Steep creek hazards such as debris flows and debris floods pose considerable risks to mountain communities and infrastructure. In Europe and Japan, centuries of experience in steep creek hazard mitigation have produced substantial practical design knowledge. By comparison, Canadian professionals have limited experience with engineered debris-flow and debris-flood risk management. This thesis aims to close the knowledge gap through three distinct approaches. First, local and international design practices are reviewed, to highlight the unique challenges facing Canadian practitioners. Second, I present a design approach that aims to improve the state of practice in Canada by creating a repeatable and transparent workflow. Finally, a series of case studies emphasize the applicability of decision analysis and integrated river management for debris-flow and debris-flood mitigation design. The results of this study can be used to inform steep creek risk management efforts in Canada.