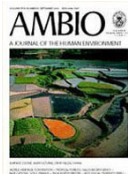


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Online ISSN: 1654-7209

Current: Dec 2011 : Volume 40 Issue sp1

 BioOne Member Since: 2001 (*Active through 2011*)

Frequency: Eight times per year

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29(8):462-467. 2000

 doi: <http://dx.doi.org/10.1579/0044-7447-29.8.462>

The Economic Value of Controlling an Invasive Shrub

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Abstract

Recent interest in the valuation of ecosystem services has provided tools for assessing the costs of invasive species in natural areas. This study evaluates the economic impacts of tamarisk (*Tamarix* sp.), an invasive woody shrub, on societally-valued ecosystem services in its naturalized range. Tamarisk, intentionally introduced from Eurasia, has invaded most riparian areas of the arid and semiarid western United States. In its naturalized range, tamarisk consumes more water than native vegetation, with significant economic implications in a region marked by water scarcity. Tamarisk also increases sedimentation in river channels, leading to increased frequency and severity of flood damage. Conservative economic estimates of these impacts indicate that the annual costs of tamarisk to the western United States total USD 280–450 ha⁻¹. Eradicating the invader and restoring native riparian communities throughout the region would cost approximately USD 7400 ha⁻¹. Full recovery of these costs, even with a highly conservative benefits estimate, would occur in as few as 17 years, after which the societal, ecological, and economic benefits of restoration would continue to accrue indefinitely.

Received: December 29, 1999; Accepted: April 27, 2000

References and Notes

Daily, G. C. (ed.). 1997. *Nature's Services: Societal Dependence on Natural Ecosystems*. Island Press, Washington, USA.

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van Wilgen, B. W., R. M. Cowling, and C. J. Burgers. 1996. Valuation of ecosystem services: a case study from South African fynbos ecosystems. *BioScience* 46:184–189. [CrossRef](#)

Pimentel, D., C. Wilson, C. McCullum, R. Huang, P. Dwen, J. Flack, Q. Tran, T. Saltman, and B. Cliff. 1997. Economic and environmental benefits of biodiversity. *Bioscience* 47:747–757. [CrossRef](#)

Simberloff, D., D. C. Schmitz, and T. C. Brown. 1997. *Strangers in Paradise: Impact and Management of Nonindigenous Species in Florida*. Island Press, Washington, DC, USA.

U.S. Bureau of Reclamation. 1995. *Vegetation Management Study, Lower Colorado River: Phase II Final Report*. Bureau of Reclamation, Lower Colorado Region, Boulder City, NV, USA.

U.S. Congress, Office of Technology Assessment. 1993. *Harmful Non-Indigenous Species in the United States*. U. S. Government Printing Office, Washington, DC, USA.

Center of the American West, University of Colorado at Boulder. 1997. *Atlas of the New West*. W.W. Norton & Company, New York, USA.

Neill, W. M. 1983. *The Tamarisk Invasion of Desert Riparian Areas*. Desert Protective Council, Inc., Spring Valley, CA, USA.

Morrison, J. I. 1996. *The Sustainable Use of Water in the Lower Colorado River Basin*. The Pacific Institute and the Global Water Policy Project, Oakland, CA, USA.

Waggoner, P. E. and J. Scheffer. 1990. Future water use in the present climate. In. *Climate Change and US Water Resources* Wiley Series in Climate and the Biosphere. Waggoner, P.E. (ed.). Wiley & Sons, New York, pp. 19–40.

Nash, L. L. and P. H. Gleick. 1991. Sensitivity of streamflow in the Colorado Basin to climatic changes. *J. Hydrol* 125:221–241. [CrossRef](#)

Baum, B. R. 1978. *The Genus Tamarix*. Israel Academy of Sciences and Humanities Jerusalem, Israel.

Walker, L. R. and S. D. Smith. 1997. Impacts of invasive plants on community and ecosystem properties. In. *Assessment and Management of Plant Invasions* Springer Series on Environmental Management Luken, J.O. and Thieret, J.W (eds). Springer, New York, USA. pp. 69–86.

