

Abstracts

To develop the following abstracts, the editorial staff searches more than 100 scientific journals, professional and organizational newsletters, conference proceedings, and other resources for information relevant to ecological restoration practice and research. Please send suggested abstract sources to the editorial staff (ERjournal@aesop.rutgers.edu).

Climate Change

Wild Bee Abundance Declines with Urban Warming, Regardless of Floral Density. 2018. Hamblin, A.L., E. Youngsteadt (Department of Entomology & Plant Pathology, North Carolina State University, Raleigh, NC, eyoungs@ncsu.edu) and S.D. Frank. **Urban Ecosystems** doi: 0.1007/s11252-018-0731-4

Because insects are small-bodied and ectothermic, the urban heat island effect has been shown to alter insect physiology and abundance in cities. Different insect taxa are affected by heat in different ways and to different degrees but wild bees have seemingly remained prevalent in urban areas. Hamblin et al. examined urban bee community structure in 15 residential yards and three urban natural areas in Raleigh, NC to determine whether temperature is a driver of community structure. The authors used a Land-sat derived heat map to identify a range of warm to cool sites within residential and natural areas. Bee abundance declined by 41% per degree C, and temperature was the primary driver of both abundance and community composition. Although floral density was considered an important factor, only large bees seemed to benefit from increased floral density, but species richness did increase with floral density. Despite this benefit, simply adding more flowers to warmer sites doesn't restore a complete pollinator community. Urban areas have a strong potential to act as refuges of insect diversity so understanding pollinator communities in these areas is essential to restoration practice.

Coastal & Marine Communities

Natural Recovery of *Zostera noltii* Seagrass Beds and Benthic Nematode Assemblage Responses to Physical Disturbance Caused by Traditional Harvesting Activities. 2018. Branco J., S. Pedro, A.S. Alves, C. Ribeiro, P. Materatski, R. Pires, I. Caçador and H. Adão (MARE, University of Évora, Évora, Portugal, hadao@uevora.pt).

Journal of Experimental Marine Biology and Ecology 502:191–202. doi: 10.1016/j.jembe.2017.03.003

Seagrass beds provide important ecosystem functions to coastal environments such as modulating the structure of marine community assemblages, but they are also sensitive to disturbances. In Portugal, seagrass beds are exposed to anthropogenic perturbations such as harvesting of mollusks for consumption or polychaetes used as bait. Seagrass communities in Portugal's Mira Estuary have begun to recover from a major collapse caused by unknown factors, but their recovery has been inconsistent. To understand how seagrass beds respond to digging, Branco and colleagues performed a field experiment comparing plots disturbed by digging to control plots. Their results showed that digging allowed a rapid recovery of the seagrasses. Microbial activity showed no differences between treatment and control plots, and observed variations in nematode assemblages were attributed mainly to changes in physicochemical conditions and other characteristics of seagrasses beds unrelated to digging. These results highlight the ability of this system to recover after low intensity harvesting activities.

Phylogenetically Diverse Macrophyte Community Promotes Species Diversity of Mobile Epi-Benthic Invertebrates. 2018. Nakamoto K. (International Coastal Research Center, Atmosphere and Ocean Research Institute, The University of Tokyo, Otsuchi, Japan, nakamoto@aori.u-tokyo.ac.jp), J. Hayakawa, T. Kawamura, M. Kodama, H. Yamada, T. Kitagawa and Y. Watanabe. **Estuarine, Coastal and Shelf Science** 207:56–62. doi: 10.1016/j.ecss.2018.03.020

In terrestrial systems, plant diversity has been shown to influence a wide array of ecological functions, from nutrient cycling and carbon storage, to species diversity. In marine habitats, there is evidence that species composition of epi-benthic invertebrates differs between communities with different macrophyte species. Nakamoto et al. examined whether these differences are a consequence of macrophyte phylogenetic diversity. The authors selected a site on Nagura Bay, Japan and sampled algae and invertebrates in the macrophyte bed. Results demonstrated a positive relationship between invertebrate abundance and macrophyte biomass, species richness and taxonomic diversity of macrophytes but no difference in species diversity. The

latter, being the most interesting result for restorationists, as it evidences how different levels of diversity have different effects on community structure. In this particular habitat, enhancing only macrophyte species diversity would have not accomplished the goal of maintaining a high diversity of invertebrates.

