a GIS Resource Guide to help field missions. This guide would summarize best management practices including legal and policy considerations, roles and responsibilities for USAID staff, and standard procedures for handling data, maps, and technical resources. In addition, the guide would include case studies that show sample scopes of work, contracts, and GIS methodologies that provide frameworks for mission projects.

This report is comprised of four sections and 13 appendices. Section I provides an introduction to GIS and its value to USAID. Section II describes the methodology and reviews the survey findings, including common GIS uses within USAID, GIS users by region, and GIS applications. Section III presents considerations for implementing GIS, the overall legal and policy framework, the roles and responsibilities of COs and CTOs at USAID, and GIS best practices. These practices include standards related to the use of GIS data and maps, general guidance for USAID implementing program partners, and the GIS lifecycle. Section IV reviews these opportunities and various recommendations. The report also includes various appendices, including the GIS assessment questionnaire, a list of questionnaire respondents, desk studies from Mozambique, Nepal, the Philippines, and the West Bank, and policies applicable to GIS.

II. USE OF GIS AT USAID

A. Survey Methodology

NRIC conducted a survey of GIS use and implementation in USAID. The survey methodology included a literature review, a survey of GIS use, key informant interviews, and an analysis of the information. This section reviews survey methodology and results.

A1. Literature Review

The team conducted a search of NRIC's web-enabled database and USAID's Development Experience Clearinghouse (DEC) website for documents and other publicly available project information and found 109 current or recent (from CY2000 to CY2004) projects within 51 missions that use GIS technology. Asia and the Near East had the greatest number of missions that relied on this technology (39 percent, 18 missions, and three regional projects), followed by Africa (26 percent, 12 missions, and seven regional projects), and Latin America and the Caribbean (21 percent, 13 missions, and four regional projects). There were fewer projects in Eastern Europe (9 percent, eight missions, and one regional project) that applied GIS technology. Of the number of GIS applications identified, 50 percent were found in projects that focused on environmental issues followed by food security and agricultural initiatives (10 percent) and use of GIS technology at the mission level and for health-related development initiatives (each 6 percent). Energy and disaster mitigation were each responsible for 5 percent; economic growth and tourism for 4 percent apiece; information technology (3 percent); and land titling, anti-trafficking, gender and education, democracy and governance (each 2 percent). Humanitarian assistance, inter-agency coordination, and remote sensing were each responsible for 1 percent.

Although the NRIC team was able to identify about 110 current or recent USAID projects that use GIS, the actual number of projects is under-reported because GIS is often a tool and not necessarily the focus of a project. Thus, project descriptions and budgets do not always highlight GIS. For example, Internet searches of the NRIC and DEC sites initially revealed no GIS activities in Bolivia although members of NRIC's team know about them, and report that every strategic objective team (SOT) in USAID/Bolivia uses GIS in one or more projects. For a comprehensive list of USAID GIS projects, please see Annex D.

A2. Survey of GIS Use

The NRIC team developed and implemented a two-phase approach to administering a detailed questionnaire about GIS use. The first step was to send a short initial message to 56 missions through USAID's Office of Natural Resource Management (NRM) to determine if any of the missions used GIS technology in their projects or at the mission level. The team received 31 positive responses from 18 missions (CTOs, program offices, and program partners working in NRM). The second phase targeted these respondents. Only 26 surveys could be used because some were incomplete or duplicates. The team then sent a more detailed, five-page survey on GIS activities to the group, which represented 18 missions. See Annex A for a copy of the survey questionnaire and Annex B for a list of respondents.

A3. Key Informant Interviews

In a series of interviews, six key informants had suggestions from field missions about how USAID/Washington might better support GIS use. They were asked to detail the history of GIS initiatives implemented with USAID, to give information for five in-depth desk studies of specific projects, as appropriate, and to provide GIS-related material. These interviews helped put into context the literature

review findings, survey results, and desk study materials. The informants had useful perspectives about using GIS. One key informant noted that GIS helped facilitate the availability and sharing of data. He said, "There are so many types of very valuable data collected, distributed, and archived by agencies in the U.S. Although these data are collected at the global scale, they are equally useful for the countries to apply in solving local problems. These data are either free or cost little, only our ignorance has minimized their benefit." Another key informant felt that GIS implementation guidelines and its applications could be standardized and made available to missions through a GIS Resource Guide. NRIC summarized these and other comments and synthesized them into a list of common problems and solutions. These are described in Section IV along with a series of recommendations. See Section IV. Opportunities.

A4. Analysis of Information

Information on project desk studies was gathered and compiled. In addition to the mission-wide survey, NRIC and the LRM team selected five USAID programs in Mozambique, Nepal, the Philippines, Russia, and the West Bank that use GIS technology. They were selected for in-depth analysis to synthesize lessons learned and best practices, and to provide reference materials that could be used in implementing future GIS activities. These materials are included as an annex to this report (see Annex C). USAID staff will receive this report in hard copy and electronic format on the EGAT Intranet.

B. Survey Results

The survey questionnaire (see Annex A) covered important topics related to GIS use and asked multiple questions on each topic. This section analyzes four of these topics: applications, costs and funding mechanisms, maintenance, and implementation.

Questionnaire results found that USAID uses GIS for a wide variety of purposes. The most common single use was as a communication tool to illustrate program activities on maps and graphics for reports. The other most common uses (in order of declining frequency) were: (1) viewing project/program locations; (2) analyzing data for strategy or program development; (3) identifying overlapping program and partner activities; (4) visualizing program indicators for monitoring and evaluation; and (5) as a data clearinghouse. Other trends include the following:

GIS use is expected to grow in the next five years. Eighty-nine percent of GIS users surveyed say that they expect to use GIS at the same level or increase its use over the next five years. The other 11 percent did not respond to the question.

GIS is important for program development. More than 68 percent of GIS users surveyed said that GIS is "very important" to their work. Thus, while GIS support is not mission critical (development work can move forward without it), it can assist in program planning, design, communication, and helping missions evaluate the impact of its investments.

Local capacity building in GIS is occurring. One-half of projects received training, specifically about how to train others to install hardware and software. This type of technical support remains the most commonly requested type of support given by USAID/Washington. Private sector training opportunities may encourage institutional development. Providing training to private sector organizations in donor countries on how to install and support the GIS hardware and software may encourage institutional development. The transfer of knowledge allows USAID and its partners to employ local organizations to conduct training instead of hiring USAID or its international contractors.

GIS users by region. Of the GIS projects identified, the greatest percentage were in Asia and the Near East (36 percent, 12 missions plus two regional projects), followed closely by Latin America and the

Caribbean (36 percent - 12 missions plus two regional projects) and Africa (26 percent, 18 missions). Relatively fewer projects using GIS are in Eastern Europe (10 percent - five missions).

GIS applications. The following types of GIS applications were identified within USAID doing Internet searches of publicly available documents:

- Environmental components (forestry, biodiversity, agriculture, water quality, sustainable resource management) (10)
- Land use/cover and conservation (10)
- Water resources management (7)
- Food security and agriculture (7)
- Mission-wide use (6)
- Health (6)
- Forest fires (5)
- Energy, (4)
- Information technology (4)
- Inter-agency coordination (4)
- Disaster mitigation (3)
- Land titling (3)
- Anti-trafficking (3)
- Coastal zone management, (2)
- Tourism (2)
- Trans-boundary coordination (2)
- Gender and education (2)
- Illicit substance eradication (2)
- Economic growth (2)
- Fisheries (1)
- Deforestation (1)
- Humanitarian assistance (1)
- Democracy and governance (1)
- Remote sensing (1)

Adherence to regulations. According to survey results, a large percentage of GIS users do not archive or distribute GIS data. Few adequately document GIS investments with appropriate metadata. Collectively, these shortcomings hamper the Agency's ability to analyze and share its data. For example, only 39 percent of the data are documented, even though it is a federal requirement to document 100 percent. Without metadata, it is difficult for other users to understand the intended use of the data and the technical specifications that make it possible to use it.

Data archiving and distribution are also deficient. In 14 percent of the cases, the CTO is the final person to receive the data. When the CTO leaves for the next post, knowledge of project data often disappears. According to the ADS regulations (551), information systems should be archived with the Information Resources Management (IRM) team. Respondents indicated that only 50 percent of the data are being archived. It is unclear how this is being done or by whom. Only half of the respondents comply with the regulations, and in some cases, none of the data is archived or has metadata.

The following four subsections, "Current or Recent GIS Applications," "GIS Costs and Funding Mechanisms," "GIS Maintenance," and "GIS Implementation," discuss the specific results of each part of the survey.

B1. Current or Recent GIS Applications

For topic 1, respondents were asked to comment on how GIS is currently or has recently been used. Questions included:

- *Within your SOT or Program Office, how are you or your implementers using GIS?*
- *Please describe the type(s) of GIS applications you or your implementers are using.*
- *If USAID program implementers are using GIS, who are they?*
- *If you know, what GIS software do you or your implementers use?*

The most common single use was to create maps and graphics for reports (Question 1). Within many institutions, the first use of GIS is often as a communication tool. This is also the case within USAID where GIS is used to make maps that help people visualize USAID activities. While these maps are important, the real power of GIS is to analyze and model information to make better decisions, and it appears that USAID and its partners are just beginning to tap into this potential.

Question 1: Most commonly identified uses of GIS (multiple responses allowed):

- 89 percent - Creating maps/graphics for reports
- 75 percent - Viewing project/program locations on a map
- 54 percent - Analyzing data for strategy or program development
- 36 percent - Identifying overlapping program and partner activities
- 29 percent - Visualizing program indicators for evaluation and/or monitoring
- 14 percent - Clearinghouse for data

Contractors and international non-governmental organizations (NGOs) are implementing the majority of GIS (Question 2). More host governments reported being responsible for maintenance than implementation (see GIS maintenance section below).

Question 2: USAID program implementers using GIS (multiple responses allowed):

- 50 percent - Contractors
- 46 percent - International NGO
- 43 percent - Host governmental agencies
- 36 percent - Local NGO
- 14 percent - Local university

B2. GIS Costs and Funding Mechanisms

Respondents for topic 2 were asked to answer several questions about how GIS activities are funded, and the amount of that funding. Questions included:

- *If known, how are GIS activities funded?*
- *If possible, please supply annual USAID funding level estimates for the following GIS activities, as appropriate.*
- *Please describe the GIS project and its timeframe.*
- *Please indicate if the following applies to the GIS project: additional financial support, in-kind contributions, GIS data or databases contributed.*

Question 3: USAID Funding Source for GIS activities (multiple responses allowed):

- 73 percent - Program funds
- 25 percent - Operating expenses funds
- 5 percent - Program development and learning funds (these came from the program office and tracked activities for an enterprise-wide system)

As a note, the cost figures obtained from this questionnaire are difficult to compare. There were several types of problems with the data. Some respondents provided total project costs, with a percentage allocated to GIS, but without a breakdown of GIS costs (data purchase, training, and so on). Others reported that 100 percent of the project is related to GIS, without specifying the amount of funding associated with it. Others reported a percentage of the total cost allocated to GIS, but then did not provide any financial information. Unfortunately, it is not possible to report any substantial findings with the type of information collected about costs. The Philippines desk study gives an example of costs related to institutional strengthening, municipal water delineation and enforcement, and fisheries management (see Annex C).

In terms of leveraging additional funding, in 29 percent of the cases, private sources contributed additional funding (Question 4). In 32 percent of the cases, in-kind contributions were made. In 54 percent of the cases, the host government contributed the GIS data.

Question 4: Percentage of GIS activities that leveraged funds (multiple responses allowed):

- 54 percent - GIS data or databases from partners or host government were contributed
- 32 percent - In-kind contributions (i.e., time, resources, or other non-cash donation)
- 29 percent - Additional financial support (from private and/or other sources)

B3. GIS Maintenance

For topic 3, respondents were asked to comment on how GIS data are maintained during a project and after the project has been completed. Questions included:

- *Are data deposited to a clearinghouse or repository?*
- *Who is responsible for maintaining GIS data?*
- *Which of the following happens to GIS data when a project ends?*

Question 5: Entity responsible for GIS maintenance (multiple responses allowed):

- 46 percent - Host governmental agencies
- 29 percent - International NGO
- 29 percent - Contractors
- 25 percent - USAID
- 18 percent - Local NGO
- 11 percent - Local university
- 11 percent - Information Technology or Computer Support within USAID
- 7 percent - Unknown
- 3 percent - Other

A good indicator of local capacity development is a government's decision to take responsibility for maintaining GIS. Forty-six percent of respondents reported that the host government was responsible (Question 5). This was the single most common response; it may mean more support for maintaining the GIS if the host government can follow through.

A potential concern is the 25 percent of respondents who reported that they were responsible for maintaining GIS. Generally, this means that when a project ends or an individual leaves, institutional memory is lost. Fortunately, with one exception, those that responded that they were responsible for maintenance also said that at least one other person or entity also claimed responsibilities for maintenance.

Question 6: After a project ends, what happens to the GIS data? (multiple responses allowed):

- 46 percent - Implementing partners retain/maintain
- 39 percent - USAID Mission retains/maintains
- 14 percent - Given to CTO (Cognizant Technical Officer)
- 14 percent - Unknown
- 7 percent - Given to Center for Development Information and Evaluation (CDIE); now referred to as the Development Evaluation and Information Division (DEI), the department in which DEC is housed

In 14 percent of the cases, the CTO receives the data. When the CTO leaves for the next post, often the knowledge associated with the project data departs as well. According to the ADS regulations (551), information systems should be archived with the IRM team. Respondents indicated that only 50 percent of the data are being archived. It is unknown how or with whom (Response G). Similarly, only 39 percent of the data are documented when it is a federal requirement to document 100 percent.

B4. GIS Implementation

Respondents for topic 4 were asked to answer several questions about how GIS data are created and used by a project. Questions included:

1. For GIS data that have been acquired, please select the most appropriate response(s).
- ☐ Data are documented with metadata (information on format, projection, use, etc.).
- ☐ Data are distributed.
- ☐ Data products are developed.
- ☐ Data are analyzed.
- ☐ Data are updated.
- ☐ Data are archived.
- ☐ Unknown
- ☐ None of the above

2. Which of the following applies to you or your program implementers?

- ☐ GIS training is available.
- ☐ A GIS plan has been implemented.
- ☐ Unknown
- ☐ Neither

3. What types of GIS products were related to this GIS project?

4. How would you rate the utility of GIS in your project design, implementation, and/or evaluation?

Question 7: What happens to the GIS data acquired? (multiple responses allowed):

- 61 percent - Data are analyzed
- 57 percent - Data are distributed
- 46 percent - Data products are developed
- 50 percent - Data are updated
- 50 percent - Data are archived
- 39 percent - Data documented with metadata (format, projection, use, etc.)
- 4 percent - Unknown
- 4 percent - None of the above

Data are primarily being used for analysis and sharing (Question 7). Responses to this question suggested several weaknesses in USAID's use of GIS data. For example, only 50 respondents indicated that they updated or archived their data. This suggests that data are used for project purposes alone. Moreover, only 39 respondents indicate that they document their data with metadata; this is both a best practice and a federal requirement. These findings suggest that USAID's investments in data are not realizing their full potential since only a portion of the data purchased or produced can be easily shared and used in the future. Without metadata, it is difficult for other users to understand the intended use of the data and the technical specifications that make it possible to use it. Regulations also state that all data (corporate information systems) should be archived. Only half of the respondents comply with the regulations, and in some cases, none of the data is archived or has metadata.

Respondents indicated that none of the data is deposited into data clearinghouses. However, at least four respondents report that their implementers participate in clearinghouse activities. No funds were reported for archiving activities. Results from question (2) above, 21 percent of the respondents stated that a GIS plan has been implemented. This suggests that the GIS data are for the project only, and there is no intention to use it for other purposes.

Question 8: GIS products generated (multiple responses allowed):

- 89 percent - Maps
- 75 percent - GIS data
- 61 percent - Reports
- 54 percent - Locally trained staff
- 50 percent - Locally installed GIS software
- 46 percent - GIS analysis
- 36 percent - Locally installed hardware
- 7 percent - Local GIS clearinghouse

In about 50 percent of the cases, capacity building is occurring at the local level for training and hardware/software installation (Question 8). Although training was reported to be offered in one-half of the projects, it remains the most common type of support requested from USAID/Washington.

Question 9: What is the most common GIS software used (multiple responses allowed):

- 82 percent - ArcView (ESRI product)
- 57 percent- ArcGIS Desktop (ESRI product)

- 25 percent - ERDAS Imagine (primarily remote sensing, some vector data)
- 11 percent - MapInfo (traditionally used in engineering applications)
- 11 percent - IDRISI (raster-based software)
- 4 percent - Unknown

The majority (82 percent) of USAID operating units and partners that implement GIS use Environmental Systems Research Institute's (ESRI) ArcView software (Question 9). ArcView is relatively user friendly and has the capability to perform spatial analysis. Some of the respondents reported inconsistent pricing when acquiring software overseas. Federal rates have been negotiated and mechanisms exist within USAID to obtain federal pricing for GIS software. It is essential to ask the local vendor to manage government rates, since they may not always be offered initially.

Within sectors, many other software analysis packages can be found. For example, EpiMap software from the U.S. Centers for Disease Control and Prevention (CDC) is a freeware product that can be installed to analyze health statistics and epidemiological data.

III. FRAMEWORK FOR GIS IMPLEMENTATION AND MANAGEMENT

As with any new technology, GIS needs to be understood, accepted, and used by diverse people within an enterprise and among partner organizations. As a result, project managers must consider technical, communication, and capacity issues to establish GIS successfully in regional programs. Section III presents factors to consider when implementing GIS technologies and management structures. This section is designed for technical staff, COs, CTOs, and partner organizations and addresses topics related to effective GIS implementation, including broad considerations for implementation, the legal and policy framework, roles and responsibilities for COs and CTOs, and GIS best practices.

A. Considerations for GIS Implementation

Based on a survey of study recommendations, this report presents some important considerations for GIS implementation. These recommendations summarize similar findings from other studies, including:

- Results of the NRIC survey of GIS use and key informant interviews
- Development Assistance Committee (DAC) Survey on Donor Information Communications and Technologies (ICT) Strategies, (Organization for Economic Growth and Development, 2005)
- Information and Communications Technology for Development: USAID's Worldwide Program (EGAT, 2004)
- Diffusion of Innovations Theory (Rogers, 1995)
- *Geographic Information Systems: A Primer for USAID Managers* (Davis, 1995)
- Longley P., Goodchild M., and Maguire, D and Rhind D. (2001). *Geographical Information Systems and Science*

Key findings include the importance of implementing appropriate technology, conducting effective marketing, fostering meaningful communications, building local capacity, establishing training programs, developing lasting partnerships, and enforcing existing regulations.

Implement appropriate technology. GIS fits into a larger portfolio of information technology (IT) and needs to be integrated into broader IT management objectives. Moreover, GIS complements and leverages other geospatial technologies in remote sensing and global positioning systems (GPS). As a result, managers should consider GIS data collection, analysis, and dissemination within the context of overall IT management. Despite the rapid growth in GIS and geospatial technologies, the latest technologies can present too many challenges for developing programs. It is better to start simple and grow slowly.

Foster meaningful communications. Implementation, diffusion, and effective use of GIS takes time. Successful organizations will require a GIS champion to market and communicate the technology to managers and technicians in the enterprise. Project managers should design mechanisms to increase horizontal communications among peers and to develop a support network of users. In addition, they should set up vertical communication channels among data creators, analysts, and decision makers. These steps will increase the likelihood that GIS will be successfully implemented throughout the enterprise.

Conduct effective marketing. GIS champions should consider applying marketing strategies to demonstrate the power and utility of the technology to diverse users to win their acceptance. For example,

they could display maps at meetings and presentations to demonstrate the value of GIS. Managers could also establish training sessions appropriate for different kinds of users. By educating and informing all stakeholders of a project's progress, GIS champions can win supporters even if they do not directly use the technology.

Build local capacity. Limited expertise and capacity presents a bigger problem for sustainable GIS projects than technology challenges. Many agencies in developing countries have shortcomings in basic information collection, analysis, and management and they lack the capacity to implement and use GIS. Local data collection often depends on who one knows and it can be a cumbersome process, even for public agencies. Ultimately, successful and sustainable GIS projects must be "owned" by local users and various local groups should have access to the technologies and their applications. For these reasons, expatriate experts who implement projects in developing countries should ensure that local staff persons receive the skills they need to use GIS on their own. Local officials may not appreciate or understand the capabilities of GIS and they may need extra consideration in training and communication. To achieve a significant development impact, all organizations, including those working with disadvantaged groups such as the poor and indigenous people, should also have access to maps and data. Moreover, since many projects include transboundary issues, GIS managers should build international and interregional cooperation.

Establish training programs. Deliberate and thoughtful training programs can increase local capacity and enable staff to design, develop, and maintain their own GIS systems. Moreover, since host country staff often seeks training and later leave for better jobs, training programs should be done on an ongoing basis to account for turnover. They should anticipate the needs of various levels of GIS stakeholders, such as high-level decision makers, members of local governance organizations, IT professionals, and GIS technicians, and design curricula for them.

Develop lasting partnerships. By creating links with private companies and relevant government agencies, GIS managers can improve data quality and quantity and move more quickly to achieve project results. The private sector can give expertise in application development, data access, and training. Technology transfer with U.S. companies can facilitate the implementation of the latest technologies and ideas. Governments can play an important role in accessing data and can establish a well-regulated, competitive environment in which IT and GIS can flourish. U.S. agencies such as the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), the U.S. Forest Service (USFS), and others may be able to provide remote sensing and technical expertise through partnership agreements. Local government should be repositories of GIS data sets and help facilitate partnerships with regional and international partners.

Enforce existing regulations. By understanding and following regulations that define GIS activities funded by federal funds, GIS managers can set expectations and assumptions related to geospatial data management and documentation. These include policies from USAID's directives management program, the ADS. In addition to the ADS regulations, Executive Order (EO) 12906 provides a mandate to develop a national spatial data infrastructure (NSDI). The NSDI comprises the technologies, policies, and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic community. Moreover, EO12906 was designed to enhance OMB Circular A-16, which supports the advancement of the NSDI as well as the Global Spatial Data Infrastructure (GSDI). The GSDI is an international collaboration that promotes the development of Spatial Data Infrastructures (SDI) throughout the world. The SDI concept describes requirements for computer technologies, policies, and people necessary to promote the sharing of geospatial information throughout all levels of government, private industry, NGO organizations, and the academic community. Careful adherence to these guidelines will simplify data management strategies and empower GIS managers to require high standards across all applications and partnerships.

B. The Legal and Policy Framework

A major finding of the survey assessment was that there were difficulties identifying, locating, and obtaining access to GIS data created within USAID programs. Although adequate policies and regulations exist for geospatial data management, Agency personnel often do not fully implement or follow them, thus hampering development on-the-ground and hindering institutional memory. USAID's ability to keep track of and share data and analyses is impeded by the large percentage of GIS users that do not adequately document GIS investments with appropriate metadata, and archive and/or distribute that data.

> **Mandate for Developing and NSD**
>
> Geographic information is critical to promote economic development, improve our stewardship of natural resources, and protect the environment. Modern technology now permits improved acquisition, distribution, and utilization of geographic (or geospatial) data and mapping. The National Performance Review has recommended that the executive branch develop, in cooperation with State, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data in such areas as transportation, community development, agriculture, emergency response, environmental management, and information technology.

In short, USAID has all of the necessary tools and would benefit greatly from enforcing regulations governing the documentation and archiving of its investments in GIS and the development of GIS data. Adequate documentation of GIS information gathered both at the Mission level and under USAID's projects would enable the Agency to find, evaluate, and apply geospatial data more broadly in its development initiatives. Moreover, it would enhance the Agency's ability to use GIS applications as a central part of decision-making and program development.

Federal regulations. All spatial data and GIS activities financed (directly or indirectly, in whole or part) by federal funds must comply with the following regulations:

Federal Executive Orders (EO)
- Executive Order 12906; and
- OMB Circular A-16

Automated Directives Systems (ADS)
- ADS 507. Freedom of Information Act (FOIA)
- ADS 551. Data administration
- ADS 547. Hardware and software maintenance
- ADS 557. Public information
- ADS 215. USAID Policy Determination 22. Environmental applications

These regulations and policies are important because, if fully implemented, they would put into place many key GIS "best practices." In this context, they outline administrative roles and responsibilities to archive, maintain, and distribute federal data. They require USAID and their grantees and contractors to:

- Make these data publicly available
- Document these data according to Level I metadata standards of the FGDC so that the investment in data is not lost and so others may use the data. The FGDC is an interagency committee composed of representatives from the Executive Office of the President, Cabinet-level and independent agencies. It is developing the NSDI in cooperation with organizations from State, local and tribal governments, the academic community, and the private sector.
- Distribute the data for free or at the cost of reproduction.

Executive Order 12906 and the National Geospatial Data Infrastructure. In addition to the ADS regulations, EO 12906 offers a mandate for developing a NSDI. OMB Circular A-16 facilitates interoperability between federal information systems and their partners, and it requires that all federal agencies coordinate their efforts to use and disseminate geospatial information. It establishes the FGDC as the interagency coordinating body for NSDI-related activities. FGDC sponsors a metadata (data documentation) clearinghouse to search for geospatial data. It currently has nearly 300 nodes for national and international users. Other federal agencies (i.e., the USGS, the Bureau of Land Management, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and NOAA) have already set up an FGDC clearinghouse node dedicated site for depositing and searching their metadata.

NSDI was created to fulfill the need for a central data storage mechanism. It makes sure that spatial data from multiple sources (federal, state, local, and tribal governments, academia, and the private sector) are available and can be integrated to improve understanding of the world. According to OMB Circular A-16, the NSDI honors several key public values:

- Privacy and security of citizens' personal data and accuracy of statistical information on people, both in raw form and in derived information products
- Access for all citizens to spatial data, information, and interpretive products, in accordance with OMB Circular A-130 (Management of Federal Information Resources)
- Protection of proprietary interests related to licensed information and data
- Interoperability of federal information systems to enable the drawing of resources from multiple federal agencies and their partners.

As of mid 2000, 40 countries have implemented a NSDI, including nine countries where USAID has missions. International compatibility is an important aspect of the NSDI; it supports building a GSDI that will advance USAID's development goals.

ADS requirements for data maintenance. Before agreeing to any data or hardware maintenance responsibilities, one should first consider that all data created or purchased with federal funding is the property of the U.S. government and must be made publicly available (see ADS 507 and 557). Unless, specifically stated in the contract, long-term data maintenance responsibilities generally do not fall under the scopes of projects. However, as many data are delivered to host countries for institutional development, it is in their best interest to consider standard data maintenance issues because they will likely be integrated with existing data. If data custodianship is part of the project design, both CTO and program partners need to review and consider four main components:

> **ADS Regulation 547:**
> **Roles and Responsibilities of Hardware and Software Maintenance**
>
> In overseas locations, the Executive Officer (EXO) or Agency principal officer (if no EXO is assigned) is the Property Management Officer (PMO) for IT resources including leased IT resources. Also, M/IRM shall manage the OE-funded core equipment worldwide maintenance contract for IT resources for USAID/W and participating Missions. M/IRM shall also manage maintenance of all OE-funded, end-user IT resources in USAID/Washington.

- Sanction to act as official repository (may delegate responsibility, or not)
- Responsibility to maintain data (create metadata/documentation)
- Need to distribute data (data is made available in a timely fashion and in a usable format)
- Provision of support staff (adequate personnel to meet requests)

Maintenance may also apply to hardware and software. ADS regulation 547 outlines roles and responsibilities regarding hardware and software maintenance within the USAID mission.

In making the decision about how to administer data, one might consider using existing federal mechanisms. One option may be submitting geospatial data to the GIS Data Portal at the Geospatial Data One-Stop (www.geodata.gov), which provides access to federal, state, and local geographic data for implementing NSDI.

ADS requirements for project completion and data sharing. At the end of a contract, USAID, either on its own or through contractors, has the responsibility to archive and share this information, however, USAID does not have adequate mechanisms in place to do this. ADS regulation 551, on Data Administration, already addresses these issues.

C. Roles and Responsibilities

As dictated by the various federal policies and guidelines discussed above, COs and CTOs at USAID have different roles and responsibilities for implementing and advancing GIS within the Agency. Both of them need to be aware of several issues when drafting terms of reference and scopes of work for projects that use GIS technology.

C1. USAID Contracting Officers

USAID COs should consider including language in the special provisions of agreements that create, acquire, or use geographic or spatial data. This would help advance the objectives of the NSDI, promote compliance with Executive Order 12609, and encourage incorporation of the GSDI. Suggested language includes:

1. Digital spatial data shall be documented according to FGDC Level I metadata standards.
2. Digital copies of data with metadata shall be a deliverable.[1]
3. Data shall be made available at the cost of reproduction.

