FORESTRY EXTENSION NOTES

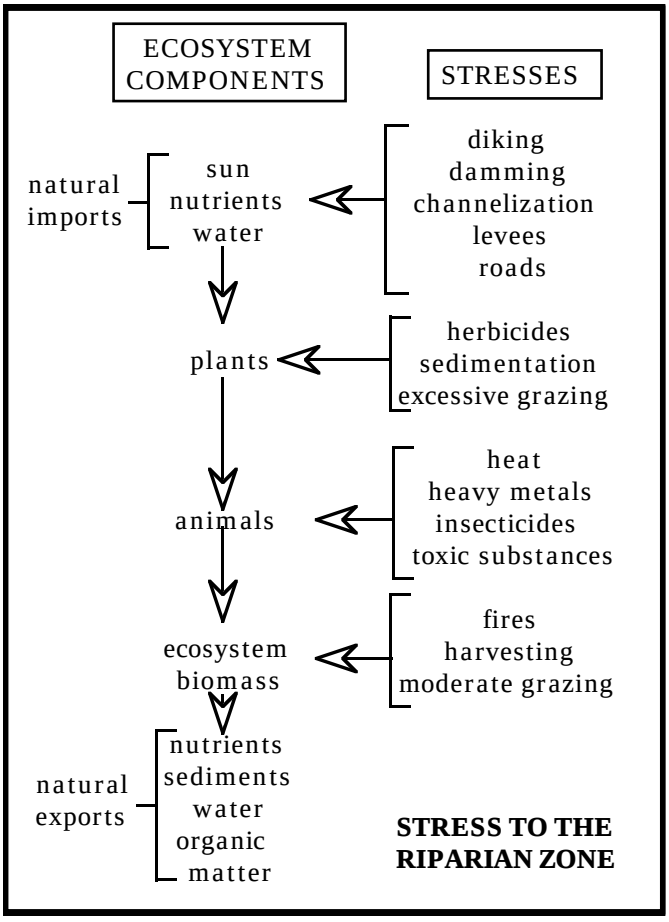
MANAGEMENT OF FLOODPLAIN FORESTS

A river or stream and its floodplain exist in a state of dynamic equilibrium. These "riparian zones" occupy sensitive niches in a watershed system when human-induced impacts are considered. Riparian zones have their greatest value as buffers and filters between man's urban and agricultural development and his most vital life-support resources - **water**.

Riparian zones occur as boundaries between aquatic and upland communities but have distinct vegetation and soil characteristics. These zones are most commonly recognized as bottomland hardwoods and floodplain forests in the eastern and central United States. Riparian forests are uniquely characterized by the combination of great species diversity, high density, and high productivity.

Forestry related uses represent a suitable use for regulated floodplain lands. The riparian lands are highly productive and can sustain a considerable harvest of biomass as long as the physical forces responsible for the high rate of energy flow and productivity remain intact. When these forces are altered, the ecosystem loses its vigor and rapidly deteriorates.

Flooding can both enhance and stress a riparian ecosystem, depending on frequency, timing, and intensity. Unfortunately, efforts to control floods that involve constructing upstream dams, channelization, or diking the streamside margins often result in reducing health of stream ecosystems and increasing the stresses to the ecosystem. Riparian productivity is reduced when normal seasonal flooding is abolished or reduced by dams. Future management should focus on means of reducing man-made flood stress and restoring the natural flow of water



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The effects observed in the stem and leaves of the bottomland trees are merely symptoms of the influence of flooding on the root systems. For most species, including bottomland species, the root system is affected and either becomes dormant or begins to die immediately after flooding. The adjustment of the root system is dictated by the growth of adventitious roots and new secondary roots under low oxygen conditions. The maintenance of proper root functioning is the factor which determines tolerance to flooding. Very tolerant or tolerant species can maintain their normal roots while also producing new scondary and adventitious roots. Moderately tolerant species are those in which the normal root system deteriorates, but the tree can produce adventitious roots to replace it. The final category consists of species in wich the normal root system dies, and the plant is unable to produce adventitious roots. These trees usually die under flooding stress in a relatively short time.

