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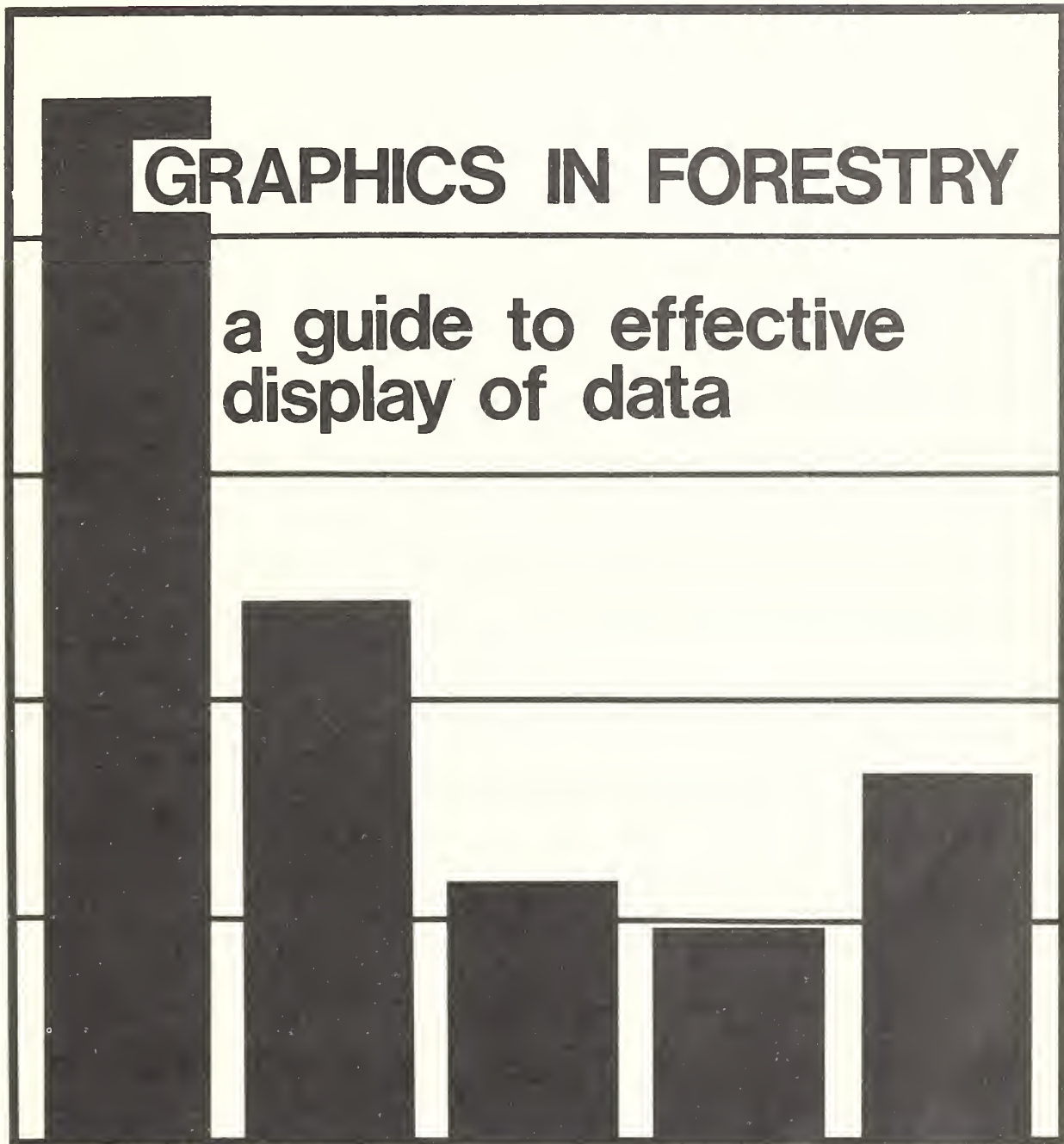
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# GRAPHICS IN FORESTRY

a guide to effective  
display of data



U.S. DEPARTMENT OF AGRICULTURE • FOREST SERVICE  
SOUTHEASTERN AREA • STATE AND PRIVATE FORESTRY

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## SUMMARY

Authors of publications pertaining to forestry will help their readers get a clearer understanding of data, quickly, with the aid of well-planned graphs. Slide presentations also will get major points across to the audience if appropriate graphs are included. Guidelines are given on four of the most useful types of graphs. They illustrate the maxim, "one picture is worth a thousand words."

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GRAPHICS IN FORESTRY:  
A GUIDE TO EFFECTIVE DISPLAY OF DATA

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## INTRODUCTION

Many reports have unfortunately earned the description of "chloroform-in-print." Massive amounts of text and endless columns of figures are commonplace; the reader must studiously pore over the data offered or else fail to grasp the concepts or trends as well as many supporting facets of the topic. However, the same data shown in visual form quickly conveys a lasting impression of the total picture. Effective graphs also bring into sharp focus the relationships of key aspects to one another, and to the whole picture. For example, a simple soil erosion graph will show, at a glance, the total gross erosion plus causes that make up that total. In short, visual information displays are dynamite communicators.