Brock, J. H. 1994. *Tamarix* spp. (Salt Cedar), an invasive exotic woody plant in arid and semi-arid riparian habitats of western USA. In. *Ecology and Management of Invasive Riverside Plants* Landscape Ecology Series. deWaal, L.C., Child, L.E., Wade, P.M. and Brock, J.H. (eds). John Wiley & Sons, Chichester, England. pp. 27–43.

Everitt, B. L. 1980. Ecology of saltcedar: a plea for research. *Environ. Geol* 3:77–84. [CrossRef](#)

Robinson, T. W. 1965. *Introduction, Spread, and Areal Extent of Saltcedar (Tamarix) in the Western States*. US Geological Survey

Washington, DC, USA.

Great Western Research. 1989. *Economic Analysis of Harmful and Beneficial Aspects of Saltcedar*. Bureau of Reclamation, Mesa, AZ, USA.

Warren, D. K. and R. M. Turner. 1975. Saltcedar seed production, seedling establishment, and response to inundation. *Arizona Acad. Sci* 10:131–144.

Loope, L. L., P. G. Sanchez, P. W. Tarr, W. L. Loope, and R. L. Anderson. 1988. Biological invasions of arid land reserves. *Biol. Conserv* 44:95–118. [CrossRef](#)

Shafroth, P. B., J. M. Friedman, and L. S. Ischinger. 1995. Effects of salinity on establishment of *Populus fremontii*(cottonwood) and *Tamarix ramosissima*(saltcedar) in southwestern United States. *Great Basin Natural* 55:58–65.

Cleverly, J. R., S. D. Smith, A. Sala, and D. A. Devitt. 1997. Invasive capacity of *Tamarix ramosissima* in a Mojave Desert floodplain: the role of drought. *Oecologia* 111:12–18. [CrossRef](#)

Busch, D. E. and S. D. Smith. 1995. Mechanisms associated with decline of woody species in riparian ecosystems of the southwestern U.S. *Ecol. Monogr* 65:347–370. [CrossRef](#)

Wiesenborn, W. D. 1996. Saltcedar impacts on salinity, water, fire frequency, and flooding. In. *Proc. Saltcedar Management Workshop* Rancho Mirage, CA, USA pp. 9–12.

Busch, D. E. and S. D. Smith. 1993. Effects of fire on water and salinity relations of riparian woody taxa. *Oecologia* 94:186–194. [CrossRef](#)

Johns, E. L. 1990. *Vegetation Management Study, Lower Colorado River: Appendix 1, Water Use of Naturally Occurring Vegetation*. Bureau of Reclamation, Denver, CO, USA.

Blackburn, W. H., R. W. Knight, and J. L. Schuster. 1982. Saltcedar influence on sedimentation in the Brazos River. *J. Soil Water Conserv* 37:298–301.

Graf, W. L. 1980. Riparian management: a flood control perspective. *J. Soil Water Conserv* 35:158–161.

Graf, W. L. 1978. Fluvial adjustments to the spread of tamarisk in the Colorado Plateau region. *Geol. Soc. Am. Bull* 89:1491–1501. [CrossRef](#)

DeLoach, J. 1997. Saltcedar; ecological interactions and potential effects of biological control. In. *Woody Plant Wetland Workshop* Grand Junction, CO, USA.

Nabhan, G. P. and S. L. Buchmann. 1997. Services provided by pollinators. In. *Nature's Services: Societal Dependence on Natural Ecosystems* Daily, G.C. (ed.). Island Press, Washington, USA, pp. 133–150.

Brown, B. T. and M. W. Trosset. 1989. Nesting-habitat relationships of riparian birds along the Colorado River in Grand Canyon, Arizona. *Southwestern Natural* 34:260–270. [CrossRef](#)

Yong, W. and D. M. Finch. 1997. Migration of the willow flycatcher along the Middle Rio Grande. *Wilson Bull* 109:253–268.

DeLoach, C. J. 1997. Biological control of weeds in the United States and Canada. In. *Assessment and Management of Plant Invasions* Luken, J.O. and Thieret, J.W. (eds). Springer, New York, pp. 172–194.

Colby, B. G. 1989. Estimating the value of water in alternative uses. *Nat. Res. J* 29:511–527.