Economics & Ecosystem Services

Prioritizing Sites for Ecological Restoration Based on Ecosystem Services. 2018. Comín, F.A. (Instituto Pirenaico de Ecología, Spanish National Research Council, Zaragoza, Spain, comin@ipe.csic.es), B. Miranda, R. Sorando, M.R. Felipe-Lucia, J.J. Jiménez and E. Navarro. *Journal of Applied Ecology* 55:1155–1163. doi: 10.1111/1365-2664.13061

The shift in focus of the field of restoration ecology from re-creating reference sites toward restoring ecosystem function and ecosystem services has paralleled with a shift from small-scale restorations to landscape-scale projects. Because large-scale restorations require more funds, prioritizing sites to maximize ecosystem services has become essential. Comín and colleagues developed the Relative Aggregated Value of Ecosystem Services (RAVES) index as a method of assessing high priority restoration sites and optimizing management plans. The index integrates societal value and value-weighted ecosystem services specific to a given study area. The authors applied the RAVES index to the Piedra River watershed of Spain, which contains a variety of habitats including riparian forests, oak forests, and scrublands. Areas with native vegetation and riparian forests yielded the highest values while agricultural areas, river stretches that lacked riparian forest, and steep slopes showed low values. The RAVES index integrates ecology and societal values to rank sites over large spatial scales and identify optimal management strategies for restoring and maintaining ecosystem services and ensuring successful restoration outcomes.

Grasslands

Rodent, Snake and Raptor Use of Restored Native Perennial Grasslands is Lower than Use of Unrestored Exotic Annual Grasslands. 2018. Wolf, K.M. (Russell Ranch Agricultural Sustainability Facility, University of California, Davis, CA, kmwolf@ucdavis.edu), M.A. Whalen, R.P. Bourbour and R.A. Baldwin. *Journal of Applied Ecology* 55:1133–1144. doi: 10.1111/1365-2664.12990

Providing appropriate habitat for wildlife is generally assumed to enhance native fauna biodiversity but the

drivers of animal community responses to plant restoration have not been well-examined. Grasslands in the Central Valley of California have faced degradation from a variety of anthropogenic factors and restoration of these communities via invasive plant removal and native replanting is often assumed to benefit wildlife. Wolf et al. compared rodent, snake and raptor usage and richness in four pairs of restored and unrestored grasslands in the Central Valley. Wildlife activity was higher in unrestored sites, likely due to the increased abundance of *Mus musculus* (house mouse) in unrestored grasslands, which attracted the predatory animals. While grassland restoration undoubtedly enhances native plant diversity, wildlife may respond to factors not directly related to the plant species present at a site. Species-specific restoration plans may need to be taken into account to ensure successful outcomes for target species.

Invasive & Pest Species

Seed Longevity and Dormancy State Suggest Management Strategies for Garlic Mustard (*Alliaria petiolata*) and Japanese Stiltgrass (*Microstegium vimineum*) in Deciduous Forest Sites. 2018. Redwood, M.E., G.R. Matlack (Dept. of Environmental and Plant Biology, Ohio University, Athens, OH, matlack@ohio.edu) and C.D. Huebner. *Weed Science* 66:190–198. doi: doi.org/10.1017/wsc.2017.74

Seed bank regeneration often hinders invasive plant management, rapidly replacing removed aboveground plants and previous studies have shown that invasive population growth is often strongly supported by seed bank regeneration. To minimize this effect, management must focus on the dormancy and germination patterns of individual species but these life history traits are unknown for many common invaders. Redwood and colleagues examined seed longevity and dormancy in *Microstegium vimineum* (Japanese stiltgrass) and *Alliaria petiolata* (Garlic mustard) over a two-year period in deciduous forests in southeastern Ohio. The authors buried nylon seed bags, then retrieved them every two months for 24 months and tested their viability. Up to 88% of *A. petiolata* seeds survived the full two years and germinated regardless of season. *Microstegium vimineum* experienced high germination rates in spring but no germination in winter. These results suggest that *M. vimineum* may be eradicated quickly with appropriate control measures but *A. petiolata* may take upwards of a decade to eliminate seedbank regeneration potential.