However, badly drawn graphs can be just as confusing as a mass of figures. Complicated graphs, even if they are mathematically perfect, will be of little use if they need a genius to understand them. The purpose of this booklet is to illustrate the effective use of graphics to display data on topics pertaining to forestry. The same principles apply to slide presentations. Many speakers put their audience to sleep by reciting more statistics than necessary. Charts projected on a screen often confuse the audience because too much data is crowded on a single slide.

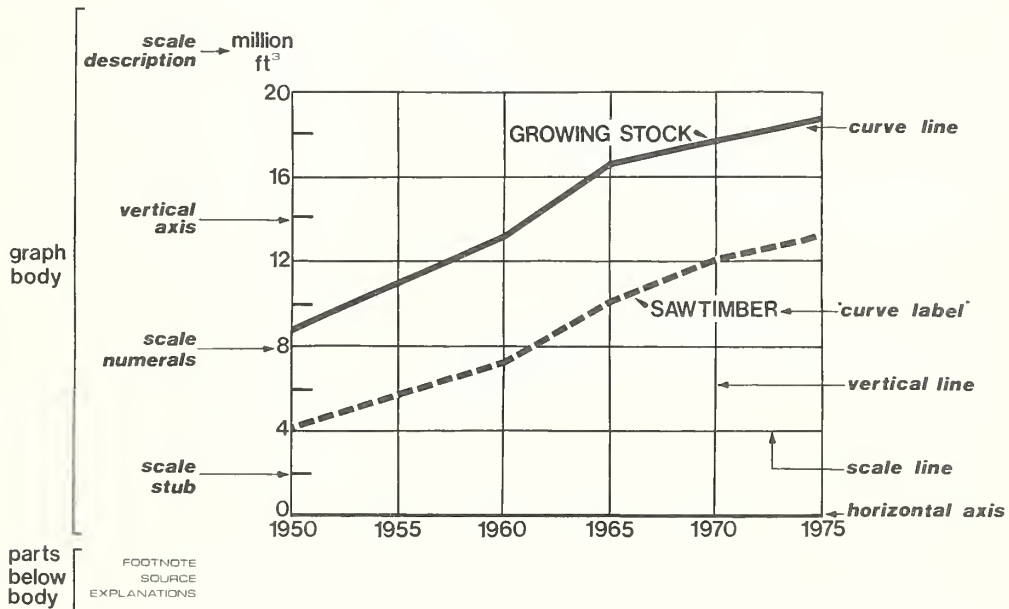
Graphs, in addition to being simple and easy to read, must, first of all attract the eye; they must be visually pleasing. With the use of today's graphic aids, creating an attractive and meaningful graph can be a simple matter.

Almost all forestry statistics can be effectively displayed, including related subjects on insect and disease problems, recreation, wildlife, livestock production, forest product utilization--you name it. Many organizations, including the Forest Service's Southeastern Area and Southern Region, have graphics specialists who can help authors in the agency to prepare professional quality graphs. An author may prepare a rough copy or simply photocopy one of the graphs on the following pages and ask the editor to have the pertinent data displayed on the kind of graph shown on the photocopy.

## THE BASIC GRAPH

Graphs must be self-explanatory to achieve their objective. The terminology and positioning shown in figure 1 will help you construct such a graph.

Figure 1.--Basic graph layout.\*



\*When footnotes, sources, or explanations appear beneath a chart, put "Figure number" and legend above the illustration (rule 2.65 GPO Style Manual.)

Figure 1 is a good basic layout for two reasons. First, it's easy to read. The second reason is standardization<sup>1/</sup>. If this layout is used throughout the report, the reader can move from graph to graph knowing that the relevant information is always located in the same position.

<sup>1/</sup>If your graph will appear in a publication printed by the Government Printing Office, refer to the GPO Style Manual, rules 2.60 to 2.66, page 13.

The line graph can be basic (figure 1) or multi-dimensional as shown in figure 2. The graph below clearly compares gross erosion with sediment over a specified time frame. The reader will understand such comparisons more quickly in graphic form than by reading columns of data.

