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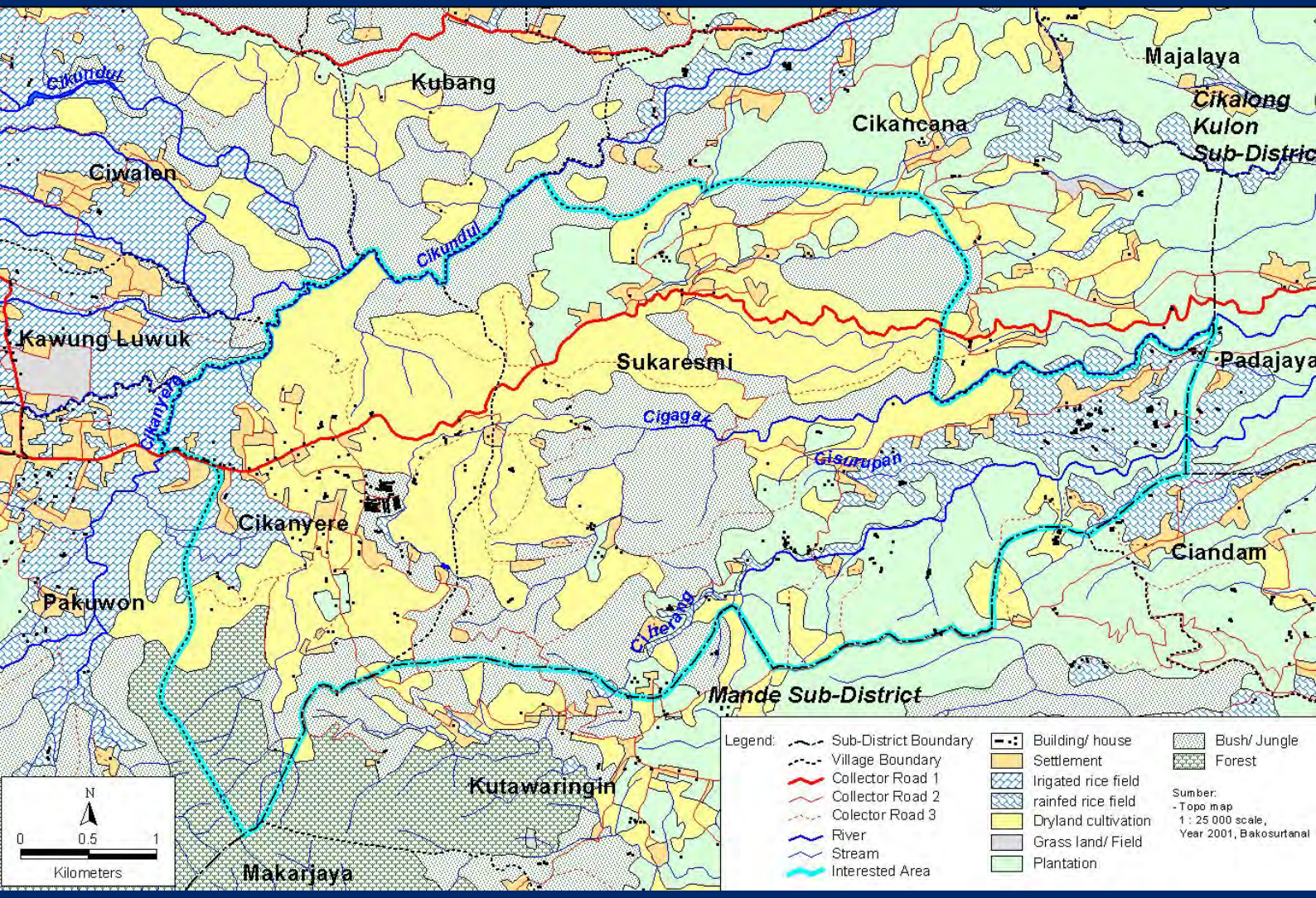
ENVIRONMENTAL ESP SERVICES PROGRAM

GEOGRAPHIC INFORMATION SYSTEMS (GIS) TRAINING REPORT AND ASSESSMENT



OCTOBER 26, 2005

This publication was produced by Development Alternatives Inc. for the United States Agency for International Development under Contract No. 497-M-00-05-00005-00.

Map Credit: ESP Jakarta/ West Java.

Caption: Part of Cianjur, West Java map.

GEOGRAPHIC INFORMATION SYSTEMS (GIS) TRAINING REPORT AND ASSESSMENT

Title:	**Geographic Information Systems (GIS) Training Report And Assessment**
Program, activity, or project number:	**Environmental Services Program, DAI Project Number: 5300201.**
Strategic objective number:	**SO No. 2, Higher Quality Basic Human Services Utilized (BHS).**
Sponsoring USAID office and contract number:	**USAID/Indonesia, Contract number: 497-M-00-05-00005-00.**
Contractor name:	**DAI.**
Date of publication:	**October 26, 2005.**

TABLE OF CONTENTS

LIST OF ACRONYMS ..... **I**

EXECUTIVE SUMMARY **1**

1. INTRODUCTION **1**

2. SOFTWARE TRAINING **2**

3. INTRODUCTION TO DAI SPATIAL PLANNING TOOLS **4**

3.1. SERVICE DELIVERY 5
3.2. WATERSHED MANAGEMENT 5
3.3. COMMUNITY MAPPING 7
3.4. ENVIRONMENTAL SERVICES FINANCE 8

4. MONITORING AND EVALUATION OF ESP WSM OUTCOMES **9**

5. ACTIVITY MAPPING **11**

6. COLLABORATION WITH OTHER USAID PROJECTS **14**

7. ADMINISTRATION **15**

8. TRAINING REQUIREMENTS **16**

8.1. DEVELOPMENT PATHWAYS TRAINING 16
8.2. COMMUNITY MAPPING METHODS TRAINING 17

9. APPENDICES **18**

APPENDIX 1: ESP GIS STTA WORK SCHEDULE 18
APPENDIX 2: DRAFT SOW: SPATIAL PLANNING SPECIALIST 20

LIST OF ACRONYMS

BORDA	Bremen Overseas Research and Development Association
DAI	Development Alternatives, Inc.
ESP	USAID/Indonesia Environmental Services Program
FS	Financial Services Delivery Team
GIS	Geographic Information Systems
GIST	ESP's Geographic Information Systems Team
HSP	USAID/Indonesia Health Services Program
IMS	Internet Mapping System
IT	Information Technology
LGSP	USAID/Indonesia Local Government Services Program
PDAM	Perusahaan Daerah Air Minum
SD	Service Delivery Team
WSM	Watershed Management Team

