SCIENCE OF RIVER FLOODING

Water is essential for life on Earth. But in large enough quantities, the very substance we drink and use to grow crops can destroy homes, businesses and cause fatalities.

RIVER BASIN
The total area drained by a river and its tributaries. A river basin is an open system with inputs and outputs of water.

River flooding occurs when river levels rise & overflow their banks or the edges of their main channel and inundate normally dry areas.

Any rain falling here will flow into another river basin.

Any rain falling here will flow within this basin.

River flooding can be caused by heavy rainfall, dam failures, rapid snowmelt and ice jams.

6 Steps to Create a Flood Model

HYDROLOGIC CYCLE
Hydrologists try to understand and simulate the natural hydrologic cycle, which is the intricate combination of many processes such as evaporation, transpiration, precipitation, infiltration, interflow, groundwater storage, and runoff.

PRECIPITATION
Precipitation is the primary input to basin hydrologic processes and serves as the primary driver of hydrologic models. Accurate representation of precipitation input is an important initial step. Small river channel systems are very sensitive to rainfall.

RUNOFF
The next step is to compute the amount of precipitation that appears in surface water within a relatively short time from the onset of a storm event. This is runoff. Runoff consists of 3 components: overland flow, rain falling directly on surface water bodies, and interflow.

UNIT HYDROGRAPH
After computing basin runoff, the next step is to calculate a forecast hydrograph in units of discharge. A hydrograph is a plot of the change of stage or discharge with respect to time. Discharge is the volume of water flowing past a location per unit time and is usually expressed in cubic feet per second (cfs).

STREAMFLOW DATA
Scientists use streamflow measurements to capture the vital relationship between discharge (volume flow rate) and stage (height) for a given location. This can only be done by taking streamflow measurements at different river levels and noting the corresponding stages. This relation is called a rating curve.

ROUTING
Hydrologists analyze and interpret how the water moves once it's in the river and how a flood wave is modified due to the effects of storage and friction as it moves downstream. So, what happens upstream affects the entire downstream community.

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