

Chavón Hydrologic Analysis



Brigham Young University
in collaboration with
INDRHI



Problem Statement

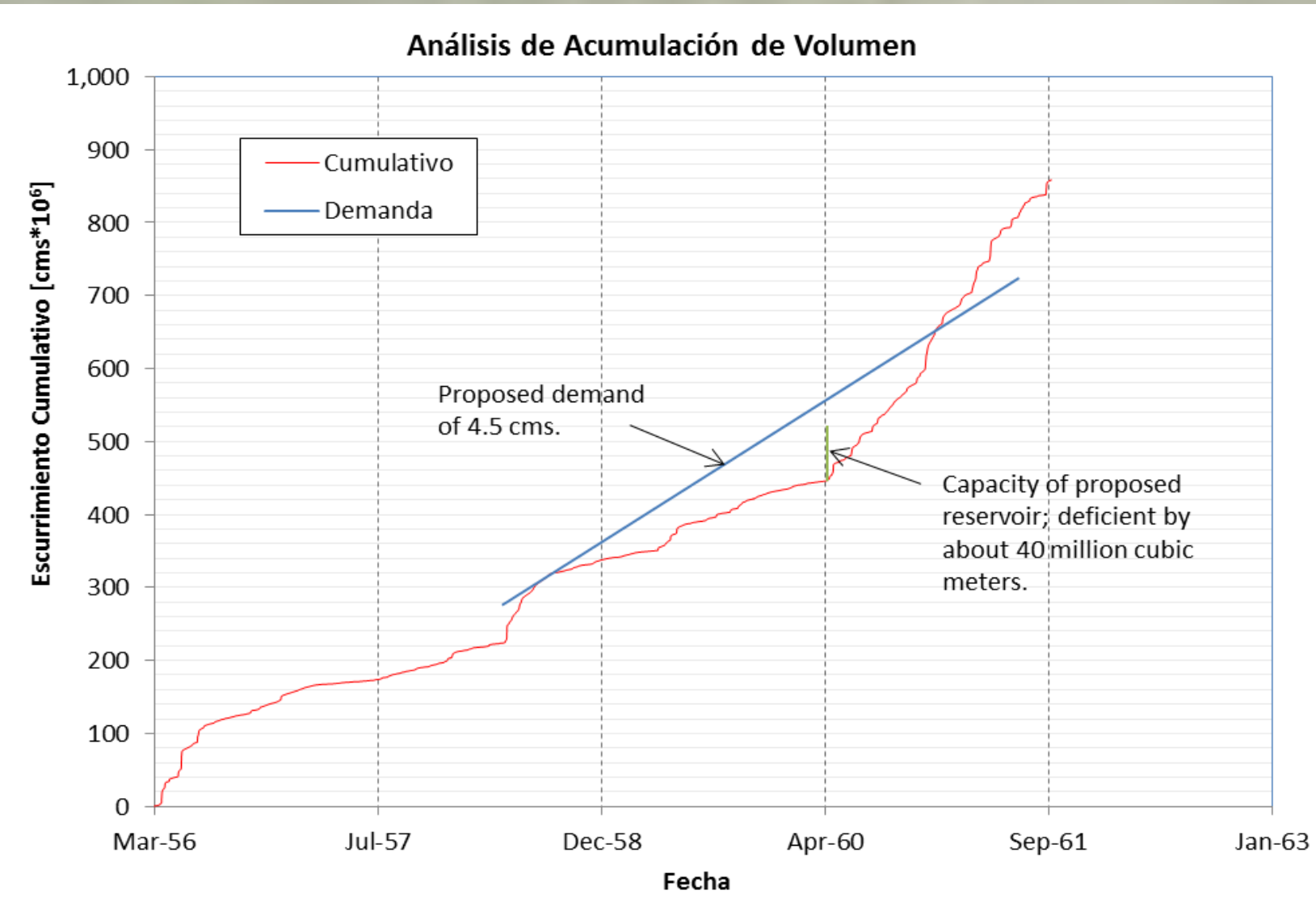
- To verify the feasibility of the Hanson Rodriquez Consulting Engineering company's proposal to design a dam on the Chavón river. The limiting factor of which is the available water in the watershed and the demand that is required for base flow, irrigation, and municipalities.

Design Constraints

- Location – this is the only spot on the river where you can build the dam. (anywhere higher there's not enough flow, anywhere lower there's not enough mountains).
- Must maintain constant flow in the channel equal to 80% reliability flow.
- Terrain only permits a dam height of 42 meters.
- Terrain only permits a maximum storage volume of 80 million cubic meters.