EXECUTIVE SUMMARY

The USAID Indonesia Environmental Services Program (ESP) benefits from the technical support of four in-house Geographic Information Systems (GIS) specialists. GIS is a crosscutting theme for ESP, and these specialists provide support to all of the component teams, with special attention given to Watershed Management and Service Delivery teams. In order to support ESP, the GIS team must be able to effectively operate vector and raster GIS software; develop, implement, and communicate with spatial planning tools; and monitor and report on project activities and results. In order to help the team fulfill all of these tasks, this consultancy provided training in vector based software, an introduction to some spatial planning methods used by DAI, and an introduction to project activity monitoring using internet mapping systems.

The GIS team has several software and training requirements that should be addressed in the short term. First, the GIS team requires a raster processing software package. IDRISI Kilimanjaro has been used on previous DAI projects and will meet the needs expressed by the ESP team. It is an extremely robust and cost-effective choice. This software will require an advanced training by DAI GIS staff, so that imagery can be used for spatial planning, development pathways mapping, and program monitoring. Second, this STTA provided only an introduction to DAI's approach to spatial planning. All team members have different levels of experience in creating and implementing spatial models, and a practical exercise in implementing development pathways lead by a DAI GIS STTA will strengthen the team's skills and confidence. Third, the team could benefit from the review and direction of a DAI GIS team member on the methods for the participatory community mapping exercises that will be conducted. A recommended SOW for future assistance is included as an annex to this report.

Ongoing support will be needed from the home office to maintain a map of ESP activities via an internet mapping system (IMS). The IMS allows project managers, stakeholders, and the client to have a current snapshot of the scope and coverage of ESP activities. The system is maintained by the DAI home office. The same data can be made available offline on a CD using a free GIS viewer. Collecting the data to populate these maps with data is the responsibility of the entire ESP team. Recommendations for doing this through the existing program TAMIS are included in this report.

The ESP GIS team is currently a very strong group of mapmakers. With ongoing support from the DAI GIS team, we look forward to seeing them become a strong group of spatial planners and analysts.

1. INTRODUCTION

ESP has a strong need for a comprehensive use of Geographic Information Systems (GIS) for planning, program implementation, monitoring and reporting across all of its technical components. ESP has a team of 4 very capable GIS specialists to carry out this crosscutting task. The purpose of this STTA was to assist and strengthen that team through software training and introduction of spatial planning tools used by DAI, including development pathways maps, participatory community mapping, and internet mapping systems (IMS) for activity mapping.

In addition to these team building activities, a general assessment of ESP GIS needs per technical component was made. These needs are gauged in terms of the current technical capacity, data, software and operating procedures available to meet those needs. This assessment was conducted in order to inform the discussion on needs from ESP for DAI home office GIS collaboration.

At the most basic level, GIS is a database linked to a map. But by linking our data to a location on the earth's surface, we open up a wide range of possibilities for visualizing and analyzing data. The three technical components of ESP, watershed management, service delivery and environmental services finance, all have uses for GIS, and take advantage of this capability in different ways. The watershed management team has a strong need for spatial planning tools to help them define their target areas in which to work. They also utilize participatory community mapping in order to bring a participatory local involvement into watershed management plans. The service delivery team has the task of introducing GIS to the PDAMs with which they work, and sanitation mapping to selected local governments. SD works with the GIS team in order to have their expertise in benchmarking the current GIS capabilities of PDAMs and local governments, and then introducing the possibilities of GIS to the selected partners so that they can understand the merits of investment in such a system. The finance team, as all of the teams, benefits from ESP activity mapping, which provides a snapshot to managers and technical specialists of the type of ESP activities that are being implemented throughout the focus area. This also provides for quick analysis of environmental and demographic conditions of the areas in which ESP is getting results. This analysis is key for planning future activities, identifying areas in need of coverage, and reporting on successful outreach to target populations.

The ESP GIS team has the challenge of serving all of these needs. With their strong capability and the experience of the DAI home office providing guidance and training in the appropriate tools as part of an ESP spatial planning approach, all of these needs are covered and the result is more efficient project planning, implementation, monitoring and reporting.

2. SOFTWARE TRAINING

ESP uses ESRI's ArcView 9.0 software for vector based data processing. All of the GIS team members have some previous experience using similar ESRI software, but none have experience with this newer version of ArcView. A basic training was conducted with all of the GIS team members in Jakarta. The training covered basic functions necessary for map production, including:

- Symbology;
- Geoprocessing Tools;
- Layout;
- Template Design;
- Assigning a Projection;
- X Tools Pro;
- Using ArcCatalog;
- Onscreen Digitizing;
- Editing Shapefiles;
- Map Topology.

These topics were selected based on a needs survey of the trainees via email conducted prior to arrival in Jakarta. Basic GIS concepts were not covered as this team is already very familiar with GIS. Discussion was centered how to implement these processes using the new version of the software. It was an exercise in 'mapping' the processes that are used daily for map production from the old versions of ArcView with which they are familiar, to the newer version of the software.

There are different levels of comfort using ArcView 9.0 among the team, but by the end of the session all were capable of producing basic maps with their own shapefiles. The utility of having a joint training with the entire team was evident as towards the end of the session, the team was able to work together to answer some of their own questions about editing and digitizing within ArcView.