Coleopteran Communities Associated with Forests Invaded by Emerald Ash Borer. 2018. Savage, M.B. and L.K. Rieske (Department of Entomology, University of Kentucky, S-225 Ag North, Lexington, KY Lrieske@uky.edu). *Forests* 69:1–13. doi: 10.3390/f9020069

The invasive beetle, *Agrilus planipennis* (Emerald ash borer), has caused extensive damage to *Fraxinus* spp. (Ash tree) forests throughout the US since its introduction in the early 2000s. *Agrilus planipennis* precipitates both direct effects in the form of tree mortality and altered forest structure as well as indirect effects such as increased light gaps, coarse woody debris accumulation, and changes in litter inputs which alters forests floor temperature and moisture. Consequently, soil arthropod community structure is also altered in invaded forests, and changes to Carabidae (Ground beetle) communities have already been documented. Savage and Rieske examined native beetle communities in five *A. planipennis*-invaded northern Kentucky forests. The authors assessed tree canopy damage and captured beetles, which were identified and assigned to various feeding guilds. Beetle abundance was significantly different across study sites with an increase in predatory, herbivorous, and fungivorous guilds positively correlated with increased *Fraxinus* damage. As *Fraxinus* forests decline and change in response to *A. planipennis* invasion, knowledge of these changes is essential to effective restoration.

Lakes, Rivers & Streams

Simple Pond Restoration Measures Increase Dragonfly (Insecta: Odonata) Diversity. 2018. Janssen, A., H. Hunger, W. Konold, G. Pufal (Nature Conservation and Landscape Ecology, University of Freiburg, Germany, gesine.pufal@nature.uni-freiburg.de) and M. Staab. *Biodiversity and Conservation* doi: 10.1007/s10531-018-1539-5

Ponds often contain more biodiversity than other freshwater systems and have experienced degradation due to destructive land use practices. Increased diversity of plants, amphibians, and macroinvertebrates in ponds is correlated with decreased shading and sedimentation. Techniques to reduce shading and sedimentation are often implemented in pond restorations but the subsequent effects on target pond taxa are rarely assessed. Janssen et al. examined whether and how these techniques affect Odonata diversity in 29 ponds (17 unrestored, 12 restored) in southwest Germany. As top predators, Odonata play an important role in freshwater ecosystems and are known to be sensitive to environmental changes. *Carex* spp. (sedge) and macrophyte cover were the primary drivers of Odonata diversity. These factors were both directly and

indirectly influenced by restoration techniques to decrease shading, which not only improved Odonata habitat but also increased suitability for other taxa. This study demonstrated that restoration processes need not always be complicated: simple restoration techniques such as the ones demonstrated here can result in significant positive change.

Outreach

Participatory Monitoring to Connect Local and Global Priorities for Forest Restoration. 2018. Evans, K (Center for International Forestry Research, Lima, Peru, kristenannevans@gmail.com), M.R. Guariguata and P.H.S. Brancalion. *Conservation Biology* doi: 10.1111/cobi.13110

Participatory monitoring engages multiple levels of stakeholders, including local citizens, in restoration projects. This type of monitoring leads to collaborative decisions that increase success and long-term commitment. In this review paper, Evans et al. analyzed 136 articles and resources as well as conducted interviews with international experts to develop a framework for participatory monitoring. Results indicated that, with training, citizens are able to collect usable data on forest change, threats and various impacts, better and at lower cost than either remote sensing or professional monitoring. This type of monitoring can link local needs to larger-scale priorities, improving restoration outcomes and long-term success.

Willingness to Participate in the Restoration of Waters in an Urban-Rural Setting: Local Drivers and Motivations Behind Environmental Behavior. 2018. Sarvilinna, A (Finnish Environment Institute, Helsinki, Finland, auri.sarvilinna@gmail.com), V. Lehtoranta and T. Hjerppe. *Environmental Science & Policy* 85:11–18. doi: 10.1016/j.envsci.2018.03.023

Government has typically played a dominant role in managing European environmental projects, but limited budgets have increased the need for collaboration between government and other stakeholders. Local inhabitants are important stakeholders since they often directly benefit from restoration efforts and should be included in both planning and funding local projects. Sarvilinna and colleagues used contingent valuation surveys to assess public attitudes regarding an aquatic restoration project in an urban, peri-urban, and rural area in Finland. These surveys assess stakeholders' consumption level of environmental commodities and estimate the monetary value of these commodities to measure participants' maximum willingness-to-pay for commodities. Willingness to pay for and/or participate in environmental projects differed among the surveyed groups with urban respondents being

more willing to pay but less inclined to participate. Rural respondents, who were in closest proximity to the project were both willing to pay as well as participate and peri-urban respondents were least inclined to pay or participate. Inclusion of local communities can improve satisfaction with restoration results as well as ensure continuing protection of restored areas.

