

RELATIVE NATURE OF WETLANDS: RIPARIAN AND VEGETATIONAL CONSIDERATIONS¹

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Abstract: Riparian ecosystems have been divided into three basic types; hydriparian, mesoriparian, and xeroriparian associated in the desert lowlands with perennial, intermittent, and ephemeral water respectively. Floral species associated with these ecosystems can be divided into four categories; obligate, preferential, facultative, and nonriparian. Additionally, various site characteristics such as (1) latitude, (2) elevation, (3) soil, (4) slope, (5) exposure, (6) water periodicity, and (7) water chemistry, create a complex matrix of terms with each one needing delineation. Few of these parameters can be readily measured in the field. We examine the classifying of vegetation according to the species presence (actual or potential) and the evolutionary/developmental history of vegetational communities and implications in wetland and riparian land classification.

Most scientists believe that they have a workable definition of "wetlands" and "riparian" in an ecological context. Writers of laws and regulations have this same confidence. Resource managers and administrators also believe they have equally usable definitions. For each term, one can find dozens of definitions in dictionaries, manuals, textbooks, and other sources. Some of these definitions are similar, others are very different. EPA regulations (40 CFR Section 230.3) state "... areas that are inundated or saturated with surface or ground water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" are wetlands. Under idealized conditions, these common sense, commonly held views are adequate to the task of definition. Each person defining these terms uses concepts appropriate to their own particular situation and background.

At best each definition generally applies to a local, regional, or particular ecosystem situation. However, application of these local concepts presents severe problems when these definitions are applied at a national scale. Johnson and Carothers (1982), Lowe and others (1986), Johnson and others (in press) and Kunzmann and others (in press) present information demonstrating that there are generally significant structural and functional differences between eastern and western wetlands. These

differences are particularly pronounced when comparing wetlands and riparian lands of the desert Southwest to the more mesic East. Even though eastern derived definitions have generally prevailed for national programs, more than half of the nation's wetlands and riparian lands are in the more arid West.

Discussion

Johnson and others (1984a) introduced the "xeroriparian," "mesoriparian," and "hydriparian" ecosystem descriptors to reflect ecological differences, especially for ecosystems associated with ephemeral, intermittent, and perennial waters in the Southwest deserts. Floral species associated with these three ecosystems can be divided into four categories (the 4-Category System): obligate, preferential, facultative and nonriparian (Johnson and others 1984a). There is no classification system, let alone rules and regulations, that address the combination of these seven entities. The current regulations and the proposed seven day test for wetland inundation (40 CFR Section 230.3 and EPA Wetland Identification and Delineation Manual) strictly applied in the west, would include only the wettest environments and exclude many of the periodic (ephemeral and perhaps intermittent) western wetlands and riparian lands (Lowe and others 1986).

By using these seven descriptors (three riparian and four floral) we are talking about wetland/riparian land ecosystem expression interpreted from "the top down" including botanical, hydrologic and soil parameters. However, plants are the ultimate synthesizers of environmental information, and vegetation composition alone may be considered the key to (1) latitude, (2) elevation, (3) soils, (4) slope, (5) exposure, (6) water periodicity, (7) water chemistry, (8) evapotranspiration rate and many other factors.

Wetland/riparian land classification and delineation is best accomplished by examination of factors that are always present and measurable. For example, consider the situation at Wilcox Playa, a large lakebed in the Chihuahuan Desert grassland of Southeastern Arizona. The playa surface is quite barren, with salty soils at its lowest elevation, becoming occupied by various salt-tolerant plants at its periphery and finally by mesquite

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subtrees up-slope. The lower elevation playa surface is intermittently flooded by a thin sheet of water, and buried to a depth of more than a meter at least every century. Mostly its surface is dry. If we are to follow the Environmental Protection Agency's 7 day saturation criteria to classify or map the extent of wetlands on the playa, we would have to observe the extent and persistence of the pool after each rain. But this does not draw the line for the 100 year (1 meter + depth) event. While it is true that soil saturation can often be judged by soil characteristics, the relationship of the 7 day saturation rule to soil characteristics has not been well established. In fact, 7 days of inundation, or other defined intervals, may or may not support "a prevalence of vegetation typically adopted for life in saturated soil conditions" (quotes from 40 CFR Section 230.3). Where the substratum is composed of coarse sand or cobbles typical hydric soil characteristics are not present. Other problems include judging soil saturation in unusual western situations, e.g. where the fine textured playa surface lies beneath a layer of shifting wind-blown sand. Additional problems include determining the bases for classifying wetlands/riparian lands where permanent water lies well below the soil surface but still within reach of phreatophytic species, such as the mesquites found at Wilcox Playa.