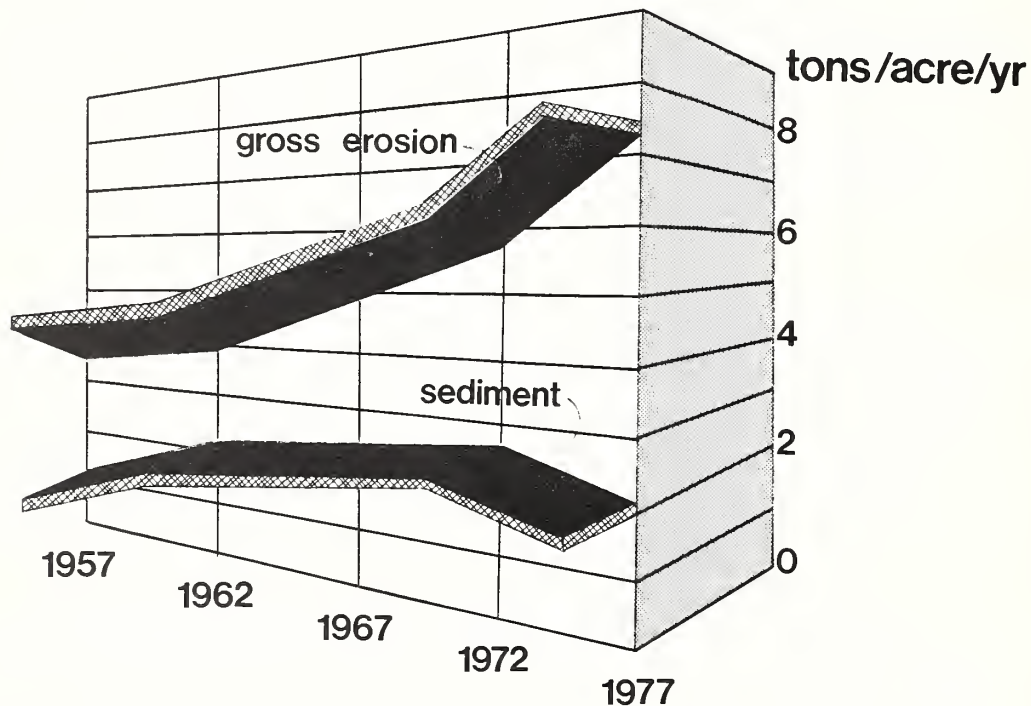


Figure 2.--Gross erosion and sediment from natural forestland.

The dimensional lines in figure 2 are constructed from shading films. The scale lines are prepared from drawing tape. Tape is far less messy than ink, reproduces better, and is easy to remove if a mistake has been made. Remember, if your graphics are to appear in a publication printed in black ink, or if they will be reproduced by a copy machine, varying shades of black are best. Other colors (red, blue, yellow, etc.) will only reproduce as dark images from a copy machine. If prints, slides or even off-set printing will be used to reproduce your graphs, most colors can be used, resulting in a visually superior graph. Of course, the visual impact on your readers will be less than that of your original color graph. If your publication is printed in one color of ink other than black, the resulting appearance of your graph may be disappointing. Use caution, for color graphs can be expensive.



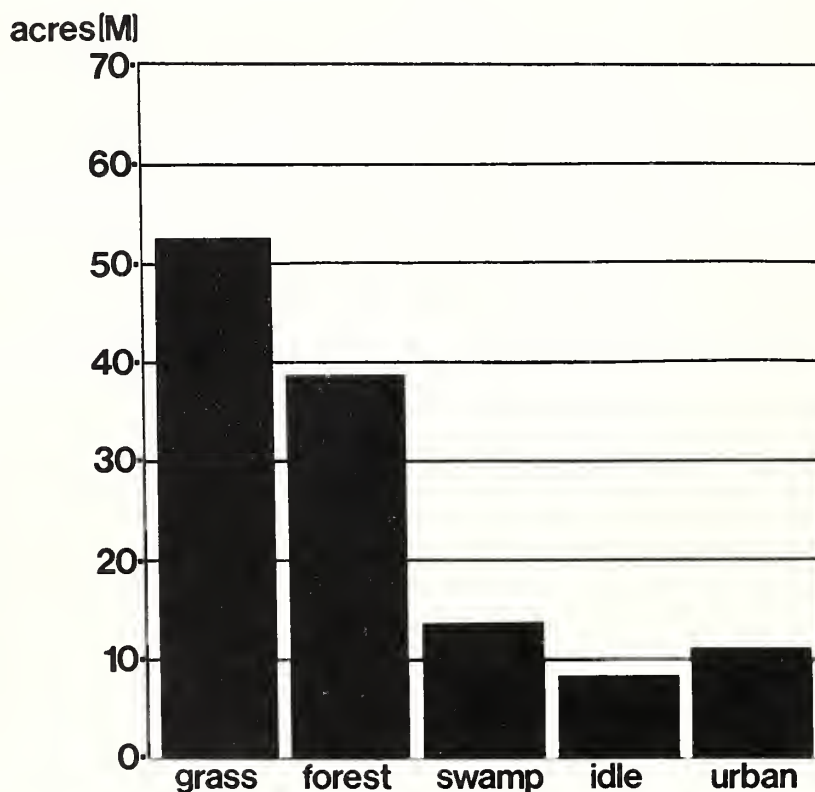
A few points to remember in drawing graphs:

- a. Use basic layout like the one shown in figure 1.
- b. Many organizations, including the Forest Service's South-eastern Area and Southern Region have audio visual specialists who will assist you in preparing your graphs.
- c. If scale lines are used, they should be light and as few as possible.
- d. When using black and white (which are more convenient for copy machine reproduction) the line to be emphasized should be heavy--others broken or dotted. If lines of equal importance are to be shown, give them a separate identity by solid, broken and dotted types. Dry ink transfer sheets are available with various types of lines as well as various styles of drawing tape.
- e. If possible, make all descriptions horizontal.
- f. Don't crowd too much on a graph--stay with one main idea.