Recommendations

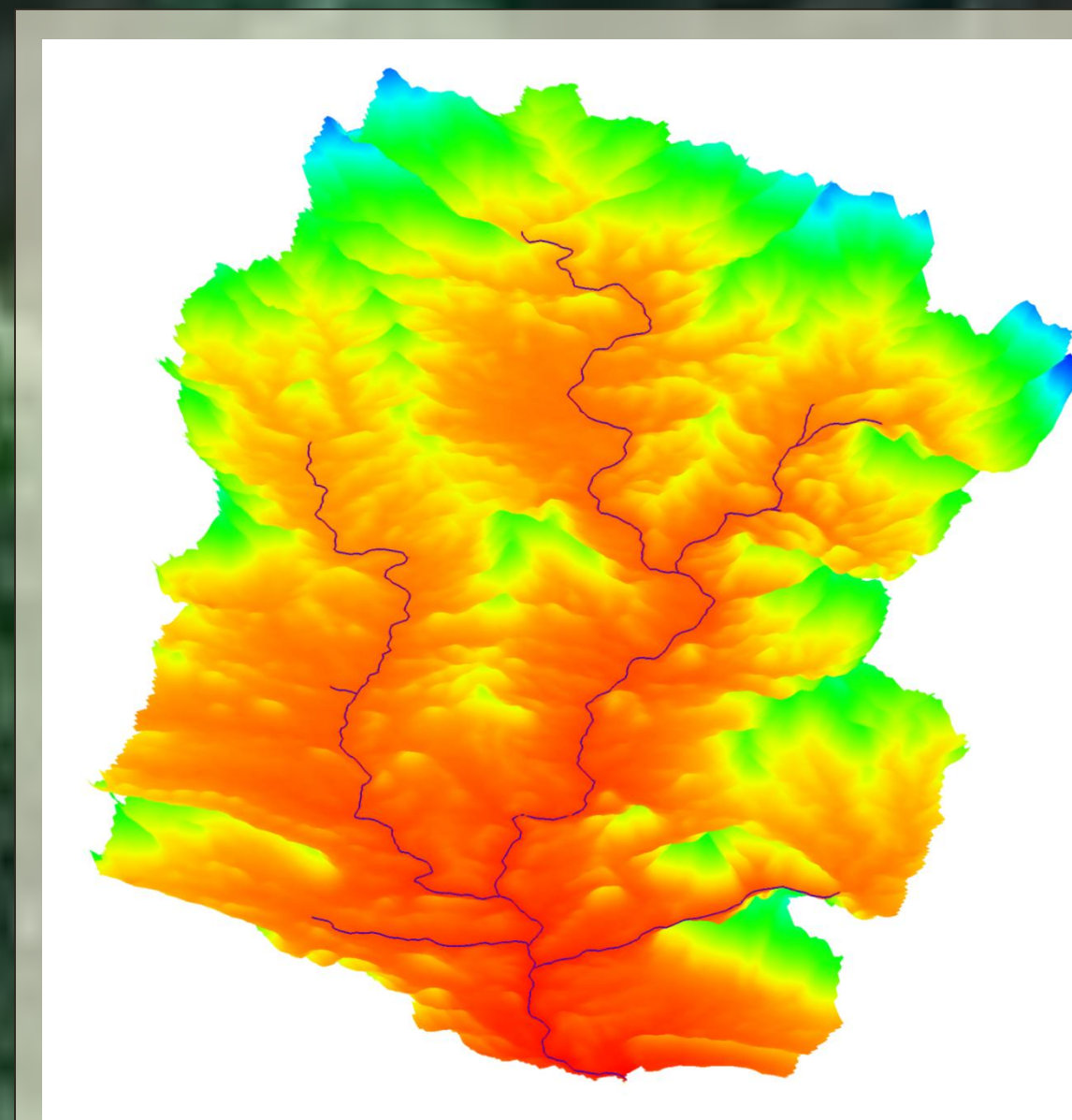
- It is recommended that the dam not be built. Based on the water flowing into the reservoir, the maximum possible steady outflow would be 2.7 cms, 1 cms of which must be released back into the riverbed downstream. The remaining 1.7 cms does not provide enough benefits to justify the expense of building the dam.