Planning & Policy

Evaluating the U.S. Estuary Restoration Act to Inform Restoration Policy Implementation:

A Case Study Focusing on Oyster Reef Projects. 2018. Blomberg, B.N. (Harte Research Institute for Gulf of Mexico Studies, Texas A&M, Corpus Christi, TX, bbloomberg01@gmail.com), J. Beseres Pollack, P.A. Montagna and D.W. Yoskowitz. *Marine Policy* 91:161–166. doi: 10.1016/j.marpol.2018.02.014

The Estuary Restoration Act (ERA) was passed in 2000 and its goals include restoration of estuarine habitats, establishment of common monitoring standards and enhancement of research capabilities as well as communication of project data and outcomes to the public. Oyster reefs represent a particularly threatened estuarine habitat, having experienced global losses greater than any other marine or estuarine habitat despite management efforts. These communities provide ecosystem services not only in the form of food resources but also nutrient cycling, shoreline stabilization and recreation. The National Oceanic and Atmospheric Administration (NOAA) and the Estuary Habitat Restoration Council established a National Estuaries Restoration Inventory (NERI) to evaluate oyster habitat restoration. Blomberg et al. examined the progress of the ERA with regard to oyster reefs and found that although there was a positive outcome of over \$45 million was invested in nearly 200 projects, monitoring and success data was still distinctively lacking and public communication also needed improvement. Effective, long-term monitoring as well as communication both between practitioners, policy makers and the public are critical if restoration projects are to be both successful and cost-effective.

Combining Ecosystem Services Assessment with Structured Decision Making to Support Ecological Restoration Planning. 2018. Martin, D.M. (U.S. Environmental Protection Agency, Office of Research and Development, Atlantic Ecology Division, Narragansett, RI, martin.davidm@epa.gov), M. Mazzotta and J. Bousquin. *Environmental Management* doi: 10.1007/s00267-018-1038-1

Restoration decision-making has typically used factors such as biodiversity, nutrient availability and ecosystem services to evaluate functionality of restored ecosystems.

However, social benefits to local inhabitants of restored ecosystems such as clean air and water, education, and recreation must also be taken into account when determining success, especially those in urban areas, even if traditional markers of success are not as high. Here, Martin and colleagues examined social benefits of restoration projects by combining ecosystem service assessment and structured decision making to measure benefits of Rhode Island's Woonasquatucket River watershed. The authors analyzed potential restoration sites for their abilities to provide floodwater retention, aesthetics, education, recreation, and bird life, and developed a scoring tool to communicate the value of each restoration candidate site. This type of objective approach can be useful to informing decision-making processes of restoration practitioners.

Propagation & Introduction

On the Reintroduction of the Endangered Thick-Shelled River Mussel *Unio crassus*: The Importance of the River's Longitudinal Profile. 2018. Zając, K. (Institute of Nature Conservation, Polish Academy of Sciences, Kraków, Poland, kzajac@iop.krakow.pl), J. Florek, T. Zając, P. Adamski, W. Bielański, A.M. Ćmiel, M. Klich and A.M. Lipińska. *Science of the Total Environment* 624:273–282. doi: 10.1016/j.scitotenv.2017.11.346

Though once widespread, many freshwater mussels (Order Unionida) are now among the most endangered invertebrates. Mussel populations are influenced by a variety of biotic and abiotic factors including chemical pollution, waterway hydraulics and host fish availability (required for larval dispersal), making restoration of these organisms challenging. Zając et al. reintroduced populations of *Unio crassus* (Thick-shelled river mussel) to their historical range in the Biała River in southern Poland, aiming to join two remnant populations. The authors monitored environmental factors potentially affecting the reintroduced populations and found that abundance was more impacted by the river's physical features such as channel slope and elevation rather than by chemical attributes of the water. Juvenile recruitment followed the same pattern, despite the availability of larval host fish, which were unaffected by any factors in the study. Due to their environmental sensitivity, unionid mussels are often used as indicator species, so maintaining and assessing their populations is of importance to restoration practitioners aiming to determine successful project outcomes.

Reintroduction of the Highly Endangered Mollusk *Patella ferruginea* Gmelin, 1791 in an MPA: A Novel Approach to Achieve High Survival Rates.