By including this language in contracts and agreements, COs can ensure that information about applying GIS technology is not lost when projects end, and that data is appropriately archived with the metadata so that each successive investment in GIS can build on previous investments and achievements.

C2. USAID Cognizant Technical Officers

USAID CTOs should be familiar with federal regulations governing the use of GIS since they may need to implement them. To that end, information about these regulations and their applicability to GIS technology should be included as a standard portion of CTO training. The following ADS regulations are relevant to the use of GIS and geospatial information (See Annex F for more details):

507 - Freedom of Information Act (FOIA). This applies to CTOs since they may need to help gather certain federal data sets for program partners. They may also need to work with the contracting officer to ensure that program-specific geospatial data are collected and archived if a request is made for these data.

551 - Data Administration. CTOs should implement ADR 551 provisions to involve Agency IRM staff, as appropriate, since they are responsible for the majority of the geospatial administration tasks and are often unaware of geospatial data activities.

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[1] An easy to use, free tool to do this is MetaLite, which can be downloaded from: http://edcnts11.cr.usgs.gov/metalite/download.html. Some GIS software packages have a metadata tool integrated into them.

557 - Public Information. This provision ensures that data are made available to the public. This promotes transparency and free access to information.

Policy Determination 22. Telecommunications, Information, and the Global Information infrastructure, Section E215.1 provides a mandate for environmental applications to use GIS. It states that environmental projects and host country partners should "explore the use of remote sensing, GIS, and other global information in environmental planning and management of renewable and non-renewable natural resources."

E547.5.11 Excess Capitalized Property. GIS hard copy products and data funded by USAID projects (barring licensed data) should be considered public property and treated as such. In the case that the GIS will be dismantled at the end of a project, guidance is provided in "E547.5.11 Excess Capitalized Property." In cases where capitalized property in USAID/Washington or overseas is in excess, it must be reported by M/IRM, via a completed copy of Form OF-132, Property Disposal Authorization and Survey Report, to M/FM for adjustment to the General Ledger.

C3. General Guidance for CTOs and COs When Drafting TORs and SOWs

When developing GIS terms of reference (TORs) or statements of work (SOW), the following elements should be considered:

- Develop clear project goals
- Develop project specifications based on obtaining project goals
- Detail desired outcomes (e.g., better land title boundaries) and translate them into deliverables (e.g., parcel boundaries accurate to within 10 meters with contiguous parcel network)
- Identify the appropriate analysis and products necessary to meet outcomes
- Consider GIS life cycle implementation elements; for example, has adequate consideration been given to planning, data acquisition, documentation, integration, training, analysis, output, archiving, distribution, and maintenance issues for the host government?
- To reduce duplication of effort and minimize costs, identify existing GIS data within USAID and its partners; if the USAID CTO systematically stored metadata at the FGDC Federal Metadata Clearinghouse, this would be an easy place to search for existing data
- Identify gaps in existing data sets to meet project objectives
- Be aware that many GIS and geospatial data are available free of charge or at huge discounts (see Data Resources link in Internet-based GIS Resource Guide); for example, the Tropical Rainforest Information Center (a NASA Earth Science Information Partner) sells previously purchased Landsat satellite imagery for $25-$50 each instead of $300-$600 each

D. GIS Best Practices

The best GIS professionals adhere to best practices and industry-accepted standards related to data, maps, documentation, and implementation plans. These standards are consistent with the Agency's interest in promoting better development procedures, implementing knowledge management systems, and capturing information related to project methods, mechanisms, and approaches. The following sections detail relevant practices related to GIS data, maps, program partners, and project life cycles.

D1. GIS Data

When gathering new source GIS data and/or when filling gaps in existing datasets, a series of standard industry considerations serve as guidance:

- Require a quality assurance or data quality statement as part of the deliverable. Examples: Data should conform to the appropriate technical norm, or state that data are within e.g. +/- 2 meters of coordinate, or if using remotely sensed data (e.g., Landsat) data must be verified in the field to show what percentage of the data have been correctly classified.

- Make sure that the data used is an appropriate scale for the project and supports a data acquisition plan. For example, national-level projects might use 1:1,000,000 scale data, regional-based projects a 1:250,000 scale data, and municipal-level projects a 1:50,000 or better (higher resolution) scale data and may be supplemented by site-specific data from the field. Higher resolution, or larger scale data, are usually more expensive and require more computer space to store and manage.

- Specify that all GIS data are delivered by contractors or program partners in the appropriate GIS format with FGDC level one metadata (free tools are available to create this metadata at the following link: http://edcnts11.cr.usgs.gov/metalite/download.html) as well as a basic text file description. This includes intended use, description, date, source, author, and appropriate technical specifications (i.e., projection and datum used). Metadata can even be created to describe groups of data files; and

- Require that all digital spatial data files created and used in the process be a part of the deliverable. These could just be one or more of the following: raw data, library or core data, final data (processed), and map or data products.

D2. GIS Maps

Like a picture, a map is often an effective tool for conveying information. However, a little forethought can go a long way to ensuring that a map will meet its potential and will convey the intended message:

- Specify type, size, and number of hard copy maps
- Include a disclaimer on maps to avoid confusion about the intended use
- Proof maps in advance of delivery and allocate time for edits and changes
- Allocate time in the work plan for the review process

Be sure to check references of proposed contractors. Consider responsiveness, experience, personnel, bonding, support programs, equipment and production facilities, and cost. Figure 1 shows a map from USAID/Nepal that demonstrates agricultural land use classification for Nepal with an overlay of districts. The areas outlined in red are parks and conservation areas.
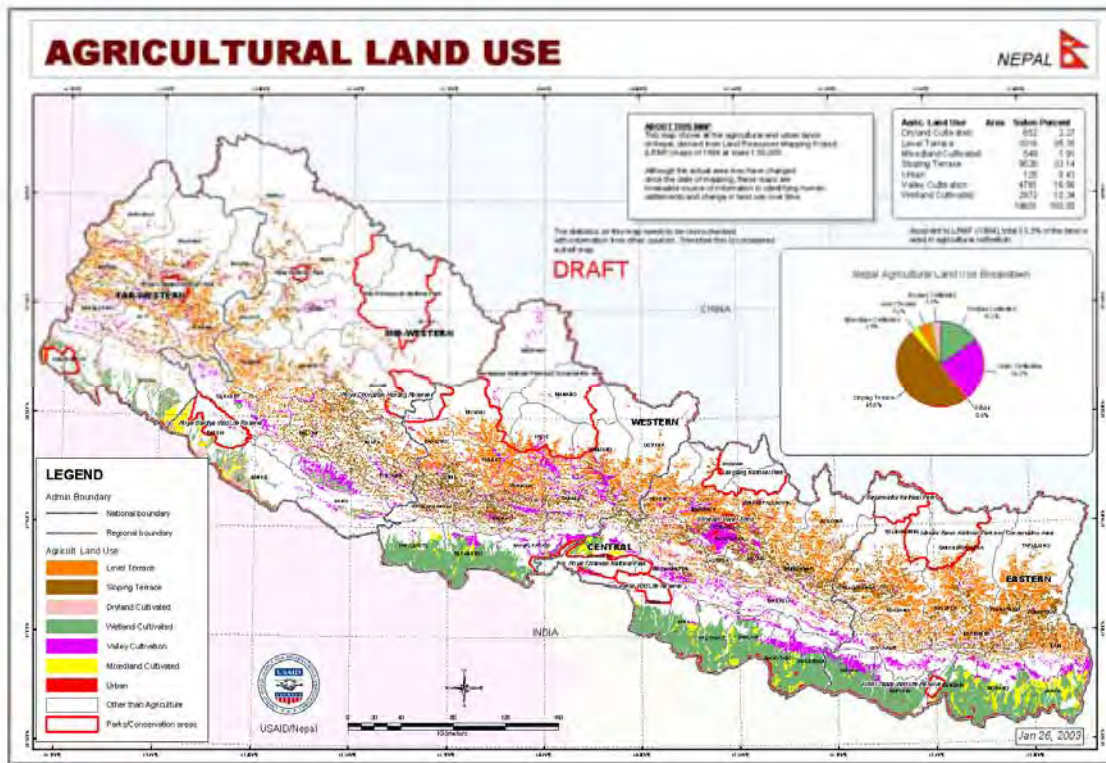
Figure 1. USAID/Nepal Map Demonstrating Agricultural Land Use Classification for Nepal with Overlay of Districts

D3. General Guidance for the USAID Implementing Program Partner

Ensure compliance by USAID implementing program partners. Set forth below are proposed best practices for program partners to consider when designing GIS projects.

- Create a GIS implementation plan that addresses each of the elements listed in Figure 2, as appropriate.

- Data documentation should be a separate activity in the work plan.

- Documentation in the form of a database dictionary should also be a deliverable that accompanies data. A data dictionary can be a separate text document and/or internal document that fully describes database field names and codes used inside the database.

- If remotely sensed data are acquired, submit them to one of NASA's Federation of Earth Science Information Partners (ESIP) where others may obtain discounts on data previously purchased by the federal government. For example, NOAA has an FTP site that allows data to be downloaded or uploaded.

- Consider following a GIS implementation paradigm. Figure 1 illustrates sample GIS implementation elements. The boxes in bold indicate that certain ADS and/or other federal regulations apply to these elements.

- Consider developing functional profiles that describe roles and responsibilities for each major implementation element (see Figure 1). For example, before assuming GIS responsibilities, consider developing a profile to identify and assess the critical office functions, significant work flows and data needs within USAID to help provide an understanding of specific office needs. For each critical office function, the profile will identify the nature and use of data, how that data is processed, and its migration. These profiles will provide USAID with a set of priority data and functions.

Figure 2 below presents a sample GIS life cycle to use, as appropriate, for host country and/or contractors, depending on the application.
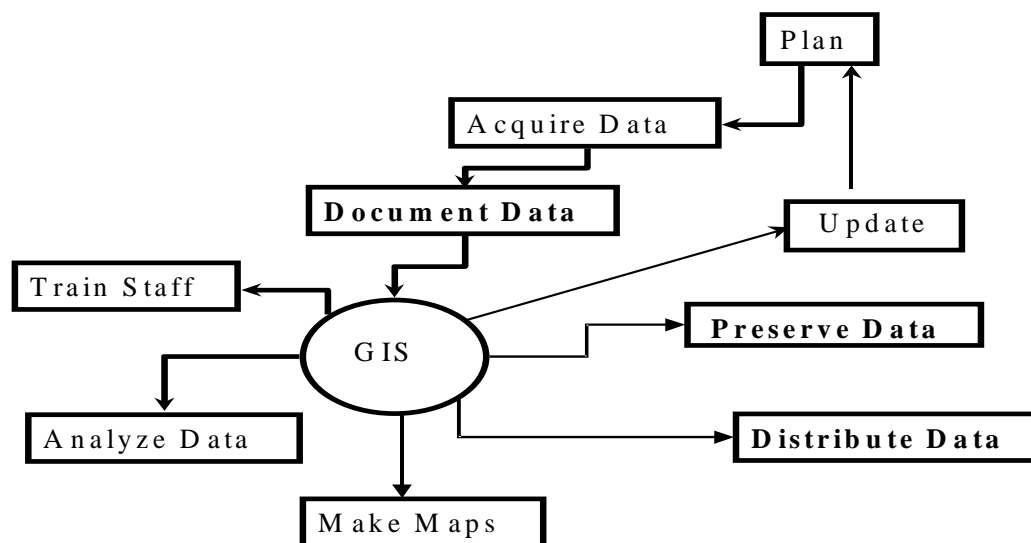
Figure 2. Sample GIS (MSGIC, 1998)

D4. GIS Lifecycle

Below is a brief discussion of each piece in the GIS implementation life cycle.

GIS implementation plan. A GIS implementation plan should include a data requirements analysis and address each of the elements listed in Figure 1, as appropriate for the project. For federal data, ADS regulations need to be implemented and enforced when data are acquired, archived or preserved, and distributed. Written procedures should be developed as to how to document geospatial data, archive data, handle requests for data, and distribute primary and secondary data, as appropriate. The ADS regulations relevant to GIS data (e.g., ADS 551 Data Administration) need to be integrated into a document that is easily referenced and implemented.

Base data acquisition. Consideration should be given to already existing, locally available, and free data, before purchase of data is considered or approved. A fair amount of small-scale data, generally regional in their coverage and a lower resolution, are available via the Internet for free or at minimal cost. For

example, the Tropical Rain Forest Information Center,[2] one of NASA's Earth Science Information Partners (ESIP) makes previously purchased remotely sensed data (e.g., Landsat) available at the cost of reproduction. The price is discounted from $600 to $50 for each new image. Older images are available for $25. USGS also offers similar discounts through the Earth Resources Observation Systems (EROS) Data Center[3] and their National Satellite Land Remote Sensing Data Archive[4] whose goal is to provide long-term preservation and access for natural resources management, natural hazards mitigation, and environmental studies. Another place to start looking for GIS data is the Geography Network.[5] This Internet page has a search interface to locate live, downloadable, and offline data. It also offers a listing of free GIS data resources.

Data sets. Some data sets are available to USAID from other government entities for in-house use only. One example is the National Imagery and Mapping Agency's (NIMA) that makes Arc Digitized Raster Graphics, scanned topographic maps, available to federal partners. However, there are restrictions placed on secondary distribution, meaning that data can only be used for project purposes and cannot be shared further. For further information, USAID missions should contact the regional NIMA representative.

Data documentation (requires special attention from CTO). This component of GIS is often the weakest link. Without adequate documentation, virtually all institutional memory and value of the GIS is lost. Users are unsure of the data quality and how it overlays with other data sets, and USAID is unable to distribute to their partners. FGDC Level 1 metadata standards (or similar standards) should be applied. Consult the FGDC web page for more details (http://www.fgdc.gov). This is an important issue to consider as U.S. government agencies are required under ADS regulations and Executive Order 12906 to prepare metadata. Tools to develop FGDC compliant metadata are available free on the Internet (http://edcnts11.cr.usgs.gov/ MetaLite/default.htm).

Training. While technical staff expresses interest in taking basic GIS training, they often have difficulty finding time to follow through. It may be helpful to allocate time in a work plan if the project wants to use GIS. Database management is also helpful. Local software training is generally available with many GIS software companies having local vendors as well as Internet training courses. One useful reference available on the Internet is Robert Davis' Geographic Information Systems: A Primer for USAID Managers. It is outdated (1995) in its discussion on software and hardware, but it has good guiding principles for implementing GIS.[6]

Analysis. USAID is interested in moving toward more sophisticated analyses, but simple basic mapping and updating capacity needs to be implemented fully first. Once this happens, other applications, such as using GIS to manage donor activity coordination and strategic planning may follow. Applications development and analysis will likely be conducted by partner organizations rather than by in-house staff. Figure 3 on the following page shows how GIS was used to track activities in West Bank/Gaza.

Map making. Basic map making combines geographic and cartographic components. A map generally includes the following elements: map title, spatial data (points, polygons, and/or lines), legend, scale bar, north arrow, logos, metadata, date, and disclaimer.

Special attention should be given to developing a disclaimer. One USAID Regional Legal Advisor suggested the following: "While USAID/(insert mission name) has made every effort to be accurate using these publicly available data, it can make no guarantee or warranty concerning the accuracy or the

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[2] For more information see: http://bsrsi.msu.edu/trfic/
[3] For more information see: http://edc.usgs.gov/
[4] For more information see: http://edc.usgs.gov/archive/nslrsda/
[5] For more information see: http://www.geographynetwork.com/
[6] http://www.dec.org/pdf_docs/PNABX636.pdf

completeness of the information contained in this map and does not necessarily endorse any interpretation or products derived from it."
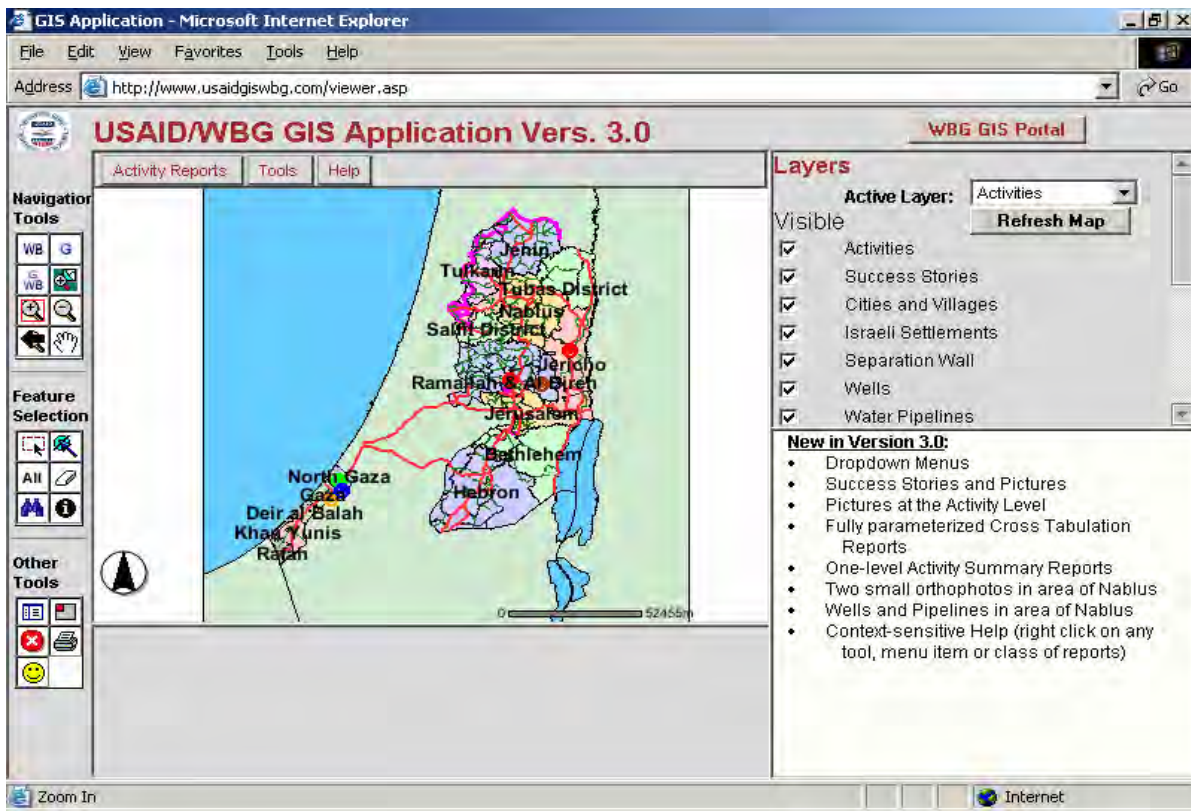
GIS Applications Simplify Data and Inform USAID

USAID/West Bank Gaza developed a web-based GIS application tool to better track, evaluate and manage its myriad activities (in the thousands). The application includes both GIS components (maps, geographic selection, buffer zones, etc.) and traditional MIS components (queries, reports, on-line updating). Through the GIS system, USAID has standardized reporting, which requires all partners to use the same format that is downloaded into a database whichcan be queried to generate various types of reports and maps. Once this has been finalized and uploaded on the Internet, all partners can add/update their activities, generate various reports and maps of their own data, use the system to know who is doing what and where, and use the other available demographic data to better plan their new activities that respond to community needs, poverty, and unemployment.

The CTOs are learning to query sites of relevant ongoing activities before meeting with a specific partner, using the system to quickly highlight specific problems, as well negative trends (e.g. safety issues) that appear to be occurring more frequently with that project. The flexibility of the system's query capabilities have provided quick, accurate answers to over a dozen ad hoc questions by management.

USAID/West Bank Gaza's Community Services Program (CSP) has begun asking questions based on maps and reports generated by applying GIS. For example, in most governorates in the West Bank, education activities comprise about 40 percent of CSP's activities (by $). Why is it less than 10 percent in a few governorates and close to 80 percent in other governoratest? Basically, the present GIS helps USAID/WBG ask more sophisticated questions.

Data distribution (requires special attention from CTO). USAID does not distribute GIS data. However, due to FOIA requirements, CTOs should be prepared to coordinate with IRM to make data available at the cost of distribution. Generally, this is merely copying a CD or requesting that the IRM team make a copy of the data that have been archived with them per ADS 551. The CTO must be careful as some GIS data should not be distributed due to licensing restrictions. This is another reason why metadata should always accompany data. This way one can discern how to appropriately distribute and use data since the metadata should explicitly state any restrictions regarding its use. FGDC regulations exist for documenting geospatial data and ADS 551 stipulate how corporate information systems are to be handled.

Data preservation (requires special attention from CTO). No formal archiving mechanism exists. Per ADS 551 regulations, data must be organized and documented, and data are to be backed up by IMS if the machine is on the network. Data may be backed up on jazz disks and metadata may be uploaded to a USAID-sponsored (or other) Internet clearinghouse to archive and disseminate data.

Abiding by the above guidelines may help users of GIS and geospatial data better implement and achieve their program goals. In addition, investment in data resources can be retained and data can be more easily shared to ultimately promote more efficient and effective use of GIS for development.

IV. OPPORTUNITIES AND RECOMMENDATIONS

The NRIC GIS survey results revealed common problems that many missions encounter. Section IV identifies the most common problems facing the Agency GIS community and suggests solutions to solve them. Based on survey results, literature reviews, and professional interviews, this section outlines five recommendations to improve the value and utility of GIS resources across the Agency. Together, these solutions and recommendations present important opportunities for Washington/NRM leadership and action relevant to the entire Agency GIS community.

A. Problems and Solutions

Problem1: Limited understanding of GIS power and potential. Since GIS is not widely used in all Agency programs, many CTOs and COs and partner organizations do not fully understand the value of GIS and how it can be used to organize spatial data, produce maps, and conduct analyses.

Solution 1: Demonstration and training. GIS specialists and trainers should champion the technology within the Agency and demonstrate how GIS can be applied to various mission programs. In addition, missions should sponsor professional training programs for COs, CTO, information technology specialists, and others to help all stakeholders better understand GIS fundamentals and how to use GIS for various applications. This could include efforts to complement communication and visualization tools with greater use of GIS analytical capabilities.

Problem 2: Failure to implement regulations. The NRIC survey revealed poor recognition of federal regulations related to GIS implementation, data storage, documentation, and maintenance. For example, only 39 percent of respondents document their data (create metadata), 50 percent archive their data, and no respondents use the federal clearinghouse to deposit their metadata.

Solution 2: Provide training. CTOs and COs need to be aware of federal GIS regulations as described in Section III of this document and be held accountable for their compliance. Training should emphasize several aspects of GIS use, including: 1) USAID-funded projects are public domain and should be accessible to the public; 2) data must be documented in metadata format; and 3) metadata must be posted on FGDC clearinghouse so GIS users can search and use relevant data.

Problem 3: Lack of consistency and standards in GIS implementation. Individual missions overlook standard metadata formats and implement inconsistent GIS management practices.

Solution 3: GIS Resource Guide. To outline and standardize best practices related to GIS implementation and management, the Washington NRM Office can develop and disseminate a GIS Resource Guide. Such a document can outline best practices to standardize guidelines and application procedures for mission projects. Section III of this document presents basic elements of best practices that could be developed into a more formal GIS Resource Guide. These practices may include: (1) following relevant federal regulations and policies; (2) defining expectations for CTOs and COs in developing contracts, scopes of work, and terms of reference; and (3) setting technical requirements for GIS data and metadata; and (4) posting standard data and metadata formats on searchable federal clearinghouse nodes. The proposed GIS Resource Guide could be tested on a few pilot projects and then adapted and improved based on lessons learned.

Problem 4*: **High GIS software costs***. Expensive GIS software can be even costlier for overseas missions; sometimes twice the cost in the U.S. Regardless, software prices and availability vary greatly among all missions.

Solution 4: Take advantage of lower federal prices. Overseas missions can buy software at lower U.S. federal prices; however, they must formally request these rates from vendors who may not readily offer them. Relevant information should be included in CTO trainings and made available in the GIS Resource Guide.

Problem 5*: **Poor familiarity of low-cost data sources***. Often, Mission staff does not know about the myriad of valuable collected, archived, and distributed by U.S. federal agencies. These data, which are gathered at global, regional, and local scales, can be quite useful to field missions who may obtain this information free or at little cost. Examples include global digital elevation models (DEM) data, climate data, and satellite imagery. Missions can overlook these valuable because staff do know about them.

Solution 5: Facilitate data sharing and availability. Training sessions should remind CTOs that data financed by USAID are public domain and need to be accessible and documented according to federal mandates. In addition, a GIS Resource Guide can provide lists and/or links to valuable sites for data acquisition, either from direct download or mail order from data distribution centers.

Problem 6: Poor sharing of learning and knowledge. With over 100 GIS projects completed worldwide, USAID has abundant experience with GIS implementation, analysis, and maintenance. While many projects can provide successful models to follow, the Agency does not provide a central knowledge management system to share lessons learned and promote standard methodologies.

Solution 6: Facilitate sharing of experiences, applications, and experiences. GIS websites, user portals, workshops, training sessions, and knowledge management tools can help capture GIS knowledge and disseminate it to many users. The Washington NRM office should provide technical leadership to develop appropriate knowledge management tools, conduct regular GIS conferences and workshops, and sponsor training programs for all levels of Agency staff and relevant partners. For example a short GIS applications session could be made at one of the global environment officers workshops and projects that are successfully using GIS could share general approaches (but not technical details) used in the analyses. In addition, once a month USAID/NRM could highlight interesting GIS applications and send short summary emails to natural resource officers that show links and more information.

B. Recommendations

Make a Strategic Plan

As a powerful new technology, GIS has great potential for natural resource management, however, USAID currently uses GIS tools in individual projects without an integrative strategy that maximizes technology, expertise, and experience. To achieve the full potential of GIS and its analytical capabilities, the Agency should define a strategic plan to implement, maintain, and use GIS. This requires plans for hardware, software, data gathering and storage, and technical training and expertise. Moreover, the strategic plan should outline roles and responsibilities for relevant agency staff, including technical staff, COs, CTOs, legal advisors, information management teams, and program partners.

Provide Good Training

Agency-wide training can serve staff at every level of the organization. Such training can result in improved performance and significant benefits in the technical and institutional aspects of GIS. Training

modules can focus on key aspects of the GIS life cycle, including best practices related to data collection, storage, documentation, analysis, distribution, and presentation. Since COs and CTOs have important roles in GIS management, but often lack technical expertise, training courses should focus on these groups. A comprehensive, structured approach to training can integrate short, one-hour non-technical sessions, with longer, two- or three-day technical classes offered by GIS vendors and private companies. Regardless, the relatively new position of GIS within more established information management departments requires innovative training programs to maximize the value of GIS investments.

Enforce Existing Regulations

As described in Section III, various federal regulations and policies govern the use of public GIS projects. These include Executive Orders (EOs) and Automated Directives Systems (ADS) and authorizations to follow several spatial data infrastructure initiatives such as the National Spatial Data Infrastructure (NSDI). CTOs, COs, legal officers, and technical personnel should know and understand these mandates and follow appropriate procedures in their professional duties. This the simplest, best way to protect GIS investments and develop widely accepted best management practices for implementation and use.

Establish and Follow Best Management Practices

With greater acceptance and use of GIS in public and private institutions combined with more evolved academic training, the industry is beginning to recognize best management practices for GIS. Section III outlines some basic elements of these practices for various phases of the GIS life cycle and serves as a model for more formal documents and policies. The Agency should develop and adopt current best management practices and disseminate them in a GIS Resource Guide. By setting standards of excellence across all levels in the organization, the Agency can better manage data and maps and improve data sharing among different offices and partner organizations. USAID's NRM Office should provide technical leadership in this area and coordinate activities among missions. Best management practices will consider the needs and responsibilities of the Agency and those of program partners and public users. At the minimum, these stakeholders should implement federal regulations and create metadata according to FGDC protocol. By implementing and following state-of-the-art best management practices, the Agency will save money and time in GIS technology and services.

Implement Spatial Data Infrastructures

A spatial data infrastructure (SDI) is the "technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data." (Executive Order 12906). As described in Section III, the federal government established a NSDI for the U.S. that sets standards and guidelines for U.S. GIS users and data collectors. In response to the rapid growth of GIS since the 1960s, foreign governments have developed their own NSDIs that reflect the needs, institutions, technologies, and users in each country. Like the U.S.-based NSDI, these spatial data infrastructures promote the "effective and safe use of data, encoded by different people to different levels of resolution and accuracy, collected at different times, without certification of quality." (Rhind, 2005). In effect, good SDIs ensure data sharing among diverse users, improve public access to data, and improve data documentation. See Table 2 for a list of countries with NSDIs. Countries in bold have USAID missions.

