Why Does Property Erode & Flood?

As a river-front resident, you live in the middle of a ***riparian ecosystem,*** *amidst the very forces that form our natural landscape.*

Riparian ecosystem: The natural associations of soil, plants and animals existing within the floodplain of a stream, and dependent for their survival on high water tables and river flow.

"The first and most important aspect of a natural channel is that it is self-formed and self-maintained. The flowing water carves the groove in which it flows. The water fashions the depth, the cross-section, the areal configuration and longitudinal profile."
—Luna B. Leopold
Professor of Hydrology, University of California, Berkeley

Rivers are ever-changing entities. Whether in a sudden rush of water during a few days or a persistent slow flow over decades, water has always been the dominant architect of the earth's surface. Periodic bank overflow is the pulse of the river, as natural and inevitable as the drifting of sand dunes, the ebb and flow of the tides or the cycles of the moon.

As a healthy river carves and reshapes the landscape, it acts as a corridor of life, laying down rich sediments and supporting a wide variety of plants and animals. A high river flow is only called a "flood" or "disaster" when people and property are in its path.

Before human settlement, the Carmel River was a wide, shallow stream with meandering threads which separated and joined on their way to the

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Carmel River Timeline

Human alterations have severely degraded the Carmel River riparian corridor, causing increased erosion and flooding over the last 80 years. Problems along the river are the cumulative result of many changes along the river and throughout the watershed.

1921 San Clemente Dam constructed

The dam traps the sediment that naturally would travel down the river to settle out in the Valley, where it is crucial in building river banks and nourishing streamside vegetation. By year 2001, this trapped sediment had reduced the San Clemente Reservoir's original storage capacity of 1,425 acre-feet by 90 percent.

1948 Los Padres Dam constructed

Currently, over one-third of the 3,030 acre-foot Los Padres Reservoir is filled with trapped sediment.

1959 Large-scale municipal pumping of aquifer begins

Decades of pumping from the Carmel Valley aquifer have reduced the water supply to native trees and vegetation. Lowering of ground water levels causes the river to run dry, especially during rainless summer and fall months. This weakens and kills plant roots which stabilize banks.

1960 Intensive development of floodplain begins

The lack of large magnitude floods, such as those experienced in 1862, 1911 and 1914, encouraged building in flood-prone areas. The river was confined to a progressively narrower channel, increasing the likelihood of severe localized erosion.

1976/77 Severe drought prompts overpumping, which increases die-off of streamside vegetation

Groundwater was pumped to a new low to satisfy community water demands. The level remained below the root zone for long periods of time, stressing trees and plants that held banks together.

1978/1986 Wet winters increased stream flow, which washed away unvegetated property

Even though flows were moderate, erosion was severe on degraded banks. An estimated 100 acres of land eroded during this eight-year period alone.

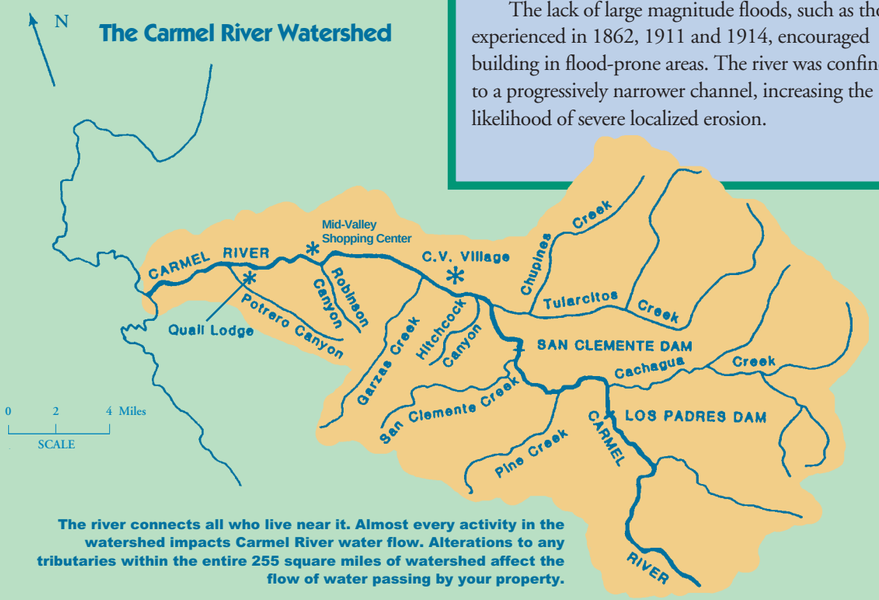
1983 Carmel River Management Plan adopted