Colby, B. G. 1989. The economic value of instream flows—can instream values compete in the market for water rights? In. *Instream Flow Protection in the West* MacDonnell, L.J., Rice, T.A. and Shupe, S.J. (eds). Natural Resources Law Center, Boulder. pp. 87–102.

Gibbons, D. C. 1986. *The Economic Value of Water. Resources for the Future*. Washington, DC, USA.

Young, R. A. 1984. Local and regional economic impacts. In. *Water Scarcity: Impacts on Western Agriculture* Englebert, E.A. and Schuering, A.F. (eds). University of California Press, Berkeley, pp. 244–272.

U.S. Bureau of Reclamation. 1992. *Vegetation Management Study—Lower Colorado River, Phase I*. Bureau of Reclamation, Lower Colorado Region, Boulder City, NV, USA.

DeLoach, J. 1997. Biological control of exotic saltcedar in western riparian areas. In. *Woody Plant Wetland Workshop* Grand Junction, CO, USA.

Taylor, J. P. and K. C. McDaniel. 1998. Restoration of saltcedar infested flood plains on the Bosque del Apache National Wildlife Refuge. *Weed Technol* 12:345–352.

Cited by

Daniel J. Leavitt. (2012) Assemblages of Rodents in Riparian Forests Along the Rio Grande in Big Bend National Park, Texas: Current and Historic Insights on the Effects of Invasion by Saltcedars. *The Southwestern Naturalist* 57:2, 148-153

Online publication date: 1-Jun-2012.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (208 KB)

Clayson J. Howell*. (2012) Progress toward Environmental Weed Eradication in New Zealand. *Invasive Plant Science and Management* 5:2, 249-258

Online publication date: 1-Apr-2012.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (256 KB)

Jorge Luis Renteria, Mark R. Gardener, F. Dane Panetta, and Mick J. Crawley*. (2012) Management of the Invasive Hill Raspberry (*Rubus niveus*) on Santiago Island, Galapagos: Eradication or Indefinite Control?. *Invasive Plant Science and Management* 5:1, 37-46

Online publication date: 1-Jan-2012.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (464 KB)

Valerie T. Eviner, Kelly Garbach, Jill H. Baty, and Sarah A. Hoskinson*. (2012) Measuring the Effects of Invasive Plants on Ecosystem Services: Challenges and Prospects. *Invasive Plant Science and Management* 5:1, 125-136

Online publication date: 1-Jan-2012.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (231 KB)

Bethany A. Bradley¹ and David C. Marvin². (2011) Using Expert Knowledge to Satisfy Data Needs: Mapping Invasive Plant Distributions in the Western United States. *Western North American Naturalist* 71:3, 302-315

Online publication date: 1-Nov-2011.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (852 KB)

Michelle K. Ohrtman, Sharon A. Clay, David E. Clay, Eric M. Mousel, and Alexander J. Smart*. (2011) Preventing Saltcedar (*Tamarix* spp.) Seedling Establishment in the Northern Prairie Pothole Region. *Invasive Plant Science and Management* **4**:4, 427-436

Online publication date: 1-Oct-2011.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (377 KB)

Eben H. Paxton^{1, 4}, Tad C. Theimer² and Mark K. Sogge³. (2011) Tamarisk Biocontrol using Tamarisk Beetles: Potential Consequences for Riparian Birds in the Southwestern United States Control Biológico del Tamarisco por el Escarabajo del Tamarisco: Consecuencias Potenciales para las Aves Ribereñas en el Sudoeste de los Estados Unidos. *The Condor* **113**:2, 255-265

Online publication date: 1-May-2011.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (793 KB)

Erik A. Lehnhoff, Fabian D. Menalled, and Lisa J. Rew*. (2011) Tamarisk (*Tamarix* spp.) Establishment in its Most Northern Range. *Invasive Plant Science and Management* **4**:1, 58-65

Online publication date: 1-Jan-2011.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (291 KB)

Patrick J. Moran. (2010) Lack of Establishment of the Mediterranean Tamarisk Beetle *Diorhabda elongate* (Coleoptera: Chrysomelidae) on Athel (*Tamarix aphylla*) (Tamaricaceae) in South Texas. *Southwestern Entomologist* **35**:2, 129-145