Table 1. Countries with National Spatial Data Infrastructures as of mid-2000.

Argentina	**Hungary**	Northern Ireland
Australia	**India**	Norway
Canada	**Indonesia**	**Pakistan**
Colombia	**Japan**	Poland
Cyprus	Kiribati	**Russian Federation**
Finland	Macau	**South Africa**
France	Malaysia	Sweden
Germany	**Mexico**	United Kingdom
Greece	Netherlands	USA
	New Zealand	

Source: H Tom, Oracle Corporation. [7]

International partnerships require data sharing and GIS interoperability across different technologies, cultures, institutions, and levels of data quality. To address these problems, governments proposed a Global Data Spatial Initiative (GDSI) to "provide broad policy, organizational, technical and financial arrangements necessary to support global access to geographic information." (Global Steering Committee, GDSI. See: www.gsdi.org). To achieve international compatibility and to leverage GIS investments with partner governments and NGOs, USAID should consider supporting federations of regional or national SDIs. Moreover, USAID could improve international coordination and support global SDIs by embracing the Global Information Infrastructure Commission (GIIC) goals:

- Strengthening the leadership role of the private sector in the development of a diverse, affordable and accessible information infrastructure
- Promoting involvement of developing countries in the building and utilization of truly global and open information infrastructure
- Facilitating activities and identify policy options which foster effective applications of telecommunications, broadcasting and information technologies and services.[8]

Embrace the E-government Initiative

The federal government provides many resources, policies, and guidelines to improve the efficiency and usefulness of information and Internet-based technologies. The e-government act of 2002 (HR.2458/S.803) codifies the role of OMB and other federal agencies in reducing redundancy that provides the best services to citizens and businesses (see www.egov.gov). Due to this initiative, the government established a Geodata Portal (see www.geodata.gov) that serves as geospatial one-stop Internet sites for downloading federal, state, and local data sets. The Geodata Portal supports the goals of the NSDI and provides tools for better inter-agency coordination and collaboration related to geospatial resources. It allows users to search and access data through the Internet and it promotes the use of standards and best management practices for GIS implementation.

USAID should consider using this existing infrastructure to access and archive data sets rather than building new infrastructure. According to Geodata Portal staff, the program will accept international data sets (Ms. Ginny Pyles, personal communication, 2005). Although the vast majority of Geoportal Data focuses on U.S. federal agency data, it welcomes non-U.S. geospatial resources from projects done cooperatively with other nations. The Geodata Portal staff encourages sharing geospatial data among U.S. agencies that have science programs outside the U.S. and serve international partner agencies involved in

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[7] Rhind, Lessons Learned from local, National and Global Spatial Data Infrastructures: http://www.gisdevelopment.net/policy/international/interna010pf.htm, 9 March 2005

[8] http://www.giic.org/about/, 9 March 2005

joint geospatial studies. The Geodata Portal publishes and search metadata regardless of geographic location. While search tools have not been optimized for non-U.S. locations, such queries can be launched using geographic coordinates, rather than map-based selection tools (personal communication, January 5, 2005 e-mail). For the reasons stated above, USAID should consider using the portal to archive mission data and weight the costs and benefits associated with creating new GIS infrastructure.

REFERENCES

Davis, Robert R. *Geographic Information Systems: A Primer for USAID Managers*. USAID. Washington, DC: U.S. Agency for International Development, 1995.

Foresman T.W. (ed.) 1997. *The History of GIS*. Prentice Hall, Upper Saddle River, NJ.

Global Information Infrastructure Commission (GIIC) web site: http://www.giic.org/about.

Information and Communication Technology for Development: USAID's Worldwide Program. USAID. Bureau for Economic Growth, Agriculture, and Trade. Washington, D.C., May 2004. Available at http://www.dec.org/pdf_docs/PDABZ702.pdf

Longley P., Goodchild M., and Maguire, D and Rhind D. (2001). *Geographical Information Systems and Science*. Wiley and Sons. Chichester and New York (in association with ESRI Inc.), April 2001.

MSGIC. 1998. Graphic developed by Maryland State Geographic Information Committee.

Organization for Economic Co-operation and Development (OECD) website. See http://www1.oecd.org/dac/ictcd/htm/introduction.htm

Pyles, Ginny. Geodata.gov administrator. January 5, 2005 personal communications.

Rhind, David. Lessons Learned from Local, National, and Global Spatial Data Infrastructures. Available at http://www.gisdevelopment.net/policy/international/interna010pf.htm

Rogers, Everett M. *Diffusion of Innovations*. New York: The Free Press, 1995.

Annexes

A.   GIS Assessment Questionnaire

B.   List of Questionnaire Respondents

C.   Country Desk Studies
- Philippines
- Nepal
- Mozambique
- West Bank/Gaza

D.   Sample USAID GIS Projects

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ANNEX A. GIS ASSESSMENT QUESTIONNAIRE

USAID-wide Assessment of Geographic Information Systems (GIS) Use Survey
Overview and Instructions

Goal: The goal of this questionnaire is to develop better tools for supporting GIS work in the field. To accomplish this, we are collecting information from USAID Missions and their implementers who are using or have recently used geographic information systems (GIS) data and information in their natural resources management programs. This information will help USAID develop a strategy for managing and maintaining the investment it has made in this information resource.

Instructions: Please take 15 minutes to respond to the following questions and email completed questionnaires to Oscar Carrasco at: info@nric.net

GIS User

1. In what country is your USAID Mission, Region, or Program? _____

2. Please identify your Strategic Objective Team (SOT) or Program Office with whom you work: _____

3. For USAID respondents, does your Mission or Region currently use a GIS in-house? ☐Yes ☐No

   If yes, is GIS supported by computer support staff or information technology staff within your Mission?   ☐Yes ☐No

4. Do you use GIS products in your programs or projects?   ☐Yes ☐No

   If you answered NO to questions 3 AND 4 you do not need to continue.
   Thank you for your time!
   Otherwise…

   If you answered YES to EITHER question 3 or 4, please take 15 minutes to answer the following questions, as appropriate.

Current or Recent GIS Applications

Please comment on how GIS is currently or has recently been used.

1. Within your SOT or Program Office, how are you or your implementers using GIS? (*Check all that apply*)

   ☐ Viewing project/program locations (on a map)
   ☐ Creating maps/graphics for reports
   ☐ Identifying overlapping program and partner activities
   ☐ Visualizing program indicators for evaluation and/or monitoring
   ☐ Analyzing data for strategy or program development
   ☐ Clearinghouse for data
   ☐ Other: _____

2. Please describe the type(s) of GIS applications you or your implementers are using (*Examples: manage forests, evaluate access to potable water, assess agricultural productivity, epidemiological plotting, etc*.): _____

3. If USAID program implementers are using GIS, who are they? (Check all that apply)

   ☐ Local non-governmental organization
   ☐ International non-governmental organization
   ☐ Contractors
   ☐ Host governmental agencies
   ☐ Local university
   ☐ Other: _____

4. If you know, what GIS software do you or your implementers use?

   ☐ ArcView
   ☐ ArcGIS
   ☐ MapInfo
   ☐ ERDAS Imagine
   ☐ IDRISI
   ☐ Unknown
   ☐ Other: _____

GIS Costs and Funding Mechanisms

1. If known, how are GIS activities funded? (*Select all that apply*)

    ☐ OE (Operating Expenses)
    ☐ Program Funds
    ☐ PD&L (Program Development and Learning) funds
    ☐ Other: _____

2. If possible, please supply ANNUAL USAID funding level estimates for the following GIS activities, as appropriate:

    ☐ Training $_____

    ☐ Hardware $_____

    ☐ Software $_____

    ☐ Data acquisition $_____

    ☐ Data analysis (and modeling) $_____

    ☐ Mapping $_____

    ☐ Archiving data $_____

    ☐ Updating data $_____

    ☐ Personnel (technical) $_____

OR, if itemized costs are not available, please provide the following:

TOTAL USAID-funded portion of GIS project cost $_____
    and/or
Percentage of project total attributed to GIS _____%

3. Please describe the GIS project and its time frame:

DESCRIPTION: _____

TIME FRAME: _____

4. PLEASE INDICATE IF EITHER OF THE FOLLOWING APPLY TO THE THIS GIS PROJECT:

☐ ADDITIONAL FINANCIAL SUPPORT WAS LEVERAGED (*FROM PRIVATE AND/OR OTHER SOURCES*)

☐ IN-KIND CONTRIBUTIONS WERE MADE (*I.E. TIME, RESOURCES, OR OTHER NON-CASH DONATION*)

☐ GIS DATA OR DATABASES FROM PARTNERS OR HOST GOVERNMENT WERE CONTRIBUTED

GIS Maintenance

1. Are data deposited to a clearinghouse or repository (Example: Federal Geographic Data Clearinghouse)? ☐ Yes ☐ No ☐ Unknown

2. Who is responsible for maintaining GIS data? (*Check all that apply*)

   ☐ Unknown
   ☐ Local non-governmental organization
   ☐ International non-governmental organization
   ☐ Contractors
   ☐ Host governmental agencies
   ☐ Local university
   ☐ Myself
   ☐ No one
   ☐ Information Technology or Computer Support within USAID
   ☐ Other (*please specify*): _____

3. Which of the following happens to GIS data when a project ends?
   (*Check all that apply*)

   ☐ Unknown
   ☐ None of the following
   ☐ Implementing partners retain
   ☐ USAID Mission retains
   ☐ Given to CTO (Cognizant Technical Officer)
   ☐ Given to CDIE (Center for Development Information and Evaluation)
   ☐ Other: (*please specify*): _____

GIS Implementation

1. For GIS data that have been acquired, please select the most appropriate response(s):

   ☐ Data are documented with metadata (*information on format, projection, use, etc.*).
   ☐ Data are distributed.
   ☐ Data products are developed.
   ☐ Data are analyzed.
   ☐ Data are updated.
   ☐ Data are archived.
   ☐ Unknown
   ☐ None of the above

2. Which of the following applies to you or your program implementers?
   - ☐ GIS training is available
   - ☐ A GIS plan has been implemented
   - ☐ Unknown
   - ☐ Neither

3. What types of GIS products were related to this GIS project? (*Check all that apply*)
   - ☐ GIS data
   - ☐ Maps
   - ☐ Report
   - ☐ GIS analysis
   - ☐ Locally trained staff
   - ☐ Locally installed GIS software
   - ☐ Locally installed hardware
   - ☐ Local GIS clearinghouse
   - ☐ Other: (*please specify*): ▭

4. How would you rate the utility of GIS in your project design, implementation and or evaluation?

   ☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5
   Not important   Very important

GIS Future Use

1. In the next five years, do you expect that GIS will be:

   - ☐ Less important to your operating unit's activities
   - ☐ About the same importance to your operating unit's activities
   - ☐ More important to your operating unit's activities

2. Is there anything that USAID/Washington could do that could facilitate your use of GIS?
   ▭

3. Please take a moment to add any comments about the use of GIS and geospatial data:
   ▭

Thank you for your time!
Please <u>save</u> your responses and send completed questionnaires to: info@nric.net

Responses will be aggregated into a report available in January 2005

Would you like a copy of the report to be emailed to you? ☐ Yes   ☐ No

ANNEX B. LIST OF RESPONDENTS

Mission/Region/Program	SOT/Program Office
Albania	SO 3.2
Albania	Health Team
Albania	SO 3.2 Health
Albania	SO 1.3
Albania	Arian Giantris, Anti-Trafficking Advisor
Albania - EMPTY	UI-LGDA
Armenia	SO 1.5 Secure and Sustained Access to Energy and Water
Colombia	SO2, Agriculture & Alternative Development Program
Georgia/Armenia	Caucasus, SOT 1.51
Guatemala - CAR - EMPTY	SO 6
Jordan	Water Resources & Environment
Lebanon	Blank
Mexico	Environmental Strategic Objective
Mexico	USAID Mexico
Mexico	Environment-SO-006 and SO-007 (old strategies)/SO-022 (new)
Mozambique	SO6
Nepal	PPD
Nigeria	Program
Panama – EMPTY	Panama Sustainably Manages the Panama Canal Watershed
Paraguay	Improve the Sustainable Mgt of Global Importance Ecoregion
Philippines	OEE and OPHN
Philippines	OEE
Philippines	SO4/OEE
Philippines – REPEAT RESPONSE	DAI - contractor
Russia	Environment
Serbia and Montenegro	General Development Office
Uganda	SO7
Ukraine	USAID Mission in Kyiv, Ukraine
West Bank/Gaza	Program Office
WARP	SO6

ANNEX C. COUNTRY DESK STUDIES

The following pages of this annex include desk studies on how USAID is using GIS applications to achieve results in four countries: the Philippines, Nepal, Mozambique, and the West Bank/Gaza.

PHILIPPINES DESK STUDY

Philippines Fisheries: Sample GIS Budget Profile

Prepared by Rene Acosta
Governance and Coastal Marine Management Specialist
USAID/Philippines (racosta@usaid.gov)

Project Summary: The USAID/Philippines Mission has approved a seven-year project entitled Fisheries Improved for Sustainable Harvest (FISH) Project to conserve biological diversity in at least four biologically and economically important marine ecosystems in the Philippines. In line with this, USAID tapped the Development Alternatives, Inc., (referred to as the "Baseline Contractor") under the project entitled "Support for Establishing Baseline Information for the FISH Project", to provide a third-party baseline assessment to ensure the development of objective and impartial baseline data. The baseline assessment will be carried out to validate the baseline on coastal and marine capture fisheries resources in the four FISH Project sites and by identifying and recommending indicators and expected targets for each site to measure project progress in increasing fish stocks to at least 10 percent in the coastal and marine ecosystems of the four ecosystem sites. One major component of the project is the Remote Sensing/Geographic Information System (RS/GIS). The RS/GIS aims to:

- Generate base maps of the four study sites
- Generate habitat maps that were derived primarily from the LANDSAT 7 ETM satellite images validated with underwater video tows
- Develop a database for the data collected during the FISH Baseline assessment by DAI to facilitate data integration between components and between study sties
- Complete descriptions on the prevailing general oceanographic conditions for each site and potential influences on habitat connectivity and recruitment.

Project	Coastal Resources Management Project (CRMP)
Strategic Objective	Enhanced Management of Renewable Natural Resources
Sector SOT	SO4 Management of productive, life-sustaining natural resources strengthened
Dates	1996 – 2004
Funding Mechanism	Contract (completed)
SOT Contact	Rene Acosta
CTO/COP Contact	CTO - Rene Acosta; COP Marco Carreon [carreon_m@ttemi.com.ph]
Regional Initiative	National: San Vicente, Palawan (Region 4) Buenavista, Calape, Clarin, Inabanga and Tubigon, Bohol (Region 7) Cordova and Lapu-lapu City ,Cebu (Region 7) Amlan, Bacong, Bais City, Dauin, Dumaguete City, Manjuyod, San Jose, Sibulan and Tanjay, Negros Oriental (Region 7) Hagonoy, Malalag, Padada, Santa Maria and Sulop, Davao del Sur (Region 11) Alabel, General Santos City, Glan, Kiamba, Maasim, Maitum and Malapatan, Sarangani (Region 12)
Program Partners	Local Government Units and the Department of Environment and Natural Resources
Project Description	The project assisted national and local government units

	institutionalize and sustain the significant gains made to improve coastal resource management in the Philippines. Emphasis was on deepening support for institutional mechanisms to sustain project gains. National implementation activities include improving policies and increasing awareness of problems and solutions. Local implementation activities involved the strengthening of institutional and multi-sectoral mechanisms for sustainability, municipal water delineation and enforcement, fisheries management, and CRM certification.
Total Budget	$18 M
Budget for GIS	Hardware – Php 50,000.00 Software – Php130,000.00 Purchase Order (PCRA, Metadata)–Php 1,361,022 (1999-2001) Salaries – Php 2,040,00 (2000-2004)
GIS Leverage	NAMRIA, PPDO-Cebu, UPV-CEIS (Technical Assistance), Conservation International (GIS Data)
GIS Users	Local Government Units, DENR
GIS Data Archiving	Arcview, Mapinfo, GIS Metadatabase (MS Access)
GIS Information	Participatory Coastal Resource Assessment Marine Protected Areas Fishing Gear, Fisher, Boat, and Catch Composition Inventory (Region7) Catch Rates and Fishery related issues (Region7) Coastal Law Enforcement Issues (Bohol)

Sample GIS Budget Profile

Item	Nature of Expense	Purpose	Amount (in USD)
CD-Philippines National Statistic Office's (NSO) Datos, Volume 1 – Physical and Economic Profile (Census 2000 Population Count by Barangay)	Purchase (Note: Handed over to the FISH Project, c/o Tetra Tech EMI, after the completion of the FISH DAI SEBI Project on August 31, 2004)	Data (i.e., tables on final population count, growth rate, number of households and average household size as well as administrative maps from provincial to barangay level of the whole Philippines) were used in mapping and site assessment for the four study sites and in producing project sites and terminal reports.	534.38
CD-Satellite: LANDSITE 7, ETM (Enhanced Thematic Mapper) Image	Purchase (Note: Handed over to the FISH Project, c/o Tetra Tech EMI, after the completion of the FISH DAI SEBI Project on August 31, 2004)	Data were used in conducting the site assessment in Tawi-Tawi and in producing project site and terminal reports.	622.42
Equipment: - Underwater spectroradiometer - Handheld GPS - Echosounder/GPS - Field Notebook Computers - Video Camera (including laboratory	Rental	Used in baseline assessment survey	107.86 303.92 214.46 250.44 465.45

processing) - Underwater Camera			125.22
- Digital Still Camera			98.34
- Inverter			<u>89.23</u>
		Total Equipment Rental Cost	1,654.92
Field Supplies (E-Map cable, rechargeable batteries, extension cords, etc.)	Purchase	Used in conducting baseline assessment visits	161.71
Computer Supplies (toner, mobile disk USB, dual fan, etc.)	Purchase	Used in conducting baseline assessment visits	200.28
Vehicle hire, taxi, jeepney, tricycle fares, airport terminal fees, excess baggage for official materials, boat rentals, fuel for rented boats, etc.	Transportation and Other Travel Costs	Incurred during site visits	777.32
Airfare	Purchase	Plane fares incurred during site visits	1,054.24
Per Diem		Incurred during site visits	1,131.81
Cellphone Cards	Communication	Incurred during site visits	26.35
Casual Labor	Payment of Services	Hired services in fabrication of equipment used during site visit	8.91
Salaries of RS/GIS Consultants	Payment of Services		17,692.00
TOTAL			**$23,864.34**

NEPAL DESK STUDY
SAMPLE MAPS AND APPLICATIONS

Prepared by: Indra Sharan KC
USAID/Nepal (ISKC@usaid.gov)

Purpose: to provide a profile of representative GIS applications developed at USAID Nepal, to USAID Washington for preparation of GIS implementation guidelines.

Project Summary:

To understand the country, terrain, its people, social conditions, and disasters faced by people, including conflict, its intensity and geographic extent, the USAID mission in Nepal makes use of Geographic Information System (GIS) technology for organizing, analyzing, presenting and communicating information among its team members, partners within and outside of the country, and the government of Nepal. With the cooperation and coordination among government and non-governmental organizations, as well as through constant updating of events from various sources, we developed a database on various themes. Then the data is processed and plugged into standardized base maps along with relevant charts, descriptions, and interpretations. Using the system achieves the ultimate goal of increasing understanding of the problems and working to bring change in the lives of Nepalese people per the wish of the people of the United States.

The following are examples of use and application of GIS at the USAID/Nepal Mission. GIS products (maps) are included, and each map gives some background and context.

1. Conflict Analysis (one map)

Nepal is going through a difficult time now. There is an ongoing fight between the Maoist insurgents and the security forces of the government. Property and infrastructure, including government buildings, hydropower plants, telecommunication towers, and airport terminals, has been damaged or destroyed, and the casualties are growing by the day. In addition, the number of people abducted by the insurgents and displaced from their villages is growing.

The USAID mission has been providing assistance in several development areas including peace-building efforts. Many infrastructure and income generating programs in several districts support Nepal's peace building efforts.

The Ministry of Local Development is responsible for planning and implementing rural infrastructure programs. To assess the damage done to the district infrastructure, it compiled information from various sources and agencies. The Ministry of Local Development asked the mission to assist in assessing the depth and dimension of the conflict's impact on infrastructure based on information they had collected from various sources. The USAID mission gave them maps that showed the extent and intensity of the conflict's impact in terms of damage to several types of infrastructure. This was not, however, an easy task.

The initial available data was all descriptive. The ministry had compiled, from several government sources, a long list of incidents that took place on different dates in various places. The data did not provide an in-depth analysis of damage and loss in exact monetary terms but it did yield useful information. Final maps and graphics produced with GIS showed for the first time an interesting pattern of the conflict's impact. Figure 1 below shows an example of the map along with data layers.
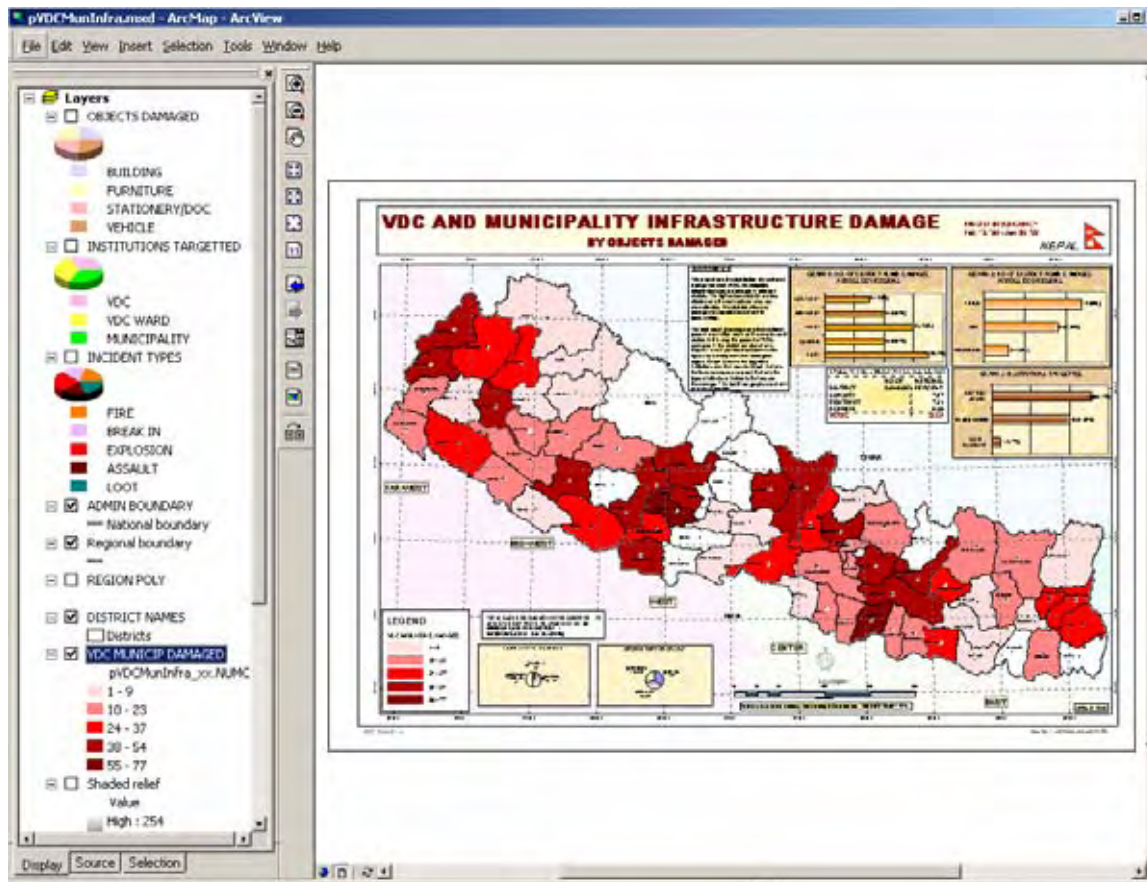
Figure 1. Framework for Conflict Impact Assessment: Example from Ministry of Local Development Data

2. Social and Development Indicators (two maps)

Maps on different social or human development indicators - two themes selected:

- Population with access to electricity
- A map showing ethnicity complexity

For designing sustainable poverty alleviation programs, it is important to develop an understanding of the level of development of people in the country in terms of their knowledge/literacy, access to basic services such as health and sanitation, electricity and drinking water, service infrastructures, schools, etc.

Information on such subjects is available in written text and tabular format in several reports. Without geo-referencing and linking them with a map, it is difficult to comprehend the complex information; this prevents the data from being used most effectively.

The USAID Mission in Nepal has developed a system to generate several maps of the country with all 75 districts, covering topics like the one above. Similar data are also processed at the sub-national, regional, and district levels. Data from the underexploited census survey 2001 is often the source of such information. In addition, we also look at other sources for the right information. These data are processed and presented in visuals.

Some of the maps are:

- literacy (male and female) - provides information on level of knowledge and abilities
- population living abroad - provides knowledge about level of remittance and un-employment
- population density (physiologic and arithmetic) for extracting information on population density based on agricultural and total land area of a district
- human development index - provides level of human development according to UN's methodology
- ethnicity - gives an understanding of the complex nature of more than 100 castes and similar number of languages and useful for formulation of all-inclusive development programs, etc.

