

GAO

Testimony

Before the Subcommittee on Interior and Related Agencies  
Committee on Appropriations  
House of Representatives

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GEOGRAPHIC  
INFORMATION SYSTEM

Forest Service Has Resolved  
GAO Concerns About Its  
Proposed Nationwide System

Statement of  
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Mr. Chairman and Members of the Subcommittee:

We appreciate this opportunity to discuss the Forest Service's plans to acquire geographic information system, or GIS, capabilities. The system will be used to store, retrieve, analyze, and present spatially-referenced information--that is, information associated with the nearly 200 million acres of national forests and grasslands that the Service manages. The GIS is part of a proposed project to acquire an integrated GIS and administrative information system.

As you requested, we are providing an overview of the Service's progress in addressing the major weaknesses that we found in its earlier plans and justifications. In our 1990 report and testimony to this Subcommittee, we concluded that the Forest Service was not ready to acquire the \$1.2-billion nationwide GIS because of an increased and unnecessary risk that the planned system would not efficiently and effectively meet the agency's information needs and would not have adequate capacity. This conclusion was based on our findings that the Service's alternatives analysis was narrow and incomplete, benefit/cost analysis seriously flawed, and data and system performance requirements inadequately defined.<sup>1</sup> Last year we testified that the Service had sketched out some promising directions to address our original concerns and recommendations, but that a determination of the Service's readiness to proceed should await more defined plans.<sup>2</sup> At your direction we reviewed the Service's revisions to its feasibility, benefit/cost, and functional requirements analyses for the GIS component of the integrated information system, using federal regulations and guidance and Department of Agriculture policy as criteria.

Today we are pleased to report that the Service has satisfactorily addressed our concerns and recommendations. The Service's plans are now more definitive, better justified, and much more likely to result in the acquisition of an information system that will efficiently and effectively support its mission.

SERVICE'S FEASIBILITY STUDY  
EXPANDED TO ADDRESS CONCERNS

As you recall, our concern with the September 1989 feasibility study was that the Service assumed that full GIS capability was needed at every site; therefore, alternatives such as selective placement of GIS technology were not considered. The Service

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<sup>1</sup> Forest Service Not Ready to Acquire a Nationwide Geographic Information System (GAO/T-IMTEC-90-10, May 2, 1990) and Geographic Information System: Forest Service Not Ready to Acquire Nationwide System (GAO/IMTEC-90-31, June 21, 1990).

<sup>2</sup> Forest Service is Making Progress in Developing a Nationwide Geographic Information System (GAO/T-IMTEC-91-11, Apr. 24, 1991).

also did not adequately assess the organizational impact of alternatives, or assess how it could best take advantage of the technology's promise to improve the efficiency and effectiveness of national forests and grasslands management. As a result, we concluded then, the Service essentially failed to address how to best harness the full capabilities of GIS technology.

The revised feasibility study addresses our concerns. In particular, the Service no longer assumes that every site will receive full GIS capability. Instead, it plans to assess needs and capabilities at each National Forest before deciding how to best meet those needs. Unlike before, the Service now plans to assess the most appropriate location of GIS technology, and the skills and staffing required to best use the technology. The Service believes that in some of the larger forests, it will find that every site--including larger Ranger District offices--needs full GIS capability. It believes that in other forests and grasslands, the needs of smaller sites, such as the small Ranger District offices, may be best served by GISs located more centrally, such as in the Forest Supervisors' offices.

To further reduce risks, the Service now plans to take a phased approach to acquiring and deploying the new technology. In the first phase, the Service plans to install and operate the new integrated GIS and administrative information system in several national forests, develop and test procedures needed to operate the system, develop training programs, and assess its implementation strategy as part of a year-long pilot. On the basis of its experience in the first phase, the Service plans to finalize its approach to the second phase--introducing the technology on a nationwide scale. We agree that a phased approach could substantially reduce the risks associated with the nationwide implementation of complex GIS technology. According to the Associate Deputy Chief for Administration, the Service will report to the Congress on the results of the pilot phase before it begins to deploy the new technology nationwide.

#### BENEFITS ANALYSIS RESTRUCTURED AND COST ESTIMATES REFINED

The Service's earlier benefit/cost analysis did not contain an estimate of the dollar value of specific benefits it expected from the planned GIS, and contained an invalid representation of future benefits. We therefore concluded that the Service did not have the information it needed to assess the relative economic benefits of its alternatives and failed to show that the selected alternative was indeed the best approach and that benefits exceeded costs.