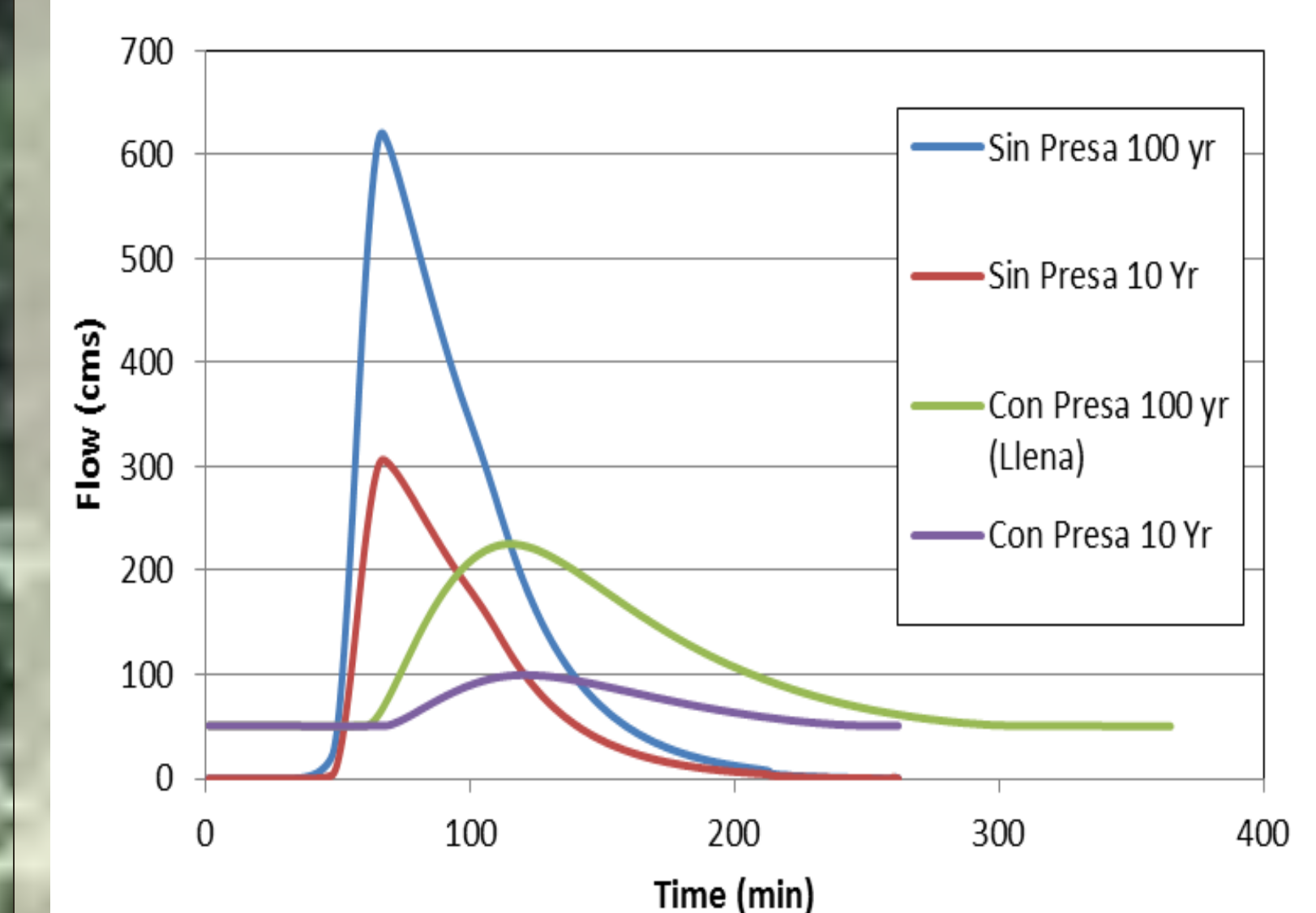
Cumulative mass curve (Ripple analysis) of historical Chavón flows showing storage deficiency.



