



## THE POTENTIAL ECONOMIC BENEFITS OF RIPARIAN BUFFERS

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### SUMMARY

Studies have demonstrated that riparian buffers are a relatively low cost, easily enforceable, and effective means of delivering valuable ecological services - such as the prevention of diffuse source pollution, protection of water supplies, flood mitigation, and aesthetic enhancement of communities and recreation areas. These services can increase state revenues by enhancing the desirability of communities and recreational areas, and limiting the unforeseen growth in state expenses that often accompanies expanded residential and commercial development in watershed areas - resulting from increased flooding, declining water tables (and thus increasing strain on public water systems), as well as the spread of invasive species, etc. Though any new restriction on the use of an individual property may have a marginal negative effect of its value, studies clearly indicate that restrictions that lead to improved water quality increase the value of homes across the board. The economic benefits of the ecological services provided by Connecticut's rivers and wetlands run in the tens of billions of dollars annually. Maintaining a minimum level of protection for these assets can help to ensure that the rapid expansion of residential and commercial development does not negate the benefits of economic growth.

# THE POTENTIAL ECONOMIC BENEFITS OF RIPARIAN BUFFERS

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## INTRODUCTION

The spread of residential and commercial land development is frequently accompanied by an increase in diffuse source water pollution when fertilizers, sediment, chemicals and other contaminants are carried from lawns and pavement into neighboring wetlands by storm water runoff.<sup>1</sup> Numerous studies document the important role that riparian buffers can play in reducing diffuse source pollution that may otherwise result in eutrophication, increased toxicity, and loss of water clarity.<sup>2,3,4,5</sup>

“A consensus of experimental research on functions of buffers clearly shows that they can substantially limit sediment run off from fields, retain sediment and sediment-bound pollutants from surface runoff, and remove nitrate from groundwater runoff.... In general, runoff of sediment from buffered plots was substantially lower than that from comparable unbuffered plots (sediment mass 12–82% reduction).”<sup>6</sup>

Studies have also demonstrated that riparian buffers can be a relatively low cost<sup>7,8</sup> and easily enforceable<sup>9</sup> means of mitigating diffuse source water pollution and that protection is far more efficient than clean-up.<sup>10</sup> In Connecticut, evidence suggests that landuse restrictions within a 100 ft wetland buffer zone has helped to reduce the loss of natural vegetation during residential and commercial land development of its coastal areas.<sup>11</sup>

## POTENTIAL ECONOMIC BENEFITS

The ecological services provided by Connecticut's rivers and wetlands are worth many billions of dollars annually. The natural protection that riparian buffers offer to the quality of these assets can safeguard and enhance the desirability of communities and recreational areas, protecting property values and promoting tourism.

### *Recreational*

Clean water, abundant and diverse wildlife, healthy fish stocks, and scenic views are a few of the assets that riparian buffers protect. This natural capital leads to a steady stream of returns in the form of tourism and recreational income and related tax revenue. Both the volume and range of outdoor recreational activities has increased dramatically in the United States over the last few decades.<sup>12</sup> For example, expenditures associated with wildlife-watching increased by over 20% in the U.S. between 1995 and 2006, from \$37.7 billion to \$45.7 billion (in 2006 dollars).<sup>13</sup> In 2006, fishing, hunting and wildlife watching activities by Connecticut residents alone generated \$755 million in recreation related revenues in Connecticut.<sup>14</sup> Another \$9 billion was spent by tourists visiting the state, generating over 1 billion in state and local tax revenue, and employing 1 in 15 workers in the state.<sup>15</sup>

But Connecticut's recreational and tourism dollars are heavily reliant upon the maintenance of healthy ecosystems. For example, numerous studies emphasize the importance of preserving the natural habitat of fish - including shade trees, submerged grasses and other food sources - to maintaining healthy fish populations in spots popular among anglers.<sup>16,17,18</sup> One survey of Alabama residents found that "the most important reasons reported for preserving the rivers were to protect fish and wildlife habitat, water quality, air quality, and scenery. They also wished to protect rivers for future generations, just for the satisfaction of knowing rivers exist and are protected, and to preserve the option to use the rivers in the future."<sup>19</sup> Numerous studies have found that individuals express willingness to pay substantial sums to protect the regional environment.<sup>20,21</sup> One study in the 1990s found particularly high dollar values placed on improving water quality to a "swimmable" level.<sup>22,23</sup>

Loss of natural riparian buffers can lead to pollution of streams by sediment, nutrients, and other contaminants, destroying fish habitat and closing swimming areas.<sup>24</sup> The 1994 EPA National Water Quality Inventory Report to Congress identified 374 sites in 22 states where recreation was restricted due to poor water quality.”<sup>25</sup>

### *Aesthetic Value*

Historically, Connecticut’s great natural beauty and well-preserved historical villages have ensured it some of the most prized real estate in the world. Its very desirable communities have attracted a relatively high-skilled, high-income population that, in turn, has attracted a dynamic commercial sector. As a consequence, Connecticut’s natural resources indirectly enhance state income and corporate tax revenues.

