ICOLD COMITTEE S
FLOOD EVALUATION AND DAM SAFETY

BULLETIN 170

SWECO

Chapter 1 - Flood Hydrograph

- Design Precipitation
- Probable Maximum Precipitation
- Design Hyetograph
- Flood Hydrograph
- Synthetic Unit Hydrograph
- Flood Routing
- Design Flood Determination
- Snow Hydrology

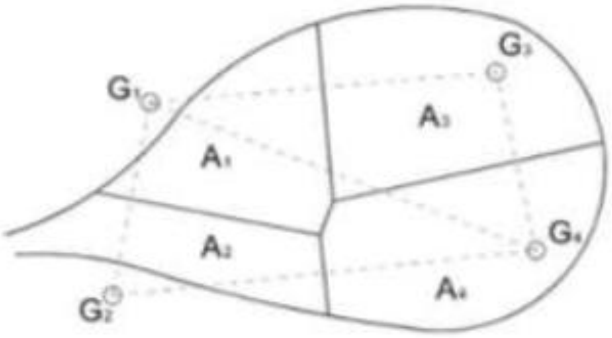

Figure 1.2 Thiessen polygon method

1.6.2 1.6.2 Degree-day method

The degree-day method is a temperature index approach that equates the total daily melt to a coefficient times the temperature difference between the mean daily temperature and a base temperature (generally 32 °F or 0 °C; NRCS, 2004).

$$M = C_M(T_a - T_b) \quad (1.64)$$

where M = snowmelt in in/d (mm/d);
C_M = the degree-day coefficient in in/degree-day F (mm/degree-day C);
T_a = mean daily air temperature °F (°C);
T_b = base temperature °F (°C).

Chapter 2 - Current Trends in the Evaluation of Extreme Floods

- Approaches to Flood Estimation
- Empirical Methods
- Deterministic Approaches
- Stochastic Event-Based Approaches
- Continuous Simulation (tillämpas i Sverige)
- Hybrid Statistical Methods
- Model Intercomparison
- Incorporating Climate Change

the application of two modelling steps, namely:

(i) a *runoff production model* to convert the storm rainfall input at any point in the catchment into rainfall excess (or runoff) at that location, and

(ii) a *hydrograph formation model* to simulate the conversion of rainfall excess into a flood hydrograph at the point of interest.

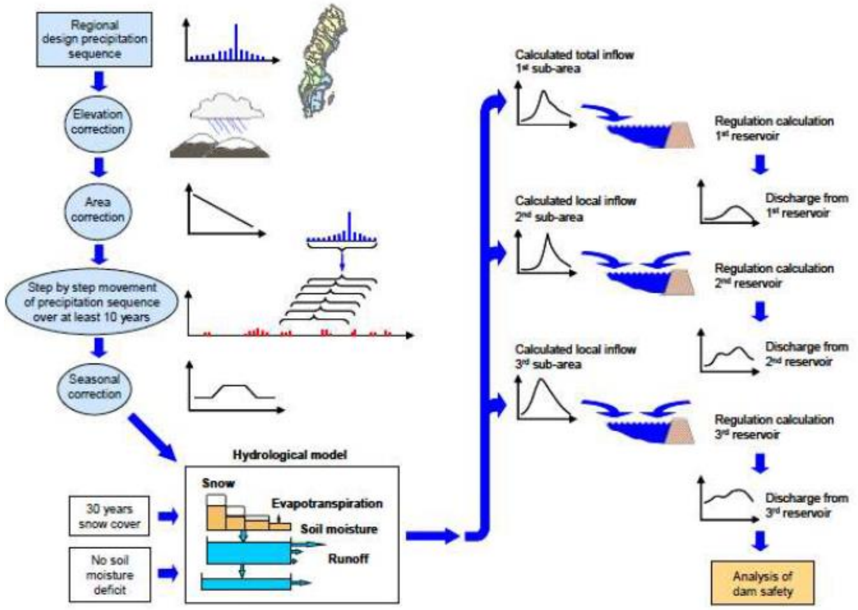

Figure 2.7 Schematic of simulation approach used to calculate the design flood for a dam required to pass an inflow flood with an annual exceedance probability of 1 in 10000 (Swedenergy et al, 2007).

Chapter 3 - New Methods in Selecting Design Floods and Risk Analysis

- Inflow Design Flood for Dam
  – Hazard classification systems
- Risk-Based Analysis
- Application of the Guidelines to a Specific Project

3.2.2 Dam hazard classification system

The dam hazard classification takes into account the potential consequences of a dam failure implicitly or explicitly. Even if most countries have their own ways to classify the dams, the different methods of classification can be divided in two main approaches:

- Dam classification based on the system's characteristics, such as dam height and type, reservoir volume, … This approach takes implicitly into account the possible impacts of a dam failure and the risk associated to such event;
- Dam classification based on the dam failure consequences. This explicit approach takes into account explicitly the evaluation (quantitative or qualitative) of the one or several types of consequences of a dam failure. The economical aspect of the consequence of a dam failure can be part of the classification, but the construction cost of the dam related to the choice of the IDF is normally excluded.

Table 3.5 – Example – Project β – Evaluation of the IDF – Sensitivity analysis

COUNT-RIES	BASE CASE		Dam height		Reservoir volume	
	Embank-ment dam	**Concrete dam**	**8 m**	**50 m**	**0.5 hm^3**	**1 010 hm^3**
Australia	10 000-yr	10 000-yr	10 000-yr	10 000-yr	10 000-yr	10 000-yr
Austria	5 000-yr	5 000-yr	5 000-yr	5 000-yr	5 000-yr	5 000-yr
Brazil (*)	PMF	PMF	PMF	PMF	PMF	PMF
Bulgaria	1 000-yr	1 000-yr	1 000-yr	1 000-yr	1 000-yr	1 000-yr
Canada – CDA	1/3 between 1 000-yr and PMF	1/3 between 1 000-yr and PMF	1/3 between 1 000-yr and PMF	1/3 between 1 000-yr and PMF	1/3 between 1 000-yr and PMF	1/3 between 1 000-yr and PMF
Canada – Quebec	1 000-yr	1 000-yr	1 000-yr	1 000-yr	1 000-yr	1 000-yr