## THE BAR GRAPH

This type of graph can be very effective. It is easy to read and preparation is simple. Use bar graphs to show trends and simple fixed values within a certain period of time. If you need a graph to show a large number of facts, the line graph might be better.

Figure 3.--Land use in the Wolf River Basin.\*



\*Source: Map Information Assembly and Display System (MIADS), 1975.

Figure 3 illustrates a simple bar graph. The lines have all been drawn with a pencil and sprayed with a workable matte fixative. Lettering is dry transfer type and the bars are developed with shading films. As with figure 2, bar graphs can be multi-dimensional. In addition to being simple, bar graphs can be compound and multi-bar. Figure 4 illustrates a simple, multi-dimensional bar while figure 5 illustrates a compound, multi-dimensional bar graph. Figure 6 illustrates a multi-bar graph in a single dimension.

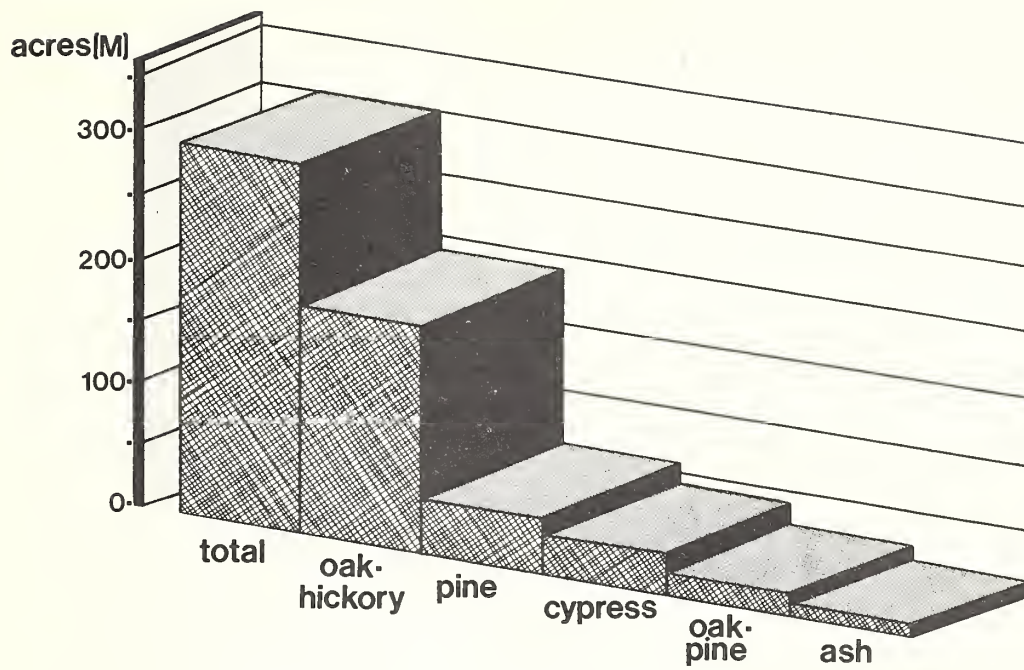


Figure 4.--Forestland types in the Big Creek Watershed.

