D FIRST DOWN & GOAL TO GO

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Introduction

I think it is safe to say that we are in the beginning of a new era in the Landsat Program. The new era is a change from a research and development/demonstration mode to an operational mode. This has been a goal of all people involved in the Landsat Program since it's inception in the late 1960's. At last, with our goal nearly at hand, we are now in a crucial phase to insure the development of a successful and operational Landsat Program that provides needed and timely resource information to Managers and Planners. The Landsat program would never have reached this important stage without the pioneering, innovative and tenacious efforts of everyone involved in this program. These years of dedicated effort have not been without confrontation and conflict within our ranks, but this has only served to strengthen our cause which is borne out by the fact that the operational program is at hand. This is an issue we need to learn to cope with.

Now is the time to draw together, assess the situation and outline a joint cooperative strategy for the 1980's to insure success. Today, I would like to touch on three elements: First, highlight past program accomplishments in Washington which have contributed to the present situation. Second, I want to describe this crucial interim phase betweeen the faltering demonstration and the operational system. Finally, I want to suggest a game plan for the 1980s.

Past To Present

Landsat projects conducted cooperatively between NASA and Washington State Agencies during the 1970s, have established the Landsat system as a viable means of collecting and disseminating some types of natural resource information. Resource Managers have long recognized the potential application and benefits of Landsat since even before the launch of the first Earth Resources Technology Satellite in 1972. In the late 1960's, the usefulness of satellite data to state agencies was explored by studying simulated space imagery collected by NASA's high-altitude aircraft. Soon after the actual Landsat data became available in 1972, Washington agencies were ready and in a position to conduct research into its' operational value.

Many Washington State Agencies have been active in demonstration projects that have dealt with a wide variety of resource applications for

Landsat data. NASA and the Pacific Northwest Regional Commission have played an important role in the funding and execution of these projects. Let us review a few examples, by discipline, that will illustrate Washington's interest in making the use of Landsat data an operational reality. These projects have emphasized issues that are regionally important in the area of forestry, agriculture, water resources, land use and wildlife management.

Great strides have been made toward incorporating Landsat data into existing state forestry inventory programs. These forestry projects have focused on determining the level of detail of forest resource information extractable from Landsat, and on how the value of resource data from Landsat might be increased by using other data such as aerial photography, existing computer inventory data and digital terrain data. These studies have also examined how the type of forest resource data from Landsat compares with the type of inventory data currently required for present forest planning and management purposes. Landsat data has also been used to monitor forest harvest activities to supplement information reported to revenue agencies for tax collection purposes. In accomplishing these research/demonstration projects, we have learned a great deal about Landsat's role in the information process and in addition, we have been able to produce some valuable information about our forest resource base.

Land Use Planning

Another discipline in which Washington agencies have conducted Landsat studies, is land use planning. Studies were undertaken to provide local and county planners with land use statistics for comprehensive planning. These studies, have explored how Landsat data can be used with available federal, state and local data sources in a digital geographic multiple use information system concept, and have had a goal of providing planners with new types of information not available from traditional sources.

In addition to forestry and land use investigations, wildlife managers have used Landsat to identify prime wildlife habitats, and Landsat data has been used to aid in the development of optimal water use policy by identifying and monitoring high water demand land uses.

It is difficult to name a resource discipline that has not investigated the potential use of Landsat. I want to emphasize that these projects are research projects. They are not considered operational because Landsat data is not being continually relied upon to direct management decisions. However, they were successful because they demonstrated that Landsat can be relied upon to provide the kind of information we need. What remains is to work out a cost effective way to provide it.

This brings us to today. The interim breather between the old "demonstration" Landsat system and the launch of the operational satellite. The demonstration projects of the 1970's are complete. It is up to us to comprehensively re-assess all of the projects of the last decade and decide —

- What Landsat can do and cannot do
- How the Landsat data needs to be assembled
- How Landsat data can make the program cost effective
- What it could do if constraints on the old research and development system were removed, such as delivery time and format.

The opportunity exists to participate in the design of the operational system. The pathways for communication are open. Those of us who participated in the demonstration projects now need to participate in the design of the institution delivery system and now to the game plan for the 1980s.