A map showing the number and percentage of households with access to electricity per district is useful information for understanding the level of rural electrification, or as a proxy for assessing the level of comfort or hardship of life. A child from a village that has piped water has more chances of going to school than one who lives in a village without water. This is also the case with electricity. Children living in villages that have electricity can complete their studies after they have finished their daily chores. See Figure 2, a Social Development Indicator Map, which shows the percentage of households per district in Nepal that have access to electricity.
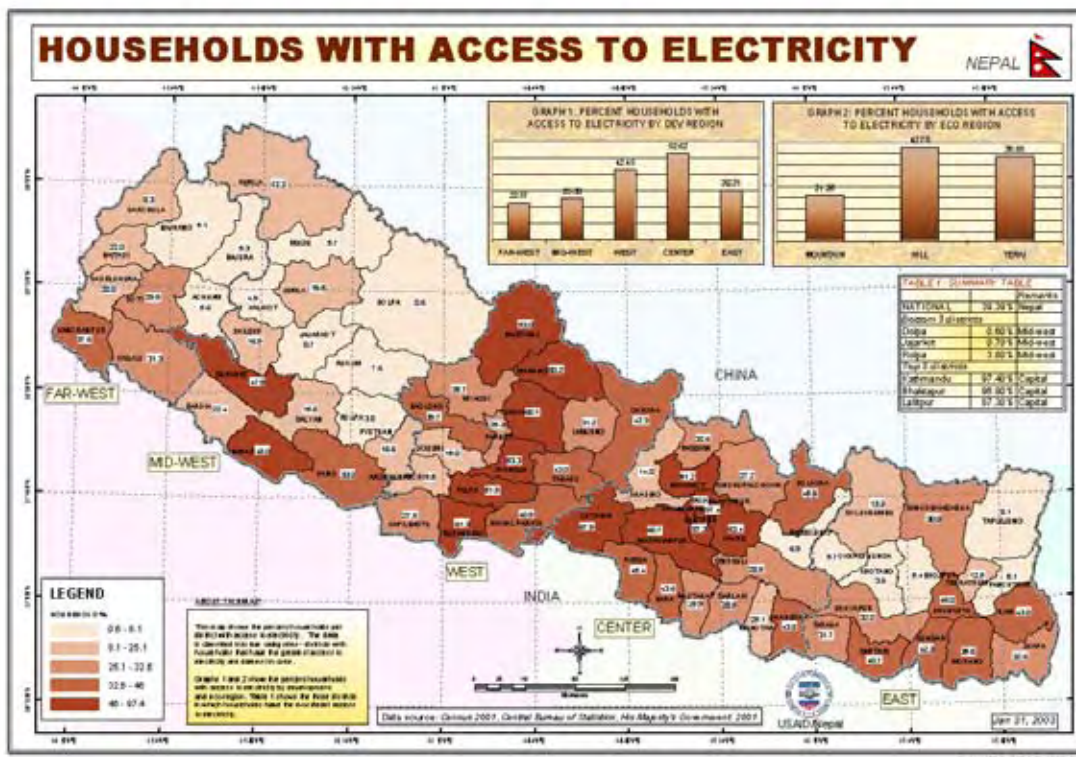
Figure 2. Map of Percentage of Households per District with Access to Electricity

It is very important to understand that Nepal is a diverse country with more than 100 castes (as reported by the 2001 Census Survey) and perhaps more than 50 languages. The government has identified about 65 ethnic groups. By excluding two major castes that have the greatest populations and processing the district-level population census, we could extract a map showing 12 castes in certain geographic areas (see Figure 3 below). Issues regarding castes and ethnicity have found a prominent place in development

debates. The rebels have also created a structure of their "state" similar to the map that shows the clustering of major ethnic castes in the districts.
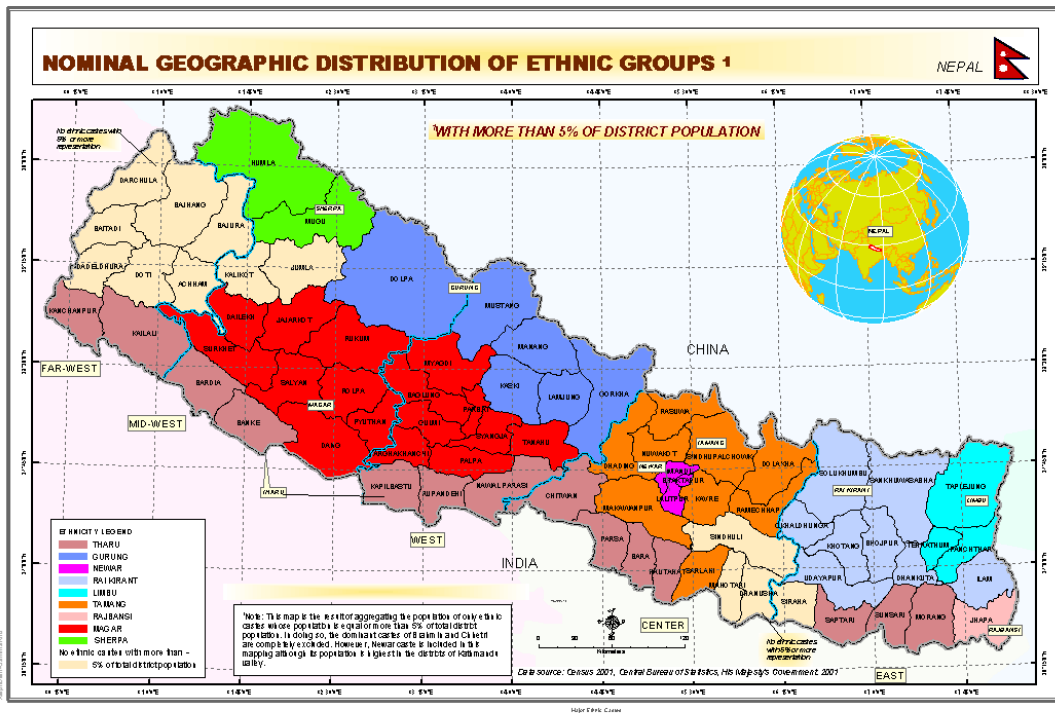
Figure 3. Nominal Geographic Distribution of Ethnic Groups

3. Project/Program mapping (one map)

USAID programs are implemented by several partner institutions—government, and international and national NGOs in the districts. To strategically plan, review, monitor and evaluate their impact on the targeted geographic regions and people, all USAID programs are geo-referenced with separate maps produced for each program and partner. A map that shows all programs under USAID's strategic objectives gives managers and team leaders rich information that cannot be obtained by reading a list or report. Program maps help enhance understanding of service delivery, targeted areas, and beneficiary populations; they also promote greater inter-program coordination and optimize resources. For instance, Figure 4 on the following page shows a map of all health programs under Strategic Objective 2.

Figure 4. Map of USAID/Nepal Health Programs

4. Preliminary risk assessment of programs and partners (one map)

This map shows all programs that were examined with respect to "risk" in conflict situations represented by proxy data. In this graphic, the number of abducted persons is selected.

The advantage of "mapping" is clear when comparing program maps with social development indicators and parameters representing the impact of conflict. These maps help identify the critical districts that require developmental and humanitarian support, and the programs and partners exposed to certain levels of security risks. The information serves as a guide and a first preliminary risk analysis, although it is important to be careful in interpreting the analysis. See Figure 5.
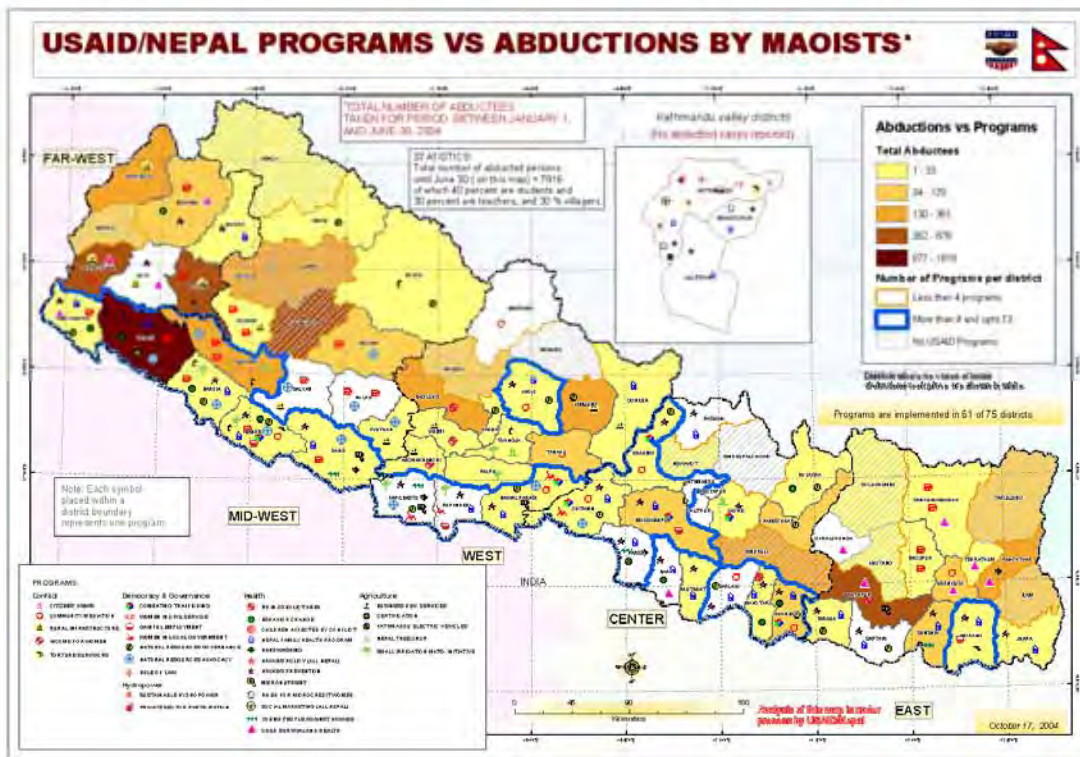
Figure 5. Programs and Partners' Information Exposed to 'Abduction', a Proxy for Insecurity

5. Natural Resources Management (one map):

In the absence of a GIS, the mission could only rely on tabular statistics about utilization of forestry and agriculture land. It has been possible with GIS to compile information about land use, land cover and produce maps that show detailed classes of land use on a national basis. These maps help identify the districts with different percentages of agriculture and forests. Although the maps are prepared from sparse and distributed map data that dates back to 1984, the visuals at a national level offer many useful insights about land and community forestry programs and agricultural land and its relationship to human settlement and population density. In addition, these data are used as reference data for planned digital classification of remotely sensed imageries.

Figure 6 below is a map that shows agricultural land use classification for the entire country, with an overlay of districts.
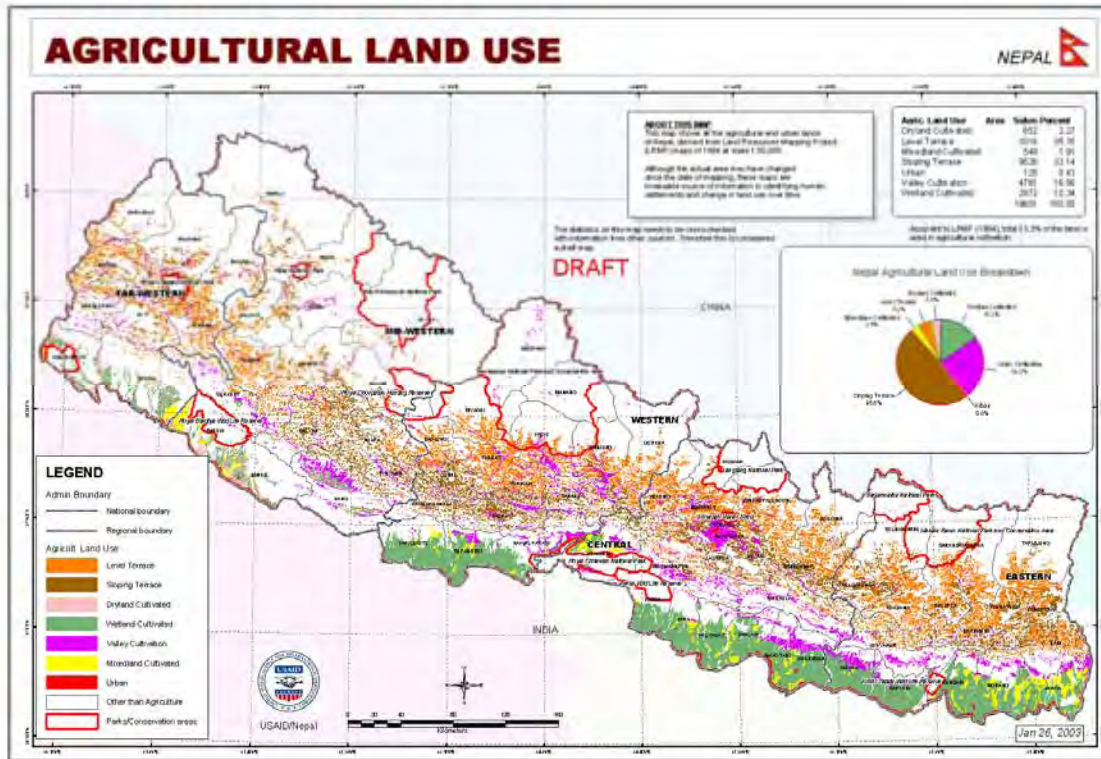
Figure 6. Agricultural Land Use Map of Nepal (the areas outlined in red are parks and conservation areas)

6. Floods and Landslides (two maps)

Two themes are selected: flood impact monitoring map for one week (July 21, 2004) and a map showing populations exposed to different landslide risks from one district.

6(a). Monsoon impact monitoring

More than 180 persons lost their lives and 25,000 poor farmers lost their homes due to floods and landslides in 2004. Many of the casualties took place during heavy rains the first week of July 2004. The numbers are not as alarming as the level of destruction created by different hazards in other parts of the world. When mortality rates during monsoon season in Nepal are considered, however, the number of casualties is high compared with many countries.

The USAID/OFDA Asia Region Office monitors the impact of a flood every day during the monsoon season (June 10 – September 15). The data collected by several partners and government institutions working in the districts are compiled and turned into a map to help donors and relief organizations evaluate the extent and intensity of impact and provide relief and rehabilitation support in the form of material and cash. The districts are ranked by combining parameters such as number of deaths, missing persons, injuries, households destroyed, livestock lost, and damage to crops.

It is interesting to note that the area shown in heavy rain by the NASA TRMM image of July 5-12, 2004 correlates well to the extent of flood impact area delineated based on locally collected impact data.

Nepal has no early warning system for alerting the people about possible floods. In such scenarios, the only way out is to monitor post-flood impact data for relief work.

However, with the availability of rainfall/precipitation data from several global organizations, there is growing interest in developing an early warning system. The maps prepared by this mission were instrumental in developing contacts by persons from international organizations with the Department of Hydrology and Meteorology of Nepal.

The map in Figure 7 shows the flood impact for July 21, 2004. Similar maps are prepared and disseminated for every week during the monsoon period and distributed to government, donors and partners in Nepal.

Figure 7. Monitoring Monsoon Impact

6(b). Landslide & risk of slope failure

The monsoon not only causes floods, but it makes the slopes more saturated and prone to landslides. Landslides are common phenomena during monsoons. Many times, houses and villages, and even military camps are swept away by landslides and mass movement. Roads are blocked for several days disrupting the linkage between rural and urban areas, leading to mass panic and scarcity of daily supplies in Katmandu, the capital of Nepal.

A GIS framework for investigating slope instability and assessing populations exposed to risks is being developed. The mountain slopes are classified in terms of their relative stability. A factor safety map for Gulmi district of Nepal was prepared and populations and households that were exposed to different levels of risks were contacted. Similarly, the roads that went through different classes of slope failure

risks were identified. Fortunately, most of the land where settlements exist are in safer zones. This information is vital for disaster preparedness as it helps minimize risks and encourages mitigation measures.

The map in Figure 8 shows the Gulmi district with a preliminary factor safety map with an overlay of population and roads.
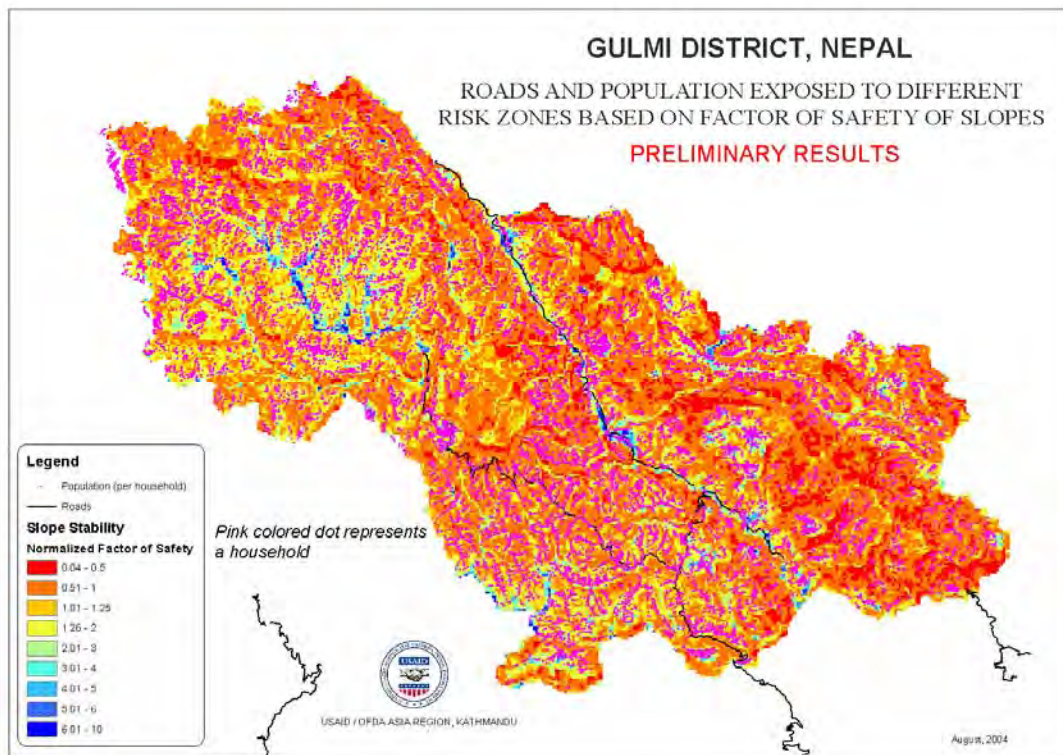

Figure 8. Factor of Safety Map: Landslide Risk Assessment Procedure Under Development

7. Assessment of conflict induced migration (a set of four graphics)

After the government imposed an emergency rule in November 26, 2001, security forces increased their counter measures against the Maoist insurgency that had begun in 1996. In addition, two side fights intensified several times in different places; this resulted in an increased number of casualties. The town of Nepalgunj, the nearest exit point to India from the mid-west and some of the far-west development region, saw an unusually large number of people of all ages, including women and children, moving from the north and heading south for several days. This is one of the largest mass exoduses of people at this time of year.
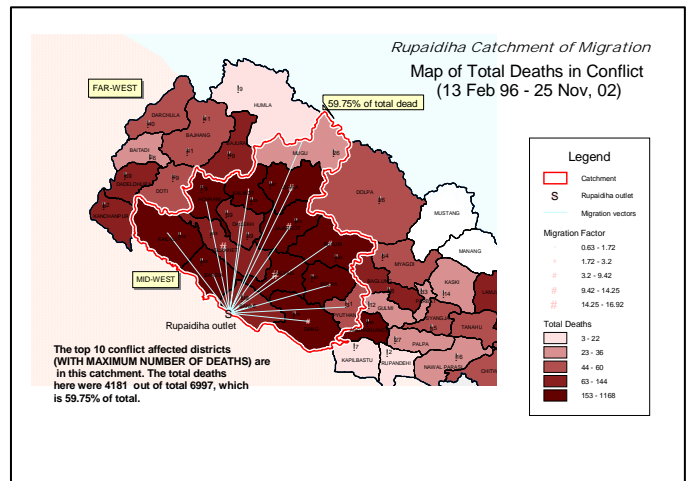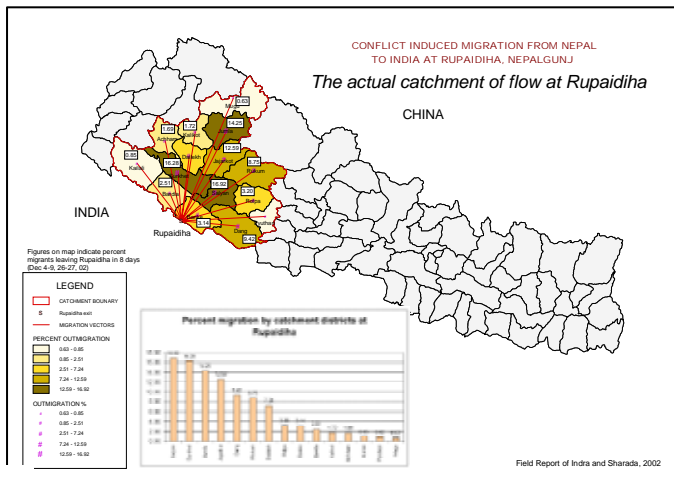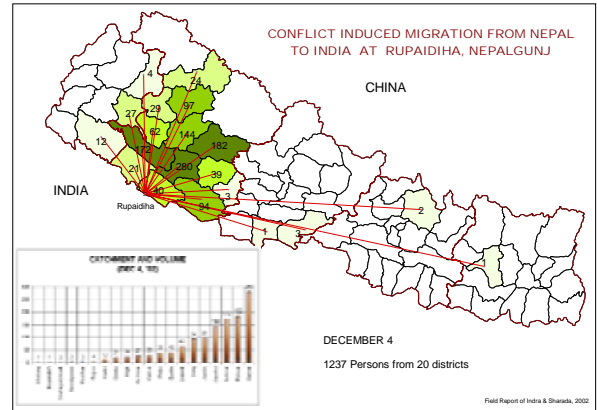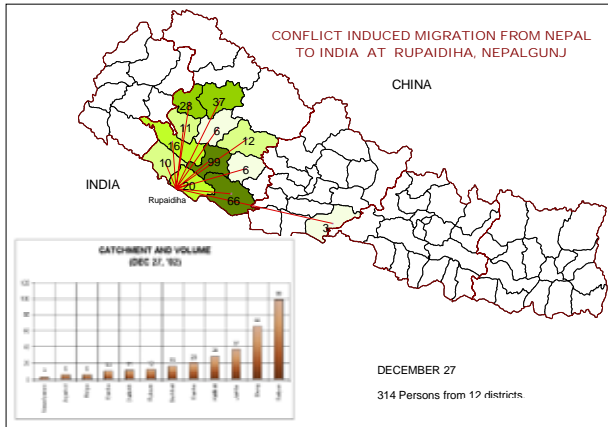
Figure 9. These maps portray a surge of population flows from the conflict-ravaged mountains of western Nepal to India, November-December 2002, the year of emergency in Nepal. The first two maps show the situation for two dates, the number of people leaving, and the districts. The third map is a consolidated map showing the 'catchment' of the flow of people at the exit point, Nepalgunj. It shows that conflict mortality, a proxy for ongoing war and insecurity, is very high in the region.

The situation was assessed in the field. Total migration during two months time, the originating districts and the destination places were accurately assessed. The districts from which these migrants originated are heavily affected by conflicts between the insurgents and the security forces.

8. Radio broadcast programming

The Government of Nepal started giving licenses to private parties to operate FM radio stations in several parts of the country and radio broadcasting has been decentralized to other parts. This provides opportunities to reach communities through radio programs on development and disaster issues.
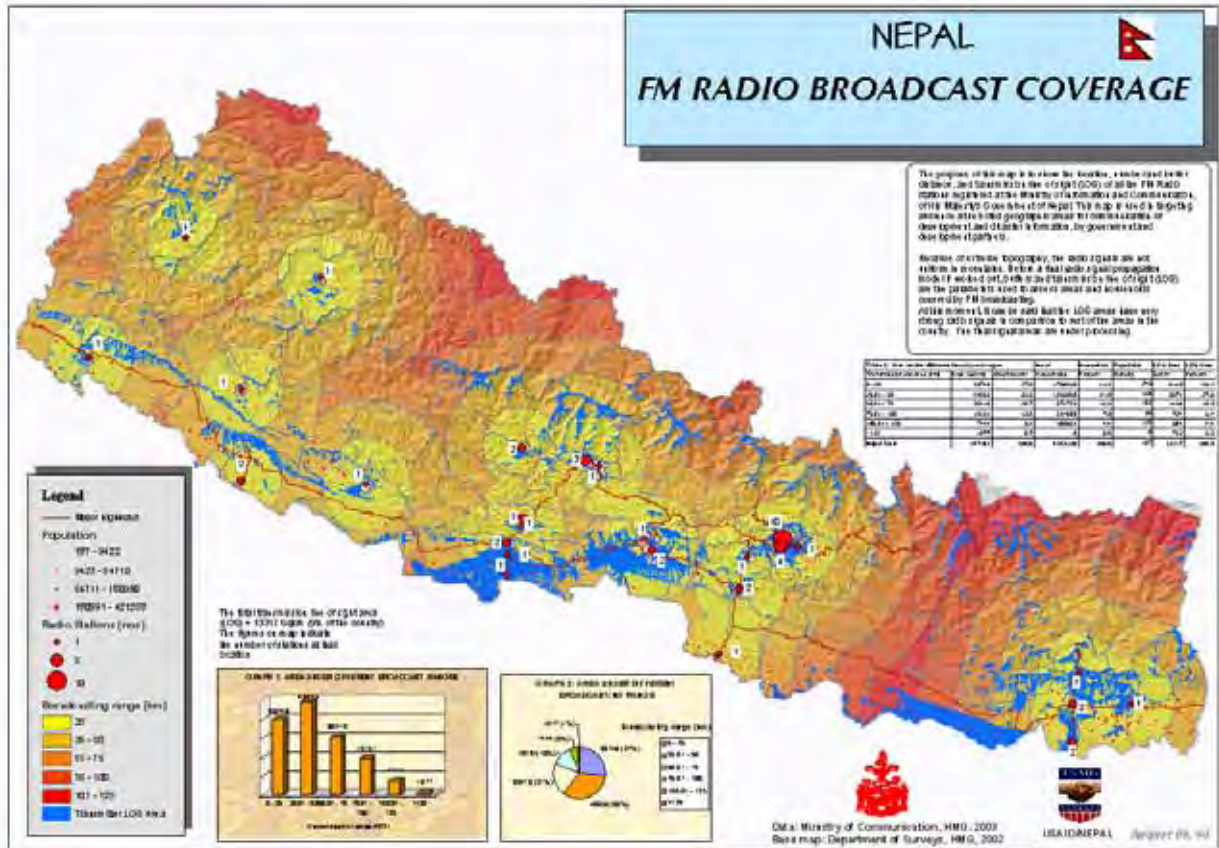
Figure 10. Location/Distribution of FM Radio Stations in Nepal

9. Conflict assessment maps in a website:

There are several maps in Bob Gersony's report on Nepal Conflict Assessment. See www.mercycorp.org/items/1662/.

Annex 4.2 Nepal: Sample Scope of Work

Scope of Work for Spatial Information Program Officer

Spatial Information Program Officer

Basic Function:
spatial information analysis/ product development for developmental and disaster assistance

The Office of United States Foreign Disaster Assistance (OFDA) and USAID/Nepal are seeking applicants for a program officer level position for the analysis and development of spatial information and its broad application for developmental and disaster assistance. While successful candidates will require academic background and expertise in geographic information system (GIS) and related systems, this position requires strong skills in the design and management of aspects of programs for socio-economic development, as well as, disaster relief and management. The officer will be responsible for guiding, supporting and designing the application of spatial display and analysis techniques in Nepal and the Asia region. The candidate should have the experience and skills necessary to manage and coordinate OFDA/Asia and Mission relations with relevant international organizations.

More specifically the spatial information program officer will:

No.	Specific responsibilities	Rough estimate of time @ task
1	Develop an Asia Regional Disaster Information and Support System, integrating local and global data to produce disaster preparedness and response products for the region. This system will extend and further articulate OFDA's Washington-based Geographical Information System.	25
2	The officer will be the OFDA Asia Team liaison and coordinator for GIS components of international programs such as Relief Web of the UN System and USG's Global Disaster Information System and shall support OFDA's regional initiatives such as the Asian Flood Forecasting System.	15
3	Manage, on behalf of OFDA/Asia, contact with, and support of US Geological Survey and USGS activities in Asia. The officer will manage USGS activities in Nepal on behalf of the USAID/Nepal Mission.	5
4	Manage, on behalf of OFDA/Asia, contact and support of NOAA and other meteorological institutions.	5
5	Analyze the geo-spatial information needs of the USAID Mission across the Strategic Objectives and design suitable GIS products. As a member of the USAID Program Team, provide analysis and interpretation of spatial information as an input to new programs and as a monitoring and evaluation tool for existing programs.	20
6	Assist USAID/Nepal program staff in preparation of presentation-ready maps and charts on Maoist insurgency and update them on periodic basis.	20
7	Work with USAID/Nepal program staff in design of database formats for program information on the Maoist insurgency and response, so that it can be efficiently used with the GIS tools.	5
8	Assist USAID/Nepal program staff with definition and identification of raw data required from GON agencies, local government bodies, partner organizations, and other sources, for incorporation into GIS products/tools.	5

8		

Note:
- The OFDA Asia Regional Office covers South Asia, including Nepal, and South East Asia.
- USAID/Nepal covers Nepal, only. USAID/Nepal's Special Objective No. 8, regarding conflict mitigation, is seen as a cross-cutting, or prismatic, element across the USAID/Nepal Strategic Objectives.
- The Spatial Information Officer will be expected to generally share his/her time to give roughly equal attention to the needs of the OFDA Asia Regional Office and USAID/Nepal.
- The Supervisory function will be taken by OFDA Asia Regional Office, with agreement to receive and incorporate regular review by the SPO8 management.

Requirements and Responsibility

- Must have the ability to manage initiatives on regional applications of GIS and remote sensing, including coordination of USAID/OFDA supported ICIMOD and USGS involvement in development of the flood information sharing system for the HKH-Himalaya.

- Requires familiarity with remote-sensing technologies and the interface to GIS as well as meta-data formats for a complex range of existing data available in various GIS formats.

- Requires an ability to liaise with a wide range of partners that generate GIS and remote sensing data as well as those who use GIS information for decision-making.

- Must possess a strong familiarity with the application of GIS information in the region and be able to advise the USGS on the design of appropriate GIS products

- Must have a firm understanding of making GIS products that are useful to a wide range of audiences, including community-level organizations as well as national and international organizations.

- Ability to liaise with and support OFDA/Washington activities as they apply to the OFDA Asia region

- Ability to support disaster operations through development of appropriated GIS and mapping products to enhance the coordination of disaster relief efforts.

- Develop spatial information to track, monitor, evaluate and assist partner organizations and US funded programs.

Qualifications:

- Practical experience in disaster relief and response.

- 8 yrs experience at a senior management level in programs using GIS for developmental applications.

- 5 years of experience with international donor organizations.

- Masters degree, min., from a reputable University in GIS and the integration of Remote Sensing information to GIS.

- Thorough knowledge of ESRI (Environmental Systems Research Institute) GIS products.

- Proven experience in design of practical applications using GIS for community level development.

- Proven ability in analysis and design of integrated GIS systems for development organizations.

Annex 4.3 Nepal: Sample Terms of Reference

Report on Geographic Information System Implementation Requirements of USAID/Nepal Terms of Reference

ARTICLE I. STATEMENT OF WORK

A. OBJECTIVE and TASK TO BE PERFORMED

1. The objective of this purchase order is to enhance OFDA and AID/Nepal programming efficiency and presentation capabilities through the introduction of spatial analysis tools involving Geographical Information Systems (GIS) technology.

