

Riparian (near the river) vegetation in New Mexico:

The forest around the Rio Grande is called the Bosque (Spanish for 'forest'). Historic Bosque vegetation included Rio Grande Cottonwood, Gooding's Willow and Peachleaf Willow (both tree willows close to the size of a cottonwood when mature), New Mexico Olive (sometimes called NM Privet) which is a tall shrub, Sliver Buffaloberry (another tall shrub), coyote willow (a shrub), false indigobush (a shrub), currant (a shrub) and a number of other small native shrubs, forbs and grasses. The tree willows along with NM olive and silver buffaloberry were very common components of the historic vegetation, and are now quite rare. Coyote willow is still common along the ditches, and riverbanks, but historically it was also common underneath the cottonwoods, which is one of the reasons Willow Flycatchers are on the endangered species list. Their preferred breeding habitat of dense coyote willow under cottonwoods is now very hard to find.

Over the past 100 years or so, Salt Cedar and Russian Olive have invaded the area. These are non-Native species that were introduced by humans for different reasons. The Salt Cedar was an ornamental tree (pretty pink flowers) that 'escaped' into the wild. Both Salt Cedar and the Russian Olive were used by the US Government to stabilize the banks of the rivers and decrease the impacts of flooding.

Cottonwood trees are the tall trees around the site. More information can be found at this website: <http://www.treenm.com/nm-tree-species/rio-grande-cottonwood/>. Mature Cottonwood forests have been estimated to consume approximately 0.62 m³/day for a meter-wide strip extending the full width of the riparian zone (Butler et al. 2007).



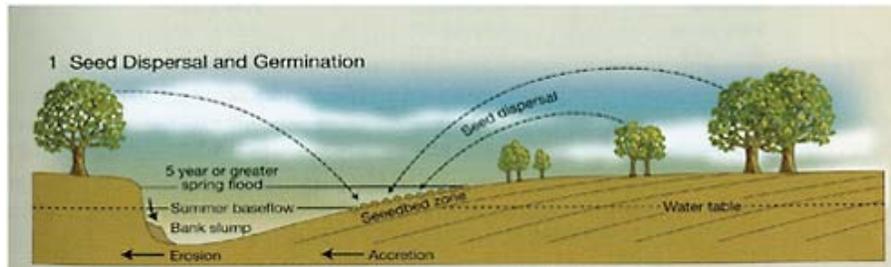
(photo by G. Weissmann)



(photo by D. Doser)

A natural vegetation **succession** for the bosque centers around these trees. Cottonwood trees germinate (begin to grow from seed) on freshly exposed, recently flooded surfaces, and they require land that is often flooded to germinate. Interestingly, the release of cotton (the seeds that you see floating around) occurs at the time of year when flooding is most likely (e.g., late spring/early summer). In their early years, Cottonwood trees require shallow water table to grow (found close to the river). These trees are well adapted to areas that experience repeated flooding. They grow rapidly when

young, and establish themselves on the bars and floodplains along the river. As they age, and the land surface around them, the land “rises” due to deposition of sand. So, we often find older trees on higher portions of bars and the floodplain because these areas have ‘aggraded’ (or risen). Therefore, when you wander around the Bosque, you can see that older surfaces have bigger trees. This allows us to do ‘relative age dating’ of surfaces near the river. This image shows diagrams the natural succession of a Cottonwood forest along rivers of the US West.



(from <https://www.nap.edu/read/13019/chapter/4>, with diagram sourced and modified from Braatne, JH, Rood, SB, and Heilman, PE, 1996, Chapter 3: Life history, ecology, and conservation of riparian cottonwoods in North America, in Stettler, RF, Bradshaw, HD, Jr, Heilman, PE, and Hinckley, TM (eds) *Biology of Populus and its Implications for Management and Conservation*, National Research Council Canada, p. 57-85.

Salt Cedar, or Tamarisk, was introduced as an ornamental tree. This tree uses significant water. Additionally, it collects salts in its leaves. When these leaves drop, they form a salty litter at their base. This excludes other plants from establishing near them. You’ll notice that these trees are not nearly as tall as the Cottonwood trees. Since these trees have been around for the past 100 years or so, they now make important habitat for some species. They also compete with the native vegetation, however. More information can be found at http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/Tamarix_ramosissima.html



(photo from <http://livingrootless.blogspot.com/2012/12/new-mexico-water-sucking-soldiers.html>, original source listed as BLM)

Russian Olive trees were introduced to control erosion along rivers in the Southwest US. These trees stabilize the banks, but they also use significant water and they compete with native vegetation. These trees, however, do form important habitat for some animals. Notice that the Russian Olive trees are about the same height as the Salt Cedar, and significantly shorter than the Cottonwood trees. Careful

around these trees ... they have large thorns! The Russian Olive and Salt Cedar have largely replaced the NM Olive and Silver Buffaloberry as the dominant bosque understory tree. As the Cottonwood trees mature and eventually die, we predict that there will be a much shorter, Russian Olive dominated forest in place of the Cottonwood forest.



(photo source: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5410126.pdf)

The invasive trees also make fire risk higher for the Cottonwood forest in the Bosque. Here's an interesting article on that influence. At a minimum, you should read the summary of the article. You may find the rest of it interesting, too, however.

http://www.firescience.gov/projects/briefs/01-1-3-19_FSBrief7.pdf

Remember, this article supports one opinion on the Cottonwood forest....good science looks at several viewpoints and evaluates observations and evidence that support hypotheses forwarded by these studies.

References:

Butler, JJ, Jr, Kluitenberg, GJ, Whittemore, DO, Loheide, SP, II, Jin, W, Billinger, MA, and Zhan, X, 2007, A field investigation of phreatophyte-induced fluctuations in the water table: *Water Resources Research*, v. 43, W02404, doi: 10.1029/2005WR004627.