Online publication date: 1-Jun-2010.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (110 KB)

M. Jake Vander Zanden^{*}, Gretchen J.A. Hansen, Scott N. Higgins, Matthew S. Kornis. (2010) A Pound of Prevention, Plus a Pound of Cure: Early Detection and Eradication of Invasive Species in the Laurentian Great Lakes. *Journal of Great Lakes Research* **36**:1, 199-205

Online publication date: 1-Mar-2010.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (294 KB)

David C. Marvin Bethany A. Bradley^{1,3} David S. Wilcove^{1,2}. (2009) A Novel, Web-Based, Ecosystem Mapping Tool Using Expert Opinion. *Natural Areas Journal* **29**:3, 281-292

Online publication date: 1-Jul-2009.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (1187 KB)

Becky K. Kerns, Bridgett J. Naylor, Michelle Buonopane, Catherine G. Parks, and Brendan Rogers. (2009) Modeling Tamarisk (*Tamarix* spp.) Habitat and Climate Change Effects in the Northwestern United States. *Invasive Plant Science and Management* **2**:3, 200-215

Online publication date: 1-Jul-2009.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (9306 KB)

Sunil Narumalani, Deepak R. Mishra, Robert Wilson, Patrick Reece, and Ann Kohler. (2009) Detecting and Mapping Four Invasive Species Along The Floodplain of North Platte River, Nebraska. *Weed Technology* **23**:1, 99-107

Online publication date: 1-Jan-2009.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (1693 KB)

Paul L. Ringold^a, Teresa K. Magee^b, David V. Peck^c. (2008) Twelve invasive plant taxa in US western riparian ecosystems. *Journal of the North American Benthological Society* **27**:4, 949-966

Online publication date: 1-Dec-2008.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (367 KB) : [Supplementary Materials](#)

Justin D. Hoffman, Sunil Narumalani, Deepak R. Mishra, Paul Merani, and Robert G. Wilson. (2008) Predicting Potential Occurrence and Spread of Invasive Plant Species along the North Platte River, Nebraska. *Invasive Plant*

Science and Management 1:4, 359-367

Online publication date: 1-Oct-2008.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (1216 KB)

Lindsey R. Milbrath, C. Jack Deloach, James L. Tracy. (2007) Overwintering Survival, Phenology, Voltinism, and Reproduction Among Different Populations of the Leaf Beetle *Diorhabda elongata* (Coleoptera: Chrysomelidae). *Environmental Entomology* 36:6, 1356-1364

Online publication date: 1-Dec-2007.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (154 KB)

Manuela Panzacchi, Roberto Cocchi, Piero Genovesi, and Sandro Bertolino. (2007) Population control of coypu *Myocastor coypus* in Italy compared to eradication in UK: a cost-benefit analysis. *Wildlife Biology* 13:2, 159-171

Online publication date: 1-Jun-2007.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (359 KB)

Daniel W. Bean³, Tom L. Dudley, and Julie C. Keller. (2007) Seasonal Timing of Diapause Induction Limits the Effective Range of *Diorhabda elongata deserticola* (Coleoptera: Chrysomelidae) as a Biological Control Agent for Tamarisk (*Tamarix* spp.). *Environmental Entomology* 36:1, 15-25

Online publication date: 1-Feb-2007.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (527 KB)

John F. Gaskin and Patrick B. Shafroth. (2005) HYBRIDIZATION OF *TAMARIX RAMOSISSIMA* AND *T. CHINENSIS* (SALT CEDARS) WITH *T. APHYLLA* (ATHEL) (TAMARICACEAE) IN THE SOUTHWESTERN USA DETERMINED FROM DNA SEQUENCE DATA. *Madroño* 52:1, 1-10

Online publication date: 1-Jan-2005.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (99 KB)

D KNOWLER, E BARBIER. (2004) Importing exotic plants and the risk of invasion: are market-based instruments adequate?. *Ecological Economics*

Online publication date: 29-Dec-2004.

[CrossRef](#)

TOM L. DUDLEY and C. JACK DELOACH. (2004) Saltcedar (*Tamarix* spp.), Endangered Species, and Biological Weed Control—Can They Mix?. *Weed Technology* 18:sp1, 1542-1551

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