The desirability of communities is strongly influenced by the surrounding environment, and the health of neighboring wetland ecosystems plays a particularly important role. Reduced water clarity, algae blooms, and eutrophication have been shown to greatly diminish adjacent property values.<sup>26,27,28</sup> And in regions where water quality has been allowed to deteriorate substantially as a result of over-development, studies have documented dramatic declines in regional property values.<sup>29,30</sup>

Over the last two decades, an 18.2% increase in the land area covered by construction in Connecticut has been accompanied by a 14.5% decline in farmland, 6.5% decline in deciduous forest, 6.9% decline in area covered by water, and a 5.5% decline in forested wetland; trends that highlight the importance of safeguarding the remaining wetlands from environmental degradation.<sup>31</sup>

Environmental restrictions on privately held land are often fought by those with short-term interests in the sale of local residential and commercial development, who fear that new restrictions will diminish market profitability. Though there is little evidence of diminished individual property values when all properties are similarly restricted, or regional economic loss<sup>32</sup>, studies do show that land use restrictions that improve water quality often lead to substantial increases in property values both on and near wetland areas.<sup>33,34,35,36,37</sup>

## MITIGATING THE UNINTENDED CONSEQUENCES OF DEVELOPMENT

By maintaining a minimum level of protection for rivers and wetlands, riparian buffers can also help to mitigate a number of unintended consequences of rapid residential and commercial development that can drain state budgets, such as increased flooding, declining water tables and increasing strain on public water systems, as well as the spread of invasive plant species. Failure to address these issues can negate many of the benefits of economic growth.

### *Drinking Water*

Safe, dependable supplies of groundwater - for residential, agricultural, commercial and public uses - are crucial to a healthy economy. Among the many ecological services offered by riparian buffers is their ability to help protect and restore groundwater reserves.

“There is a close association between surface and groundwaters. Groundwater is replenished or ‘recharged’ by percolation of precipitation through the soil and by seepage from stream channels (Guldin 1989). Water also moves from groundwater into streams. Therefore, polluted surface waters can contaminate groundwater, and vice versa. In some streams, as much as 40 percent of the annual flow and nearly all the flow during dry periods is provided by groundwater. This continuous flow of water is critical to maintaining adequate stream water levels and temperatures to support aquatic life. Removing vegetation from riparian lands can result in loss of groundwater recharge and increase the frequency, duration, and severity of low flow conditions in streams.”<sup>38</sup>

Americans spend large sums each year to treat and maintain water supplies.<sup>39,40</sup> The loss of ecological services provided by riparian buffers can increase these costs. Increased sedimentation leads to the need for dredging and more frequent repair and replacement of equipment.<sup>41,42</sup> Increased runoff of nutrients and other contaminants from lawns, fields, and pavement into wetlands increases the need to treat drinking water with chemical coagulants and disinfectants. And contaminants can also cause costly depreciation of commercial equipment. Expanding riparian buffers has the potential

to limit these costs.<sup>43</sup>

### ***Flood Control***

By impeding and absorbing flood waters, and thus reducing their velocity and volume, riparian forest buffers reduce the damage caused by floods. And by reducing the sedimentation of rivers and streams, which fills streambeds and makes them more prone to overflowing, riparian buffers also reduce the frequency of flooding.<sup>44,45</sup> According to one study, reducing runoff by 10% within a watershed could reduce flood peaks with a 2 to 5 year return period by 25% to 50%.<sup>46</sup>

According to the NFIP, the value of flood losses in the U.S. between 1996 and 2005 totaled over \$2.4 billion.<sup>47,48</sup> Rapid land development and the loss of riparian buffers have the potential to increase these costs.<sup>49</sup> Ironically, where new land development leads to increased flooding, it has the potential to drive down the value of existing housing stocks in flood prone areas.<sup>50</sup>

### **POLITICAL FEASIBILITY AND “WILLINGNESS TO PAY”**

Numerous studies find that Americans express a willingness to pay substantial sums for programs that will improve water quality.<sup>51,52,53,54,55,56,57</sup> Despite concerns by economists that such studies might overstate the true willingness to pay for ecological services, the notable consistency of such results indicate a very real concern over the availability and security of safe drinking water. One study that explored the difference between the hypothetical willingness to pay among survey participants and taxpayers' actual willingness to pay for a riverfront improvement project, found that there was no statistically significant difference between the two.<sup>58</sup> Since the benefit/cost ratio to households of wetland restoration projects is often very high<sup>59</sup>, it is perfectly rational for residents to be willing, if not eager, to pay for such projects.

## Endnotes

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