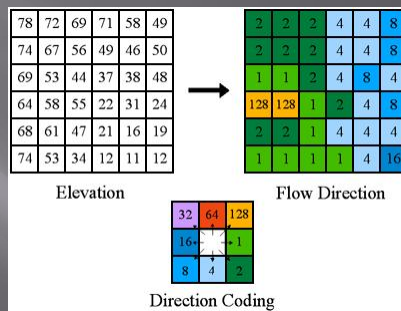


SINKS AND FILL

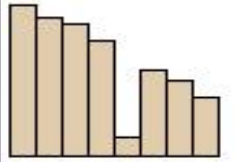
LOWELL ANTHONY

WHAT IS A SINK?



“A sink is a cell or set of spatially connected cells whose flow direction cannot be assigned one of the eight valid values in a flow direction raster. This can occur when all neighboring cells are higher than the processing cell or when two cells flow into each other, creating a two-cell loop.”

ARC FUNCTIONS REGARDING SINKS



Profile view of a sink

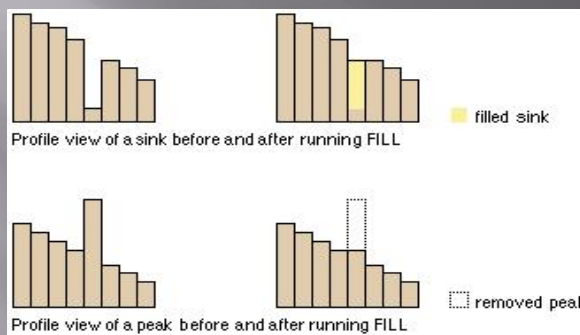
The output of the Sink function is an integer raster with each sink being assigned a unique value. Sinks are numbered between one and the number of sinks.

The SINK tool creates a raster of sinks coded with depth:

Other common tools that can be used to delineate sinks are:

1. Watershed - contributing area for each sink.
2. Zonal Statistics - minimum elevation
3. Zonal fill - create a raster of maximum elevation.
4. Minus - subtract minimum from maximum for depth.

THE PROCESS OF USING FILL



Fill uses the equivalents of several functions such as Focal Flow, Flow Direction, Sink, Watershed, and Zonal Fill to locate and fill sinks. The function iterates until all sinks within the specified Z limit are filled. As sinks are filled, others can be created at the boundaries of the filled areas, which are removed in the next iteration.

APPLICATIONS

An understanding of the shape of the earth's surface is useful for many fields, such as regional planning, agriculture, and forestry. These fields require an understanding of how water flows across an area and how changes in that area may affect that flow.



Photos:
Dr. Heejun Chang power point presentations - Hydrology Geo 414

REFERENCES

Mark, D. M. 1988. Network Models in Geomorphology. *Modelling in Geomorphological Systems*. John Wiley.

Tarboton D. G., R. L. Bras, I. Rodriguez-Iturbe. 1991. On the Extraction of Channel Networks from Digital Elevation Data. *Hydrological Processes*. 5: 81-100.

QUESTIONS...

1. What is Arc's definition of a sink?

A cell or spatially connected cells with flow directions that can't be assigned one of the eight valid values in a flow direction raster.

2. What are the possible causes of sinks within a flow direction raster?

They are most commonly due to errors in the data they are often caused by sampling effects and the rounding of elevations to integer numbers.

3. Can there be naturally occurring sinks with a cell size of 10 meters or larger?

They are rare, but yes usually in glacial or karst areas, but can generally still be considered errors.

4. The Fill tool allows the user to 'fix' delineations in the raster to ensure proper drainage, what are the possible different functions it can use?

Fill uses the equivalents of several functions such as Focal Flow, Flow Direction, Sink, Watershed, and Zonal Fill to locate and fill sinks.