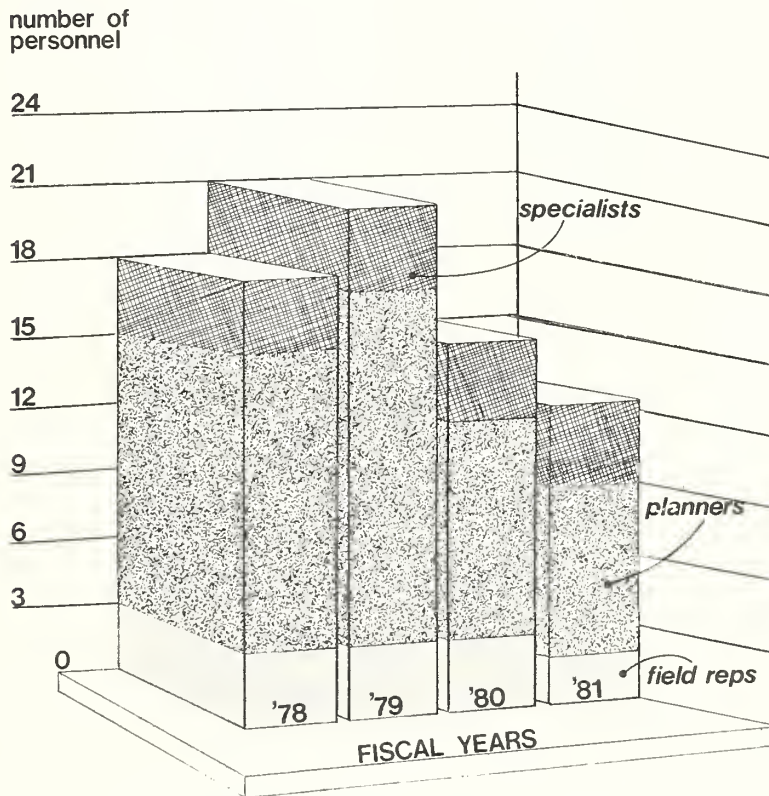
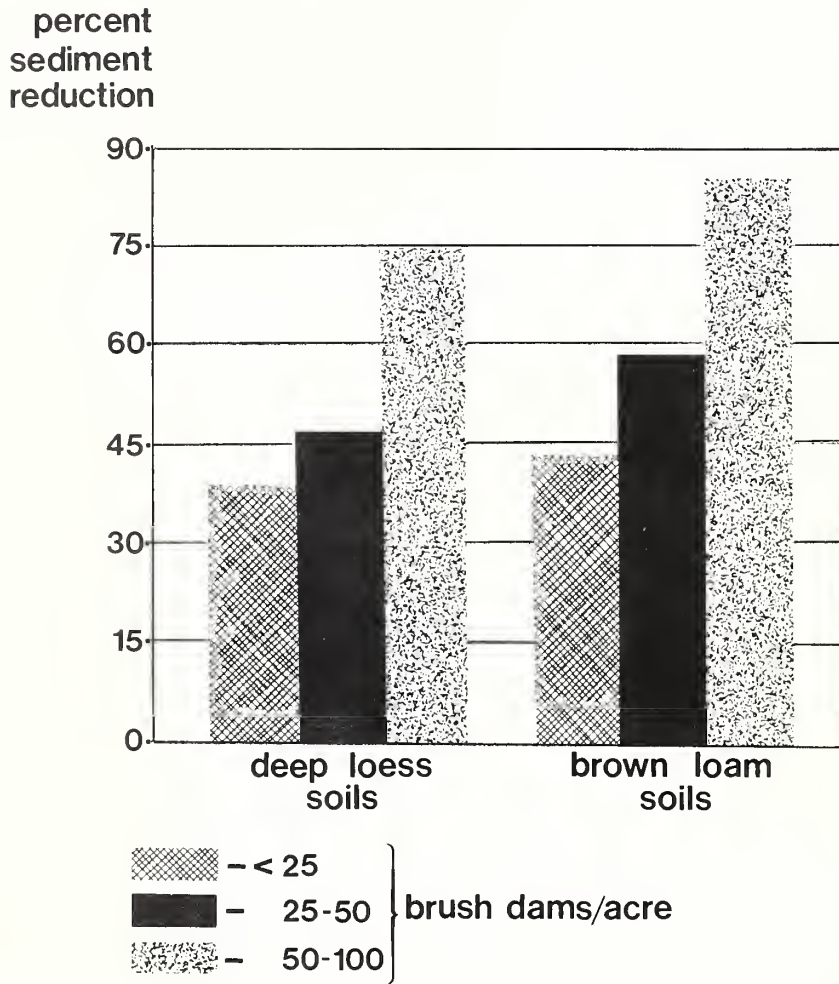


Figure 5.--Field Office personnel needs.

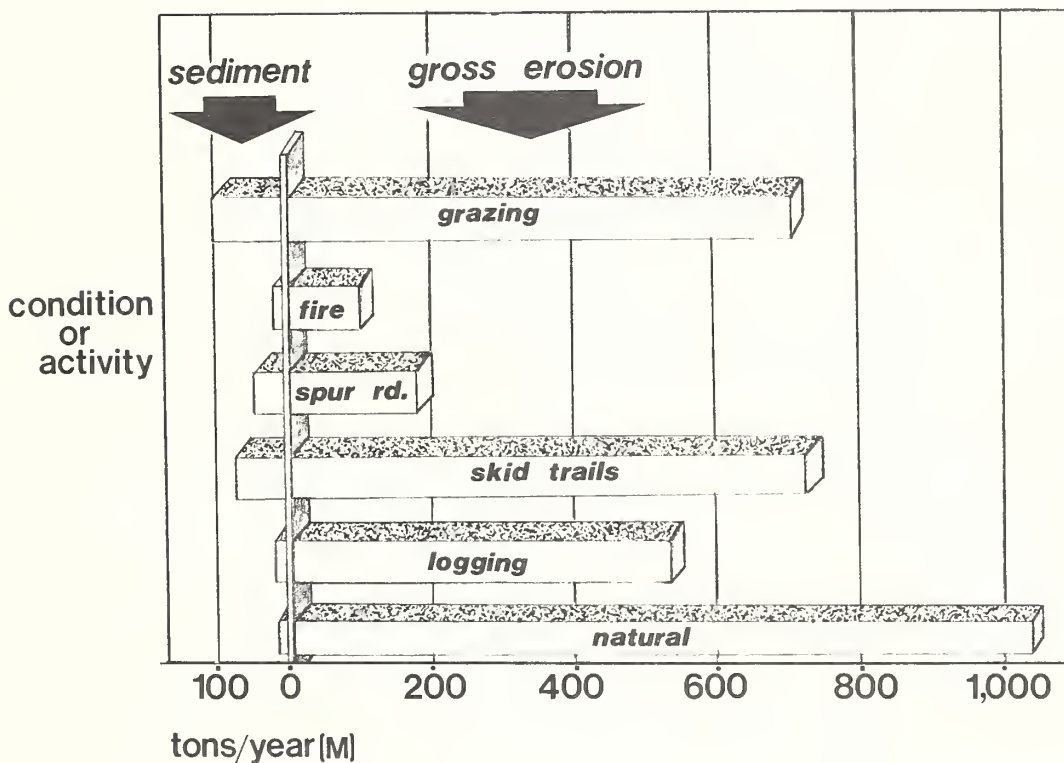
Figure 6.--First year sediment reduction after brush dam construction.