2. An analysis will be performed to determine the best use of GIS technologies for OFDA and Mission programs.

3. Recommendations will be developed on GIS support to programs of OFDA and the mission, including recommendations on applications software and particular Geo Spatial information sets applicable to programs available locally and internationally.

Statement of the Problem and Need for Consultancy

In a time of shrinking budgets, it is critical for missions to employ every tool that allows more effective and efficient programming. In addition, the enhanced presentation materials that can be developed from GIS packages will help Mission argue more persuasively for continued and increased funding as well as additional programs. In the case of the OFDA Regional Office the creation of a special database and hazard maps were part of the SOW for the Office. Lacking in-house capability at the Mission, OFDA intends to employ a short-term consultant to define the parameters of GIS integration for the Mission and OFDA Regional Office.

B. TECHNICAL DIRECTIONS AND DELIVERABLES

The deliverables are as follows:

1. A presentation to the assembled Mission and OFDA personnel on GIS and its applicability to development programs. This will acquaint all staff with GIS applications, its usefulness and its limitations as a tool in aiding analysis for development programs and disaster relief.

2. Individual assessment interviews with SO teams, Mission management, PPD, and OFDA staff to determine possible useful applications to aid analysis, monitoring, and reporting of program data.

3. A follow-up presentation to the Mission and OFDA on results of the analysis and recommendations for GIS implementation including use of remote sensing data. This presentation will focus on current and potential uses based on needs articulated by SO teams. Recommendations will focus on the usefulness of different types of information related to the resources (staff and funding) required to establish and maintain GIS applications.

4. A set of written recommendations on availability and use of geo-spatial data sets, base maps, and remote sensing products available locally and internationally. These recommendations will include costs, resources required for maintaining these products, and a description of product functions usefulness.

5. A set of options for OFDA and USAID to consider that focus on the availability of local GIS providers, the services they can provide including potential costs, and the staffing, and capital/ recurring costs that the mission would require to maintain and operate them. Options will examine 1) total reliance on local external providers, 2) total reliance on USAID staff, 3) services provided by local providers and limited USAID staff involvement.

Summary: All of the above deliverables will allow USAID and OFDA to rank the usefulness of applications against costs and staff time and determine which options, if any, would be most useful for application by USAID Nepal.

C. LOGISTICS SUPPORT

Contractor will be provided with office space in OFDA Regional Office and access to the OFDA GIS computer which shall be disconnected from the secure Mission network for the duration of the consultancy.

D. QUALIFICATION OF PERSONNEL PROPOSED

The consultant should be familiar with Nepal and the use of GIS in Nepal for development work particularly to rural communities.
The consultant should have at least 5 years using GIS applications for development work in Nepal. 3 years at a management level required.
The consultant should have a Masters degree in GIS or remote sensing applications.

ARTICLE II

This consultancy should run from approximately September 25, 2001- November 5, 2001. Remuneration will be made only after all deliverables have been met, certified and approved by the Cognizant Technical Officer (CTO).

Annex 4.4 Nepal: Sample Vacancy Announcement for GIS Specialist

William S. Berg ~, OFDA

MISSION NOTICE

USAID MISSION TO NEPAL

SUBJECT: Vacancy for Geographic Information System Specialist in the Office of Foreign Disaster Assistance (OFDA) and Special Projects Office (SPO)

NUMBER: 02-19

DATE: 07/11/02

USAID/Nepal invites applications from all interested and qualified individuals for the following position:

Geographic Information System Specialist:

1. BASIC FUNCTIONS OF POSITION:

The incumbent for this position will serve as a Geographic Information System Specialist level position for the analysis and development of spatial information and its broad application for developmental and disaster assistance. S/he requires academic background and expertise in Geographic Information System (GIS) and related systems. The incumbent will be responsible for guiding, supporting and designing the application of spatial display and analysis techniques in Nepal and the Asia region.

2. DESIRED QUALIFICATIONS:

A. EDUCATION: A Masters degree or higher from a reputable University in GIS and the integration of Remote Sensing information to GIS.

B. EXPERIENCE: At least 8 years of experience at a senior management level in programs using GIS for developmental applications. At least 5 years of experience with international donor organizations. Practical experience in disaster relief and response is required. Proven experience in design of practical applications using GIS for development at the community level.

C. LANGUAGE: Level IV English written and spoken proficiency is required to perform the assigned job.

D. KNOWLEDGE: Should have a thorough knowledge of Environmental Systems Research Institute (ESRI) GIS products.

E. ABILITIES/SKILLS: Should have proven ability in the overall analysis, design and production of integrated GIS system products for development organizations.

Detailed job description is available at the USAID/Nepal, Human Resources Office and can be collected during office hours. Applications along with bio-data should be submitted to the Human Resources Officer by COB July 26, 2002.

EXO:JJKessinger

Distribution: A, B, D, E, F

Clearances: OFDA:LKentro:
SPO:JIsaacson: 7/11/02

Drafted by HR/KBPaudel
July 11, 2002

MOZAMBIQUE DESK STUDY

Scope of Work for FEWS NET Chemonics Task Order in support of USAID/Mozambique: Mozambique Integrated Information Network for Decision-Making (MIND)

December 14, 2000

Background

The tragic floods in Mozambique earlier this year not only resulted in considerable damage to infrastructure and loss of human lives, but they also resulted in a serious setback for Mozambique's economic development, thus exacerbating poverty as well as health and food insecurity. To emphasize the importance of food security in overall national policy, the recently approved National Poverty Reduction Strategy (PRSP) has given a prominent position to the roles of food access and information in increasing rural productivity and reducing poverty. The National Food Security Strategy aims to create the conditions for raising rural productivity through market-based solutions and is predicated on more reliable and useful information, including that which helps protect rural livelihoods and food-producing natural resources through improved disaster mitigation, prevention, preparedness, early warning and disaster response. As is also noted in the USAID strategic package for increasing rural incomes, food insecurity largely defines poverty in Mozambique. At least ten million Mozambicans live in food insecure households, a fact that will affect almost all other social sector investments until rural productivity is more sustainable. There is a common recognition in both the USAID food security strategic objective and the PRSP of the importance of better information to:

- Improve the working of the disaster management system, including a more effective early warning system component
- Help better identify vulnerable groups for specific uses, such as helping to identify target groups in need of basic food in the event of emergencies
- Improve access to market information in rural areas that leads to the private movement of agricultural surpluses to areas facing chronic and acute food deficits
- Promote more community responsibility for the management of natural resources
- Create local information networks

The Congressionally-approved flood supplemental is providing the funds necessary for USAID/Mozambique and AFR/SD to support the ACT program in its objective of providing increased user access to natural hazard and vulnerability information through the internet and other means. This information is critical to protect communities recovering from the 2000 floods, since many of these communities are currently extremely vulnerable to increased food and health insecurity that might be precipitated by the repeat occurrence of flooding in 2001. Activities and funding under the ACT program will be managed by USAID/Mozambique with support provided by AFR/SD. (Note: Activities and funding for the Regional Flood activity managed by AFR/SD, in collaboration with USAID/Mozambique, are not contained in this Task Order.) All supplemental funds made available under this Task Order must be expended within two years of the date of obligation. (This is expected to be on or about December 15, 2002.)

Problem Statement

A 1999 assessment of risks of natural disasters in Mozambique by Medicins Sans Frontieres-Consolidated Information System (MSF-CIS) noted some of the historical antecedents to this year's flood tragedy.

Records back into the 1970s suggest that drought, cyclones, and floods have been recurring phenomena in Mozambique, with considerable loss of life and damage to agriculture production capabilities over the years. If history is not to repeat itself, it is clear that more timely and more useful early warning and vulnerability information are required for improved contingency planning and response at all levels in Mozambique.

The five major aspects of the problem addressed in this scope of work are developed in the following five parts of this section.

1.   Weak Early Warning System and Communications System for Flooding and Cyclones

Throughout Africa, substantial effort and resources have been invested over the years to develop regional and national food security information and preparedness systems. These aim, in part, to provide drought early warnings and develop appropriate response plans to slow-onset natural disasters. In the case of drought, the need does not exist for at-risk communities to receive urgent, timely and informative warnings, but rather governments and others unaware of the occurrence of drought. However, cyclones and flooding are often rapid-onset events that require good data, rapid analysis and effective communication of warnings to those at risk A flood and cyclone early warning system does not currently exist in Mozambique that meets the above-mentioned challenges of informative analysis and warnings communicated rapidly to those most at-risk.

In the case of floods, flood early warning information needs to be disseminated to the communities at-risk since flood threats require a different information flow than is traditionally the case with drought early warning systems that report up to the national level. During the floods of 2000, the Government's cyclone warnings were issued by the Department of Meteorology (INAM) for the country, and its flood warnings for rivers in Southern Mozambique were issued by ARA-SUL. These INAM and ARA-SUL warnings were issued in Maputo and broadcast on both national radio and the print media. ARA-SUL also issued warnings in Gaza Province from its offices in Xai Xai that were broadcast in local language over provincial radio channels. Based on the existing data and models, ARA-SUL was only able to issue very general early warnings about the threat of flooding. Analytical limitations due to the nature of the data and models available at the time led to only generalized warnings primarily based upon analyses of expected river flow levels in relationship to actual rainfall levels. These general warnings were of limited information value since they did not contain any of the following critical pieces of observed and forecast (predicted) information for each river system:

1)   the volume and intensity of river flow
2)   the level of flooding
3)   the amount (and depth) of inundated area
4)   the timing of volumes, intensity, river levels and amount (coverage and depth) of flooded area
5)   the location of volumes, intensity, river levels and amount (coverage and depth) of flooded area, and
6)   the district and village level actions recommended, particularly: a) when villages should be evacuated and b) where they should be evacuated to (i.e. safe haven locations identified that are the nearest village or other area that are at elevation levels outside of expected unsafe inundation areas).

Thus, the general information provided during the 2000 floods at the village level was viewed by many as being incomplete and untimely, especially in villages being notified of the severity of the threat in insufficient time to take the necessary and appropriate actions to evacuate to safe locations. At the same time, those areas that did receive advance warnings were not prepared to take timely and decisive action to avert the ensuing crisis.

Also, as noted in the GOM-UN Report on Lessons Learned from the Response to the 2000 Floods, there is the need to develop the now weak information and communication networks that are among the most important factors limiting private and state response to potential hazards. There are currently a number of institutions, both within and outside government, collecting data related to drought or flood early warning. However, the lack of coordination among those information systems has resulted in less than timely information and sometimes contradictory analysis. It is critical that the incentive structure be improved within government and donor institutional structures to promote improved institutional cooperation that ensures that the producers of early warning and vulnerability information are responding in collaborative, transparent and timely ways to the requirements of users. More feedback is needed from district and provincial levels for more precise use of vulnerability analyses.

Moreover, as noted in the Lessons Learned Report, information does not arrive in the form and timeframe in which policy, program and intervention-related decision-making occurs. The focal points for vulnerability analyses have been too scattered, and the use of remote sensing and GIS mapping inadequate. Numerous information gaps are identifiable, particularly regarding regional flood hazards and potential ranges of intensity. Mozambique's meteorological and river flow surveillance systems are in a severe state of disrepair that will take several years to repair or upgrade. Systems designed to provide rainfall, cyclone and flood early warning to provincial authorities are slow and unsystematic. Even where warning information arrives in time, there have been inadequately institutionalized response mechanisms at all levels.

Thus, the problem is that systems for early warning for flood and cyclones in Mozambique are seriously deficient, particularly in identifying and communicating useful information that is needed both by communities at-risk and by national and local governments.

2.   Constrained Decision-Making Due to the Absence of Useful and User-Oriented Decision Support "Systems"

The areas and groups affected by this year's flood are areas and groups that face, in any given year, chronic food insecurity, malaria and the 'threat' of acute food insecurity caused by drought or flood. While flood is clearly an obvious worry, especially given the magnitude of this year's flood, other serious hazard threats exist. In urban areas, it is typically the rapid rise of malaria, while in rural areas, it is typically drought and malaria. Moreover, since most of the flood-affected areas can be characterized as being chronically food insecure, it is these households, for the most part, that stand in harm's way from flood, drought, and malaria.

Nevertheless, disaster managers focus on flood (and drought), public health officials focus on malaria, and agricultural officials focus on chronic food insecurity. While this approach might work for many decision-makers, there are others who require a better understanding of the complex realities of the situation they face. For these, the data and analyses currently available in Mozambique do not help decision-makers (or analysts) understand certain critical relationships among water, agriculture, food, nutrition, health and transport that might help improve their response to an emergency. Their interest in these relationships is not academic, but rather that of helping them to better meet operational and related needs, such as identifying the food and medical needs of communities and groups especially vulnerable to specific flood hazard occurrences and meeting them rapidly in an emergency. The following example of the needs of children under five age in a flood emergency will help to illustrate this connection that decision makers need to know for at least two reasons. The first is to assist separate ministries to coordinate their preparedness and response activities to the same area affected by flooding. The second is that senior officials working above the sectoral level are more likely to require information related to all of the "needs" of a flood affected areas, not simply the food or health needs. This, in turn, again requires

coordinated actions at the sectoral level. In the example that follows, this coordination involves linking information from the health sector, the food and agricultural sector, and the transport sector. The example deals with how and when to coordinate the identification, assembly and delivery of critical items both before and after an emergency that people will need.

On the health side, chronic levels of malnutrition, particularly in children under the age of five, are of direct interest to those working within the health sector, as is the negative synergy between malnutrition and other diseases, such as malaria and gastro-intestinal infections. Both malaria and gastro-intestinal infections are water-related and thus affected by the presence or absence of water. Consequently, they are affected by rainfall levels (normal, below normal and above normal), seasonal variations in rainfall, and flooding. Therefore, decision makers interested in flood preparedness, and particularly those in the health sector, will need information from the health, water and meteorology sectors to feed into a specific preparedness strategy for the pre-positioning as well as rapid delivery of essential items such as oral rehydration kits and malarial medicines.

On the food security side, levels of chronic malnutrition, particularly in children under the age of five, are not only due to water-related and other infections as mentioned above, but also because of inadequate levels of food consumption, inadequate frequency of feedings, and/or inadequate nutritional quality of the diet. Location-specific analyses of the chronic food insecurity and vulnerability of high risk groups that might be affected by floods are not presently available. Without organized data and the ability to link information about chronic food insecurity and food security vulnerability to floods into integrated analyses, decision-makers are unable to take into consideration important information that will help produce more cost-effective responses to important, complex food security- related problems. An example is that of having to prioritize those areas and groups requiring flood-recovery assistance based upon knowledge of chronic food and health insecurity conditions and the consequences of the natural disaster upon their specific incomes and livelihoods. Thus, decision makers interested in flood preparedness, and food and agricultural decision makers in particular, will need information related to food security, health, water and meteorology to feed into a specific preparedness strategy for the pre-positioning as well as rapid delivery of essential items such as essential food items for adults and high energy food supplements for at risk children under five.

On the transport side, information for the health and food and agricultural sectors about access to areas affected by flooding is essential in a flood emergency, yet is not yet available in Mozambique. As was seen in the case of Hurricane Mitch, rapid response to communities in need will be greatly facilitated by maintaining on a daily basis a data base of current operational status of the road and bridge network that is used to update an analytical system that determines the most accessible route to the areas facing the food and health needs. This information is certainly needed by the food security and health related sectors in an emergency.

In summary, there is currently a problem in Mozambique in producing and integrating the necessary yet complex types of information that provide improved early warning as well as leads to improved coordination in planning and response within the food security, health and transport sectors that is needed for both flood emergency preparedness and for flood response. That essential information is simply not available in a simple and readily usable form for decision-makers.

3.   Critical Gaps in Flood Hazard, Vulnerability and Resource Information

In order to meet these information needs of decision makers, three core categories of information are required to link the prediction/occurrence of a hazard event and appropriate pre-planning and response:

- Hazard information that details the nature, magnitude and likelihood of certain hazards in particular areas.
- Vulnerability information that provides the context information that allows for a determination of the possible effects of the hazard on different population groups.
- Resource information that inventories the range of possible alternatives for responding to a disaster (human, financial, material, etc.).

Hazard Events:

Since hazards are a fact of life in Mozambique, the analysis of past hazard events provides the only knowledge base for understanding possible future hazard events. At the present time, much of this knowledge either does not exist or exists outside of Mozambique. In addition, research on past events provides important clues about the effect that future climatic episodes might have in creating natural hazards, including links with greater climate variability in Southern Africa in coming years that could lead to periods of increased rainfall, compared to long-term historical averages, interspersed periods of drought. Concerns about the effects of climate change are currently worrying to senior Government of Mozambique officials. This is not surprising in light of the highly atypical cyclone pattern that occurred in the Mozambique Channel earlier this year. While the technology exists to track the onset of drought, floods and cyclones, new and promising hazard detection and accompanying early warning tools are not yet available within Mozambique.

Vulnerability Information: Important Links between Livelihoods and External Resources Required in an Emergency Are Not Well Understood

While significant efforts have been devoted before this year to cataloguing and attempting to understand drought in Mozambique, almost no attention has been given to systematically building up vulnerability information in relation to floods and cyclones. As stated in a recent study in Mozambique, "Although there are still some gaps relating to hazard assessment,…very little has been done with regards to analyzing vulnerability to hazards, with the exception of some studies relating to drought" .

Without vulnerability information to the specific hazard, it is not possible to know how people will be affected by floods or droughts in real terms, particularly in terms of the loss in access to food, cash income and critical assets. Moreover, a population's own capacity to cope with a disaster that needs to be mobilized and strengthened varies seasonally and by wealth group. For instance, a hazard event that occurs during the hunger-gap will affect people differently than one that occurs just before planting. Likewise, 'richer' groups may have some of their assets in savings, thereby facilitating a faster recovery for them than for poorer groups living within very small margins. Up until now, disaster planners in Mozambique have been missing these crucial aspects of coping in their analysis of different hazards, particularly flooding.

Consequently, planning without vulnerability information becomes a time-consuming exercise in determining the extent of directly-observed damage and numbers of people 'affected'. When it comes to translating this damage into real effects on people, there is no objective measure for doing so. In Mozambique, lack of vulnerability baseline information was potentially one cause for the discrepancies in relief estimates provided by WFP and MSF-CIS this year . It is simply impossible to say for sure how much food is needed by whom and where unless one starts with a detailed understanding of the relative importance of food and income options for different affected households. This understanding highlights specific areas of the local economy susceptible to damage given a certain level of flooding and allows for a quantitative estimate of the impact of different shocks on food and cash income. Without vulnerability information, decision-makers might be able to determine the physical extent of flooding and the number of people 'affected' or within range of the flooding, but they will not be able to determine the effects of

the flooding on rural households' access to food and cash income, or the degree to which local livelihoods will be able to withstand, or even benefit from, the flooding.

Resource information:

An inventory does not currently exist of all relevant on-going and intended activities that would be relevant to responding to a specific hazard event. This information needs to be categorized in some easy and useful way for disaster managers, possibly organized around categories such as: a) different hazards, b) specific locations, c) subject matter (or sectoral area), and/or c) type of effort (e.g. disaster mitigation, emergency preparedness and/or response). This information would greatly facilitate such important decisions as how best to plan interventions in the case of a disaster that would minimize the risk of duplicating effort, but more importantly promote more efficient and cost-effective decision-making for resource allocation. Thus, a basic inventory of the nature and location of on-going and planned activities identified by resource providers (with contact point information) is a key information need that is not currently being met within a simple and easily accessible information network that supports decision makers.

4.   Ineffective Contingency Planning for Preparedness, Response and Prevention (Mitigation)

As noted in the Government of Mozambique and United Nations Lessons-Learned Report, systematic contingency planning and preparedness did not occur prior to the 2000 floods. Information collection and dissemination structures are needed that will facilitate rapid and well coordinated decision making both within government and the donor community in the event of a disaster. Limited capacity and inter-governmental coordination structures exist for rapid information collection and analysis, particularly for more sudden onset phenomenon. Rapid-onset disasters, in particular, require immediate response measures at the national, provincial, district, community and international levels. Moreover, the Report also notes that practical contingency planning has not been prioritized and does not include relevant flood risk and vulnerability analysis and mapping. Government and donor decision makers have, however, expressed a need for much improved use of remote sensing and on-the-ground vulnerability and livelihood analysis for risk maps, as well as information required for targeting that will improve emergency response without disrupting Mozambique's already weak food and agricultural marketing system.

5.   Weak Government Capacity to:

•   Strengthen Weak Early Warning System and Communications System for Flooding and
        Cyclones,
•   Improve Decision-Maker Access to Integrated Data, Analyses and Decision Structures for
        Decision Support,
•   Fill Critical Gaps in Hazard, Vulnerability and Resource Information, and
•   Provide Leadership and Direction for Contingency Planning that Addresses Preparedness,
        Response and Prevention (Mitigation)

Despite the past occurrence of extreme disasters involving widespread loss of life, along with the serious threat posed by possible drought, flood and cyclone in any given year, the Government of Mozambique has been unable to capture and institutionalize the lessons learned from past disasters. This has impeded the development of its ability to strengthen future preparedness and response not only through the INGC, but also through other sectoral bodies of government at the national and provincial level. While extensive donor involvement in past disaster responses has reduced the short-term suffering associated with natural disasters, past responses can be characterized as being ad hoc and temporary. Moreover, the nature of donor responses has been emergency-oriented and generally not based on a thorough understanding about

the factors and conditions that could result in responses either being ineffective, or worse yet, having unintended negative effects. Also, in the case of the 2000 floods, many of the external information experts involved heavily in the flood response have left the country and thus are no longer available to assist the government either as disaster resources or in assisting it to capture past lessons learned for future responses. Structures to capture experience and learning about disaster early warning and management, to respond effectively in times of emergency, and to protect against future disasters do not yet exist within the INGC and elsewhere within national and provincial governments. Moreover, as structures change and new structures emerge, government will face many constraints in being able to operationalize these structures in ways that will be both useful and effective. And while the Government of Mozambique acknowledges its responsibility to identify mitigative policies and programs, preparedness plans and information networks that support sound hazard management decision-making and dissemination of early warning information at all levels in its National Policy on Disaster Management, it faces serious manpower, financial and organizational constraints in pursuing its disaster management policy objectives. Without information systems appropriate to local livelihood systems and tailored to socio-cultural conditions, community preparedness and response, external interventions responding to specific hazard occurrences will continue to be ad hoc, temporary and too narrowly focused on short-run considerations divorced from the realities of the lives and livelihoods of those most affected.

Objectives

There are five objectives/results to be achieved under this Task Order, each of which corresponds to the five major problem areas mentioned in the previous section.

Objective 1.   Strengthen Weak Early Warning System and Communications System for Flooding and Cyclones

A natural hazard early warning system will be established and/or strengthened for floods, drought and cyclones that reinforces communication among Mozambican government and non-government authorities at the national, provincial, district and village community level for enhanced mitigation and hazard preparedness.

Objective 2.   Improve Decision-Maker Access to Integrated Data, Analyses and Decision Structures for Decision Support

An integrated information network will be developed that provides decision-makers with easy access to timely and useful information on food security and health that identifies and helps those responsible to respond to natural hazards and disasters. A principal purpose for developing this integrated network is to address overall disaster management needs triggered by flooding and other disasters. The work performed will help to create the conditions where Mozambique decision-makers will demand and have regular and easy access to analysis and information resulting in improved coordination of response interventions at all levels. It is expected that the network will include hazard, vulnerability and resource information useful to the general public, decision makers in government and non-government institutions, and technical user analysts.

Objective 3.   Fill Critical Gaps in Hazard, Vulnerability and Resource Information

A hazard-based geographic vulnerability database will be developed that will substantially improve the ability of government decision-makers to make cost-effective decisions about targeted interventions during emergencies and to plan for drought and flood preparedness, food security, and poverty reduction. Priority emphasis will be placed upon conducting these analyses in ways that promote network ownership and consensus among the principal users within Mozambique in order to reduce the possibility of

contradictory information coming from various sources. The production of consensus reports through the early warning and vulnerability analysis working group, combined with effective networking with users, will lead to effective use of these analyzes for drought and flood mitigation purposes, as well as during flood and drought emergency responses. Gaps in resource information will also be identified and addressed as necessary.

Objective 4.   Prioritize Contingency Planning for Preparedness and Response as well as Preparedness Planning and Mitigation

Contingency Planning for flood, drought and other natural disasters will be strengthened under this Task Order through providing to the planning process: important hazard early warning system modalities, improved decision support structures, and new and important flood hazard, vulnerability and resource information. Assistance will be provided to those involved with contingency planning to help them make full use of the improvements supported under this Task Order.

Objective 5.   Strengthen Government Capacity to:

•   Organize and Implement an Effective Hazard Early Warning System and Communications System for Flooding and Cyclones,
•   Improve Decision-Maker Access to Integrated Data, Analyses and Decision Structures for Decision Support,
•   Fill Critical Gaps in Hazard, Vulnerability and Resource Information, and
•   Provide Leadership and Direction for Contingency Planning that Addresses Preparedness, Response and Prevention (Mitigation)

It is essential that work under this Task Order result in a stronger capacity of government to plan and operationalize effective hazard early warning; to identify and provide important hazard, vulnerability and resource information as required; to develop sound decision support structures that are effective in providing decision-makers with easy access to essential early warning, vulnerability and resource information; and to lead effective contingency planning exercises that draw upon the relevant resources available.

Technical Reports and Deliverables

To report on results achieved, USAID/Mozambique requires two main deliverables:

1.   Semi-Annual Reports. The contractor shall submit semi-annual written reports at the end of June and mid-January. The report will consist of two main parts: a status report of results to date and a work plan. In addition, the contractor shall include important assessments produced as part of this task order with the semi-annual reports. USAID will review and approve the work plan of each report.

      a.   The status report for June will be a post rainy/cyclone season report on the performance of the flood and cyclone early warning system(s), along with recommendations for improvements, including elements for future USAID flood contingency planning and a work plan for the rest of the calendar year. The first report should include making recommendations to USAID about modifying and/or intensifying the flood and cyclone communications work for the Limpopo watershed within Gaza Province, as well as identifying through discussions with USAID whether or not to extend flood early warning to other priority rivers.

b.   The January report is the required annual report including the annual results achieved through the calendar year and the work plan for the next calendar year. In the second year the report will be the final report due at the end of the task order (o/a December 15, 2002). The contractor shall detail in the final report the achievements under the Task Order, along with recommendations on priority follow-up actions that will maintain the momentum of progress.

2.   Periodic Debriefings. The contractor shall debrief USAID every two months during the rainy season (approximately December until April) about progress and next steps under the Task Order. At the beginning of the task order and in the event of another emergency situation, more frequent debriefings will be required. The purpose of these debriefings will be to provide information and make important decisions that will move the Task Order work forward. These debriefings should be used as opportunities to present any assessments or sub-deliverables required under the task order and may also be used to inform other stakeholders about the progress under the task order.

Scope of Work

Work will be undertaken to achieve each of the five objective/results of this Task Order at both the national and provincial level by the designated personnel. Within this context, FEWS NET will focus on providing services and information products that assist four contingency planning user groups; namely, the national and provincial level governments of Mozambique, at-risk-communities, information network users, and USAID/Mozambique. Described below, by Task Order objective/result, are illustrative tasks and sub-deliverables. The contractor is invited to suggest changes to the suggested tasks and/or sub-deliverables that can be accomplished with the level of effort specified in the Level of Effort and Personnel section of this Scope of Work. The contractor's efforts shall, at first, concentrate on developing a functional, sustainable, emergency preparedness and response model in the Limpopo watershed. However, the contractor shall consider expansion to other watersheds as resources, needs, other donor activities, and the Government of Mozambique priorities allow and/or require.

Objective 1. Strengthen Weak Early Warning System and Communications System for Flooding and Cyclones

The contractor shall assist Mozambique to develop a flood and cyclone early warning system that provides informative, accurate and timely analysis and warnings that are communicated rapidly to those most at-risk and to decision makers. The contractor shall:

- Identify priority areas for contractor-supplied assistance required by Mozambican stakeholders (i.e. INGC, DNA, INAM, ARA-SUL, and Mozambican Red Cross). This assistance shall be related to developing and/or strengthening two-way technical early warning communication channels among the relevant Mozambican water and meteorological institutions and the international and regional bodies dealing with water, floods, cyclones, and rainfall (i.e. the SADC Water Sector, SADC Regional Remote Sensing Unit, LIMCOM, and the Drought Monitoring Center in Harare). (Note: this is inclusive of, but not restricted to, the Limpopo River.)