Many similar problems can arise regarding classification by using criteria, e.g. hydrologic regimes, that are not always present and visible. There is a strong similarity in visual contrast between riparian ecosystems and those of the desert uplands of the Southwest, whether mesoriparian hydriparian, or xeroriparian (Johnson and others 1984a). Many of the latter might not be delineated as wetlands under classification systems such as Cowardin and others. (1979) or U.S. Army Corps of Engineers and E.P.A. Guidelines. However, these xeroriparian plant communities are generally characterized by a higher visible differentiation from the vegetation of adjacent uplands, even than most riparian ecosystems, e.g. the visual differences between bottomland hardwoods along running streams and deciduous hardwood forests of the eastern U.S.

In addition to the visual contrast between xeroriparian ecosystems and adjacent uplands, xeroriparian communities are generally composed of measurably different biotas from those of adjacent communities. Thus biotic components differentially utilize xeroriparian ecosystems whether classifiers considers them wetlands or not. Johnson and others (1984a) determined that vegetational differences do occur between difference or occur between different order washes as well as between uplands and xero-riparian lands. The preferential use of xeroriparian habitats compared to desert upland habitats has been quantified for birds. Johnson and Haight (1985, 1988) found up to 10 times (or

greater) the number of individuals and species of birds along desert washes in comparison to adjacent uplands in the Chihuahuan and three subdivisions of the Sonoran Desert.

We propose addition of a visual comparison component to the wetland/riparian land definition; that vegetated wetlands/riparian lands be defined as "those whose vegetation is dominated by obligate, preferential or facultative wetland/riparian plants whose species occurrence, or woody plant density, or stature differ by more than 25 percent (an arbitrary figure) compared to the surrounding non-wetland communities." After additional analysis the 25 percentage difference may be modified to a more realistic figure if necessary to reflect the actual vegetation pattern. Now classification can be based on something that is visible and measurable at any time.

The requirement that vegetation be composed of wetland/riparian plants would prevent misclassification of areas where effective soil moisture differences in upland situations result in vastly different vegetation types, e.g. along ridge-lines, where slope/aspect control available moisture and vegetational differences greater than 25 percent are commonplace, between north and south facing slopes, for example. In general, the 25 (or whatever) percent rule would apply to wetland/riparian obligate or preferential species. It is not true, however, for facultative species, e.g. in the desert Southwest. Foothills paloverde (*Cercidium microphyllum*) is a widely distributed, diagnostic upland species in the Arizona Upland Series (Brown and others 1979). It grows on rocky hillsides with saguaro (*Cereus giganteus*), desert ironwood (*Olneya tesota*), mesquite (*Prosopis* spp.), and triangleleaf bursage (*Ambrosia deltoidea*) along the eastern and northern limits of the Sonoran Desert (annual precipitation 7-13 in.). Near Yuma, Arizona, (annual precipitation approximately 3 inches) these species still occur together but are strictly confined to washes where they behave as obligate xeroriparian riparian species. Redbud (*Cercis occidentalis*), an eastern upland species, typically occurs along water courses in the arid west. In xeric environments creosotebush (*Larrea tridentata*) grows to a stature of a meter or less and plants are spatially separated by 2 meters or more. Yet along 1st or 2nd order desert washes (Johnson and others 1984b) it occurs as a xeroriparian plant with individuals occasionally 3 to 4 meters tall and separated by less than a meter.

Our proposed 25 percent difference in species composition, woody plant density, or plant height, would correctly classify each of these examples above as wetlands/riparian lands in relation to their surrounding communities.

Conclusions

These wetland/riparian land classification and identification difficulties will continue so long as ecologists persist in differentiating between uplands and wetlands/riparian lands on bases other than plant species growing in the natural communities. A paloverde-triangleleaf bursage community should be classified as such regardless of where it is growing. Differentiation into a "wetland" category should be in relation to surrounding ecosystems. Although on the surface this proposal seems inapplicable to legal absolutes, its ecological flexibility allows the definition to be adopted to varying local conditions and/or habitats.

Until a scientific consensus is reached about the classification and demarcation of wetlands/riparian lands, we suggest that the legal system depend more heavily on the opinions of expert wetland/riparian ecologists, than on the rule-making ability of attorneys and administrators.

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