- Some points to remember when drawing bar graphs:
- Stay with the general layout as shown in figure 1.
  - All bar graphs should start with zero.
  - All bars should be the same width, while space between the bars can vary.
  - Limit multi-bar graphs to three bars. If more than three bars are required, a line chart might be better.

Figure 7 illustrates a simple multi-dimensional bar graph with information displayed horizontally, rather than vertically. This is often referred to as a "relative" bar graph. In this graph, erosion and sediment production by sources are quickly visualized.

Figure 7.--Gross erosion and sediment, by sources, in the Wolf River Basin.\*



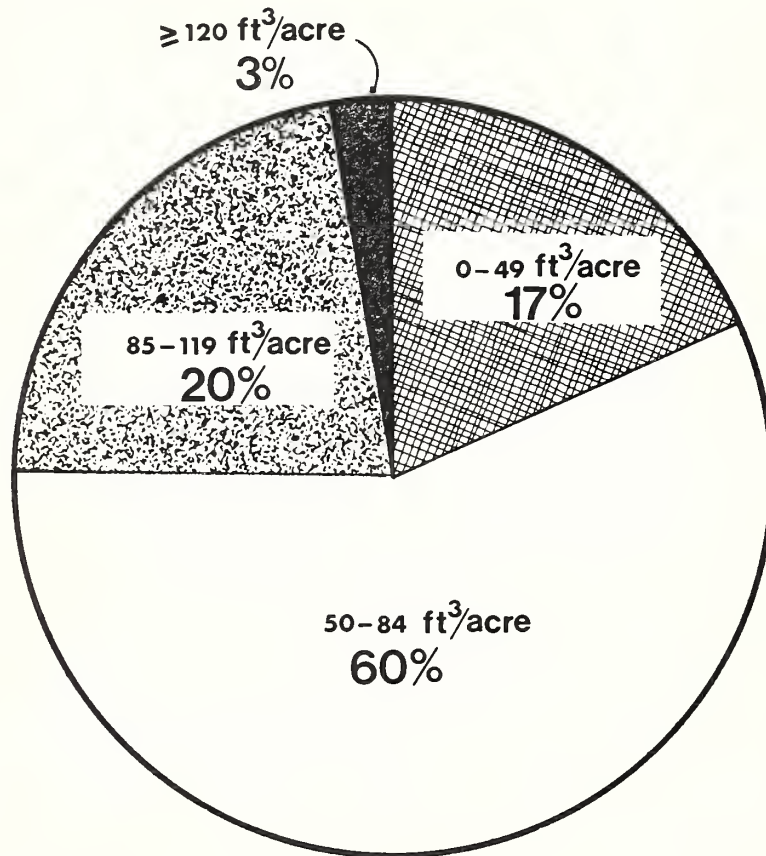
\*Source: Forest Survey, 1976.

The bar graph is usually designed to hit the eye with a single complete fact, while the line chart shows many facts such as comparisons, cumulative results, seasonal fluctuations, and so on.

## THE PIE GRAPH

This type of diagram consists of a circle cut up into segments to show the components of the figures presented. The pie graph is very popular for its visual effect; however, being circular, it is generally more difficult to prepare than the bar graph. Also, the areas of the segments are not so easy to compare, visually, as the comparative lengths of bars.

Figure 8.--Potential annual productivity of forestland in the Wolf River Basin.\*



\*Source: Forest Survey, 1977.

Figure 8 illustrates a simple pie graph, showing the potential productivity distribution of forestland. It is important that each segment be labelled as to its percent of the total. In figure 8, it can easily be seen that 60 percent of the commercial forestland is in the productivity class of 50-84 ft³/acre/year.

Figures 9 and 10 illustrate variations of the pie graph.

