

Journal of The American Society of Mining and Reclamation (JASMR)



An Official Online Publication of the American Society of Mining and Reclamation

ISSN Number 2328-8744

Volume 9, Number 3, 2020

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payable prior to placement
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Journal of the American Society of Mining and Reclamation

The Journal of the American Society of Mining and Reclamation (JASMR) promotes the exchange of basic and applied solutions for the reclamation, restoration, and revitalization of landscapes impacted by the extraction of natural resources—including, but not limited to coal, minerals, gas, and oil. Contributions reporting original research, case studies, field demonstrations, or policy dealing with some aspect of ecosystem reclamation are accepted from all disciplines for consideration by the editorial board.

Contributions to JASMR

The Journal of the American Society of Mining and Reclamation publishes contributions under the headings Research Papers, Case Studies, Demonstrations, Policy Papers and Review articles. All papers are peer reviewed. Manuscripts may be volunteered, invited, or coordinated as a symposium.

Research Papers: Emphasis is given to the understanding of underlying processes rather than to monitoring. Applying these principals to specific, replicated laboratory, glasshouse, and field problems dealing with reclamation are encouraged. These reports are grouped into the following ASMR defined groups: ecology, forestry and wildlife, geotechnical engineering, land use planning and design, international tailings reclamation, soils and overburden, and water management.

Case Studies: Papers in this category report on reclamation activities over spatial or temporal scales. Monitoring of the response of ecosystem components (water, soil, and vegetation) to innovative practices are the basis for these case study reports.

Demonstration Studies: Papers in this category report on reclamation activities that do not necessarily include projects where significant amounts of data are collected. These may consist of largely photographic evidence of before and after some reclamation technique is applied. These may be observations that practicing reclamationists have observed that have changed how they continued to enhance the process of returning disturbed landscapes to a more desirable condition.

Policy or Review Papers: Submission of papers dealing with regulatory and procedural issues are welcome. These papers emphasize changing approaches to the science and technology of landscape revitalization. We strive to have them reviewed within 6 weeks.

Other: Letters to the Editor are accepted, and Book Reviews may be invited by the Editor-in Chief.

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Manuscripts are submitted electronically to Dr. Richard Barnhisel at asmrjournal@twc.com or asmr@twc.com

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Donald E Ries



Ronald (Ron) Edward Ries, age 76, passed away on September 8, 2020, at Spirit Mountain Hospice House in Cody, Wyoming.

Ronald was born to Joe and Amelia Ries on February 7, 1944 in Powell, Wyoming. After high school, he continued his education at NW Community College, Powell and the University of Montana, Missoula, receiving a B.S. in Forestry in 1966 and M.S. in Forestry in 1968. and the University of Wyoming, Laramie, graduating with a Ph.D. in Range Management in 1973. Ronald married Ann Taplin on December 17, 1966,

He worked as a Range Scientist for the USDA Agricultural Research Service, at the Northern Great Plains Research Center, Mandan, North Dakota, from June 1974-June 30, 2001. His work included research on reclamation of surface mined lands, grass seedling morphology and establishment and weed ecology and control. He was a life member of ASMR

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Michael Nattrass, Jesse I. Morrison, and Brian S. Baldwin

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DOI: <http://dx.doi.org/10.21000/JASMR20030044>

ABSTRACTS OF PAPERS
Research Papers

**ACID MINE DRAINAGE TREATMENT BY BEAVER IMPOUNDMENTS
IN SOUTHEAST OHIO¹**

Peter G. Dittrich², Rebecca M. Swab and Alexys K. Nolan

Abstract. Nature's engineers, beavers, which have been observed to improve water quality, have created series of dams which act as a passive treatment system for acid mine drainage (AMD). Though this phenomenon has been observed for decades, it has not yet been scientifically quantified. At The Wilds in Southeast Ohio, where this research took place, over 90% of the land was surface-mined for coal. The northern property was mined pre-law and has numerous AMD locations. Strands of beaver ponds with AMD were observed and appeared to treat water similar to engineered passive treatments. Therefore, this study focused on quantifying the differences in water quality in eight series of beaver ponds affected by AMD. Each beaver pond (n=64) was tested for pH, conductivity, Fe, Mn, and temperature on the upstream side of the dam. Findings indicate that Fe and pH have a strong relationship: when pH rose, Fe levels lowered. Fe concentrations were less than 1 mg/L at the end of each strand of ponds, which is considered safe for wildlife. Six out of eight strands had a higher pH at the end than at the beginning. Mn concentrations showed no correlation with distance or pH. Conductivity was relatively constant for all strands. Overall, beaver impoundments did appear to help the water quality, given the final pH levels were raised by an average of 23.5% and Fe concentrations decreased by an average of 22.2%.