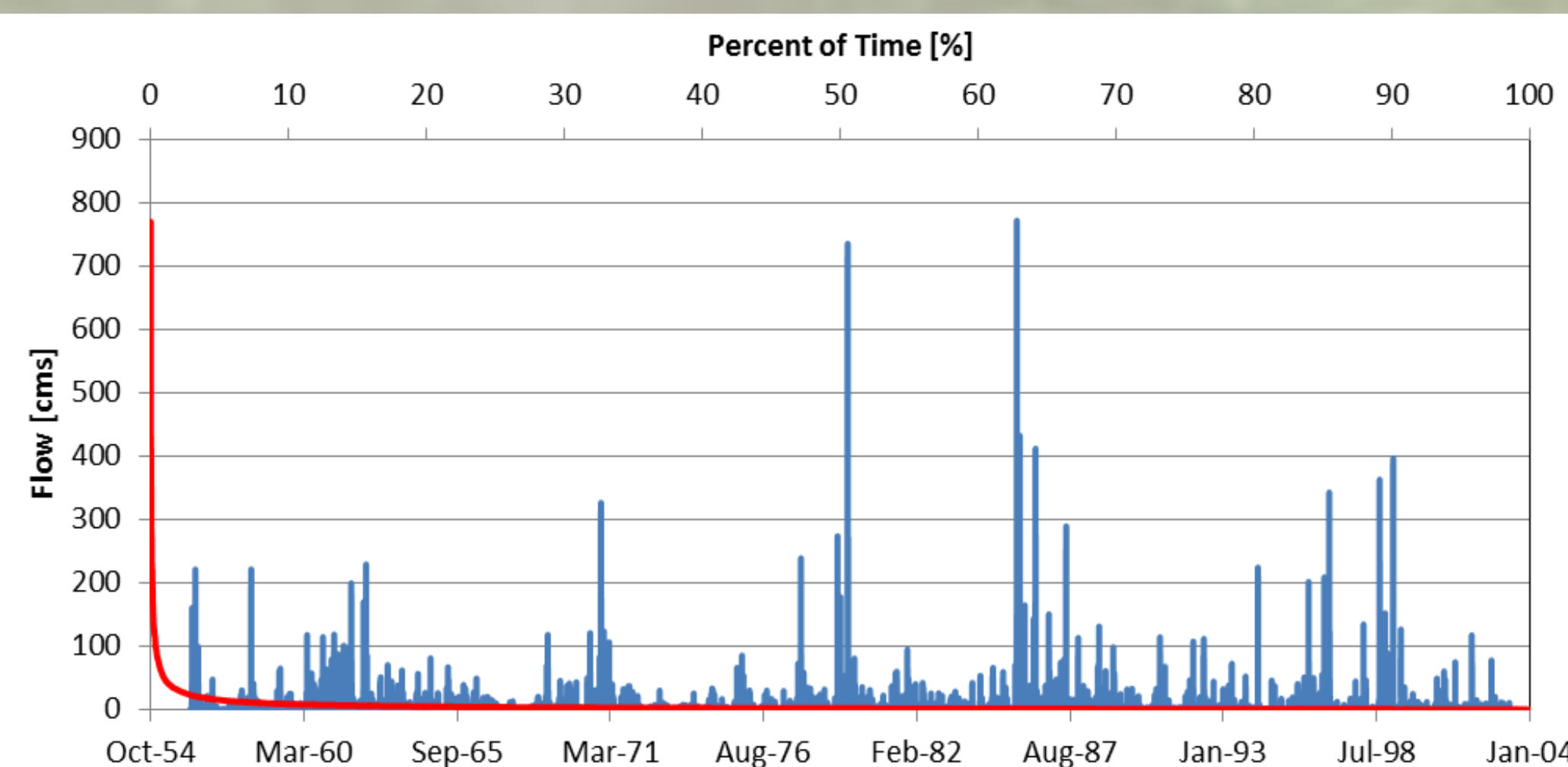
Flood plane in the event of complete dam failure.



Chavón watershed developed with WMS from 30 meter elevation data.



Hydrographs showing attenuation of stream flow with reservoir routing if dam were built.



The red curve (flow duration) shows the reliability of having a certain flow in the channel (see top axis). Blue lines show historical flows.

Dr. Nelson
Dr. Miller
Erick Conde
Tracey Brimhall
Scott Christensen
Nathanael Whipple

Cost Analysis

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-15	Year 16-25	Totals
Revenues								
Loan	50.0							
Value of water (\$0.21/m ³)				12.1	12.1	12.1	12.1	474.70
Electricity Revenue				1.4	1.4	1.4	1.4	
Lives saved				5.8	5.8	5.8	5.8	
Job creation	0.3	0.3	0.3					
Costs								
Loan Payments		6.8	6.8	6.8	6.8	6.8		
Land/construction cost	350.0							465.20
Maintenance						1.0	1.0	
Profit								9.50

All values are in millions of dollars.