Outstanding ArcView 9.0 training issues are centered around advanced uses of CAD data. The team has received a great deal of data from local government sources developed using AutoCAD, a drafting software. This data will be of use to the Service Delivery team for the task of assisting with the development of PDAMs' GIS/MIS and Sanitation Mapping systems for local governments. Specifically, the STTA will follow up with the ESP team on the issues of:

- CAD annotation import tools;
- CAD parallel polylines to polygon

as new strategies not discussed during the training are uncovered, with input from the DAI home office GIS team.

Mastering a new software takes time as one practices the processes they will need to conduct regularly. The team will undoubtedly find time-saving shortcuts as they work with the software. As the team begins to work with ArcView 9 regularly, more questions will surely arise and the home office team will be available to answer any questions in a timely manner.

After successful completion of the training, there are no ESP-required vector processes that warrant the purchase of ArcInfo or ArcEditor licenses at this time.

3. INTRODUCTION TO DAI SPATIAL PLANNING TOOLS

A review of current ESP GIS work across the ESP High Priority Provinces, including activities, data and deliverables made it apparent that while all ESP GIS team members (GIST) are working toward work plan activities, some are providing more support for the Service Delivery team, and others more for the Watershed Management Team. This difference is appropriately due to team demand. These differences could make it seem as though the GIS team were not working as a cohesive unit. But while the activities may differ, they all serve to move ESP closer to completing work plan tasks. The DAI Approach to Spatial Planning was presented to the team, and the possibility of using this framework as a way to conceptualize how all of their separate activities work in concert was discussed.

Spatial Planning Framework - Skeleton

Project Purpose/Goal:

Broad Scale Spatial Planning Approach

Objective	Assess/evaluate	Analyze/Diagnose	Decisions/plans	Results include:
Develop a watershed-specific action plan (set priorities).				

Fine Scale Spatial Planning Approach

Objective	Assess/evaluate	Analyze/Diagnose	Decisions/plans	Results include:
Develop a local level - specific action plan (set priorities).				

A blank spatial planning framework is presented above. It reads from left to right, so that after the objective is established, then the appropriate GIS tools are implemented throughout the process of assessment, analysis and decision making to lead to the desired results at both scales. The first and most important part in establishing a framework is deciding the project purpose/goal. This drives the necessary results and the selection of tools. For example, if the goal is to conserve and better manage selected watershed areas, then the broad scale results may include prioritizing watersheds in the project area, and the local level results would include creation of watershed management plans.

3.1. SERVICE DELIVERY

The GIST compiled a summary of their current duties in order to provide a context for thinking about how these activities might fit into a broader spatial planning framework for ESP.

For the Service Delivery team, the list was compiled as follows:

- Help facilitate PDAM data collection;
- GPS training to PDAMs;
- Overview of GIS and on the job training for PDAMs;
- Help SD team to select PDAMs to work with on the GIS/MIS;
- Benchmarking the current level of the PDAMs (related to PDAM selection);
- Technical Assistance;
- Advice on maintenance and improvements;
- Capacity building on system use.

Many of these activities fit into the framework, as they involve an assessment of the current state of the PDAM's technology and the available data, a diagnosis of what type of system might be the best fit, and decisions on which PDAMs to assist and in what fashion. Emphasis was placed on the fact that it is not the mandate of ESP to deliver a system to the PDAM's, only to provide information about GIS to pique interest, gauge interest and ability, and then provide training as needed for those that go forward with such an investment. Selected PDAM's must have a strong desire for the system as it will require an investment and commitment on their part. GIST will need to coordinate closely with the SD team in the selection of which PDAM's will receive this type of assistance. GIST can offer training services on specific software to the PDAMs that do go forward with purchases. Bapeda/Bapeko and Bappeprop were identified as possible data sources for PDAMs needing base data for their systems. ESP can direct partners to these resources, but it will not be the responsibility of the GIST to digitize large amounts of data for import into a PDAM or local government GIS.

Sanitation mapping comes with similar concerns regarding data availability, training and software requirements for participating local governments. In this case there is the advantage of working with BORDA, who are advising on requirements and assisting with sanitation mapping. The GIST is working with SD to gauge which local governments are best to work with. The community participation in these mapmaking exercises is important, but in the end a map product with the sophistication to serve as a planning tool and site selection tool for sanitation pilot plants. Therefore, the GIST is closely involved with the community surveys and data collection.

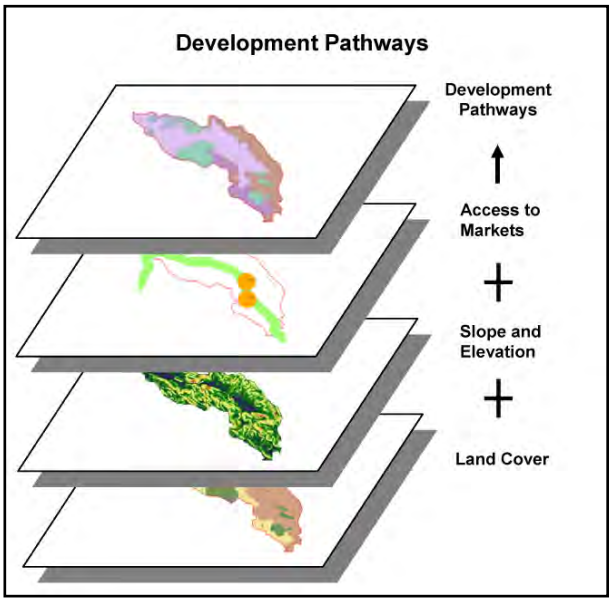
3.2. WATERSHED MANAGEMENT

For the Watershed Management team, the list of GIS tasks was compiled as follows:

- Data collection;
- Analysis to determine priority watersheds;
- Microcatchment analysis;
- Analysis for land rehabilitation area (where are the critical lands?);
- Capacity building for Bappeda (managing expectations about training will be important);
- Community mapping (working together with FIELD);

- Capacity building for conservation NGOs;
- Help the teams to focus their activities by defining the parameters of site selection, and then establishing the criteria for each parameter (development pathways mapping).