Additional Key Words: Coal mining, Strip mining, AMD, Passive treatment.

¹ Paper submitted for consideration for publication in our Journal JASMR and was not presented at our conferences that were held in the past, R.I. Barnhisel (Ed.) Published by ASRS, 1305 Weathervane, Champaign, IL 61821

² Peter Dittrich, Restoration Ecology Apprentice, The Wilds, Cumberland, OH 43732; Rebecca M. Swab, Previous Director of Restoration Ecology, The Wilds; Alexys K. Nolan, Previous Restoration Ecology Program Associate, The Wilds.

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DOI: <http://dx.doi.org/10.21000/JASMR20030001>

DIMENSIONS IN POST-INDUSTRIAL LAND TRANSFORMATION IN PLANNING AND DESIGN: A PORTUGUESE CASE STUDY CONCERNING PUBLIC PERCEPTION¹

L. Loures², J. B. Burley³, T. Panagopoulos⁴, and Jing Zhou⁵

Abstract. Planners and designers are often interested in the criteria, values, and principles employed to create an intervention. In our study, we were interested in respondents' guiding beliefs and principles associated with post-industrial land reclamation. Experts have proposed heuristically, dimensions and sets of guiding planning and design beliefs associated with post-industrial reclamation. We were interested in determining whether these expertly derived dimensions matched the thinking of the population at large. To conduct our study, we started with examining six noted, post-industrial projects to derive a set (list) of design criteria from professionals who worked upon these projects. We then engaged European planning and design professionals and citizens from southern Portugal to examine the mathematical/statistical ordination of these principles. The study revealed that the principles as expressed by the public are structured and organized differently compared to what experts have proposed. The public's perceptions, expectations, and values are dispersed across numerous independent dimensions (seven to twelve or even larger) and are much more complex than the simplistic interpretations presented in the literature by experts. Our study suggests that public expectations concerning post-industrial reclamation are broadly multi-dimensional and arrayed with many variables; it is not simple and not easy to intellectually grasp. The results reflect the complicated set of citizen expectations associated with reclamation projects. To satisfy this set of expectations may not be an easy task. In the successful planning, design, and construction of post-industrial sites, these values/principles/beliefs can form the beginning of a thoughtful program of criteria to begin the planning/design process.

Additional Key Words: environmental design, landscape architecture, environmental psychology, urban design, multivariate analysis, social science, urban ecology, urban anthropology

¹ Paper submitted for consideration for publication in JASMR and was not presented at our conferences that were held in the past, R.I. Barnhisel (Ed.) Published by ASRS, 1305 Weathervane, Champaign, IL 61821

² Dr. Luis Loures is Professor, and Vice-Rector of the Polytechnic Institute of Portalegre, Portugal;

³ Dr. Jon Bryan Burley is in the Landscape Architecture Program at the School of Planning, Design, and Construction, College of Social Science and College of Agriculture and Natural Resources, Michigan State University, E. Lansing, MI, 48824, USA

⁴ Dr. Thomas Panagopoulos is Professor with the Faculty of Science and Technology, University of Algarve, Portugal,

⁵ Jing Zhou is a PhD student in Environmental Design at Planning, Design, and Construction at Michigan State University, E. Lansing, MI, 48824, USA.

Click below for full paper. <https://www.asrs.us/Portals/0/Documents/Journal/Volume-9-Issue-3/Loures-MI.pdf>

DOI: <http://dx.doi.org/10.21000/JASMR20030014>

INFLUENCE OF TEMPERATURE AND VEGETATION ON SELENIUM REMOVAL IN CONSTRUCTED WETLAND MICROCOSMS¹

Michael Natrass², Jesse I. Morrison, and Brian S. Baldwin

Abstract. Intense precipitation events over coal fly ash sediments produce large runoff volumes that can accumulate and transport selenium (Se) into surrounding watersheds and degrade the quality of aquatic ecosystems. Constructed wetland (CW) phytoremediation is a cost-effective, ecological water treatment alternative that relies on plant metabolic processes to improve the quality of Se-impacted runoff. This research was conducted to evaluate the seasonal influence on Se removal in simulated CWs planted with either cattail (CAT; *Typha angustifolia* L.) or duckweed (DWD; *Lemna minor* L.) compared to an unplanted (UNP) control over four consecutive, week-long flood events. CWs were simulated in 110 L microcosms containing 25 kg of Catalpa silty clay loam. Microcosms were acclimated for 14 d before the first flood event, when each received 30 L of simulated selenate-impacted runoff. Runoff treatments included 0, 1x or 2x Se rates. Water, plant, and soil samples were collected at application and six d after treatment application. Total Se concentration [Se] was determined with inductively coupled plasma mass spectrometry (ICP-MS). Data were analyzed with PROC MIXED ($\alpha=0.05$). Overall, CAT and DWD significantly decreased aqueous [Se] by 47% compared to 36% for UNP ($P<0.0001$). Results indicate the greatest aqueous Se removal was observed in the summer (73%) followed by the fall (42%) and spring (41%). Temperature was strongly correlated with Se removal (0.65, $P<0.0001$). At temperatures between 15 and 20°C, CAT and DWD are suitable aquatic species for phytoremediation of selenate-impacted waters in CWs.

