

Dykaar, Bruce B. and P.J. Wigington Jr. "Floodplain Formation and Cottonwood Colonization Patterns on the Willamette River, Oregon, USA." *Environmental Management* (25)1: 87-104.
(Reviewed by Eleanor Gordon)

This paper uses aerial photographs from a period of 60 years (1936-1996) to analyze how floodplain formation is related to patterns of riparian growth on the Willamette River. It discusses the geomorphologic changes that create land areas that increase the establishment of pioneer riparian species. According to the authors, alluvial rivers such as the Willamette form elements of floodplains that become colonized by riparian species and consequently change the levels of erosion and sediment deposition, which in turn influence the geomorphology.

The paper reviews past case studies of floodplain formation and channel change mechanisms in other areas of the country and world that have similar wandering gravel-bed rivers like the Willamette in order to show that a particular fluvial geomorphic regime is related to the ecological conditions of the river and riparian area. The ecology and establishment of cottonwoods are also discussed in detail, followed by an overview of the physiography, geology, climate, hydrology, floodplain morphology, vegetation, human alterations to natural fluvial geomorphic regime and floodplain vegetation of the Willamette River. The section on human alteration discusses the major changes in the 150 years that have affected the normal flow regime of the river. For example there have been major dam and reservoir construction, channel-bank stabilization structures, gravel mining, and other changes.

The analysis of the aerial photographs is presented using sequences of photos from the US Geological Survey. Their results and pictures are in the text of the paper with detailed descriptions describing the changes and their consequences.

Critique

I really appreciate the way that this paper is written. Without having much of a geology or hydrology background, I still found this paper extremely informative and comprehensive. The overall description of the Willamette River area is surprisingly informative considering its brevity and ties directly into the results of the study. It is appropriate to be able to see the actual pictures of the river as it changed over the years, especially with the detailed analysis that goes along with them. It makes the connection between changes due to natural fluvial geomorphologic flows and those due to the human alterations much more clear, as well as the interactions between the two.

Human impacts have changed the river fluvial geomorphologic regime making the river a more single-channel flow without as many bars and islands to promote the recruitment of cottonwood stands. This paper therefore can be used more than just a geomorphologic assessment and study, but could be helpful when making choices concerning riparian restoration in areas along the river. If geomorphologic factors are considered in restoration, perhaps land use decisions in the future will consider that ecosystem functions are highly dependent on diminishing the human impact on channel flow regimes.

The research is very thorough, especially concerning the review of past research on the Willamette. This is evident in the author's disagreement with a previous study of the Willamette's channel based on the evidence presented in the paper. For example, data from the 1970s asserted that the Willamette's multi-channel plan-form was due to flood flows cutting channels from the existing floodplain. Dykar and Wigington instead use the aerial images to conclude that there were never sudden shifts to new channel locations during the period studied.

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