Some of the appropriate tools for the WSM team in the assessment and diagnosis phases of analysis include development pathways mapping and community mapping. These concepts were presented to the GIS team, as well as some examples from DAI GIS experience in implementing these exercises on other projects. There are varying degrees of experience with these concepts among the GIST, and it will be important for them to engage in these activities in a uniform fashion. DAI can help to provide a sounds methodology for these activities based on proven field experience.

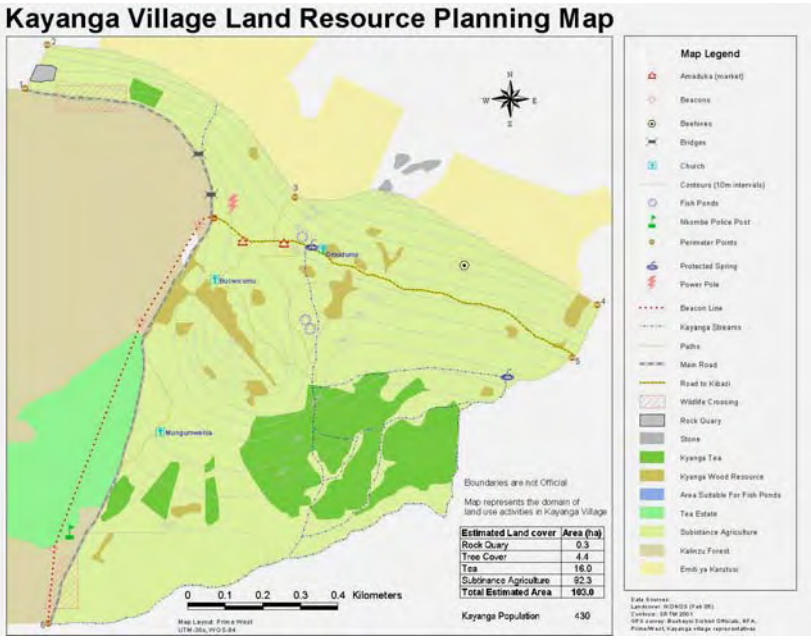


In order to maximize program impact, a decision support tool is needed to help program managers identify the most appropriate activities for the areas in which they operate. A landscape approach to integrated conservation can provide this support, allowing multiple factors to be analyzed in a single context. A development pathways map, as shown at left, integrates knowledge about the physical and economic landscape, including current structure of the land, land-use patterns and relevant market factors to prioritize development activities and areas. A sample of the information that can comprise these maps is provided in the example above. Pathways maps integrate information based on parameters and criteria that is set by the project's technical teams. For example, if a project is trying to identify critical watersheds in which to implement conservation activities, their selection of these areas is based on many factors which may include the type of land cover, slope, elevation, proximity to markets, proximity to PDAM's with a demonstrated will to participate in program activities, and the presence of other current or previous conservation initiatives. All of these are spatial factors that can be mapped and combined into a single planning map that highlights the areas in which they project can most likely get results.

Combining factors in this way for planning purposes has already been done in one ESP map series. Maps for the Cianjur area completed by Sabdo Sumartono combine factors of land use, slope, and the amount of vegetative cover to create a final planning map that identifies critical lands in need of program rehabilitation. However, the selection of parameters and criteria for those parameters was completed solely by the GIS specialist, based on models used in previous project work. In order for the planning maps to be of the highest value, and for the maps to be embraced and used by the technical teams, the criteria must be developed with the participation of the relevant technical teams, in this case the watershed management team. Increased communication between the GIS specialists and the WSM teams in all regions will be necessary for the production of effective development pathways maps that highlight the ideal areas in which to focus program resources for maximum results.

3.3. COMMUNITY MAPPING

Once development pathways maps have been created, spatial planning for the ideal sites for community mapping exercises can be more readily identified. These will be communities in which the local authorities appreciate the need to involve local people in the land planning and management of the areas in which they live and farm. It is important that the map development happen with the combined efforts of local officials and community members to guarantee mutual agreement on the map outputs.



A community mapping guide is under development by the GIS specialist in Jakarta. While very thorough in some areas, the GIST could benefit from the DAI experience with community mapping. The current guide does not make use of GPS for defining perimeters nor does it use satellite imagery for land cover development. The best approach to participatory mapping certainly differs by community. There are times when using GPS technology and satellite imagery can be very useful in generating legitimate community maps that will be considered by local governments for development planning. Using these tools does not imply an increase in expense or time needed to complete the exercise, and they add accuracy and legitimacy to the already transparent process.

Every community mapping exercise is unique. While in some areas completed community maps exist only in paper format, in other areas local governments are investing in GIS technology and the final maps need to be in digital format at the end of the exercise. For these communities, it is best to start with a plan for digital data collection, rather than completing the exercise entirely by hand and then digitizing the final result when necessary.

DAI has experience creating community maps all over the world, including recent projects in Mozambique, South Africa, Malawi, Uganda and Madagascar. Map outputs such as the one shown at above, developed by GIS team leader Bob Bouvier and the Uganda PRIME/West team with local counterparts. In this case, the perimeter was mapped using GPS and was done together with district officials to ensure agreement regarding the land cover and land use within the community. The activity and map product provide an important starting platform for dialogue between district decision makers and the stakeholder regarding community investment. Agreement regarding the extent and type of land cover is a very important starting point for community development planning. This process begins with traditional maps that the community prepares in the soil or on a flip chart. Those initial

maps are used to plan the GPS survey. This use of appropriate technology helps to legitimize the map both in the eyes of the officials and the stakeholders.