- As required, facilitate through workshops, meetings, seminars or other appropriate means, discussions involving the relevant Mozambican and regional officials: 1) in the meteorology departments of Mozambique and NOAA (possibly including the experience of Reunion and Mauritus in establishing cyclone early warning systems) and 2) in the Mozambican and regional organizations responsible for water. These meetings would be held to resolve problems that they identify and to establish informal agreements that will address the need for sharing critical

cyclone early warning information and developing systems for providing clear and timely cyclone early warnings and/or amendments to the SADC protocol on shared water courses.

• After an initial concentration on the Limpopo watershed, recommend if it will be advisable to use meetings among officials of other regional river systems that flow into Mozambique to catalyze informal river-specific working networks. The purpose of each network would be to develop an operational river-specific regional flood and cyclone early warning information network.

• Identify key users of flood and cyclone early warning information and key early warning information products required. Based on this information about key user needs, provide guidance to meteorological and hydrological experts involved with these systems that will help shape the structure and products provided. This task also contributes to Objective 2 (internet site).

• Assist appropriate stakeholders to develop and implement, with the involvement of the relevant GOM bodies, a communication strategy for cyclones, as well as a communication strategy for floods, that will deal with the following aspects of communication: the identification of appropriate 'messages' for decision-makers at the national and provincial levels, the identification of appropriate audiences (i.e. down to the village level), and the identification of appropriate information flows (vertical (two way) and horizontal). This will be a generalizable strategy that can be readily applied to other areas. The Limpopo watershed will be the initial area of application for the communication strategy.

• Promote institutional cooperation that will ensure that the producers of cyclone and flood early warning and vulnerability information are responding in collaborative, transparent and timely ways to the requirements of users. To support the development of stronger institutional linkages and collaboration, the Ministry of Agriculture's Early Warning Unit (FEWSNET), with support from the EU and FAO, will participate in a process involving all partners to reach a consensus on the establishment of a coordinating structure for early warning and food security-related information systems. Once established, FEWS NET will collaborate with others (e.g. the EU) within this structure to ensure that its activities are complimentary and supportive to government initiatives in this area. This task also will contribute to the other Objectives.

Sub-deliverables:

• As part of a debriefing to USAID, the contractor will present no later than March 2001, a written equipment needs assessment that identifies the critical unmet communications hardware needs that constrain communication among network members. (Note: This report will be used by AFR/SD in identifying regional equipment needs that might be funded under the regional component of the supplemental.)

• As part of the first semi-annual report, a post rainy season "Gaza Province Communication Assessment" Report, including recommendations to USAID concerning continuation of communication strategy in Gaza, as well as possible extension of that strategy to other provinces sharing other major river systems in Mozambique.

Objective 2. Improve Decision-Maker Access to Integrated Data, Analyses and Decision Structures for Decision Support

In order to assist Mozambique by improving the access by decision makers to integrated data, analyses and decision structures for improved decision-making, the contractor shall:

- Identify a sustainable internet-based decision support structure that responds to critical information needed (identified as part of the other Objectives) by government officials and others in Maputo and the provinces. For example, in the event of a disaster threat, the governor has legal authority to act. Decision-making at the provincial level, therefore, requires access to information that should be available directly in the province rather than only in Maputo. Links could include:

  -International, national and sub-national early warning information for drought, flood, and cyclones (including flood early warning provided by USGS (in Mozambique and at the SADC Regional Remote Sensing Unit))

  -Intra-sectoral information for health, food and agriculture that links relevant underlying chronic problems with analyses related to an acute threat and/or event (e.g. providing baseline vulnerability information related to food security so that it informs both emergency preparedness as well as mitigation planning)

  -Inter-sectoral information required by food, agriculture, health, transport and disaster planning decision-makers at the national and sub-national level to improve preparedness and response to flood, drought and cyclone, as well as mitigation planning

  -Inter-sectoral information to the disaster management structures of INGC and provincial government

  -National information and decision-making structures to provincial information and decision-making structures in all provincial capitals

  -Government information for decision making to bilateral and multilateral community information for decision making

  -NGO information for decision making to host country government and other bilateral and multilateral cooperating partners

  -Resource information about activities by sector and location that clearly identifies those involved in hazard mitigation, preparedness, as well as early warning and response activities. Resource information, including areas of donor involvement and intentions, contact names for key people in government and various UN and NGO organizations, and other relevant sectoral information required by key users groups

Note: The structure will build upon the experiences gained with the flood hazard prototype developed by USGS and utilizes USGS capability for developing linked internet data bases for decision support (most notably using GIS). The focus will be upon identifying a suitable, practical structure that encourages and reinforces institutional interest in self-updating information, especially resource information related to an inventory of activities and easy access to technical reports produced by these institutions.

- Build consensus within Mozambique by August 1, 2001 for the structure and the internet platform upon which to stage the decision support structure. Based upon this consensus, recommend to USAID/Mozambique (and AFR/SD) a suitable platform for the decision support structure and an implementation schedule, along with suggested coordinated implementation responsibilities to be assigned to Chemonics, USGS and other partners involved in the development of the decision support structure.

- Ensure that 1) vulnerability baseline information and general contact and reference information collected as part of Objective 3 and 2) information available from the USGS work are integrated, as deemed appropriate, into the database system, allowing analysts to retrieve these baselines and model the potential effects of any number of hazards on rural household food security.

- Implement by November 1, 2001 the development of the decision support structure in line with agreed upon responsibilities assigned to Chemonics.

- After November 1, 2001, train USAID and other users familiarizing them with the decision support structure.

- Monitor and evaluate the utility of the internet website decision support structure using cluster "user groups" such as the general public (e.g. the press), decision makers (i.e. those controlling resources that could be used for mitigation, preparedness, and/or early warning and response), and technical users of data, analytical methods and models. This will be done during development and then at critical intervals such as at the beginning of the rainy/cyclone season(s) and then after the conclusion of the rainy/cyclone season(s) for use in contingency planning.

Sub-deliverables:

- In the first June semi-annual report, provide the Mission, AFR/SD, and USGS with a written assessment of the performance of the Flood Hazard Monitor web site along with recommended changes in the web site format, content, location etc. that will facilitate its usefulness as a decision support tool in Mozambique. The assessment will also include a proposed strategy for building and maintaining critical resource information, required by decision-makers, on the appropriate web site(s) for use in cyclone and flood early warning, preparedness and response.

- Provide a July or August 2001 presentation (with handouts) to USAID of the proposed design of the decision support system that reflects the preliminary consensus about the structure and the internet platform to use. Utilize feedback from USAID/Mozambique (and AFR/SD) as part of consensus building among users.

- Revise the 2001 work plan to include Chemonics recommended implementation responsibilities.

Objective 3. Fill Critical Gaps in Hazard, Vulnerability and Resource Information

In order to assist Mozambique in filling critical gaps in essential information, the following tasks are required:

- Assist the Vulnerability Assessment Working Group to develop priorities and an implementation schedule for undertaking food security-specific vulnerability analyses related to drought (Southern and Central Mozambique), flood (along river basins) and cyclones (coastal zones) in high risk areas.

- Build vulnerability baselines assessments using existing information systems, including the MSF/AEDES-CIS monitoring system and the Ministry of Health baseline profiling work allowing food security analyses to be conducted by homogenous livelihood zones instead of district levels.

Note: At present, the Ministry of Health district-level profiles are unique in that they disaggregate food and income-related information by wealth group, going beyond district-level analysis. Current national

systems monitor key trends at the district level, making it difficult to predict varied effects on different wealth groups within the district. At the same time, the MSF/AEDES food security monitoring system conducts regular monthly monitoring in a systematic fashion, but will be improved by access to disaggregated (by wealth group) baseline information against which to monitor its current indicators. On the other hand, the Ministry of Health profiles will be linked to a regular monitoring. By assisting MSF/AEDES, with minor modifications in quantifying the current production and market indicators, the MSF/AEDES system will link easily to the Ministry of Health income and health profiles, adding value to both efforts.

- Provide the necessary technical assistance and training that will enable Mozambican and international experts to conduct these baseline analyses as rapidly as possible in order of priority. Vulnerability baseline assessments will allow a faster and more accurate analysis of emergency relief needs and will also provide an opportunity to: 1) train local monitors in order to increase the value of their input into regular monitoring systems and 2) find out more about local early warning communication networks that might be strengthened in future work.

- Identify training needs within the health sector community to enable them to input data information and use the food security vulnerability assessment methodology for health applications related to flood, drought and cyclone threats.

- Help specify information products required and timing based upon having clarified among the relevant stakeholders the most important questions related to preparedness and response decisions that need to be made and thus, identify what kinds of information products decision-makers will require and when. It will be critical to prioritize what information is most important since it is highly unlikely that all of the information products are needed and likely to be available within the short timeframe existing before the start of the season. Moreover, these products are time-sensitive for decision-making depending upon the purpose for which the information is required.

Note: Information products expected to be required include: 1) sector-specific activities by location that clearly identifies the activities and responsible parties involved in hazard mitigation, preparedness, as well as early warning and response; 2) resource information on areas of donor involvement and contact names for key people in government and various UN and NGO organizations; and 3) the locations of various technical information and references related to flood, cyclone, or drought mitigation, early warning, preparedness (i.e. contingency planning) and/or response.

Sub-deliverables:

- In briefings and semi-annual reports, provide information on progress made on completing vulnerability baseline assessments and other types of information gathering for flood, drought, and cyclone hazards in at-risk areas.

- Prepare (with other partners, including USGS) basic and routinely "self-updating" maps of who is doing what, where and with which institutions of government to contribute to the annual contingency planning (for flood, cyclone and drought) exercise. (June, 2001, 2002).

- Produce an annual calendar of key information products that will require inter-ministerial work and systematic data-sharing.

Objective 4. Prioritize Contingency Planning for Preparedness and Response as well as Prevention (Mitigation) Planning

Contingency planning is especially important in light of four factors:

- The uncertain effects of climatic events (e.g. El Nino) upon rainfall patterns, timing and levels within Mozambique,

- The fact that many Mozambicans reside in high flood and drought risk areas,

- The fact that many of these areas are ones where damage to levees from the 2000 floods has not yet been repaired, and

- In the event of flood, drought and/or cyclone, access to critical types of information will be needed for operational purposes that will be best served through a well-managed and analytically rich decision-support information system.

Within the overall context presented above, the contractor will focus on providing services and information products (through the achievement of the other Objectives) and assist, as required, the four target user groups in contingency planning:

- The Government of Mozambique (at the national and provincial level): To help operationalize practical and efficient approaches towards contingency planning for drought and flood and to ensure that donor contingency plans are compatible with Government efforts to develop sustainable contingency plans. Currently, the Mozambican authorities responsible for disaster management; namely, the INGC and the Ministry of Foreign Affairs, are presently engaged in contingency planning (for flooding) and have identified several information requirements that will help improve early warning, preparedness and response:

  -Better and more timely meteorological and river flow information, since many of the country's rainfall measuring and hydrological stations are destroyed or are in disrepair;

  -Mapping, particularly multi-layer risk maps. Current maps are inadequate to the needs of a contingency and response plan;

  -Early warnings that translate technical jargon into language and messages that decision-makers at all levels can understand easily and that lead to correct and timely actions.

- At-risk-communities: To obtain feedback from them and provide them with more information-rich early warnings (especially of the threat of inundated area) and to improve their preparedness and response capabilities.

- Information network users: To assist responsible actors to help develop contingency planning network components that not only link Government and USAID efforts but extend to all other relevant information stakeholders (e.g. other donors, NGOs, provincial governments etc.), including at-risk communities.

- USAID/Mozambique: To help in developing meaningful and useful contingency plans and disaster reporting cables, particularly related to the informational aspects of these plans.

The contractor shall:

• Maintain an inventory of and close working relationship with those working in the areas of hazard, vulnerability and resources.

• Help develop and improve the information coordination structure to be used to monitor and respond to successive rainy seasons for flood, drought and cyclone monitoring purposes. This includes facilitating the establishment of clear lines of authority, responsibility and channels of communications between key government offices and individuals so that contingency plans will identify information needs of various responsible stakeholders in advance of their actual need. A simplified structure (see Attachment) involving both the government and donor community is recommended as a conceptual framework.

• As required, facilitate cooperation among key donor partners, NGOs and United Nations Agencies, to build the earliest possible consensus about the possible severity of a threat and next steps for joint action.

• Review contingency plan in Gaza Province and contribute value-added input to:

-ensure that the Mozambican Red Cross has an appropriate role recommended in the Province of Gaza's contingency plan;

-if required, provide training to the Mozambican Red Cross to ensure 1) flood early warnings issued by ARA-SUL (INGC) and 2) cyclone early warnings issued by INAM are clearly understood and communicated by the Mozambican Red Cross;

-ensure that baseline vulnerability analyses of food economy zones within Gaza Province are available, understood, and used, as required, for both Red Cross and GRM contingency planning at the provincial level.

• As required, provide value-added input, making full use of achievements under other Objectives, to the contingency planning process for flood, drought and cyclone at both at the national and sub-national level other than for Gaza province. This will involve INGC, INAM, Ministry of Agriculture, Ministry of Health, ARA-SUL, DNA, and the National Red Cross in conjunction with USAID, the UN, NGOs and other international donors.

• Help provide information that leads to better pre-positioning of food stocks, most notably by WFP.

• Help in monitoring the rainy season and flood, drought and cyclone effects upon food security, and to the extent practical, link analyses of health security to this monitoring effort.

Sub-deliverables:

• By March 31, 2001, provide an updated USAID Mission Disaster Relief Plan and include the information required to update this plan as part of the information needs to be supplied as part of Objective 3.
• In the briefings and semi-annual reports, include 1) results of Task Order efforts to improve contingency planning; 2) recommendations and options for continued support for contingency planning efforts as part of the Work Plan; and 3) provide a copy of the updated contingency plan for Gaza Province, when available.

Objective 5. Strengthen Government Capacity in the Areas of: 1) Early Warning System and Communications System for Flooding and Cyclones, 2) Decision-Maker Access to Integrated Data, Analyses and Decision Structures for Decision Support, 3) Filling Critical Gaps in Hazard, Vulnerability and Resource Information, and 4) Providing Leadership and Direction for Contingency Planning that Addresses Preparedness, Response and Prevention (Mitigation)

All of the tasks in the previous four areas of the Scope will be undertaken in ways that are clearly designed to elicit government interest and involvement in developing skills in each of these critical areas. In addition, the contractor shall explore if any of the Mozambican Universities could become institutions that contribute to the sustainability of this effort. USAID/Mozambique had received an expression of interest from the Catholic University in Beira to the use of their GIS capability and staff to better understand the flood phenomena, measure its impact, and prepare a mitigation plan involving communities (Contact-Mike Schultheis).

Sub-deliverables:

- In the semi-annual report, provide greater detail on 1) the impact of the Task Order on strengthening government capacity and 2) the proposed work plan tasks that will achieve greater sustainability through institutional-building efforts and the institutionalization of efforts involving the other Objectives.

Information, Communication and Coordination with Other Donors

Through the regional flood watch activity integrated with national, provincial, district and community sub-elements, FEWS NET will act as a catalyst to encourage a coordination structure that encourages efficiency, by offering information and mapping products of widespread interest. By demonstrating openness, transparency and excellence of products, FEWS NET will set an important example that the sharing and integration of data is an essential corollary for good coordination. As an initial contribution in this regard, FEWS NET will work with other partners to prepare a map of who is doing what, where and with which institutions of government (Sub-deliverable, Objective 3).

Since the floods, there are numerous new activities planned or under consideration in various riverine areas now vulnerable to flooding. This represents a very important opportunity for coordination, particularly in the event that the sub-national early warning systems being piloted in Gaza Province prove valuable and workable in river basins where other donors and NGOs are active. In that regard, USAID/Mozambique is aware of both new and on-going donor projects with which FEWS NET will coordinate. While the list is undoubtedly incomplete, the range of other relevant donor activities demonstrates the unusual opportunities for integrating data management and for achieving synergies in information and communications management. These partners include:

- EC Food Security Unit and Medicins sans Frontieres (MSF) The Consolidated Information System covers all 128 districts and is moving to the Ministry of Agriculture. NGOs such as World Vision and Food for the Hungry participate. The continuation of this invaluable data system is very important for building livelihoods baselines and moving more rapidly to food economy analyses that can answer questions beyond current VA work. FEWS NET will work closely with the EC Food Security Unit and MSF during this Task Order.

- GTZ –Buzi and Limpopo River Systems The German government is beginning a pilot flood early warning project on the Buzi river next year in Manica province. The intention is to develop localized systems of risk management for later application at the national level. In contrast to the

USAID-supported Limpopo activity, the Buzi project does not include regional remote sensing and flood modeling, nor the multiple systems of radio communications proposed. The German government is also starting a new proposal to strengthen legislation and water management associations along the Limpopo, a program which will complement this Task Order. Close coordination between USGS, Chemonics and the GTZ on the Limpopo and Buzi activities could yield important lessons for Mozambique's seven other river systems that periodically flood.

- Japan and JICA JICA will be undertaking the rehabilitation of hydrologic and meteorological stations in the center of the country in Manica and Sofala beginning with the Sabi river system. They have also been asked to repair and raise river dikes so as to serve as high ground for flood victims and helicopter pads in the event rescue operations are needed. This work will not start until 2001 and will probably begin in the Chockwe area where JICA will also assist with the rehabilitation of the irrigation systems that were destroyed during the 2000 floods. In addition, Japan will be preparing a master plan for small multi-purpose dam construction, although they say they will only finance the planning phase.

- UNDP and Contingency Planning Among other activities, UNDP has begun providing Technical Assistance to INGC for their lead in contingency planning. In addition, FEWS NET will coordinate the development of the website in cooperation with the Information Unit of the UN Office for the Coordination of Humanitarian Affairs on general information (e.g. linking ReliefWeb to the website) and on more technical issues related to data protocols that will be needed to update maps of disaster affected areas.

- WFP and VAM Since WFP's Vulnerability Analysis and Mapping (VAM) work was begun in Mozambique, there has been a clear appreciation by the Mozambique government of this work. FEWS NET will assist the VA working group improve services through Objective 3. Government will see the benefits of more fully integrated vulnerability systems. WFP is also participating in the contingency planning exercise with risk planning scenarios and is hoping to work with Eduardo Mondlane University on urban vulnerability analyses and food security implications of HIV/AIDS.

- FAO and The Ministry of Agriculture Early Warning Unit FAO technical assistance to the MADER Early Warning Unit is coming to an end in December 2000 at a particularly inopportune time. The lead FAO Technician has been instrumental in encouraging various individuals working with early warning information to cooperate more effectively. They were also instrumental in bringing many parties together in the Ministry to propose the SENCAP structure to the Council of Ministers.

- IFPRI and Rural Poverty Mapping The International Food Policy Research Institute has proposed undertaking a poverty mapping exercise in Malawi and Mozambique. The development of poverty maps has obvious links with maps of areas and food insecure groups vulnerable to drought and flood.

- WORLD BANK and Core Welfare Indicators Survey Beginning early in 2001, the World Bank and the National Institute of Statistics (INE) will collaborate on the collection of data for a series of core welfare indicators. The activity, with the acronym CWIC, will be modular in fashion, beginning with Inhambane, Gaza, and Sofala provinces, and will include some questions in the questionnaires designed to obtain welfare indicators on the consequences of floods to rural populations.

- USAID/Regional and Washington Beginning in the first half of 2001, USAID/Botswana will be implementing a program supporting the implementation of the SADC Revised Water Protocol on Shared Water courses concentrating on the Limpopo water shed. Once both contracts have been awarded, the contractor will be required to coordinate but not duplicate activities. USAID/W will also be programming supplemental resources for regional activities that will complement this effort.

In addition, it will be important for FEWS NET to coordinate closely with the Mission's Leland Initiative Coordinator for internet connection with all provinces and Michigan State University's work in supporting the Government of Mozambique's SIMA price and market information system. SIMA (and MSU) now have a strong database that is increasingly being used by SETSAN for food security policy-making. These data sets will have utility for the food economy vulnerability work of FEWS NET but could also be important for the flood early warning activity in the Limpopo basin with radio broadcasting of commodity price bulletins into Gaza Province, in addition to those provinces already covered.

Level of Effort and Personnel

1.   Short-Term

- Work with UNDP, INGC, WFP and OCHA to identify base data and information product gaps along with protocols for information sharing. Provide the informal information working group along with the prototype being developed as a possible tool for improving information coordination during a possible flood emergency.   (2 months).

- Vulnerability assessment technical support required for training of Vulnerability Assessment Specialist (2 months)

- Other (as specifically agreed to by USAID either in contractor's response to the proposal or at a later date) (6 months)

A six-day work week can be authorized for short-term personnel. Unless otherwise approved by USAID/Mozambique, all short-term personnel must be able to write and speak Portuguese and English.

2.   Long Term

Senior Technical Advisor and Coordinator (STAC) (Expatriate-2years) The Senior Advisor will provide leadership to, as well as coordinate, the efforts of the FEWS NET field team and will ensure the technical quality and timeliness of all related work tasks and deliverables noted in the Scope of Work. The STAC will provide technical guidance and support to all activities to ensure objectives of the Task Order are met through the tasks and deliverables mentioned in the Scope. He/she will develop and maintain close institutional and professional linkages and coordination with FEWS NET counterparts and partners, including the relevant government officials at all levels, international agencies and donors, NGOs, academic institutions and others.

Early Warning Systems Decision Support Structures- The Senior Advisor will take a leading role in coordinating the development of effective early warning systems for flood, drought and cyclone (Objective 1).

Developing Decision Support Structures- The Senior Advisor will also work closely with INGC, other relevant government partners and the UN system to identify a joint internet-based decision support structure (Objective 2).

Required Hazard, Vulnerability and Resource Information- The Senior Advisor will take a leading role in developing analytical capacity within partnership networks and will help ensure that analytical products are timely and useful, meeting the actual needs of decision-makers at all levels (Objective 3).

Contingency Planning- The Senior Advisor will ensure meaningful FEWS NET contribution by all FEWS NET professionals in developing response and contingency plans to enhance preparedness at national, sub-national and regional levels (Objective 4).

Strengthened Government Capacity- The Senior Advisor will ensure that the tasks and deliverables in the previous four areas of the Scope will be undertaken in ways that elicit government interest and involvement in developing skills in each of these critical areas (Objective 5).

National Communications Specialist (NCS) (Local Hire- Year 2 (12/01-12/02)) This Specialist will have primary responsibility for developing and maintaining two-way communication networks and linkages between regional, national, provincial, district and local levels, in collaboration with key partners (Objective 1). In particular, the Specialist will ensure that flood modeling and hydrological information generated from regional and national activities, as well as other partner information products, are communicated to local levels in easy to use and appropriate formats, according to the needs of different client groups. The Communications Specialist will take a lead role in supporting vulnerability assessment activities at both national and local levels (Objective 3). The FEWS NET Communications Specialist will provide training and technical support in desktop publishing for network partners.

Gaza Province Communications Specialist (Local Hire-Year 1 and 2 (12/00-12/02)) The Specialist will have primary responsibility for developing and maintaining two-way communication networks and linkages between regional, national, provincial, district and local levels, in collaboration with key partners (Objective 1). In particular, the Specialist will ensure that flood modeling and hydrological information generated from regional and national activities, as well as other partner information products, are communicated to local levels in easy to use and appropriate formats, according to the needs of different client groups. The Gaza Province Communications specialist will have responsibilities in three major areas at the provincial capital level in Xai Xai:

• To provide technical support to the Red Cross (and/or others designated by USAID/Mozambique) to assist in developing and ensuring the two-way flow of flood and other relevant hazard information between the national, provincial capital and community level;

• To assist ARA-SUL in improving the timing, information content and dissemination of flood early warning information at the sub-provincial level that will be clear, easily understood and actionable by provincial government officials, Red Cross, other NGOs, and those living in at-risk villages;

• To assist in improving the timing, information content and dissemination of INAM's cyclone early warning information at the sub-provincial level within Gaza province.

The Gaza Province Communications Specialist will work with the Mozambican Red Cross (and/or others designated by USAID/Mozambique) to develop a prototype village information and preparedness strategy that will be implemented in the Limpopo River basin and refined, leading ultimately to recommendations for further action and replication. The Specialist will work with the Mozambican Red Cross and government officials to sensitize them, where necessary, to considerations related to the use of flood early warning at the village level, as well as to improve the flow and understanding of the content of warning and/or evacuation messages. The specialists will also identify and train government, local Mozambican

NGOs, religious leaders or other civil society groups who can help provide effective early warnings in times of flood and cyclone emergency. In addition, the Communications Specialist will also be alert to higher food insecurity in certain food economy zones within the province as a result of the vulnerability baseline fieldwork that was conducted in Gaza Province in November.

Vulnerability Assessment Specialist: (Local Hire-Year 1 and 2 (12/00-12/02)) This specialist will serve as the key resource for flood and drought hazard and vulnerability assessment (Objective 3). He/she would provide the necessary interface between vulnerability and hazard analyses done at the provincial level with the decision making response structures existing at the provincial capitals. He/she would maintain close liaison with the communications specialists at the national and provincial level to ensure the smooth flow, easy access, and thus use of vulnerability information at the national and provincial levels.

The Vulnerability Assessment Specialist will:

•   Conduct routine vulnerability assessments and perform baseline vulnerability assessments. This information will routinely feed into the integrated database and contingency and response planning.
•   Conduct training of identified local representatives and monitors in vulnerability assessment and effective monitoring in order to build local capacity (Objective 5).

•   Raise awareness among key decision-makers on how to use vulnerability baseline information (particularly the spreadsheet analysis) in contingency and response planning. This will take place after the vulnerability assessment work is completed in order to ensure that effective use is made of the new information.

Thus, the Vulnerability Specialist will work closely with WFP, the Red Cross and the provincial government to provide food economy zone analyses throughout Mozambique that helps address acute food insecurity arising from flood, drought and cyclones, as well as chronic food insecurity that in some cases increases longer term vulnerability to drought and flooding.

FEWS NET Country Representative: (Local Hire-Year 2 (12/01-12/02)) The FEWS NET Mozambique Country Representative will continue to undertake the core functions of FEWS NET Mozambique. These include the dissemination of accurate and timely early warning and food security information through monthly and ad hoc reports; promoting and contributing to vulnerability assessment and analysis; supporting improved decision-making and response planning; strengthening and contributing to network partnerships; and strengthen national capacity in the areas supported by the FEWS Network (FEWS NET). Through these activities, the FEWS NET Mozambique Country Representative will directly contribute to the expanded activities of FEWS NET Mozambique within this Task Order. (Year 2: 12 months)

Administrative Assistant: (Local Hire-Year 2 (12/01-12/02)) The Administrative Assistant will be needed to provide a full range of administrative support to the Chemonics and USGS teams resident in Maputo. Among normal administrative tasks, this individual will have skills in handling a wide range of administrative matters that will enable the technical team to concentrate fully on their work. The Administrative Assistant will report to the Senior Technical Advisor and will have a wide range of skills, including that of making the necessary administrative arrangements for workshops, seminars and meetings that FEWS NET might wish to convene and managing the administrative tasks within the FEWS NET office. The Administrative Assistant will be responsible for the procurement of supplies under the program and can request assistance from the USAID Executive Office in procedures such as customs clearance etc. This person must obtain a house and furniture for the Senior Advisor.

Long term personnel are authorized five-day work weeks.   All long-term national personnel are required to speak and write Portuguese unless special approval is obtained from USAID/Mozambique.

Workshops, Conferences, and Training

When responding to this proposal, the Contractor shall estimate costs in the budget for an appropriate level of conferences, workshops, and training needed to accomplish the identified Objectives.

Procurement of Goods and Services

The contractor will be required to procure goods and services for the operation of FEWS NET, including up to two cars, computers, other office equipment, furniture, vehicles, office supplies, travel-related tickets, and shipment of goods. In addition, the contractor shall also identify needed communication equipment and a budget for this equipment. Finally the contractor shall allocate $200,000 in order to procure additional essential but not yet identified equipment needed to support the Government of Mozambique and/or another institution to achieve the Objectives of this program.

Logistic Support

The contractor shall be responsible for furnishing all logistic support.

USAID and Other Liaison Officials

Resources provided through USAID/Mozambique will be managed by USAID/Mozambique Rural Income Strategic Objective team with assistance provided by AFR/SD. A 'virtual management review' at least semi-annually, and a more formal review will occur at the end of year one involving AFR/SD's participation. (The management structure for the USAID/W complementary regional program is not part of this particular task order.)