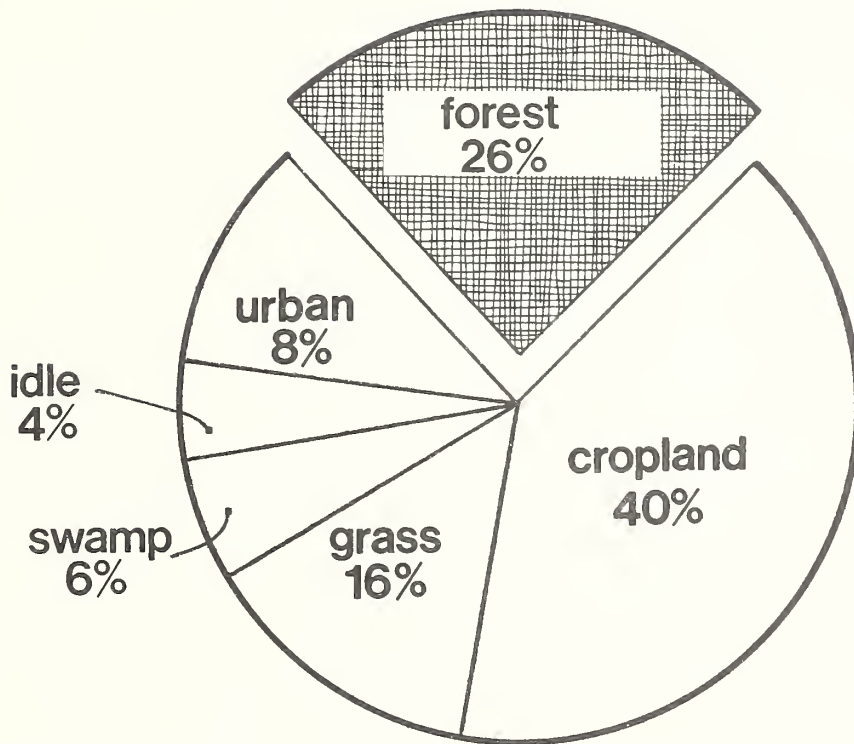


Figure 9.--Commercial forestland in the Wolf River Basin, 1975.

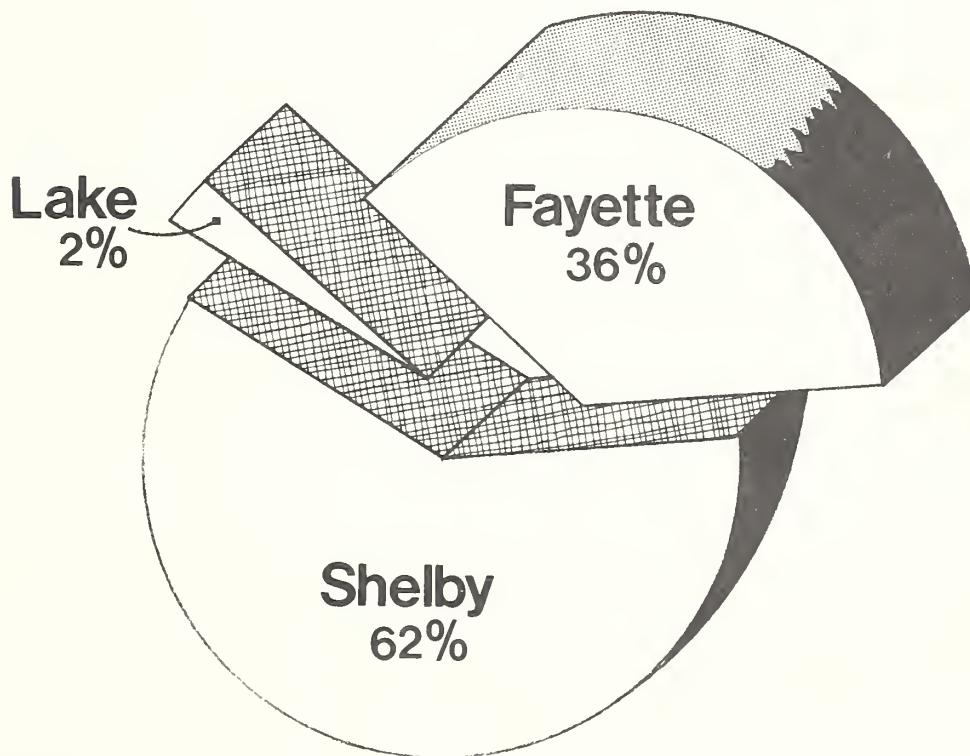


Figure 10.--Percentage of land in the Canyon Creek sub-basin that lies within three counties, 1975.