DAI also adds value to the community mapping process by bringing the results of broad scale analytical maps down to the community level. This not only allows GIS spatial planners to field test the broad scale maps, but it adds tremendous value to the community scale maps. Broad scale analysis such as the identification of critical lands can be overlaid with the final community map to reveal important areas of interest and help explain the rationale for community selection.

3.4. ENVIRONMENTAL SERVICES FINANCE

ESF must monitor many indicators that are spatial in nature. The ESF team is continually identifying new information needs to help them manage their work and tell the story of their impact. These needs include demographic data at the province and city level, such as population, prevalence of water borne diseases and per capita income. Also, they will need information at the PDAM level, such as the number of connections, the number and locations of PDAMs offering clean vs. potable water, and the donors with which a particular PDAM is working. All of this information is important for planning interventions, and for reporting on the situation of the populations that are helped by ESF activities. The GIST supports ESF by helping them to find this data when it is lacking, and helping them to showcase their results against an appropriate backdrop of demographic information via the ESP IMS. While this component may not require advanced analytical modeling, ESF are heavy consumers of the activity mapping site, which is discussed in a later section.

4. MONITORING AND EVALUATION OF ESP WSM OUTCOMES

ESP Activity Mapping, discussed in the following section, is an important tool for monitoring the scope and progress of all ESP activities. However, the GIS team must take a special leadership role in the monitoring of two WSM Outcomes which are specifically spatial in nature, WSM Outcomes 2 and 3. As part of the team building exercises the GIS team worked with the WSM team leader to establish a methodology for developing a baseline and annual figures for these indicators.

WSM Outcome #2 = Improvement of watershed function in areas supplying water to urban centers and PDAMs as measured by a 50% increase in rehabilitated land.

In order to establish a baseline for the amount of rehabilitated land in the High Priority Provinces at the time of ESP inception, GERHAN Reports and Department of Forestry Rehabilitated Lands Reports will be assessed to obtain area estimates in hectares of rehabilitation activities. The rehabilitation activities under consideration will be limited to tree crops only.

A survival rate will then be applied to this base area estimation.

Assumption: 20% survival rate after one year

Rationale:

1. Rehabilitation projects include planting, but no crop maintenance;
2. Land conflict is a problem and people remove the seedlings;
3. Inappropriate species selection;
4. Planting occurs during the dry season as a result of poor activity planning.

Year 1 = Year 1 area
Year 2 = Year 1(survival rate) + Year 2 area
Year 3 = Year 1(survival rate) + Year 2 (survival rate) + Year 3 area

Note: The area applied toward the ESP target of a 50% increase will be inclusive of both direst ESP assistance and indirect assistance carried out by ESP partners.

Watershed Management Outcome #3 = Area of forest in ESP High Priority Provinces with high biodiversity value under improved local management increases by 50%.
The baseline will be achieved by first determining the total area of the following forest categories:

1. Protected areas (including national parks and nature reserves);
2. Protection forest;
3. Other forest areas (significant forest cover found outside of areas 1 and 2 using recent land cover maps).

This area will then be adjusted according to the management index. This index is determined by the quality of the management and the involvement of local communities in management. It will be derived for each HPP by contacting BKSDA, BTN and Conservation

NGOs as applicable to determine:

1. Where are formal and informal management activities happening?;
2. What is the quality of the conservation management (1 = good, .5 = fair, 0 = poor);
3. Is there any local involvement in the management? (1= yes, 0=no).

Area under improved local management = (areas with high biodiversity value) * (conservation management ranking) * (local involvement ranking)

5. ACTIVITY MAPPING

DAI's Internet Mapping System (IMS) capability was presented to the GIS team and the ESP Regional Advisors. DAI has made an investment in both a dedicated server and ArcIMS software. The only cost to ESP will be the labor of Ioana Bouvier for maintenance and updates to the site. The ESP IMS will be a place to show the coverage and depth of ESP activities throughout the high priority provinces.

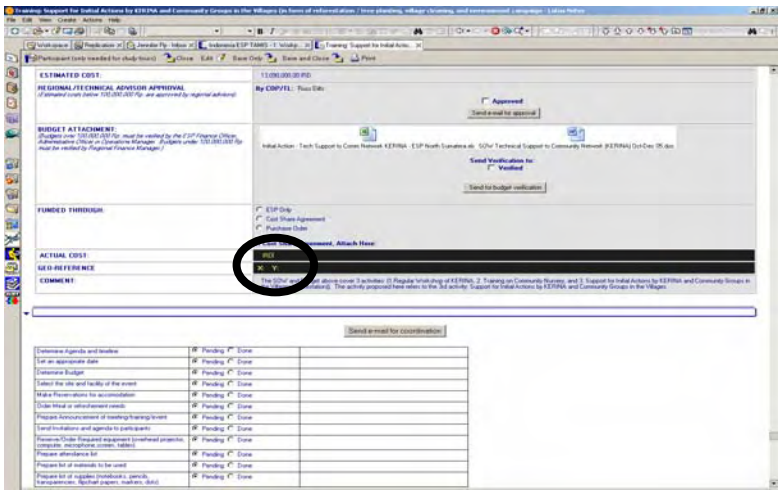
Data for the site will be transmitted through one Sabdo Sumartono. An ftp folder for sharing these files has been established.