2018. Zarrouk, A. (Research Unit Ecosystems and Aquatics Resources, Institut National Agronomique de Tunisie, University of Carthage, Tunisia, anis.zarrouk@spa-rac.org), M. Salah, Romdhane and F. Espinosa. *Estuarine, Coastal and Shelf Science* 202:259–269. doi: 10.1016/j.ecss.2018.01.014

Patella ferruginea (Ribbed Mediterranean limpet) is the most endangered marine endemic invertebrate on the Western Mediterranean coast due to extreme range contractions over the last century. Translocation of individuals from established populations and release of captive-bred limpets have been the main reintroduction strategies for this species since the 1980s. However, high mortality rates are associated with both methods. In addition to being largely unsuccessful, such methods are also costly. Zarrouk and colleagues evaluated a new protocol for translocation using protective cages around translocated individuals, comparing mortality rates to un-moved control populations and translocated individuals without protective cages in Tunisia's Zembra Archipelago National Park. Caged limpets showed higher survival rate than uncaged limpets after 697 and 457 days at two sites. Larger limpets (> 4–6 cm) also showed increased survival rates. For critically endangered species, such as *P. ferruginea*, decreasing mortality during conservation processes is of utmost importance.

Reclamation, Rehabilitation & Remediation

Saltmarsh Plants, But Not Fertilizer, Facilitate Invertebrate Recolonization After an Oil Spill. 2018. Johnson, D.S. (Department of Biological Sciences, College of William and Mary, Virginia, dsjohnson@vims.edu), J.W. Fleeger, M.R. Riggio, I.A. Mendelsohn, Q. Lin, S.A. Graham, D.R. Deis and A. Hou. *Ecosphere* 9(1): e02082.10.1002/ecs2.2082

The Deepwater Horizon oil spill of 2010 had a devastating effect on Louisiana's wetlands. Since then, billions of dollars have been allocated to restoration efforts, with no clear evaluation of the methods used to achieve recovery. Johnson and colleagues performed factorial experiments to test effects of the addition of *Spartina alterniflora* (Smooth cordgrass) transplants and nutrients to heavily oiled marshes in Barataria Bay, Louisiana. Their results indicated that transplanting had a positive effect on the associated assemblage of annelids, but nutrients had no effect on invertebrate density. Finally, they highlighted the positive effect of the transplants on early stages of the pioneer polychaete, *Capitella capitata*. Understanding the

role of transplanting in ecosystem recovery after anthropogenic disturbance can elucidate successional processes that speed restoration.

Species at Risk

Habitat Fragmentation, Low Seed Germination Rates, and Herbivory Impede Conservation Efforts for a Prairie Relict Wildflower. 2018. Daniels, K., D. Hagan (Department of Forestry and Environmental Conservation, Clemson University, SC, dhagan@clemson.edu) and D. Jachowski. *Journal of the Torrey Botanical Society* 145:121–125. doi: 10.3159/TORREY-D-17-00020.1

In much of the eastern United States, suppression of natural disturbance regimes has led to replacement of a diverse mosaic of plant communities with late successional forests. Few open habitats, such as prairies, remain and species endemic to these communities have experienced declines. *Symphytotrichum georgianum* (Georgia aster), a species endemic to remnant prairie ecosystems in the southeast, is one such species and has been designated as a target species for conservation and management. Daniels et al. inventoried populations of *S. georgianum* in areas where it was historically present in central South Carolina as well as conducting germination studies. Across 7,000 ha, they found 37 fragmented patches. The plant also experienced low germination rates, suggesting inbreeding depression in the small populations. Additionally, this species was subject to intense herbivory by *Sylvilagus floridanus* (eastern cottontail). Since *S. georgianum* thrives in early successional habitats, active forest management to create and maintain these habitats will be critical for maintaining populations of this plant.

Balancing Ecological Costs and Benefits of Fire for Population Viability of Disturbance-Dependent Butterflies. 2018. Warchola, N., E.E. Crone and C.B. Schultz (Washington State University, Vancouver, WA, schultzc@wsu.edu). *Journal of Applied Ecology* 55:800–809. doi: 10.1111/1365-2664.12983

Ecological disturbances restructure habitats and alter community interactions and many species depend on these changes. Disturbances are often anthropogenically suppressed, so many disturbance-dependent species are threatened. *Plebejus icaroides fenderi* (Fender's blue) is a federally-endangered butterfly endemic to Oregon's remnant native prairies due to the presence of several lupine species, which serve as larval hosts. Warchola and Schultz conducted burning experiments in Oregon's Bassett Slough National Wildlife Refuge, and monitored pre- and post-burning population dynamics and behavioral responses of *P. icaroides fenderi*. Though fires induced larval mortality and didn't affect adult behavior, fecundity was increased for two years after burning. The authors also

modeled butterfly population dynamics under different burning regimes and found that targeting burning yields the highest population growth rates. Studies that enhance our understanding of disturbance on population dynamics are critical to restoring habitat for disturbance-dependent species.