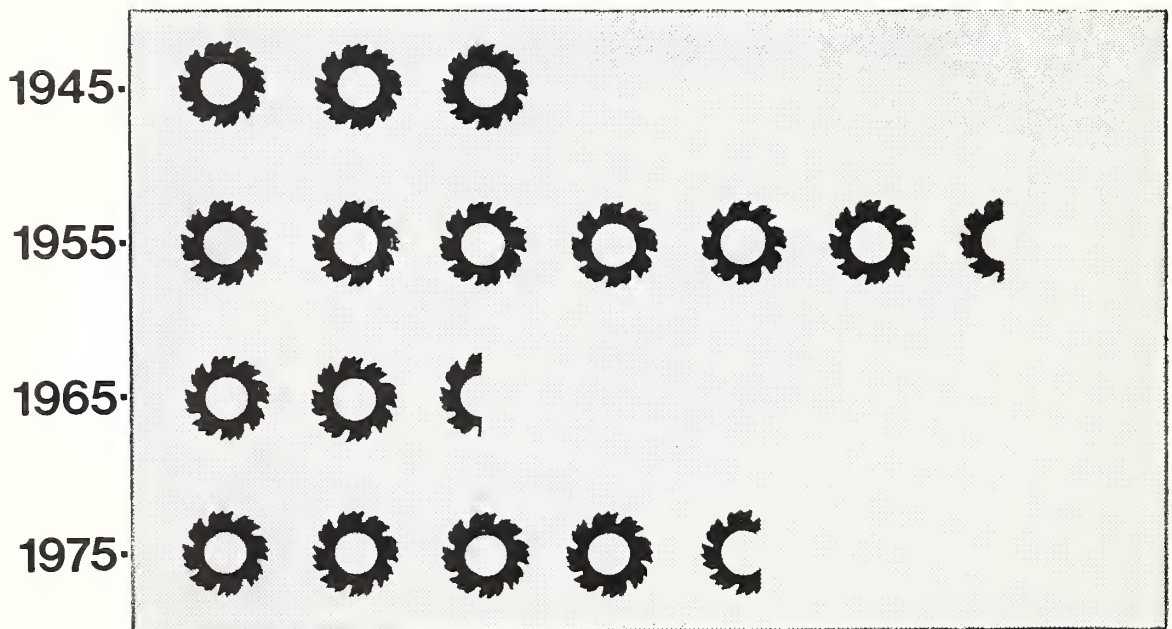
## THE PICTORIAL GRAPH

Sometimes, to represent data, pictures or diagrams are used to produce the desired effect. This type of graph sacrifices a certain amount of detail for effect. The pictorial graph has a few simple rules:

- a. Do not use scale values or lines.
- b. Place the symbols horizontally.
- c. If showing the data by years, place the earliest year at the top followed by next year and so on downwards.
- d. To show larger quantities use a greater number of symbols--never larger symbols.

Figures 11 and 12 show some typical illustrations of pictorial graphs. <sup>2/</sup>

Figure 11.--Softwood sawmills within the Wolf River Basin, 1945-1975.\*

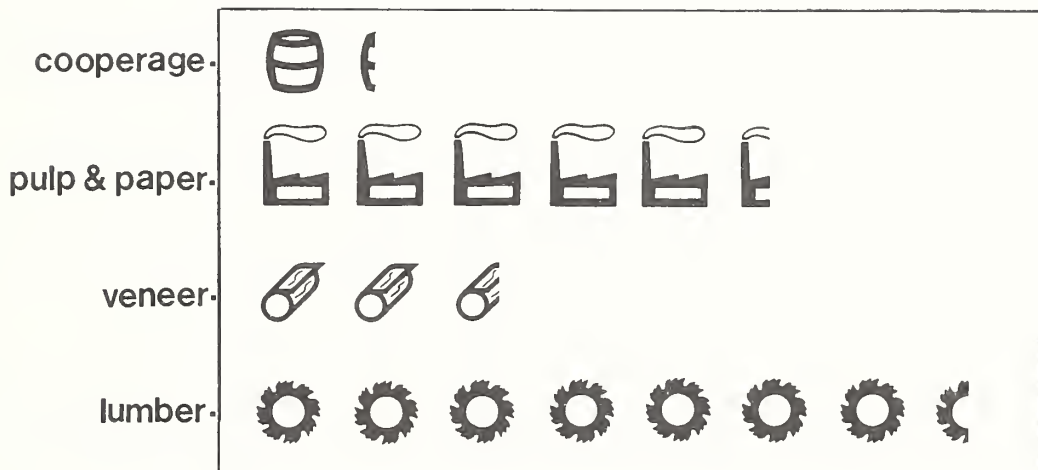


**\*Each symbol represents 10 sawmills**

<sup>2/</sup> The symbols used in these two figures are based on designs by Roger W. Rich, Staff Director, Area Planning Staff, Southeastern Area.



Figure 12.--Value of forest product shipments in the Wolf River Basin, 1975.\*



\*Each symbol represents 1 million dollars

### CONCLUSIONS

The need for simplicity in graphically displaying your data cannot be overstressed. Think of your readers or audience: very few of them will be experts. A graph that is complicated with too many ideas will puzzle the audience and your work will be lost.

Combining and coordinating written words with graphics serves to underscore key facts. The end result: a report that is both clear and concise.