The layers needed for an effective ESP IMS were discussed with the GIS team and the WSM Advisor. Important layers noted include:

- Boundaries (countries, province, district, subdistrict, villages, cities, towns);
- Development pathways inputs and outputs;
- Rehabilitation sites;
- PDAM locations;
- **ESP Activities;**
- Catchment areas;
- Roads;
- Rivers;
- Watershed boundaries;
- Springs;
- Water intake points;
- Protected areas;
- Forest cover;
- Wetland cultivation;
- HIPPAM locations (community based clean water supply);

The ESP activities are the most important and obtaining them is a high priority. In order to collect this data, ESP staff is being trained in the use of global positioning system (GPS) units. These units provide the GIS team with the latitude and longitude coordinates of ESP activities. Many ESP staff are already familiar with using GPS. However, there needs to be some education on using them to capture project activity data, and the importance of doing so must be stressed by ESP managers. They should be used to capture the locations of ESP interventions, including trainings, grants, communication campaigns, and

Geo-reference Information on TAMIS Output Form



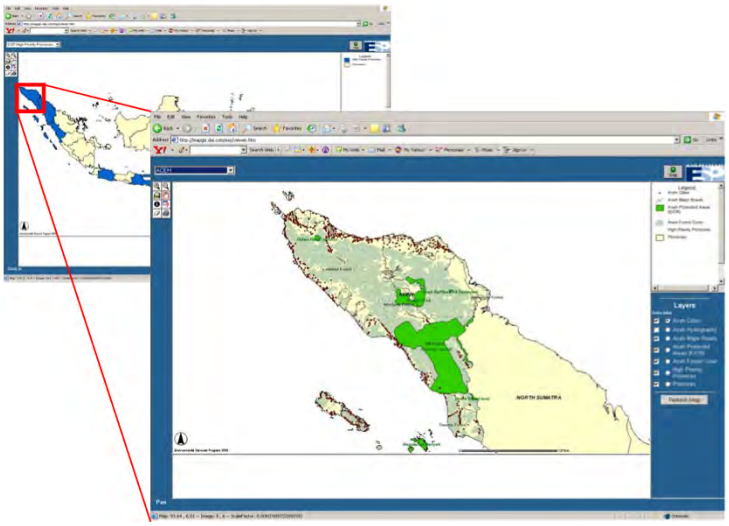
support to PDAMs and local governments. One method of capture for this data will be the program TAMIS.

The STTA worked with Tami Fries during her recent STTA to find the most appropriate TAMIS forms from which to draw spatial information. A GIS View is being established which contains relevant information for display on the ESP IMS. This information will be drawn from the TAMIS Output form. The initial fields that should be captured in the GIS view are provided in the sample table below:

Illustrative GIS View for TAMIS

Output Title	Event Type	Province	District	Watershed	Georef X	Georef Y	Total Participants	PDAM (participating partner org)	Cooperating USAID Programs
SAMPLE									
Activity	Training	Aceh			95.19	5.35	35	Siron 2	LGSP

Illustrative ESP IMS



This view can then be exported by the GIS specialist on a regular schedule. It can be readily mapped using the spatial coordinates provided by the staff member responsible for the activity. The resulting shapefile is then posted to the ftp site for addition to the website on the server in the DAI home office.

A preliminary site to test the functionality of the system was established in August. It contained some scale dependent sample data. As shown in the graphic above, this means that as one zooms in to an area of interest, more detailed information is displayed. This allows a great deal of information to be stored in the IMS without overwhelming the user with too much data in a single map view.

The system also allows users to query the data behind the map. For example, if a manager would like to highlight all of the training activities with over 30 participants, they can create a simple query and results will be presented in a table at the bottom of the screen and the locations of those trainings will light up on the map. Once they have found the information they need, users can print their own customized maps directly from the site. The site is relatively simple to use, and the map tools are customized according to ESP requirements.

ESP users that tested the preliminary site were pleased with the way it could help to showcase ESP activities. However, the need for an offline option was expressed, as the audience for the ESP IMS will include those without access to a reliable high speed internet

connection. In order to meet this need, the same information is distributed using ArcExplorer, a free GIS viewer made by ESRI. The free program and all of the map data layers can be added to a CD. This interface is similar to the IMS, although there are more tools available. A short training is required to prepare ArcExplorer users to be able to take advantage of all the spatial analysis tools.

6. COLLABORATION WITH OTHER USAID PROJECTS

Two USAID Indonesia Projects, the Health Services Program (HSP) and the Local Governance Support Program (LGSP), include a GIS component that is relevant for ESP. Collaboration with these programs on data collection and data development will be beneficial to all involved.

HSP

HSP is a new project and their GIS needs have not been completely defined. However, health data is very spatial in nature, and it will be beneficial for HSP to be able to monitor their program activities against the health landscape in their project area. HSP has an upcoming baseline survey on health conditions and behaviors, and ESP is providing advice on how to best collect that data with a spatial reference so that it can be mapped at a later date. This is also helpful information for their upcoming facility-based survey. Information on the location and conditions of hospitals and clinics in the areas upon which HSP focuses could provide an interesting backdrop by which to consider ESP activities and results. While HSP's use for their spatial data may be limited to display and activity monitoring, it will be useful for ESP to use in some of its spatial planning activities. It is important for ESP to be available to guide HSP in their initial phases as they decide how much GIS support is needed for their own planning, monitoring and reporting. There is certainly overlap in the basic administrative and demographic data needed for HSP and ESP, and data sharing should be a priority whenever possible.

LGSP

LGSP will be collecting, developing and housing a great deal of data for the creation of the Local Government Data Bank, which will be available online. This includes some spatial data, such as basic demographic information for the cities, such as population, employment, ethnicity and infant mortality rate. But there will also be specific information on the local government development plans, budgets and policy studies conducted. While this information may not be useful as a direct input into ESP spatial models, it may be useful for helping ESP to identify local governments with strong political will for environmental initiatives, and tracking against ESP activities over time.

7. ADMINISTRATION

Several administrative housekeeping items need to be considered so that the GIST can operate in the most efficient way possible. These are briefly highlighted below.

The GIS team will, from time to time, need to install free programs from Internet sites on their computers in order to complete their daily tasks. This includes freely available programs for downloading GPS data, cleaning polygons, or scripts to enhance their existing software. They need to be given administrator rights to their computers so that this process can happen quickly and easily.