Since then, we have examined two versions of the benefit/cost analysis. Our review of the Service's initial revision showed that the analysis still contained an invalid estimate of the

economic benefit of its alternatives. After discussing this with Service officials, the Associate Deputy Chief for Administration agreed that the estimate did not represent the economic benefits it expected from its alternatives, but instead was an estimate of costs that would be avoided. Further discussion revealed that the Service needed GIS capability to help it address the backlog of congressionally and judicially mandated work, such as preparing forest plans and studies. The Associate Deputy Chief agreed that the Service should recharacterize its estimate and describe the work backlog in justifying the need for GIS capability.

After these discussions, the Service again revised its benefit/cost analysis and included estimates of the work backlog in each of the Service's regions. It now estimates that the productivity increase it expects from the new systems will enable it to overcome about half of the 83,027 staff years of backlogged work it estimates will accrue over the next 12 years--the planned life of the information system, thus avoiding additional costs to perform the mandated work. The Service argues that the acquisition is therefore justified because the cost of the new system is less than the cost to increase its work force sufficiently to accomplish the same portion of mandated work. It estimates that the potential incremental value of cost avoidance is about \$1.5 billion--or almost 5 times the estimated \$312-million incremental life-cycle cost of the GIS. We believe that this revised benefit/cost analysis approach is a valid way to estimate the cost-avoidance value of the GIS, and to justify this component of the acquisition.

We would also like to point out that the estimated cost of the GIS component of the integrated system has been lowered, while the administrative component has been increased. The Service's estimate of incremental life-cycle costs for the GIS is now about \$312 million, or about \$923 million less than its 1990 estimate of \$1.24 billion. This decrease is primarily due to an approximately \$831-million reduction in the Service's estimate of management and overhead expenses associated with the GIS, and a \$97-million net reduction in the estimated cost of GIS software, hardware, and maintenance. The Service's estimate of the acquisition cost of the administrative component has increased by about \$312 million to about \$610 million. This increase is due to refinements in its estimates for computer and telecommunications equipment and software, and new cost elements for services such as the use of non-Forest Service computers.

REQUIREMENTS ANALYSIS MORE  
CLOSELY REFLECTS NEEDS

The Service had previously not adequately defined its mission-based data and system performance specifications, or determined a strategy for collecting, storing, and processing satellite or

remotely-sensed image data. Our concern was that by failing to adequately describe these needs, the Service was unnecessarily increasing the risk that vendors' offers would not meet its functional and performance requirements. We were also concerned about an increased risk that the abbreviated specifications would be insufficient to make appropriate tradeoffs between the price and performance of offered systems.

The Service's revised data and performance specifications and description of its needs for image data are more comprehensive and reflective of its needs, thus greatly reducing risk. The Service has developed a performance evaluation process that requires vendors to show that they can accomplish within a defined time period a set of information processing tasks that it believes are representative of its work load. The requirements analysis also provides a much more detailed description of the information products it needs, and the timing, frequency, and volume of these products, as well as the types of data it needs to process, including data from remote sensing sources such as satellites and aerial photography.

#### CONCERNS OVER NEW COMPUTER HARDWARE REQUIREMENT RESOLVED

In the course of reviewing the revised functional requirements analysis, we questioned the need for a new computer hardware requirement. The Service stated that all computer workstations and servers it would acquire had to be binary compatible--able to operate all acquired software without recompilation.<sup>3</sup> Our analysis showed that such a requirement was not needed and would unnecessarily restrict the range of solutions vendors could propose. Such a requirement could also reduce the Service's flexibility to incorporate newer, more cost-effective technologies over the expected 12-year life of the system.

The Associate Deputy Chief of Administration agreed to remove the binary compatibility requirement from the requirements analysis and draft request for proposals and state the Service's needs in functional terms, thus allowing vendors more latitude in proposing solutions to the Service's needs while adhering to the federal information processing standards that the Service has already specified as a requirement.

#### UNNECESSARY RISKS REDUCED

In sum, Mr. Chairman, at your direction the Service has revised its plans to better define its needs and substantially reduce the

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<sup>3</sup> As used here, recompilation of software refers to the process of translating high-level instructions again so they can be executed by a different computer.

risks associated with such a large-scale acquisition of information technology. With the assistance of MITRE Corporation, the Forest Service has revised its analyses to provide a much more complete picture of the information-processing alternatives, activities, requirements, benefits, and costs. While every large-scale information-system acquisition incurs risk, the Service has succeeded in reducing the unnecessary risks that were previously associated with the project.

Mr. Chairman, this concludes my statement. I will be pleased to answer any questions that you or other members of the Subcommittee may have at this time.