Monterey Peninsula Water Management District adopted a plan to protect and restore the Carmel River and its riparian corridor. Numerous projects have prevented property loss, reduced flood hazards, protected streambanks and restored the river.

1995/1998 Significantly high river flows cause property damage and erosion

High river flows in January 1995 (9,800 cubic feet per second) and March 1995 (16,000 cubic feet per second) eroded unprotected banks and flooded hundreds of structures. Although larger floods have occurred, the building of homes in flood-prone areas turned this natural phenomenon into a catastrophe.

Three years later, some areas along the Carmel River flooded again in February 1998 with a peak flow of 12,000 cubic feet per second. Many steep banks along the river failed and erosion in the watershed was widespread.



The river connects all who live near it. Almost every activity in the watershed impacts Carmel River water flow. Alterations to any tributaries within the entire 255 square miles of watershed affect the flow of water passing by your property.

ocean. But as people developed the floodplain, they began confining the river into a narrower and narrower channel. Today, due to dams, levees, roads, bridges, homes and other barriers, the Carmel River is a single, deeply-incised channel. This narrowing has intensified the velocity of water flow against riverbanks and increased the potential for erosion.

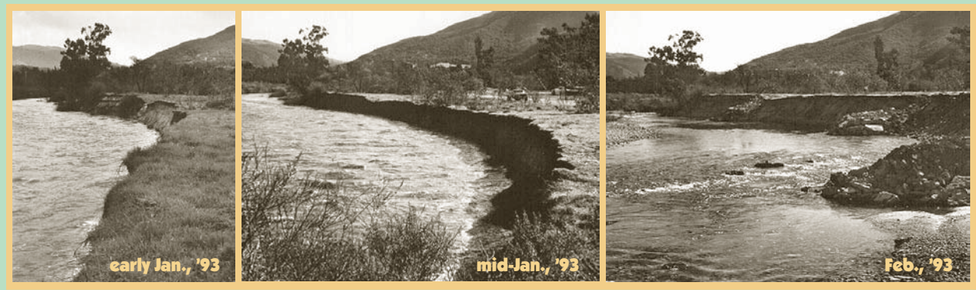
This problem is compounded when property owners cut native, streamside vegetation, or when too much groundwater is pumped, leaving plants to wither and die. Without the extensive, intertwining root systems of riparian trees and plants, there is nothing to stabilize the riverbank and hold the sandy soil together.

High velocity river flow against these denuded riverbanks has the same effect as a fire hose pointed at a pile of dry sand. Even though the Carmel River is usually peaceful and scenic, erosion can be dramatic when the increased flow of the confined river moves against unprotected banks.

The key to minimizing the effects of erosion and flooding lies in understanding river dynamics. Nobody has ever won a fight with a major force of nature, but by working together *with* the river and not against it, you can achieve a degree of control and peace of mind. Read on . . .

River Myth #1: fact & fiction

Confining the river effectively would make flooding obsolete.
Levees, dams and other confinements cannot always prevent flooding. At best, these alterations can only make floods less frequent. Levees often increase local flooding when they fail. A floodplain is bound to get wet at some point—it's a matter of time.



These successive photos of the same riverbank in mid-Carmel Valley show how even moderate flows can severely erode banks that are unprotected by native vegetation.

Steinbeck on the Carmel River:

"The Carmel is a lovely little river . . . in its course it has everything a river should have. It rises in the mountains, and...spills into pools where trout live...In the winter it becomes a torrent, a mean little fierce river, and in the summer it is a place for children to wade in and for fishermen to wander in. Deer and foxes come to drink from it...and now and then a mountain lion crouched flat laps its waters...it's everything a river should be."
—John Steinbeck, from *"Cannery Row,"* 1945