The GIST members that operate in the smaller offices of Medan and Padang have reported spending as much as 25% of their time on IT issues. This includes troubleshooting for office staff, server maintenance and tape backups. While it is understood that the GIST are often the most computer experienced members in the office, they should not spend more than 10% of their time on these issues, as they have a very full schedule of GIS tasks to attend to.

During the GIS team building session, it became clear that in order for the team to benefit from all the experience of the team, regular GIS team meetings should be a priority. These meetings will serve as a forum to share current projects, ideas and solutions. While the team is very proficient at sharing documents and reports via the program TAMIS, a carefully structured regular meeting would be very beneficial in reinforcing lessons learned and reducing duplicate efforts. For example, there are currently two GPS training manuals that have been developed. These could have been collapsed into one manual, saving time and resulting in a better single product if the team had met together and prioritized its development as an agenda item. A well panned agenda that includes specific outputs should be developed by the specialist in Jakarta and circulated beforehand to ensure productivity.

Communication with the DAI home office should be more free-flowing. The home office GIS team serves as a resource for the ESP team, and is available via email and Skype to address questions regarding software, procurement, and analytical concepts. This STTA served as an initial introduction between the two teams and the hope is that ESP GIS will now avail themselves of this resource frequently.

8. TRAINING REQUIREMENTS

The training requirements for the ESP GIS team have now moved beyond basic map production. They need advanced raster based software training, and practical instruction in spatial planning tools, specifically development pathways maps and community mapping.

Advanced Software Training
Demonstration: some of the basic IDRISI Kilimanjaro functions

- Import of Common Data Types
- Creating a Composite
- Generating a Fly Through
- Delineating Watershed Boundaries from DEM

A list of the necessary raster based processing functions for the GIST was created, which included:

- Watershed delineation;
- Generate contours;
- Flythrough;
- Data imports;
- Composites;
- Projection;
- Clip;
- Mosaic;
- DEM Development;
- Reclassification;
- Introductory Imagery classification as appropriate for ESP needs;
- Stream and flow models.

With training, it will be possible for all GIST members to complete these operations within IDRISI. No concerns were raised about additional operations that would be outside of the scope of IDRISI.

8.1. DEVELOPMENT PATHWAYS TRAINING

A development pathway map, as described previously, is a spatial planning tool that integrates knowledge about the physical and economic landscape, including current structure of the land and waterbodies, conservation status, market access and land-use patterns to prioritize development activities and areas of project focus. These maps help project managers to better understand the many intricate variables at play in an area and allow them to incorporate them systemically into their decision making. As part of an integrated spatial planning approach, pathways maps are a powerful tool for understanding, designing, introducing, and monitoring appropriate interventions. Combining these elements yields a

sharp delineation of the types of intervention that makes the most sense and offers the greatest potential: the "development pathway."

The models used to create these maps are not developed and executed by the GIS team alone. To be of value to ESP, these models (the parameters and criteria for each planned intervention) must be developed through communication with the component teams. The GIS expert serves a support role; explaining the purpose of the map, the possibilities and limitations of the inputs to the map, and helping to put the final map products to use for solid decision support. In order to play this role, the ESP GIS team members will need training. This training is best conducted through a practical application of such a model for a specific ESP objective.

The concept of using spatial overlays to analyze an area is not new to the team. The Jakarta-based GIS specialist has already created an assessment of the critical lands in Cianjur that is based on similar principles. It combines the physical characteristics of the area in a series of overlays to arrive at a discreet area of critical lands that need project attention. The team has the skills to execute basic models. They need some guidance in preparing a model based on team input, developing proxies when ideal data is not available, refining models based on fieldwork, and integrating the results of those models into other mapping exercises, including community mapping and activity mapping. This training will serve as a practical application to strengthen the team's skills in advanced raster analysis.

8.2. COMMUNITY MAPPING METHODS TRAINING

Participatory community mapping exercises are not new to Indonesia, nor are they new to the ESP GIS team. The Jakarta-based GIS specialist has developed a community mapping guide based on his previous experience in implementing such projects in Indonesia. This guide is useful and his experience will be very valuable to the process. DAI's experience in rapidly developing local community mapping capabilities could add value to ESP's arsenal of community mapping tools. Possibilities include using available satellite imagery and GPS units in the creation of the maps, involvement of local government officials along with community members, and sharing of the final product through freely available GIS viewers. DAI does not have its own guidebook approach to community mapping because each situation is unique, but the ESP team could benefit from a field exercise in community mapping that would include a DAI GIS STTA in order to get their input on appropriate tools and analysis.

9. APPENDICES

APPENDIX 1: ESP GIS STTA WORK SCHEDULE

October 7—26, 2005

DATE	ACTIVITY
Friday, October 07, 2005	Arrive in Jakarta. Meet with COP and DCOP to discuss SOW tasks and deliverables. Brief meeting with GIS team member Sabdo Sumartono. Discussed some of his vector processing needs and an exercise on critical lands definition that he completed.
Saturday, October 08, 2005	Review ESP materials, specifically PMP indicators. Prepare powerpoint for discussion about data collection and monitoring of WSM Outcomes 2 and 3. Prepare questions for the upcoming meetings with the technical teams. Continued work on training materials.
Sunday, October 09, 2005	Day off
Monday, October 10, 2005	Meet with the Jakarta based WSM and SD teams. Learn more about what they are doing and discuss how they can best utilize the project's GIS resources. Review spatial data with Sabdo. Prepare a schedule for day one with the GIS team.
Tuesday, October 11, 2005	GIS team building Day 1. Initial discussions with the entire ESP GIS team. Who is doing what, where, in terms of GIS on ESP? Introduction to the DAI home office GIS team and the services they provide. Presentation of development pathways and other tools in a spatial planning framework. Discussion of WSM Outcomes 2 and 3 monitoring methodology. Introduction to internet mapping system. Prepare a schedule for day two with the team.
Wednesday, October 12, 2005	GIS team building Day 2. ArcView training. Aceh security briefing at USAID. Prepare a schedule for day three with the team.
Thursday, October 13, 2005	GIS team building Day 3. ArcView Training continued, including follow up on outstanding questions from Day 2. Development pathways review and discussion: What does it mean for ESP? Demonstration of basic IDRISI functions.
Friday, October 14, 2005	Wrap up final questions. Develop and distribute brief summary and list of follow up items to the GIS team. Meeting with Kemal Siregar and Tammy Carolina of the Health Services Program project to discuss possible collaboration.
Saturday, October 15, 2005	Write summary of team building for distribution to GIS team.
Sunday, October 16, 2005	Day off
Monday, October 17, 2005	Travel to Aceh. Meet Nofaldi and discuss plans for stay in Aceh.