Technology & Tools

A Method for Determining *Batillaria attramentaria* Distribution Using Aerial Balloon Photography and a Vegetation Index Camera: Demonstration at the Yatsu Tidal Flat, Chiba Prefecture. 2018. Shiraki, Y. (Geo-Environmental Science, Rissho University, Saitama, Japan, shiraki@ris.ac.jp), T. Kitazawa, S. Lee and Y. Senga. *Advances in Remote Sensing* 7:15–24. doi: 10.4236/ars.2018.71002

Remote sensing is often used to collect landscape data in large areas that would otherwise be difficult to assess in the field. While this technique is valuable for many restoration projects because it is inexpensive and not labor-intensive, it is ineffective for monitoring small species such as invasive invertebrates. Shiraki et al. used an aerial balloon fitted with a vegetation index camera to assess populations of invasive *Batillaria attramentaria* (Japanese mud snail) which associate closely with invasive *Ulva* spp. (sea lettuces) in the Yatsu Tidal flat, a remnant tidal flat in Tokyo Bay. The balloon operated at 5–10 m above the tidal flat and the authors were able to distinguish between photographed snails and sea lettuces at a depth of up to 10 cm of water due to different spectral reflectances of the two species. While not as passive as remote sensing, this technique may still provide advantages over traditional field sampling methods such as manual surveys.

Urban Restoration

Human-Modified Landscape Acts as Refuge for Mammals in Atlantic Forest. 2018. Bovo, A.A.A, M. Magioli, A.R. Percequillo, C. Kruszynski, V. Alberici, M.A.R. Mello, L.S. Correa, J.C.Z. Gebin, Y.G.G. Ribeiro, F.B. Costa, V.N. Ramos, H.R. Benatti, B. Lopes, M.Z.A. Martins, T.R. Diniz-Reis, P.B. Camargo, M.B. Labruna and K.M.P.M.B. Ferraz (Universidade de São Paulo, Escola Superior de Agricultura “Luiz de Queiroz”, Brasil, katia.ferraz@usp.br). *Biota Neotropica* 18:1–12. doi: 10.1590/1676-0611-BN-2017-0395

Human-modified landscapes (HMLs) are habitat fragments surrounded by agriculture or urban areas and are a dominant habitat type in Brazil’s Atlantic Forest. Although animals inhabiting these landscapes face challenges, these areas still provide valuable habitat for a variety of fauna. While most fauna in HMLs are generalists, rare or

threatened species may sometimes be found in these fragments. Bovo et al. used active searching, camera and live traps, and mist nets to assess populations of terrestrial and flying mammals in three sites in Brazil’s Atlantic Forest. Despite high anthropogenic disturbance at the sites, the authors found 35 native and seven non-native mammal species. Most of the fauna were generalists but three nationally threatened and two data-deficient species were also recorded. Significant threats in these HMLs were low quality habitat, road kills, and high populations of domestic dogs and cats. Studies examining the use of HMLs by mammal species are critical to informing restoration and conservation practice in human-dominated landscapes.

Hierarchical Multi-Taxa Models Inform Riparian vs. Hydrologic Restoration of Urban Streams in a Permeable Landscape. 2018. Gwinn, D.C. (Biometric Research, Fremantle, Western Australia, Australia, dgwinnbr@gmail.com), J.A. Middleton, L. Beesley, P. Close, B. Quinton, T. Storer and P.M. Davies. *Ecological Applications* 28:385–397. doi: 10.1002/eap.1654

Urban stream syndrome, characterized by simplified structure, increased hydrologic variability and elevated temperature, nutrient, and chemical load, is a central challenge for urban restoration ecologists. In particular, streams that are mildly sloped and located in permeable landscapes appear to be particularly sensitive. Gwinn and colleagues compared macro-invertebrate community diversity in streams located along an urban to rural gradient in Perth, Australia. The authors present evidence that riparian restoration at the local scale may be more effective than catchment-wide influences of imperviousness. While catchment-wide management is encouraged, the authors identify the potential for local, site-specific treatments to increase urban stream habitat and integrity. Urban stream syndrome is a global issue that should be addressed at multiple scales of restoration and urban planning.