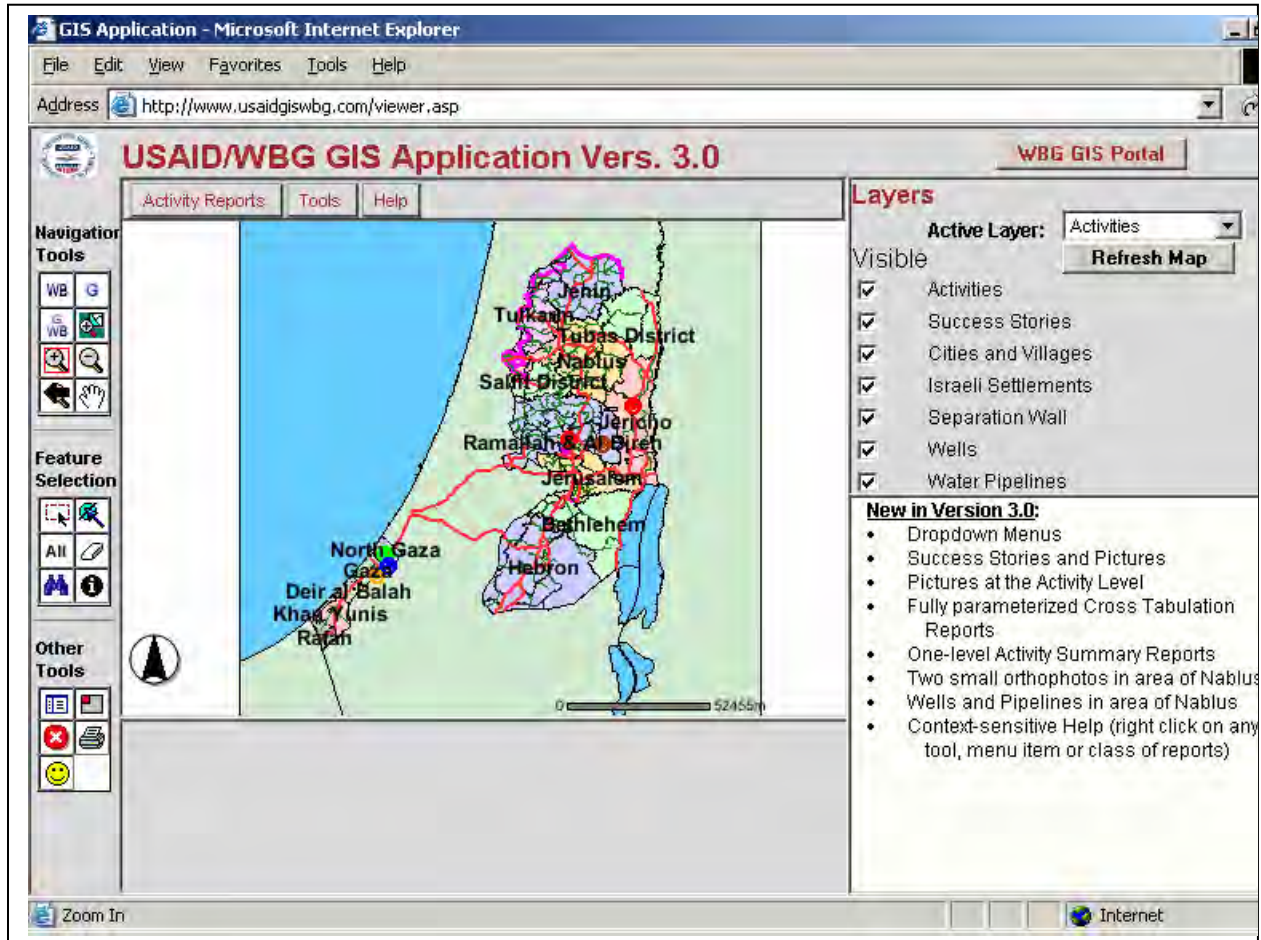**Other Reporting and Record-keeping Requirements**

Beside any information required by the task order manager to approve financial vouchers, quarterly financial reports will be required. These reports shall be submitted to both the USAID/Mission task manager and the USAID/W CTO. These reports will review charges over the 90 day period of the quarter and project expenditures for the next quarter. The report will contain a detailed accounting of expenses incurred in each contract line-item, a pipeline analysis, and a projection of the expected financial requirements for the next 90 days. The first report is due to USAID on April 30th for the period from the beginning of the contract through March 31st.

USAID/Mozambique will provide additional guidance, as required, on the desired format for any of the financial, technical, and/or other sub-deliverable reports requested.
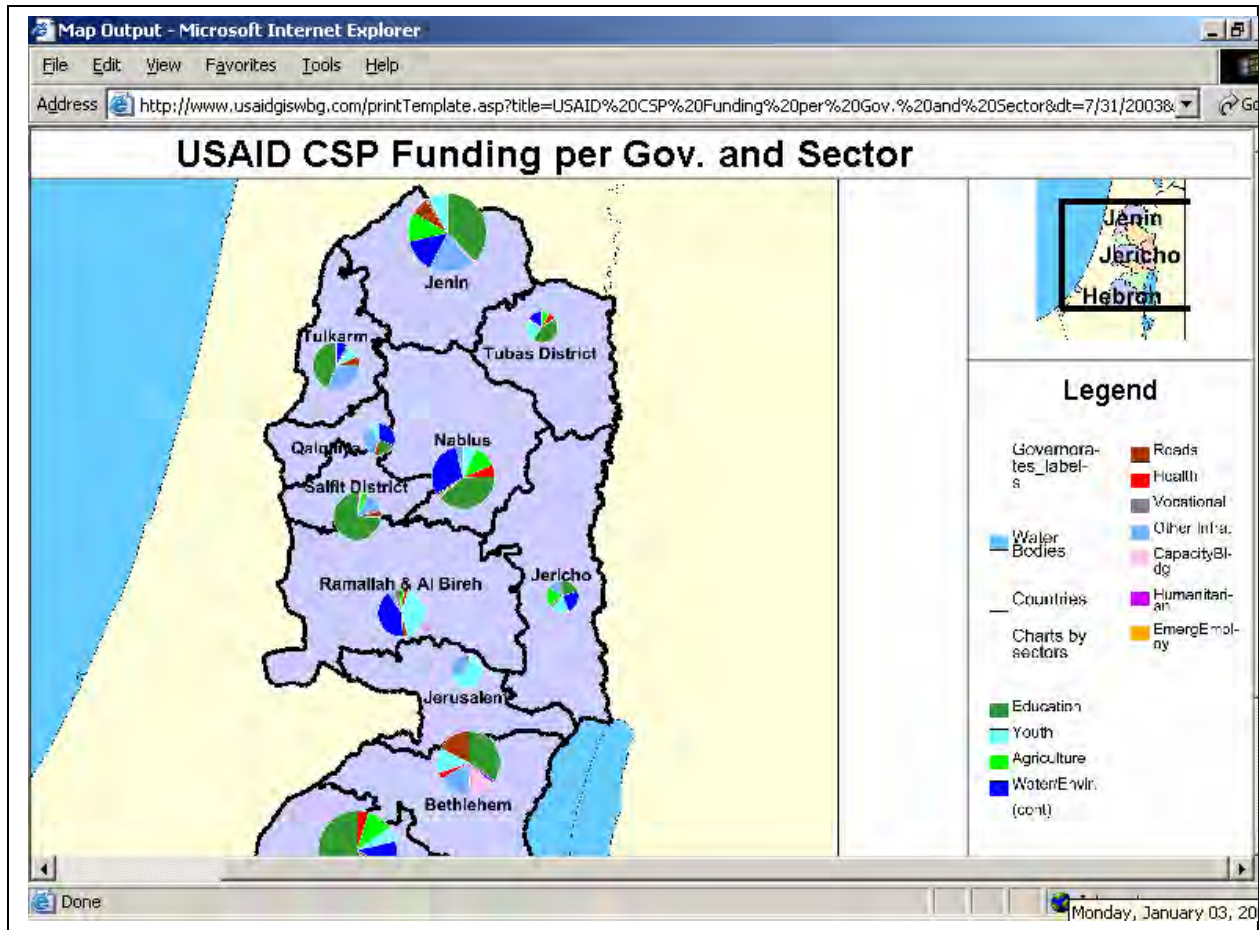
WEST BANK/GAZA DESK STUDY

West Bank: Sample Mission-Wide Internet Mapping Application

From http://www.usaidgiswbg.com/viewer.asp

From http://www.usaidgiswbg.com/portal.asp

From: http://www.usaidgiswbg.com/portal.asp

From: Knowledge Management Inventory
http://www.dec.org/partners/km_fair/cfapps/inventory/index.cfm?fuseaction=viewrecord&KMInventoryItemID=125

Item: USAID West Bank & Gaza GIS Website

Description: This is a GIS-based management tool for managing, tracking, evaluating, and
                       planning USAID activities. USAID/WBG has developed a web-based GIS
                       application to better track and manage the thousands of individual activities it is
                       funding. USAID staff, USAID partners, clients, and the public will use the tool.
                       The main objectives of the system are: 1) to improve the tracking and
                       management of ongoing partner activities; 2) to help USAID better measure its
                       output results; 3) to assist USAID in planning and evaluating its programs; 4) to
                       enhance the monitoring and evaluation of activities; 5) to help USAID's partners
                       plan, present and manage; 6) to provide better tools for planning and more up-to-
                       date demographic data; and 7) to help USAID reach its clients, stakeholders and
                       the general public by making the system available on the Internet with superior
                       reporting, mapping, and querying capabilities. The web-based application
                       includes both GIS components (maps, geographic selection, buffer zones, etc.)

and traditional MIS components (queries, reports, on-line updating, etc.). It is based on an architecture that combines SQL Server, Crystal Reports, and ESRI's ArcSDE and ArcIMS software packages. USAID/WBG contracted with Systematics Technologies, ESRI's distributor in Israel, and Good Shepherd Engineering of Bethlehem (a Palestinian company) to develop the system. Presently, the system is running on USAID/WBG's internal LAN, where USAID users can track various projects and generate various maps and reports.

Value Proposition: In 2002, USAID/WBG issued a tender bid for the development of "a geographic information system (GIS) to assist its Community Services Program (SO8) in better planning, monitoring and resenting its program." Before developing the GIS, SO8 partners (12 USPVOS) used Excel to report thousands of activities on quarterly basis, which makes it very difficult for USAID staff to track what has been changed, deleted, or modified. Also, the analysis, the comparisons, and the aggregation of the thousands of activities from various partners and various sectors or governorates were almost impossible. In addition, for partners, planning where to put new activities and who is working there, or mapping and visually presenting projects were impossible.

Results: Through the GIS system, USAID managed to standardize reporting, where all partners are using the same format. It is downloaded into the database that can be queried to generate various types of reports and maps. Once it has been finalized and uploaded on the Internet, all partners will be able to add/update their activities, generate various reports and maps on their own data, and use the system to know who is doing what and where, and to use available demographic data to plan new activities that respond to community needs, poverty, unemployment, and other issues. Presently, USAID/WBG's Community Services Program (SO8) is using the system with excellent results. CTOs are using the systems reports as a basis of their discussions with their counterparts at the SO8 PVOs regarding the status of the various activities. Engineers and CTOs who make field visits to sites report on any problems they uncovered in their visits and indicate in their brief on-line reports when they think that activity status information supplied by the PVO – for example, "percent completed" or "planned completion date" – are not justified by the facts on the ground. The CTOs are learning to query the site visits about all ongoing activities before meeting with a specific partner, using the system to highlight specific problems, as well as negative trends (e.g., safety issues) that occur more frequently with that PVO. Summary reports and cross tabulations required by the director of the Community Services Program or by the Mission's management are being routinely generated by the system. The flexibility of the system's query capabilities have provided quick, accurate answers to over a dozen ad hoc questions by management. In addition, CSP has begun asking questions based on maps and reports generated by the GIS. For example, in the West Bank, most governorates education activities comprise about 40 percent of CSP's activities (by $). Why in a couple of governorates is it under 10 percent, while it is close to 80 percent in another governorate. Presently, the GIS is helping USAID/WBG ask more sophisticated questions, while the answers are typically found outside the system.

Issues: The system is being administrated by USAID staff, where they can add new programs, partners, and so on. In the coming months, the GIS will be applied to

the other five SOs in the Mission. Tables drive the system. Thus, replicating the system at a USAID mission in another country should not require major software changes. However, it would require analysis to modify the USAID/WBG defined types of activities and output measures, training for USAID and partner personnel, off-the-shelf software, two hardware servers, two country-specific GIS layers of villages and provinces with relevant demographic data, and additional background GIS layers (e.g. interurban roads, rivers, bodies of water, etc.) that the mission deemed useful. It should be possible to scale up (and modify) the system so that it can operate on the Internet from a couple of powerful servers located in one place in the world, to serve several missions. This would likely reduce the costs for replicating hardware servers and off-the-shelf software, but most other tasks and costs related to implementing the system at a new mission would remain.

Type(s):	Management Tool
Category(s):	Management / Administration
Contact(s):	Tayseer Edeas
	tedeas@usaid.gov

ANNEX D. SAMPLE USAID GIS PROJECTS

The list below is a sample of USAID funded projects that utilize geographic information systems for mapping and graphic communication, planning, monitoring, evaluation, or training. Full information for each project can be found at www.nric.net.

Sample of USAID Projects Using a Geographic Information System

USAID Project	Project Location
Adaptive Strategies for Flood and Drought Mitigation	India, Nepal
Afghanistan Revitalized Irrigated Agriculture (Phases I and II)	Afghanistan
AGRHYMET - Agrometeorological, Hydrological and Meteorological Services in the Sahel	Benin, Burkina Faso, Cape Verde, Chad, Gambia, Guinea-Bissau, Mali, Mauritania, Niger, Senegal, Togo,
AGUA - Acceso, Gestion y Uso Racional del Agua	El Salvador
AIMS - Afghanistan Information Management Service	Afghanistan
AMORE - Alliance for Mindanao Off-Grid Renewable Energy	Philippines
Aquaculture CRSP - GIS: Planning, Policy, and Global Data Analysis	Thailand, Vietnam
Baseline Analysis for Land Use in Mexico	Mexico
BOLFOR - Bolivia Sustainable Forest Management Project	Bolivia
BOLFOR II - Bolivia Sustainable Forest Management Project	Bolivia
Building Capacity for Integrated Coastal Management - Vietnam	Vietnam
CARPE - Central African Regional Program for the Environment	Burundi, Cameroon, Central African Republic, Congo DR, Congo PR, Equatorial Guinea, Gabon, Rwanda, Sao Tome and Principe
CARPE - Forest Cover and Information Systems Project	Burundi, Cameroon, Central African Republic, Congo DR, Congo PR, Equatorial Guinea, Gabon, Rwanda, Sao Tome and Principe
Causes and Impacts of Fires	Indonesia
Chisec Community Conservation Project	Guatemala
COMPASS - Community Partnerships for Sustainable Resource Management	Malawi
CONCADE - Counter-Narcotics Consolidation of Alternative Development Efforts	Bolivia
CRDA - Community Revitalization through Democratic Action	Serbia and Montenegro
Creation of a Preliminary Atlas of Poverty Vulnerability and Assistance in Building an Information System for Mali	Mali
CRM II - Conserving Critical Coastal Ecosystems in Mexico	Mexico
CRMP - Coastal Resource Management Project	Philippines
Development of a Geo-Referenced Database for Improved Program Planning and Implementation	Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama
FEWS NET - Famine Early Warning Systems Network	Afghanistan, Angola, Burkina Faso, Djibouti, Chad, Eritrea, Ethiopia, Guatemala, Haiti, Honduras, Kenya, Malawi, Mali, Mauritania, Mozambique, Nicaragua, Niger, Rwanda, Senegal, Somalia, Sudan, Tanzania, Uganda, Zambia, Zimbabwe
FISH - Fisheries Improved for Sustainable Harvest	Philippines

USAID Project	Project Location
FOREST - Forestry Resources and Technologies Project	Russia
GCP - Atlantic Forest	Paraguay, Argentina, Brazil
GCP - Bering Sea	Canada, Russia, United States
GCP - Kilimanjaro Heartland	Kenya, Tanzania
GCP - Kimbe Bay	Papua New Guinea
GCP - Komodo National Park	Indonesia
GCP - Lower Mekong Forests	Cambodia, Laos, Vietnam
GCP - Southwest Amazon	Brazil, Bolivia, Peru
GCP - Sulu Suluwesi/Banda-Flores Seas	Indonesia, Malaysia, Philippines
GCP - Terai Arc	India, Nepal
Global Forest Watch in Indonesia	Indonesia
Gorilla Directive	Cameroon, Congo DR, Nigeria, Rwanda, Uganda
Great Limpopo Transboundary Natural Resources Management Initiative	Mozambique;South Africa;Zimbabwe
GreenCOM - Panama	Panama
Honduran Flood Hazard Mapping	Honduras
ICRAF-FORRI Agroforestry Research and Development Activity	Uganda
Improved Forest Conservation Management	Indonesia
Increased Environmental Management Capacity to Promote Sustainable Development	Ukraine
Integrated Coastal Zone Management	Lebanon
Integrating Coastal Resource Concerns into River Basin Management in the Souss-Massa	Morocco
IPM CRSP - Uganda	Uganda
Land Reform Technical Assistance	Indonesia
LEWS - Livestock Early Warning Systems	Ethiopia, Kenya, Tanzania, Uganda
LIFE - Living in a Finite Environment	Namibia
MACGA - Mesoamerican and Caribbean Geospatial Alliance	Belize, Panama, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica
Mali HIV/AIDS and Community Radio	Mali
Maram Project	West Bank and Gaza
Middle Egypt Utilities Institutional Strengthening Project	Egypt
Mitigation of Adverse Effects of Future Natural Disasters	El Salvador
Natural Resources Conservation and Historic Preservation Project	Ghana
Outer Islands Bioregional Program	Indonesia
PBCPP - Philippine Biodiversity Conservation Priority-Setting Program	Philippines
PHRplus - Partners for Health Reform-plus	Albania, Beninm, Egypt, El Salvador, Ghana, Honduras, Jordan, Mali, Peru, Senegal, Yemen
PiP - Corcovado National Park	Costa Rica
PiP - Del Este National Park	Dominican Republic
PiP - Guaraqueçaba Environmental Protection Area	Brazil
PiP - Madre de las Aguas Conservation Area	Dominican Republic
PRIME/West - Uganda Productive Resource Investments for Managing the Environment — Western Region	Uganda

USAID Project	Project Location
PRISMS - Promoting Improved Sustainable Microfinance Services	Nigeria
Procure Services to Address Major Water Resource Issues	Iraq;Jordan;Lebanon
Protected Areas and Sustainable Resource Management	Brazil
RAMP - Rebuilding Agricultural Markets Program in Afghanistan	Afghanistan
RPPR - Rural Power for Poverty Reduction	Bangladesh
RSSTI - Red Sea Sustainable Tourism Initiative	Egypt
SANREM CRSP - Andes Project	Ecuador, Peru, Bolivia
SANREM CRSP - Global Decision Support Systems	Mali, Senegal, Burkina Faso, Kenya, Uganda, Tanzania
SANREM CRSP - Global Information Exchange	Worldwide
SANREM CRSP - Southeast Asia	Philippines, Vietnam
SARI - South Asia Regional Initiative on Energy	Maldives, Sri Lanka
SEBI-FISH - Support for Establishing Baseline Information for the FISH Project	Philippines
SIWM - Souss-Massa Integrated Water Management Project	Morocco
Soils CRSP - Decision Aids for Integrated Soil Nutrient Management	Costa Rica, Mali, Philippines
Soils CRSP - Soil Management Practices for Sustainable Production on Densely Populated Tropical Steeplands	Haiti, Honduras, Nicaragua
Soils CRSP - The Rice-Wheat System of South Asia	India, Pakistan, Bangladesh, Nepal
Soils CRSP - Tradeoffs Analysis Project	Peru, Ecuador, Kenya, Senegal
Spatial Modeling of Deforestation Baselines in NW Ecuador	Ecuador
Strategic Planning and Monitoring for Conservation and Sustainable Development	Mexico
Strengthening Community Forest Management: Experiences and Planning in the Sierra Norte of Oaxaca	Mexico
Strengthening Regional Sustainable Water Management for Enhanced Environmental Quality	Armenia
Tarangire National Park Project	Tanzania
TCDI - Ghana Tourism Capacity Development Initiative	Ghana
Tourism Activity Management Services in Agadir	Morocco
Trafficking Child Labor ICT Activities	Brazil
Tropical Forest Conservation Strategy for Fiji	Fiji
US Forest Service International Programs	Albania, Bolivia, Brazil, Bulgaria, China, Congo DR, Ghana, India, Indonesia, Israel, Jamaica, Jordan, Kenya, Madagascar, Mexico, Palestine, Puerto Rico, Romania, Russia, South Africa, Tanzania, Turkey
US-AEP Sri Lanka	Sri Lanka
Water Management in the South Caucasus	Armenia;Azerbaijan;Georgia
WAWI - West Africa Water Initiative	Ghana, Mali, Niger
West Africa Land Use and Land Cover Trends	
World Lake Basin Management Initiative	Armenia, Canada, Ethiopia, India, Indonesia, Kyrgyzstan, Mexico, Nicaragua, Philippines, USA
WPM - Morocco Watershed Protection and Management	Morocco
WRS - Morocco Water Resources Sustainability	Morocco

ANNEX E. SAMPLE CONTRACTING WITH GIS PROFESSIONALS

PART 3: GUIDELINES - SECTION I
CONTRACTING WITH GIS CONSULTANTS

I.   PURPOSE

This guideline provides local communities with guidance in developing a project and project goals, preparing a request for proposals (RFP), and executing a contract for GIS mapping or analytical services. Included are technical and administrative specifications that are important to ensure the creation of a quality community product useful for many years to come.

II. PICK A PROJECT COMMITTEE AND PROJECT CONTACT

Contracting for consulting work may require the commitment of local volunteer time. Before developing an RFP or contract, the community should appoint a project committee that will be responsible for designing and reviewing the project. The committee should include representatives of different town functions (lister, planner, select board, etc.) so the project reflects an integrated approach to data development and use. Projects that meet the needs of multiple town officials and tasks are efficient and cost effective. Another important aspect of contracting with a consultant is to identify the key person with whom the consultant will talk and negotiate. Group process is good only up to a certain point. Consultants will work more efficiently if only one person is giving them information and instructions.

III. DEVELOP PROJECT GOALS

Prior to developing a set of specifications for GIS work, the committee should develop a specific set of goals for the project. These goals can relate to the town plan, development or update of tax/parcel maps, or another specific project of interest. These goals then become the framework for developing the detailed specifications. This is a critical function. Many projects can go astray without articulated goals or goals that don't take into account the multiple beneficiaries of the project. If multiple town officials, citizens, or private businesses are included in this process, they may bring up legitimate public needs that can be met in the same project, and may even be able to help pay for it. This inclusiveness can be beneficial, but be wary of "project creep," the tendency of projects to grow in size and complexity to accommodate every contributor's needs.

IV. DEVELOP CLEAR WORK SPECIFICATIONS

Following the identification of project goals, the project committee should detail the desired outcome of the contracted work. Describing the desired outcome entails identifying the analysis and products needed to meet the project goals. The project committee should write down as many project expectations as possible to make sure that conflicts over what was expected don't occur between the consultant and the community. The scope of this step can be a brief sentence or two or may be paragraphs long for each desired project outcome. After identifying outcomes (e.g. better parcel boundaries") the committee must translate, them into deliverables (e.g. parcel boundaries that are accurate within 50 ft., and that create a

contiguous patchwork of parcels). The more specific the committee is about actual deliverables, the less chance there is for misunderstanding.

V. DEVELOP A LIST OF EXISTING SOURCE MATERIALS

A list of data, information, maps, and other source materials needed for the consultant to do the job should be developed. This task may require research on the part of the project committee. The list should be as complete as possible, and may include potential as well as actual sources. The more information and data you can provide your contractor, the less research he or she has to do, and the more accurate your final product will be. VCGI and the Regional Planning Commission has listings of available GIS data. In many cases, communities will want to computerize additional source materials. The list of source materials should clearly indicate where the contractor can obtain them and, if possible, their format (e.g., paper, spreadsheet, maps, database, etc.).

VI. PREPARE NEW SOURCE MATERIALS (OPTIONAL)

Some communities prepare some of their own source materials in the form of GIS data. This approach serves two positive purposes. First, there is community ownership or "buy-in" to the final GIS product and second, the source data has a local quality control check built in. It can also reduce the cost of the project. (The Regional Planning Commission can provide some guidance on procedures and techniques, and VCGI provides data standards). Examples of data that towns often collect are bridges/culverts, public assets, downtown tree locations, town forest boundaries, etc. The client will want to discuss the materials with the contractor in order to ensure that they are as complete as possible.

VII. PREPARE REQUEST FOR PROPOSAL (RFP)

The RFP should contain the Project Specifications and General Standards that a consultant needs to follow in the course of the work. The VCGI Municipal Mapping Guidelines (information on how to access this guideline are found in the "Resources" section of this document) include a sample of an RFP. It is very important that the RFP contain all details needed to help the consultant prepare an accurate cost proposal, as well as request a listing of projects completed over the last year or two. It is highly recommended that a GIS professional review the RFP, as well as the finalist's proposal, if the municipality does not have one on staff.

GIS specialists, VCGI staff, Vermont Mapping Program staff, or even a consultant not participating in the bid process, are all appropriate. The community should put the proposal out to bid via: a) the Regional Planning Commission; b) the VGIS-L email list serve (a free email subscription service that allows you to send one email to many recipients (in this case, GIS professionals in Vermont) and to receive emails that others post – subscribe at the VCGI web site in the Community Resources section **www.vcgi.org/commres/vgisl**); or c) it should directly solicit at least three proposals (a list of consultants is provided at the VCGI web site at the Publications page). A thirty-day response period is usually adequate. Be prepared to answer and post at a web site (if possible) clarifying questions.

VIII. REVIEW PROPOSALS

The Project Committee should review the proposals and make a recommendation to the approving authority. As mentioned above, it is a good idea to include a GIS professional in this process, to help the committee understand the technical aspects of the proposals. One convenient method of review is independent committee member review using a numeric rating system. The committee would only meet after all members had ranked the proposals submitted on their own—be sure to specify in the RFP that a

copy of the proposal be submitted for each committee member (this saves a lot of copying). The Municipal Mapping Guidelines contain the review criteria suggested by VCGI. Two or more of the contacts for listed previous projects should be called. Cost proposals should be submitted in separate sealed envelopes and not be opened until after the technical review. This keeps individual biases to a minimum. The committee may want to interview the most highly qualified firm and in some cases interview the top several firms.

IX. CHECK REFERENCES

Prior to executing the contract, the project contact person should check with at least two of the consultant's references.

X. PREPARING CONTRACT DOCUMENT

All clarifications to the original work specifications and the accepted proposal should be agreed upon prior to finalizing the contract document. The VCGI Municipal Mapping Guidelines contain a sample contract that can be revised for other types of projects. The contract should contain the original specifications of work to be performed, the selected contractor's proposal, and the details of performance expected from the contractor. This would include itemization of deliverable products, meetings, progress reports, payment schedule, and all other administrative requirements of the community. The contract document should contain clauses that:

1. Require the consultant to follow VGIS Standards and Guidelines. For community and RPC purposes it would be highly advisable that the guidelines be treated the same as standards.
2. Specify size, type & quantity of hard copy maps and other products.
3. Specify that all digital data be delivered in the desired GIS format.
4. Specify that all digital and hardcopy products developed as part of the project are the property of the community (this is an extremely important clause that is often overlooked!).
5. Provide disclaimer language for use on all hard copy products to protect community against misuse (suggested language usually comes with existing GIS data layers).
6. Identify the quality control and proof plot checking procedure.
7. Indicate the amount of time the committee requires to review the product and how much time the contractor has for correcting errors found.
8. Provide community developed map symbology and shading patterns desired or provide other information desired on the map (optional).
9. Require that formal metadata be provided with all digital data, as well as a more user-friendly version as an additional deliverable. For example, a 1-page, brief metadata product that includes the bare essentials: summary, intended use, date, source data (brief), author.

XI. PAYMENTS

A payment for delivered products is the norm. A fifteen percent holdback until the final delivered product is accepted should be specified in this part of the contract. Don't pay until you have had the final digital product(s) reviewed by a GIS professional.

XII. RESOURCES

The VGIS Municipal Mapping Guidelines and other data standards can be found at www.vcgi.org/techres/standards.

Regional Planning Commission contact information can also be found at the VCGI web site: www.vcgi.org/commres/rpc.

If you are thinking of buying local large-scale aerial orthophotography, contact the Vermont Mapping Program for advice: www.state.vt.us/tax/vermontmapping.htm.