RELATIVE TOLERANCE OF SPECIES TO FLOODING

1) *Very tolerant*
   - tamarack (Larix laricina)
   - black spruce (Picea mariana)
   - eastern cottonwood (Populus deltoides)
   - black willow (Salix nigra)

2) *Tolerant*
   - balsam fir (Abies balsamea)
   - boxelder (Acer negundo)
   - red maple (Acer rubrum)
   - silver maple (Acer saccharinum)
   - river birch (Betula nigra)
   - hackberry (Celtis occidentalis
   - green ash (Fraxinus pennsylvanica
   - sycamore (Plantanus occidentalis)
   - swamp white oak (Querus bicolor)
   - bur oak (Quercus macrocarpa)
   - arbor vitae (Thuja occidentalis)
   - American elm (Ulmus americana)

3) *Intermediate*
   - buckeye (Aesculus sp.)
   - river birch (Betula nigra)
   - blue beech (Carpinus caroliniana)
   - catalpa (Catalpa speciosa)
   - hawthorn (Crataegus sp.)
   - honeylocust (Gleditsia triacanthos)
   - Kentucky coffeetree (Gymnocladus dioicus)
   - osage orange (Maclura pomifera)
   - mulberry (Morus rubra)
   - white spruce (Picea glauca)
   - red pine (Pinus resinosa)
   - white pine (Pinus strobus)
   - pin oak (Quercus palustris)

4) *Very intolerant*
   - white fir (Abies concolor)
   - black maple (Acer nigrum)
   - sugar maple (Acer saccharum)
   - eastern alder (Alnus rugosa)
   - hickories (Carva sp.)
   - black walnut (Juglans nigra)
   - eastern redcedar (Juniperus virginiana
   - ironwood (Ostrva virginiana)
   - Black Hills spruce (Picea glauca densata
   - Colorado blue spruce (Picea pungens)
   - jack pine (Pinus banksiana)
   - bigtooth aspen (Populus grandidentata
   - quaking aspen (Populus tremuloides)
   - black cherry (Prunus serotina)
   - Douglas fir (Pseudotsuga menziesii)
   - white oak (Quercus alba)
   - blackjack oak (Quercus marilandica)
   - chinkapin oak (Quercus muhlenbergii)
   - northern red oak (Quercus rubra)
   - post oak (Quercus stellata)
   - black oak (Quercus velutina)
   - black locust (Robinia pseudoacacia)
   - sassafras (Sassafras albidum)
   - basswood (Tilia americana)
   - eastern hemlock (Tsuga canadensis)

Healthy riparian zone forest stands are characterized by a thrifty, moderately dense stand of trees dominating a dense, vigorous, mixed stand of shrubs. Such stands usually

have a site-protective litter and duff layer like other hardwood forests in good conditon. There is usually some on-going tree and shrub reproduction.

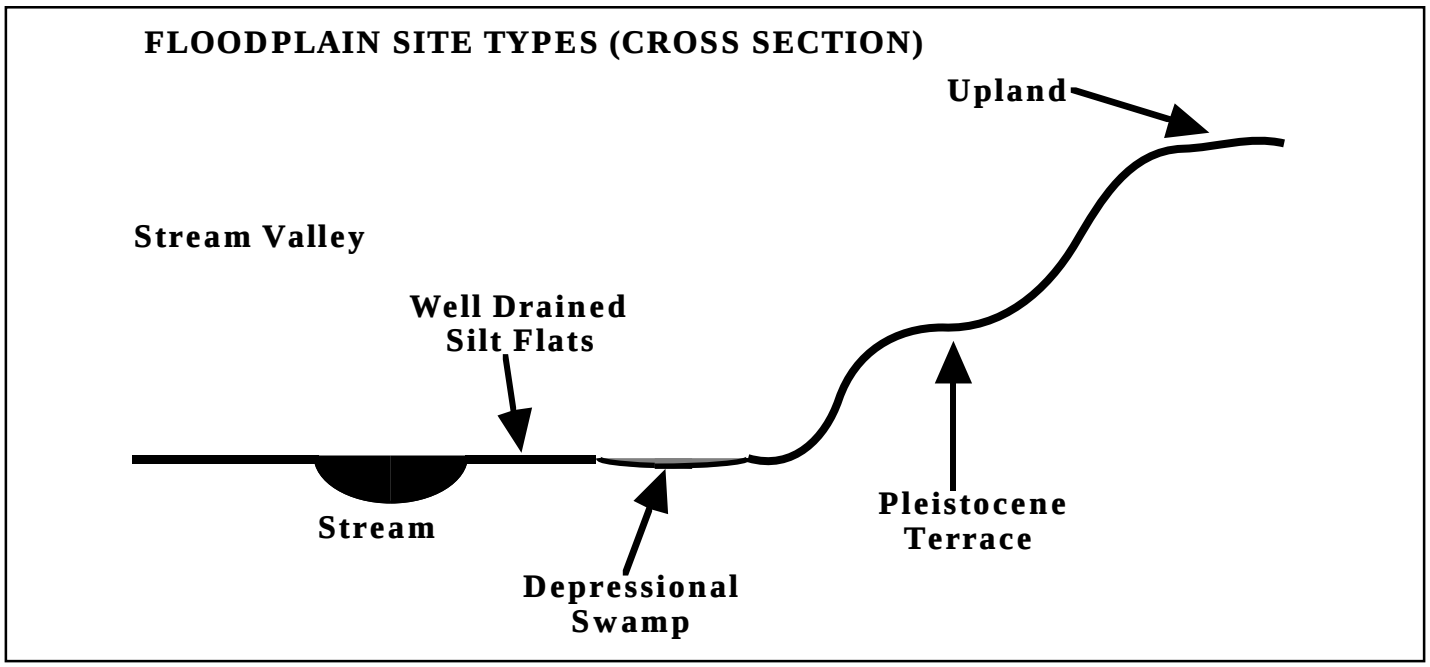
Declining stands usually have a decadent tree overstory in advanced stages of breakup, with only scatered remnants of the associates shrub stand. The site is typically devoid of duff and litter. Tree and shrub seedlings, suckers, and sprouts on these sites are rare. Reduced vigor and growth of senescent trees make declining stands especially vulnerable to damage by insects, diseases, and mechanical stresses. Declining stands may possibly be revitalized and habitat values enhanced by a combination of fencing for domestic livestock, partial cutting of the trees and underplanting.