Wetlands

Restoration of Native Mangrove Wetlands Can Reverse Diet Shifts of Benthic Macrofauna Caused by Invasive Cordgrass. 2018. Feng, J., Q. Huang, H. Chen, J. Guo and G. Lin (Division of Ocean Science and Technology, Tsinghua University, Shenzhen, China, lingh@tsinghua.edu.cn). *Journal of Applied Ecology* 55:905–916. doi: 10.1111/1365-2664.12987

Mangrove communities are generally resistant to invasion but over the last several decades *Spartina alterniflora* (Smooth cordgrass) has invaded mangrove wetlands in southeastern China. *Spartina alterniflora* can be effectively controlled via cutting, waterlogging, and re-establishment of native vegetation. However, restored communities have less biodiversity and provide fewer ecosystem services than

un-invaded sites and little is known about trophic interactions in restored mangrove systems. Feng et al. compared diets of several species of gastropods and arthropods in three restored mangrove wetlands in southern China to a reference site. In restored sites, *S. alterniflora* detritus represented the majority of the diets, which should include a heterogeneous mix of algae. Even in mangrove forests over 40 years old, *S. alterniflora* comprises a portion of the faunal diets, due to nearby *S. alterniflora* wetlands. Restoration and invasive removal can restore trophic interactions but the process is lengthy and invasive species may continue to impact ecosystems long after removal and remediation.

Wildlife Habitat Restoration

Bat Activity Following Restoration Prescribed Burning in the Central Appalachian Upland and Riparian Habitats. 2018. Austin, L.V., A. Silvis, W.M. Ford, (U.S. Geological Survey Virginia Cooperative Fish and Wildlife Research Unit Blacksburg, VA, wmford@exchange.vt.edu) M. Muthersbaugh and K.E. Powers. **Natural Areas Journal** 38:183–195. doi: 10.3375/043.038.0208

Prescribed burning is becoming a frequently-used management tool for fire-adapted plant communities but its effects on bats are not well studied. Because fire may affect taxa differently across habitat types, Austin and colleagues used acoustic surveys to assess bat activity in burned and unburned riparian and upland forest sites in central Virginia. Bats responded differently to fire in upland vs riparian habitats, but statistically, landscape-level burning had only a slight positive impact on bat activity. Bat communities are under stress from white nose syndrome, wind farms, and habitat loss, so understanding bat communities and implementing bat conservation measures are of critical importance to land managers and restoration practitioners.

Woodlands

Early Ecological Outcomes of Natural Regeneration and Tree Plantations for Restoring Agricultural Landscapes. 2018. César, R.G. (University of Sao Paulo, Brazil, ricardogoce@yahoo.com.br), V.S. Moreno, G.D. Coletta, R.L. Chazdon, S.F. Ferraz, D.R. de Almeida and P.H. Brancalion. **Ecological Applications** 28:373–384. doi: 10.1002/eap.1653

To plant or not to plant? For tropical forest restoration practitioners, this is the question. Historically, two broad strategies have been applied to tropical forest restoration:

mixed tree plantings and natural regeneration. As long-term studies emerge, we are beginning to understand how these techniques differ in their ecological outcomes. In the present study, César et al. compare 7–20-year-old mixed tree planting sites and naturally regenerated second-growth forest on former pastures with old-growth reference sites. The authors found planted forests had higher aboveground biomass of native species, but lower abundance and diversity of native seedlings and lianas than second-growth forest. Furthermore, differences in the diversity of naturally regenerating species between second-growth and planted forest sites suggest these forest types may continue to diverge as they continue to mature. These results suggest that after twenty years, the two main approaches to tropical forest restoration may not produce the same outcome. As we scale-up restoration efforts worldwide, long-term understanding of ecological outcomes is imperative for informing policy and restoration approaches.