ANNEX F. POLICIES APPLICABLE TO GIS

Excerpt from Automated Directives System (ADS) 507 - Freedom Of Information Act (FOIA)

507.3 POLICY DIRECTIVES AND REQUIRED PROCEDURES

5.7.3.1 General Policy

It is the policy of USAID that information and operations be freely available to the public. The policy directives and required procedures in this chapter are based on the spirit as well as the letter of the FOIA.

See Circular no. A-130: Management of Federal Information Resources:
http://www.whitehouse.gov/omb/circulars/a130/a130trans4.html#8

8. Policy:

    a.   Information Management Policy

          1.   How will agencies conduct Information Management Planning?

              Agencies must plan in an integrated manner for managing information throughout its life cycle. Agencies will:

              (a) Consider, at each stage of the information life cycle, the effects of decisions and actions on other stages of the life cycle, particularly those concerning information dissemination;

              (b) Consider the effects of their actions on members of the public and ensure consultation with the public as appropriate;

              (c) Consider the effects of their actions on State and local governments and ensure consultation with those governments as appropriate;

              (d) Seek to satisfy new information needs through interagency or intergovernmental sharing of information, or through commercial sources, where appropriate, before creating or collecting new information;

              (e) Integrate planning for information systems with plans for resource allocation and use, including budgeting, acquisition, and use of information technology;

              (f) Train personnel in skills appropriate to management of information;

              (g) Protect government information commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information;

              (h) Use voluntary standards and Federal Information Processing Standards where appropriate or required;

(i) Consider the effects of their actions on the privacy rights of individuals, and ensure that appropriate legal and technical safeguards are implemented;

(j) Record, preserve, and make accessible sufficient information to ensure the management and accountability of agency programs, and to protect the legal and financial rights of the Federal Government;

(k) Incorporate records management and archival functions into the design, development, and implementation of information systems;

1. Provide for public access to records where required or appropriate.

Automated Directives System (ADS) 551: Data Administration

Functional Series 500: Management Services
ADS Chapter 551 - Data Administration

551.1 Authority
551.2 Objective
551.3 Responsibility
551.4 Definitions
551.5 POLICY
551.5.1 DATA ADMINISTRATION
E551.5.1 Data Administration
551.5.1a DATA DEFINITIONS
E551.5.1a Data Definitions
551.5.1b DATA AND META DATA
E551.5.1b Data and Meta Data
551.5.1c DATA STEWARDSHIP
E551.5.1c Data Stewardship - N/A
551.5.1d CENTRAL REPOSITORY
E551.5.1d Central Repository
551.5.1e CORPORATE CONTRACTS
E551.5.1e Corporate Contracts - N/A
551.5.1f PROPRIETARY APPLICATION SOFTWARE
E551.5.1f Proprietary Application Software
551.6 Supplementary Reference - N/A
551.7 Mandatory Reference - N/A

Effective Date: 12/22/95
(This chapter, formerly known as 548, was approved for renumbering on 08/23/99.)

Functional Series 500: Management Services
ADS Chapter 551 - Data Administration

551.1 Authority

1. Federal Information Processing Standards Publications (FIPs PUB) 156

2. Information Resource Dictionary System (IRDS), 1989

551.2 Objective

To provide the framework for management of the Agency's Data Administration Program.
To provide the essential procedures for management and stewardship of the Agency's Data
Administration Program.

551.3 Responsibility

1. The Director, Bureau for Management, Office of Information Resources Management (M/IRM/OD) is
responsible for the Agency's Data Administration Program.

2. The Bureau for Management, Office of Information Resources Management, Information Policy and
Administration Division (M/IRM/IPA) is responsible for proposing data for Agency organizations,
coordinating development of corporate system meta data, and publishing bulletins on new and revised
meta data. M/IRM/IPA is also responsible for maintaining the Corporate Data Repository and for making
the Repository available to end-user application designers and developers.

3. Heads of USAID's Bureaus/independent offices/overseas organizations: These officials have
stewardship responsibility for data and meta data in information systems developed, maintained, and
operated by their bureaus/independent offices/overseas organizations.

4. Agency Managers: Agency managers have stewardship responsibility for creation and maintenance of
data, meta data, and corporate data.

551.4 Definitions (See GLOSSARY)

Central Repository Computer Assisted Systems Engineering (CASE) Tools Corporate Data Corporate
Information Systems Data Administration Data Stewardship Meta Data

551.5 POLICY

The statements contained within the .5 section of this ADS Chapter are the official Agency policies and
corresponding essential procedures.

551.5.1 DATA ADMINISTRATION

The Bureau for Management, Office of Information Resources Management (M/IRM) shall establish the
policies, standards, and guidelines for the Agency's Data Administration Program. Included are all data
created and/or used by USAID corporate information systems, applications meeting criteria for corporate
information systems, data physically stored on magnetic or other permanent, electronic media, and data
developed by non-corporate systems resulting from processing corporate data.

E551.5.1 Data Administration

Data administration standards shall be available from M/IRM and accessible in the Central Repository.
The Bureau for Management, Office of Information Resources Management, Information Policy and
Administration Division (M/IRM/IPA) shall maintain the Central Repository.

551.5.1a DATA DEFINITIONS

Data definitions shall comply with internal standards established by M/IRM's documentation guidelines. M/IRM shall comply with and enforce the conventions of the Model Computer Assisted Computer Engineering (CASE) Tools.

E551.5.1a Data Definitions

Agency personnel responsible for new corporate information systems development projects must request assistance from M/IRM in defining data content and definitions during the analysis and design phases of information systems development. M/IRM must assess such systems to ensure that data aspects of the systems conform to the Agency's information architecture and data administration policies and standards.

551.5.1b DATA AND META DATA

Data and meta data are the property of USAID and not individual organizations or employees. Data and meta data shall be managed with the same force as traditional assets, such as personnel, cash, inventories, etc.

E551.5.1b Data and Meta Data

M/IRM shall coordinate development of corporate system meta data and publish bulletins of new and revised meta data periodically to inform Agency managers of prospective developments which have potential to affect their organizations. M/IRM shall convene interested parties to discuss issues that arise, frame issues, and draft recommendations when issues require resolution by higher management.

551.5.1c DATA STEWARDSHIP

M/IRM shall coordinate proposals for stewardship of data for each Agency organization. In some cases, joint stewardship shall be appropriate. In cases of unresolved disagreement over data stewardship, M/IRM shall refer disagreement through the hierarchy of management for resolution.

E551.5.1c Data Stewardship - N/A

551.5.1d CENTRAL REPOSITORY

The Central Repository shall be the single, authoritative source of information describing all Agency data processed by automated systems.

E551.5.1d Central Repository

M/IRM shall manage a central Agency-wide repository of corporate data definitions.

The Central Repository of corporate data definitions shall be implemented by a commercial software product which specifies a model for describing information resources called the Information Resource Dictionary System (IRDS) compliant with Federal Information Processing Standards (FIPS) 156.

The Central Repository shall store meta data describing characteristics of corporate data and valid codes to be used in application systems.

551.5.1e CORPORATE CONTRACTS

All contracts for development and maintenance of corporate automated information systems shall include contract deliverables to conform to the Agency's data administration policies and standards.

E551.5.1e Corporate Contracts - N/A

551.5.1f PROPRIETARY APPLICATION SOFTWARE

M/IRM shall assess proprietary software and associated issues relating to data administration.

E551.5.1f Proprietary Application Software

Agency personnel considering the purchase of proprietary application software packages for creation and maintenance of corporate data shall request assistance from M/IRM in performing evaluations prior to procurement.

551.6 Supplementary Reference - N/A

551.7 Mandatory Reference - N/A

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Automated Directives System (ADS) 557: Public Information

557   Public Information

557.1   Authority
557.2   Objective
557.3   Responsibility
557.4   Definitions - N/A
557.5   POLICY
557.5.1   PUBLIC INFORMATION
E557.5.1   Public Information
*557.5.2   INFORMATION CENTER
*E557.5.2   Information Center
*557.5.3   INFORMATION POSTED TO THE World Wide Web (WWW)
*E557.5.3   Information Posted to the World Wide Web (WWW)
557.6   Supplementary Reference - N/A
557.7   Mandatory Reference - N/A

Functional Series 500: Management Services
ADS Chapter 557 - Public Information

557.1   Authority

                Foreign Assistance Act of 1961, as amended

557.2   Objective

                 To provide the policy for Agency information distributed to the public and
                 responding to requests for information about USAID's programs and activities
                 from the public.

557.3   Responsibility

         1.   Bureau for Legislative and Public Affairs (LPA) is responsible for the following:

                 a. Responding and/or referring all inquiries and requests from the public for
                 materials regarding the activities of USAID (except Freedom of Information
                 Requests, which are handled by The Bureau for Management, Office of
                 Administrative Services, Information and Records Division, [M/AS/IRD]), and
                 when necessary, for contacting appropriate bureaus/offices to gather and interpret
                 information or materials necessary to respond to the request for information;

                 b. The operations of the USAID Information Center, the purpose of which is to
                 facilitate and expand access to USAID information by the general public; and

                 c. Review of Agency-produced or -funded materials available to the public on the
                 World Wide Web.

         2.   Bureaus/Offices and Officers are responsible for the following:

                 a. Responding to requests from LPA for information or materials to respond to
                 public inquiries;

                 b. When using Information Center facilities, coordinating its use with LPA; and

                 c. Submitting Agency-funded or -produced material to be posted on the World
                 Wide Web (WWW) for review prior to posting.

557.4   Definitions - N/A

557.5   POLICY

The statements contained within the .5 section of these ADS chapter are the official Agency policies and
corresponding essential procedures.

557.5.1 PUBLIC INFORMATION

It is the policy of USAID that information concerning its objectives and operations must be freely
available to the public to the maximum extent practicable. Because public understanding of development
assistance programs is dependent upon the availability of this information and prompt and reliable
response to inquiries, the Bureau for Legislative and Public Affairs (LPA) must respond promptly to all
requests for information from the public and perform other functions in order to educate the public on
foreign assistance activities.

While the Information Center staff within LPA is the focal point for the preparation and release of
information, there must be a continuing, comprehensive, Agency-wide concern for producing and

disseminating timely, accurate information. LPA's Information Center staff must stimulate, program, and coordinate these efforts, but must rely on the active participation of all major offices and officers in USAID in responding to the need for an accurately informed public.

E557.5.1   Public Information

Response to requests: LPA must process all information requests (in whatever form received, except for Freedom of Information requests that are handled by M/AS/IRD) from the general public concerning foreign assistance programs of the United States and other related requests.

Requests for Information from Other Bureaus/Offices: Since some public information requests require LPA to contact another bureau/office to obtain information necessary to draft a response to the inquiry, bureaus/offices contacted must attempt to respond within two working days to such requests. If it is determined that the person seeking information must have direct contact with a source within the Agency, the individual in question must attempt to respond to the outside caller within one working day. (The telephone number for this service is 202-712-4810; the public e-mail address is pinquiries@usaid.gov.)

*557.5.2   INFORMATION CENTER

The Information Center staff within LPA must direct the overall operations of the USAID Information Center. The Information Center staff must explain the Agency's assistance programs to non-USAID audiences and house other major information resources of the Agency that are generally available to the public.

*E557.5.2   Information Center

The operations of the Information Center require the close cooperation of various organizational units within the Agency. Other bureaus/offices located within the Information Center or using Information Center facilities must closely coordinate activities and seek guidance and direction from LPA.

*557.5.3   INFORMATION POSTED TO THE WORLD WIDE WEB (WWW)

Information posted to the World Wide Web (WWW) is readily available to the general public. As part of the Information Center's responsibility, such materials must be reviewed by LPA prior to posting to the WWW.

*E557.5.3   Information Posted to the World Wide Web (WWW)

Most materials posted to the WWW are available to the general public. Materials financed by the Agency must be reviewed by LPA prior to posting to the WWW. LPA must coordinate this review with the Bureau for Management, Office of Information Resources Management (M/IRM) and ensure that materials presented on the WWW are of consistent quality and accessibility; provide clear and accurate information to the general public; conform to overall design and navigation requirements; are consistent with stated agency public positions; contain the required privacy related statements and meet other requirements.

557.6   Supplementary Reference - N/A

557.7   Mandatory Reference - N/A

ads16/557

Excerpt from USAID Policy Determination: 22

TELECOMMUNICATIONS, INFORMATION, AND
THE GLOBAL INFORMATION INFRASTRUCTURE (03 July 01)

 Full text available at: http://www.usaid.gov/policy/ads/200/pd22.pdf

215.1 OBJECTIVES
This Policy Determination provides the principles and the conditions for USAID funding of
telecommunication and information applications and technologies to promote sustainable development.
These guidelines are to ensure that the uses of the bilateral assistance funds satisfy sound programmatic,
budgetary, and financial practices and that the initiatives are consistent with USAID's sustainable
development objectives and U.S. government policies supporting economic growth, promoting trade, and
accessing the "Global Information Infrastructure (GII)". The GII, in general, includes the components to
gather, transmit, access, and disseminate information over a global system of networks.

E215.1.1 Applied Applications by Strategic Area

Telecommunication and information applications are important cross-cutting tools in promoting
sustainable development. USAID will apply the tools and technologies of the GII to achieve the goals of:
(1) encouraging broad-based economic growth, (2) stabilizing world population growth and promoting
human health, (3) protecting the environment, (4) building democracy, and (5) providing humanitarian
assistance. This involves supporting developing country institutions to adopt the practices, systems,
structures, and training methods to take advantage of the new technologies and realize the potential
development benefits.

In the area of telecommunications and computer networking, demands on the infrastructure -- physical,
institutional, and human -- are growing rapidly. The telecommunications infrastructure must be tailored to
specific country needs and circumstances which vary widely. For example, in some countries there may
be an emphasis on introducing commercial principles, privatization of government-owned
telecommunications entities, and increasing access to networks. In other countries, it may be necessary to
help with getting an appropriate physical infrastructure in place, improving procurement and contracting
procedures, and introducing competitive market principles into the provision of telecommunications
services, especially the privatization of state-owned systems, the design of rate structures, and the
allocation of frequency bandwidth.

In addition, new technologies will require changes in the regulatory environment, while supportive
conditions can accelerate the introduction and broad availability of new technologies. Both developed and
developing countries will need to devise new approaches to a regulatory infrastructure for promoting
competition and open access to the GII as satellites and microwave systems augment long-distance cable
networks and cellular systems emerge as alternatives to local distribution networks. It also may be useful
to assist countries implementing policy reforms and liberalization of services in designing
telecommunications services that are compatible with those in the United States, thereby encouraging the
sale of U.S. equipment.

The types of program activities in each sustainable development or humanitarian assistance objective may include, but are not limited to, those that are described below.
These carry out the policies in Chapter 215.3. Specific examples of ongoing or completed activities are provided in the Supplemental Reference (SM215.1).

c. Environment

To explore the use of remote sensing, Geographic Information Systems, and other global information in environmental planning and management of renewable and non-renewable natural resources.

To facilitate transnational efforts to promote energy efficiency and reduce industrial pollution.
To promote technology transfer partnerships with U.S. companies to facilitate the analysis and monitoring of threats to the environment.

To enhance the capacity for countries to design, develop, and maintain their own environmental information systems.

ANNEX G. ANNOTATED INTERNET LINKS

The following four tables present information concerning GIS applications that are available via the World Wide Web. Specifically, they cover:

- Selected GIS applications
- Groups
- Standards and references
- Geospatial data

Table G-1. Selected GIS Applications

Selected GIS Applications	Location on Internet	Annotations and Additional Information
West Bank/Gaza	http://www.usaidgiswbg.com	General public site offers interactive mapping capabilities to query activities and success stories, among others. A GIS portal provides access to reports, thematic maps, and WBG development information.
Nepal	http://www.mercycorps.org/items/1662/	Western Nepal Conflict Assessment. Highlights maps and has full application report.
Philippines: Fisheries improved for sustainable harvest (FISH)	http://www.usaid-ph.gov/environment%20fish_usaid.htm http://www.oneocean.org/fish/the_project.html	USAID project link. The FISH Project (Fisheries for Improved Sustainable Harvest) builds on lessons learned from the Coastal Resource Management Project (CRMP) and other projects and programs to achieve the next crucial benchmark in managing fisheries and coastal resources in the Philippines. This benchmark calls for integrated fisheries management driven by informed, disciplined and cooperative stakeholders at national and local levels of engagement.
Mozambique – FEWSnet (Famine Early Warning System)	http://www.fews.net/centers/innerSections.aspx?f=mz&pageID=specialDoc&g=1000231 http://www.fews.net/imagery/	GIS applications for Famine Early Warning Systems.
Russia: Forest Resources and Technologies (FOREST) Project	http://www.usaid.ru/en/main/documents/index.shtml?lang=en&id=842 http://www.forestproject.ru/web2/pests/pests.htm	USAID page has a general project description listing partners' objective and achievements. Forest Project web page has detailed information and a series of thematic maps listed under project publications
Joint USAID and USGS project – Hurricane Mitch Disaster Relief	http://mitchnts1.cr.usgs.gov/projects/gis.html http://www.procig.org/ing/procig-nicaragua.htm http://www.iadb.org/regions/re2/consultative_group/groups/ecology_workshop_1.htm	USGS, in coordination with USAID Missions, counterpart agencies, and municipal officials, developed 1:50,000 scale GIS`s for approximately 70 priority municipal areas in Honduras, Nicaragua, El Salvador and Guatemala. The GIS integrates digital base maps, aerial photography, maps of flood and landslide risk, and other information needed for disaster mitigation and response.

Table G-2. Groups

Groups	Location on Internet	Annotations and Additional Information
CONTACTS in USAID's Geo-IT Community	http://forum.usaid.net/forums/gis/public/template.jsp?file=contacts.html&title=contacts	Contacts as of June 2003. Washington and field-based contacts and extended member listing,
USAID GIS working group	http://www.usaid.gov/policy/cdie/index.html	
Global Spatial Data Infrastructure Regional Discussion Lists	Africa: http://lists.gsdi.org/mailman/listinfo/sdi-africa Asia and Pacific: http://lists.gsdi.org/mailman/listinfo/sdi-asiapacific Europe: http://lists.gsdi.org/mailman/listinfo/sdi-asiapacific North America: http://lists.gsdi.org/mailman/listinfo/sdi-northamerica South and Central America and the Caribbean: http://lists.gsdi.org/mailman/listinfo/sdi-latinamericacaribbean	Regional discussion lists are openly available for anyone to read on the web. To submit comments or to receive submitted comments by e-mail, one must register.
Open Geospatial Consortium, Inc	http://www.opengeospatial.org/	"The Open Geospatial Consortium, Inc. (OGC) is a non-profit, international, voluntary consensus standards organization that is leading the development of standards for geospatial and location based services. Through our member-driven consensus programs, OGC works with government, private industry, and academia to create open and extensible software application programming interfaces for geographic information systems (GIS) and other mainstream technologies"

Table G-3. Standards and References

Standards and References	Location on Internet	Annotations and Additional Information
International Organization for Standardization: Technical Committee 211 – Geographic Information/ Geomatics	http://www.isotc211.org/	Standardization in the field of digital geographic information
The Federal Geographic Data Committee	http://www.fgdc.gov/	"The Federal Geographic Data Committee is a 19 member interagency committee composed of representatives from the Executive Office of the President, Cabinet-level and independent agencies. The FGDC is developing the National Spatial Data Infrastructure (NSDI) in cooperation with organizations from State, local and tribal governments, the academic community, and the private sector. The NSDI encompasses policies, standards, and procedures for organizations to cooperatively produce and share geographic data."
Global Information Infrastructure Commission	http://www.giic.org/	Relates to USIAD Policy Determination 22: The GIIC is a confederation of chief executive officers of firms that develop and deploy, operate, rely upon, and finance information and communications technology infrastructure facilities. Together as GIIC commissioners, these executives are dedicated to speeding the spread of information infrastructure throughout the world.
OMB Circular A-16	http://www.whitehouse.gov/omb/circulars/a016/a016_rev.html#6	Describes Federal responsibilities as they relate to GIS (i.e. Collect, maintain, disseminate, and preserve spatial information such that the resulting data, information, or products can be readily shared with other federal agencies and non-federal users, and promote data integration between all sources)
USAID Policy Determination 22	http://www.usaid.gov/policy/ads/200/pd22.pdf	Telecommunications, information, and the global information infrastructure. See page 6:
ADS Regulation 551 - Data Administration	http://www.usaid.gov/policy/ads/500/551.pdf	
The Spatial Data Infrastructure Cookbook	http://www.gsdi.org/docs2004/Cookbook/cookbookV2.0.pdf (English) http://www.gsdi.org/pubs/cookbook/recetario_es0515.pdf (Spanish) http://geoinfo.uneca.org/sdiafrica (Africa-specific implementation)	January 2004 version
USAID Center for Development Information and Evaluation	http://knowledge.usaid.gov/	Resources and tools that you need to successfully implement knowledge for development practices within your project group, and community. You can also see who else in USAID is engaging in knowledge for development practices, and how to get in touch with them so that you can find out more

Standards and References	Location on Internet	Annotations and Additional Information
USAID's Development Experience Clearinghouse	http://www.dec.org	
Regional Centre for Mapping and Resource Development	http://www.rcmrd.org/programme.php	Site dedicated to build capacity, coordinate with others, develop and constantly update harmonized and standardized land resources and urban development digital data and information infrastructure for the region, based on demand; To develop a regional early warning system for food security, environmental monitoring and disaster management using mainly satellite technology in Africa.
Organization for Economic Co-operation and Development (Environment and Naturals Resources Management are key applications for ICT)	http://www1.oecd.org/dac/ictcd/htm/matrix_usa.htm	Development Assistance Committee (DAC) Donor Information Communication Technology Strategies Matrix – 2003 questionnaire response
Geographic Information for Sustainable Development	http://external.opengeospatial.org/gisd/	The Geographic Information for Sustainable Development (GISD) initiative outlines a USAID-U.S. State Department-led international collaboration and alliance whose objective is to apply a new generation of earth observation data, state of the art GIS-linked technologies, and field-tested geographic knowledge to ongoing sustainable development problems in diverse target areas Africa.
The Geography Network	http://www.geographynetwork.com/	The Geography Network is a global network of geographic information users and providers. It provides the infrastructure needed to support the sharing of geographic information among data providers, service providers, and users around the world. Through the Geography Network, you can access many types of geographic content including dynamic maps, downloadable data, and more advanced Web services. It is intended to support the vision of a spatial data infrastructure (SDI) enabling ready access to geographic information.
The Geospatial Resource Portal	http://www.gisdevelopment.net/index.htm	Links to GIS events, applications, companies, downloads, policy, publications, proceedings, etc..

Table G-4. Geospatial Data

Geospatial Data	Location on Internet	Annotations and Additional Information
GIS Data Portal for Geospatial Data One-Stop Access to Federal, State, and Local Geographic Data	http://www.geodata.gov/gos	Geodata.gov is part of the Geospatial One-Stop E-Gov initiative providing access to geospatial data and information. Information on standards, data publishing.
Geospatial Data one-stop: Facilitating Partnerships and Access to Geospatial Information	http://www.geo-one-stop.gov/about/index.html	Establishment of a web-based Portal for one-stop access to maps, data and other geospatial services will simplify the ability of all of levels of government and citizens to find geospatial data and learn more about geospatial projects underway. An interagency, intergovernmental team has outlined requirements and characteristics critical to a Geospatial One Stop portal that will serve as an Internet-based organizational umbrella for Federal, State, local and tribal geospatial activities and a gateway to find geospatial information.
National Satellite Land Remote Sensing Data Archive	http://edc.usgs.gov/archive/nslrsda/	Long-term preservation and access for natural resources management, natural hazards mitigation, and environmental studies
Global Change Master Directory	http://gcmd.nasa.gov/	
Institute of Water Research	http://gis.iwr.msu.edu/	Michigan State University, Interactive Geographic Information System, ESIP site to obtain digital data.
Tropical Rain Forest Information Center	http://bsrsi.msu.edu/trfic/	The Tropical Rain Forest Information Center is a NASA Earth Science Information Partner (ESIP). Our mission is to provide NASA data, products and information services to the science, resource management, and policy and education communities. We provide Landsat and other high resolution satellite remote sensing data as well as digital deforestation maps and databases to a range of users through web-based Geographic Information Systems. We also provide scientific information on the current state of the world's tropical forests, and value-added expert services.

ANNEX H. CONTACTS IN USAID'S GEO-IT COMMUNITY

The information contained in this annex came from:
http://forum.usaid.net/forums/gis/public/template.jsp?file=contacts.html&title=contacts

USAID's Geographic Information Technology, Community of Practice consists of people from the following groups:

- Washington-based USAID contacts
- USAID personnel with experience using, managing or supervising ICT-related activities
- Mission (Field-based) USAID contacts
- Extended Member List - Selected USAID partners, contractors, other USG Agency, and UN partner contacts

The following are staff and managers within USAID who have expressed interest in, used directly, or supervised application and use of geo-information technologies such as GIS, remote sensing, GPS and related tools in various USAID projects. If you know of others with GIS-related skills or experience in USAID among its contractors and partners please contact Robert Ford (below) so we can assess skills and compile "lessons learned" and better inventory needs.

Washington-based USAID contacts with technical GIS/RS/GPS and related skills and experience:
- Carrie Stokes, EGAT/ESP-Climate Team - E-mail: cstokes@usaid.gov
- Dan Deely, EGAT-Water Team - Tel. 202-712-5255 E-mail: ddeeley@usaid.gov
- Dennis King, DCHA-HIU - E-mail: dking@usaid.gov
- Dong Chung, DCHA-GIU - E-mail: dchung@usaid.gov
- Jeff Cochrane, I-Team (EGAT/EIT) - Tel. 202-712-1956 E-mail: jcochrane@usaid.gov
- John Becker, PPC - Tel. 202-712-4197 E-mail: jbecker@usaid.gov
- Mike Jones, ANE - Tel. 202-712-1691 E-mail: mjones@usaid.gov
- Lena Heron, BASIS CRSP - EGAT-Ag. - E-mail: lheron@usaid.gov
- Maria Barron, LAC/Democracy and Governance - E-mail: mbarron@usaid.gov
- Nate Smith, DCHA-GIU - E-mail: nasmith@usaid.gov
- Rhonda Davis, DCHA/OFDA/GIU (Geographic Information Unit) - Tel. 202-712-0421 E-mail: rhdavis@usaid.gov
- Stephanie Wilcock, EGAT-Urban Programs - Tel. 202-712-5145 email: swilcock@usaid.gov
- Robert Ford, Land Resource Management Team (EGAT/LRMT) -Tel. 202-712-5073 E-mail: rford@usaid.gov
- Wil Whelan, DCHA-FEWS - E-mail: wwhelan@usaid.gov

USAID staff with some exposure to GIS/RS/GPS and experience using, managing or supervising ICT-related activities and projects.
- Alicia Grimes - EGAT-Forestry Team - E-mail: AGrimes@usaid.gov
- Anne Simmons-Benton - EGAT/EG - E-mail: ASimmons-Benton@usaid.gov
- Anthony Meyer - EGAT-EIT - I-Team - E-mail: ameyer@usaid.gov
- Barbara Belding - E-mail: bbelding@usaid.gov
- Barbara Best, EGAT-Water Team - E-mail: bbest@usaid.gov
- Carol Wilson, EGAT-Ag - E-mail: cwilson@usaid.gov

- Charles Patalive, EGAT-Webmaster - Tel. 202-712-5087 E-mail: cpatalive@usaid.gov
- Charles Sloger, EGAT-LRMT - E-mail: csloger@usaid.gov
- Chris Light, AFR-SD - E-mail: clight@afr-sd.org
- Christopher Ritter, EGAT-Ag - E-mail: critter@usaid.gov
- C.J. Rushin-Bell - EGAT/Forestry Team - E-mail: CjRushin-Bell@usaid.gov
- Dan Henry, IRM/CIS - Tel. 703-465-7146 Email: dhenry@usaid.gov
- David Soroko, EGAT-Ag-RAISE+ IQC - E-mail: dsoroko@usaid.gov
- Elizabeth Range - EGAT-EIT - E-mail: erange@usaid.gov
- Ellyn Ogden - Global Health Bureau - E-mail: eogden@usaid.gov
- Elzadia Washington, AID/HR - E-mail: ewashington@usaid.gov
- Eric Witte, EGAT-ESP - E-mail: ewitte@usaid.gov
- Eunyong Chung - EGAT - EG - E-mail: echung@usaid.gov
- Gary Vaughan, Knowledge Management Officer/EGAT - Tel. 202-712-0691 E-mail: gvaughan@usaid.gov
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- Grace Lang, E-mail: glang@usaid.gov
- Harry Rea - EGAT-Water Team/Pond Dynamics - E-mail: HRea@usaid.gov
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