DATE	ACTIVITY
Tuesday, October 18, 2005	Meet with Aceh team members, including Pak Eri and Pak Irfan. Discuss their needs and expectations in terms of GIS support, data and deliverables. Meet with Holger Treidler of GTZ to discuss data availability for Aceh. Meet with Mizailin Affan, Director of the GIS and Remote Sensing Development Center at Syiah Kuala University to discuss their available resources in terms of hardware, software, training facilities and research assistants. Site visit around Banda Aceh.
Wednesday, October 19, 2005	Discussion of GIS needs with Regional Advisor John Pontius. Meeting at United Nations Information Management Service (UNIMS), GIS Officer Alois Mutua. Presentation by Stephen Menard on East Aceh village data survey and administrative boundary correction.
Thursday, October 20, 2005	Travel to Medan. Meet with Khairul. Discuss his impressions of working with his demo version of IDRISI. Worked together to import some of his imagery and gave him 90 meter resolution elevation data.
Friday, October 21, 2005	De-brief to ESP advisors meeting. Answered some ArcView 9 questions from Khairul Rizal.
Saturday, October 22, 2005	Prepare questions for meeting with Financial Services team. Review Sabdo's community mapping guide.
Sunday, October 23, 2005	Day off
Monday, October 24, 2005	Meeting with Jakarta based Financial Services team. TAMIS refresher with Sabdo. Discussed needs for the GIS View in TAMIS.
Tuesday, October 25, 2005	Community mapping discussion with Sabdo. Meeting with Gusdiyanto, GIS Specialist and Mohamad Lutfi, Database Management Specialist, Local Governance Support Program (LGSP). Work on draft STTA report.
Wednesday, October 26, 2005	Debrief with COP and DCOP. ArcExplorer training for DCOP. Depart Jakarta in the evening.

APPENDIX 2:
DRAFT SOW: SPATIAL PLANNING SPECIALIST

Consultant Name: (Last, First)	Ioana Bouvier	**Position Title:**	Landscape Planning Specialist
Contract Name:	Environmental Services Program		
Billing Code:	5300-200	**Contract No:**	497-M-00-05-00005-00
Period of Performance:	February 2006		
Travel Days:	3		
Work Days Overseas:	15		
Work Days Home Office	8		
Remaining Work Days: (Research, Report Writing)	0		
Total Level of Effort:	26		
Evaluator:	Chief of Party & Deputy Chief of Party		

BACKGROUND

The Environmental Services Program (ESP) is a fifty-eight month program funded by the United States Agency for International Development (USAID) and implemented under the leadership of Development Alternatives, Inc. (DAI). ESP works with government, private sector, NGOs, community groups and other stakeholders to improve the management of water sources and broaden the distribution of safe water to urban dwellers by strengthening watershed management and delivery of key environmental services, including clean water, sanitation and solid waste management in Indonesia. The period of the project is from December 2004 through September 2009. ESP activities are focused on five High Priority Integrated Provinces: North Sumatra, West Sumatra, East Java, West Java/DKI Jakarta, and Aceh. ESP also supports a limited set of activities in four Special Imperative Areas (Balikpapan, Manado, Manokwari and Jayapura).

OBJECTIVES (SCOPE)

The purpose of this short-term assignment is to provide advanced software training, lead the GIS team in practical exercises in the use of broad and local scale spatial planning tools for watershed management, and make adjustments to the internet based mapping system for program activity monitoring. The software training will be ESP-specific, focusing on the outputs of the spatial planning exercises. This will include development pathways mapping for watershed planning and participatory community mapping in selected watersheds.

The position is based in the main ESP project office in Jakarta, although a portion of the time will be spent in selected high priority provinces, with a special focus on the spatial planning needs in Aceh.

TASKS

The proposed tasks/responsibilities of the GIS Specialist are:

1. Review the DAI landscape planning approach with the GIS and WSM teams and conduct a series of workshops on criteria development for development pathways mapping.

2. Provide advanced level training to the ESP GIS team in the use of IDRISI Kilimanjaro through practical, ESP specific exercises in landscape planning and spatial analysis for watershed management and participatory community mapping;.
3. Provide training for the ESP team's new GIS Specialist who will cover the Aceh Region;
4. Provide GIS recommendations for the Aceh Post-Tsunami Improved Water Resource Concept Study;
5. Prepare map outputs from the training exercises and present the results. Prepare a report that includes the results from the initial spatial planning exercises and recommendations for the future use of these tools, including any further necessary capacity building and future home office support.
6. Prior to arrival in Jakarta, work with the GIST via email on updates to the IMS
7. Review the IMS with ESP users to determine the needs for different layers, assess the functionality of storing and retrieving the necessary spatial information in the program TAMIS, and update the site as required;

DELIVERABLES

Deliverables required from the Spatial Planning Specialist are:

1. Lead an exercise in practical applications of the Spatial Planning Approach in support of the ESP Watershed Management Component;
2. Update the internet-based mapping website with feedback from ESP staff;
3. Conduct training in the use of IDRISI Kilimanjaro, raster processing GIS software.
4. Report and recommendations on spatial analysis for ESP watershed planning and participatory mapping, including recommendations for future training.

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