River bank erosion transfers sediment, particulate carbon and particulate-bound nutrients from floodplains to rivers. River bank accretion and overbank sedimentation control the flux of these materials in the reverse direction. These fluxes, between rivers and floodplains, strongly influences carbon cycling on floodplains and in rivers, and control the timing, magnitude, and composition of riverine biogeochemical inputs to the coastal ocean. Neither these fluxes nor the dynamics that control them are presently represented in regional or global climate models. As the start of a global analysis to quantify and parameterize river-floodplain exchange rates we present a pan-arctic assessment of river systems draining permafrost-dominated watershed. These systems are of particular interests because of the high sensitivity of permafrost areas to climate change, and the uncertainty associated with the impact of climate change on the fate of carbon in these areas. Using Landsat acquired imagery, we quantified areal and linear rates of river bank erosion and accretion along 6 major arctic rivers. Several smaller rivers systems were also analyzed using aerial photographs and high-resolution satellite imagery. This quantification aims to: 1) develop a predictive framework for river-floodplain exchanges and; 2) quantify the influence of permafrost on river dynamics. We examine the relationship between erosion rates and local and watershed-scale parameters. Local parameters include river width, slope and climate. At the watershed-scale we examined drainage area, basin relief, mean basin slope, climatic variables, vegetation, and soil types. The correlations between these parameters and erosion and accretion rates, as well as future comparisons of these correlations at different climatic and ecologic regimes, will aid in representing these processes in regional or global climate models.