Harvesting activities in a 20 meter wide strip adjacent to the stream chanel should be limited. Complete removal of vegetation within this corridor increases erosion and thermal pollution. Selective cutting of trees may be acceptable and even highly desirable in these areas. Clearcutting should not be used within the stream corridors but is a viable practice outside of these protective areas. Clearcutting should be restricted to small areas so that seed transportation is rapid but the area must also be large enough to allow ample light to reach the forest floor. Seed trees of the most desirable species should be left in the buffer strips and remaining stands.

Application of fertilizers or herbicides by air should be discouraged in the riparian zone. Ground application and direct injection methods of treatment should be emphasized and then only outside of the protective buffer strips. Cultural practices can be used to relieve the need for such chemical treatments in the buffer strips as well as in the whole ecosystem.

Five **floodplain site types** can be recognized along rivers and streams. Under proper management, these areas can provide timber, wildlife, and recreational benefits with the adverse effects on the riparian ecosystem.

Depressional swamps - Little potential exists for producing timer or fiber on the poorly drained areas characterizing this site type. The opened crowned forest of this type is exceptional wildlife habitat. These areas can be maintained as dense cover by frequent patch cutting. Snags should not be removed except where they constitute insect and disease harbors, or a hazard to nearby trails.



Well drained silt flats - The fertile, well-drained silts characteristic of these sites are potentially the most valuable floodplain areas for timber production. Short rotation even-aged stands can be used or group selection can be used on an uneven-aged management basis. Care must be taken to open areas large enough for reproduction to occur. Recreation values of this site type are linmited due to dense undergrowth and insect.

Frequently flooded point bars and rapidly forming deposits - Frequent flooding and unstable soil conditions limit many potential uses on these sites. Destructive flooding is more common here than on other floodplain sites; lower basal areas and productivity is typical. Debris makes these sites aesthetically unattractive and undesirable for recreational uses. Even-aged management systems, such as patch clearcutting, are most suited to the propagation of the shade intolerant species wichoccupy these sites. Management efforts should be concentrated onproduction with minimal capital investment.

Stable point bars - The low fertility and soil moisture availability problems within this site is the primary factor limiting forest productivity. Wildlife habitat can be improved and maintained by patch cutting. Selection cutting is not recommended.

Pleistocene terraces - Disturbance by flooding is rare and the forest understory lacks heavy herbaceous growth which characterizes more frequently flooded sites. These sites are most suited to intensive recreational use. Because of the stable conditions, recreational facilities can be built and easily maintained here. Forest management options are smilar to those which exist on upland sites. Where these sites adjoin upland forests, they should be managed along with those stands. Plantations of high value trees can be planted here with good results (e.g., walnut). Patch clearcutting will maintain this forest type while selection cutting will change the tree species content and is not desirable.

In all site types, grazing is not compatible with good forest and stream management. Stand and stream deterioration is a direct result of grazing domestic animals.

Forest management assistance is available from the Iowa Department of Natural Resources' District Forester for your area.

Sources:

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