Planting Accelerates Restoration of Tropical Forest but Assembly Mechanisms Appear Insensitive to Initial Composition. 2018. Li, L., M.W. Cadotte (University of Toronto, Toronto, Ontario, Canada, mcadotte@utsc.utoronto.ca), C. Martínez-artínez, L., M.W. CaDomene and G. Du. **Journal of Applied Ecology** 55:986–996. doi: 10.1111/1365-2664.12976

A central goal for forest restoration is to accelerate the regeneration of diverse, self-sustaining forests. While there is evidence of the efficacy of planting, less is known about the influence of restoration techniques such as plant selection on future community assembly. Can planting strategies increase the diversity, both phylogenetic and functional, of plant communities in restored sites? In this paper, Li et al. test the restoration potential of two planting strategies in the restoration of a tropical pastureland. For eight years, the authors measured natural regeneration and seedling recruitment in wind-dispersed and animal-dispersed species. The results suggest that using either animal or wind-dispersed species accelerates restoration. However, when comparing diversity of naturally regenerating species, there were no reported differences between planting treatments. This research suggests that, while the two planting strategies improve forest restoration, they do not appear to increase either phylogenetic or functional diversity during early succession in tropical forest restoration sites. Ultimately, longer-term studies that test multiple restoration strategies are needed to highlight key ecological mechanisms and strategies to increase restoration success.

***Rhododendron maximum* Impacts Seed Bank Composition and Richness Following *Tsuga canadensis* Loss in Riparian Forests.** Cofer, T.M, K.J. Elliott (USDA Forest Service, Southern Research Station, Center for Forest Watershed Research, Coweeta Hydrologic Laboratory, Otto, N.C., kelliott@fs.fed.us), J.K. Bush and C.F. Miniati. *Ecosphere* 9:1–16. doi: 10.1002/ecs2.2204

Southern Appalachian riparian forests have been altered by pest and pathogen invasions, resulting in changes to forest understory dynamics. The decimation of *Castanea dentata* (American chestnut) by *Cryphonectria parasitica* (Chestnut blight) and *Tsuga canadensis* (eastern Hemlock) by *Adelges tsugae* (Hemlock woolly adelgid) has resulted in increased growth of the understory shrub *Rhododendron maximum* (Rosebay rhododendron). *Rhododendron maximum* inhibits regeneration of canopy trees by physically and chemically altering resource availability. In two North Carolina forests, Cofer and colleagues compared soil seed banks with a dense *R. maximum* cover to forests without *R. maximum*. Density of all species present in the seed bank did not differ between forest types but richness was much lower in forests with *R. maximum* and community composition was not similar between forest types. Several woody species occurred in higher densities in forests with *R. maximum*. Active management of *R. maximum* may be necessary to restore *T. canadensis* forests since seed bank recruitment may not be possible under its cover. Since *R. maximum* is a native species, restoration practitioners may not initially target it for management. Understanding forest regeneration dynamics is critical to assessing restoration potential of forests recovering from pests or pathogens.

Recently Received Titles

If you are interested in reviewing one of the books listed here, please contact the editorial staff at ERjournal@sebs.rutgers.edu.

Botanical Heritage of Islands at the Brink of Niagara Falls

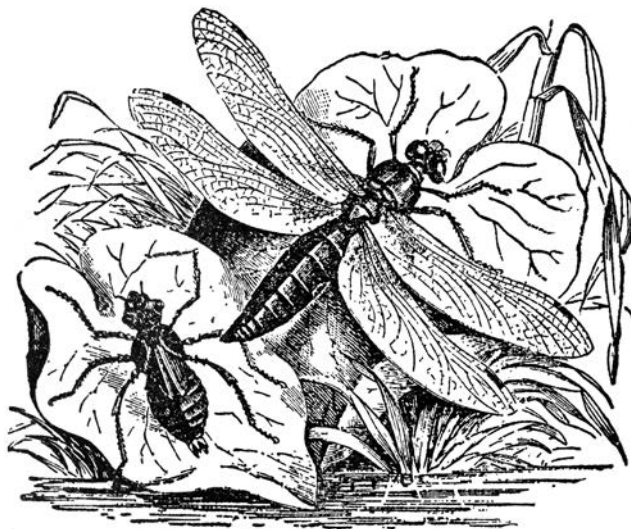
Patricia M. Eckel CreateSpace Independent Publishing Platform. \$28.99 Paperback. ISBN 978-1-48-414180-9. 372 pages.

Ecological Restoration and Power at Niagara Falls

Patricia M. Eckel CreateSpace Independent Publishing Platform. \$24.99 Paperback. ISBN 978-1-53-001773-7. 310 pages.

Sustainability and the Rights of Nature

Cameron La Follete and Chris Maser, CRC Press. \$189.95 Paperback. ISBN 978-1-49-878844-1. 406 pages.



Dragonfly and nymph. 1906. Vaughan L.B. Hill's Practical Reference Library Volume II. New York, NY: Dixon, Hanson and Company. The Florida Center for Instructional Technology, fcit.usf.edu.