Game Plan For The 1980s

I recognize this interim period we are in, is a time of uncertainty because of both funding and political reasons, but I see this as an opportunity. This time should not be squandered. Important issues need to be addressed and resolved regarding the implementation of the operational system. Past demonstration projects should now be reviewed carefully. Enough demonstration projects have been performed to identify consistent patterns emerging from the results. For example, Landsat can realiably provide general Level 1 and Level 2 resource data when used by itself, but this level of information is generally not needed. Additional resource data can be provided at Level 3 or 4 by incorporating other layers of data with skilled resource analysts. This adds considerably to the cost and complexity of the operation. It is, however, such Level 3 and 4 data that is most needed. These costs, the technology and personnel needed, to apply it, could price this kind of Landsat derived information, out of reach for many resource management/planning efforts.

The game plan for the 1980s, then, needs to focus on creating cost-effective Level 3 and 4 information and incorporating the data into existing programs. The way we can overcome the cost constraints is by using Landsat data as layer of geographical information in a geographic information system which many states, such as Texas and Minnesota, are presently developing or have in place. The Washington concept of a GIS is simply a service center that archives and disseminates resource

information. This concept is being proposed because many resource agencies use and need common data such as land use, topography, ownership, legal and political boundaries. When all agencies work cooperatively, the entire process of obtaining and using resource data is made more cost-effective. This is a particularly importnat consideration in these times of tight budgets. I believe the sponsors of this conference recognize the relationship between cost-effective dissemination/use of Landsat data and geographic information systems as evidenced by the program content of this conference.

We in Washington believe incorporation of Landsat data into a state multiple GIS will increase the potential for success of the operational program. The following points illustrate how incorporating Landsat into a geographic information system will improve the chances of success for an operational system —

1 The computer technology is similar. Both GIS and Landsat digital processing operate most effectively on mid-size computers with specialized graphic capability that are dedicated to the application. Such systems are costly for a single agency to acquire and use, but become more justifiable when their utility is expanded from solely an image processing system to the more general geo-processing system. An operational Landsat program can be implemented more cost-efficiently in this context by sharing equipment and costs.

2 Landsat data is more useful if combined and used in conjunction with other types of resource data presently required by resource managers. The increased cost and complexity of this kind of image analysis is largely due to traditional image processing systems being optimized to handle images of spectral data. The geographic ancillary data does not usually fit well in this environment, so that the processes of merging it with spectral data and subsequent analysis requires indirect and inefficient analysis. The geographic information system has streamlined these analyses so that by marrying the image system and the GIS, best procedures are provided, thus reducing the complexity of the solution and costs.

3 The large cost of entering ancillary data in a Landsat project, is reduced when analysis is performed through a GIS. One of the fundamental ideas in building a shared geographic data base is that much of the resource data is used in identical form by all users of the system. These high priority data layers would be the first entered so they would be

available without delay for future GIS applications, such as Landsat analysis. Most Landsat projects using ancillary data have not had the benefit of such a pre-existing data base so high costs of data entry run up project costs and delay delivery of results. In a properly planned GIS where Landsat is considered only a specialized data layer, the benefits of a GIS can reduce high costs of data entry and increase the timeliness of results.

To summarize these 3 points, the hassles involved with acquiring and using image processing systems, added to the hassles of obtaining and assembling Landsat and ancillary data, combined with the constraints of processing geoinformation in an image processing environment, causes Landsat's unique advantages to be diluted if not eliminated. These 3 problems can be resolved by creation of a GIS system with Landsat subordinated as a data layer. Landsat's advantages, such as synoptic view, will be improved and the reduced time and costs required for each Landsat project could allow more frequent analysis of Landsat's multispectral repetitive coverage. It is these characteristics that make Landsat unique and valuable. It is these characteristics that should be enhanced.

Summary

In conclusion, I want to say that in the State of Washington, we have developed a strategy - a 10 year game plan for transition to the operational system. This game plan is to carefully examine the results of past demonstration projects to identify successful operational applications, take advantage of geographic information systems, and finally, work toward reducing/elimianting constraints of the present system that are inhibiting operational use. We believe we have demonstrated our support of the Landsat program by sending a user representative to NOAA who is working for the next two years with that agency in the development of a user-oriented system. We believe Landsat has great advantages and we are working to make it a reality. We are currently sponsoring GIS legislation in the legislature of our state.

I believe, through dedicated efforts of all participants in the Landsat program, that we have experienced a highly successful research/development and demonstration program and achieved a measure of success toward the implementation of an operational program. All participants are to be congratulated. However, we are presently at a crucial turning point. We need to re-assess our position, be sure emphasis is on the right syllable, figure out how to take advantage of the efforts of the past 8 years, coordinate our efforts so as to enhance Landsat's advantages in a cost-effective manner, then proceed. This will require a different emphasis - a different mode of operation for most of us - one of interdiscipline, interagency, perhaps interstate cooperation - but if we can make the change, Landsat can deliver.