Additional Key Words: cattail (CAT), constructed wetlands (CWs), duckweed (DWD), phytoremediation, selenate.

¹ Oral paper presented at the 2019 national meeting of the American Society of Mining and Reclamation, Big Sky, MT, June 3-7, 2019. R.I. Barnhisel (Ed.) Published by ASMR; 1305 Weathervane Dr., Champaign, IL 61821.

² Michael Natrass, Assistant Professor, Tennessee Technological University, Cookeville, TN. ³Jesse I. Morrison, Associate Research Professor, Brian S. Baldwin, Professor, Plant and Soil Sciences, Mississippi State University, Mississippi State, MS.

Click below for full paper. <https://www.asrs.us/Portals/0/Documents/Journal/Volume-9-Issue-3/Natrass-MS.pdf>

DOI: <http://dx.doi.org/10.21000/JASMR20030044>

ABOUT THE AUTHORS

Dr. Brian S. Baldwin is a Professor of Plant Sciences and Genetics. He was born on Long Island, New York and left to attend Bates College (Lewiston, ME) for an undergraduate degree – B.A. Botany. Dr. Baldwin moved to New Mexico to obtain a M.S. in plant breeding, working with alfalfa at New Mexico State University. After three years working as a cotton breeder for Dunn Seed Farms, Inc. in Seminole, TX, he returned to Las Cruces (NMSU) to obtain a Ph.D. in plant genetic improvement. Dr. Baldwin moved to Mississippi State University in 1990; as Assistant Dean of CALS with a teaching appointment in Agronomy (now Plant & Soil Sciences). Over a five-year period, he migrated to teaching and research in Plant & Soil Sciences. During his tenure at Mississippi State, Brian has taught seven courses ranging from Biometrical Genetics to Survey of Agriculture. His research focuses on alternative crops, specializing in native grasses for conservation, reclamation, and forage.



Dr. Jon Bryan Burley has been a member of ASRS for almost 40 years. He earned his PhD in 1995 from the University of Michigan, in Landscape Architecture at the University of Michigan. He is a registered landscape architect and inducted as a Fellow in the American Society of Landscape Architects for his research investigations. Over a decade ago, he was honored as ASRS researcher of the year. He was also the editor of *Environmental Design for Reclaiming Surface Mines* by the Edwin Mellen Press. During his career he has earned 14 AIA/ASLA awards for his research and design projects. Jon is most well-known for his visual quality work and research addressing soil productivity modeling for reclamation purposes, addressing models in MN, WI, MI, ND, MT, WY, CO, TX, GA, and FL. He is a faculty member at Michigan State University in the School of Planning, Design, and Construction affiliated with the MSU College of Social Science and the College of Agriculture and Natural Resources. Jon has been teaching for over 45 years and published his first paper as an undergraduate. He has lectured at 35 universities around the world, is a Fulbright scholar, and was funded by the French government to conduct landscape research for a year. In addition, he has had 33 visiting scholars and visiting students from China, Japan, Turkey, Portugal, and France to collaborate with him at Michigan State University.



Mr. Peter Dittrich is a Cincinnati, Ohio native and undergraduate at The Ohio State University pursuing a bachelor's degree in Environmental Engineering, with a minor in Environmental Sciences. Previously, he was a Restoration Ecology Apprentice at The Wilds, where he actively researched and restored pre-SMCRA reclaimed mine land. He then became a college intern at the Ohio EPA, CDO, where he started the unpermitted discharges project for central Ohio. He is now focused on creating, restoring, and enhancing wetlands around Ohio with the H2Ohio initiative through ODNR before returning to Ohio State and graduating this coming fall semester.



Dr. Luís Loures is a Landscape Architect and Agronomic Engineer, Vice-President of the Polytechnic Institute of Portalegre, who holds a Ph.D. in Planning and a Postdoc in Agronomy. Since he graduated, he has published several peer reviewed papers at the national and international levels and he has been a guest researcher and lecturer both at Michigan State University, and at the University of Toronto, where he has developed part of his Ph.D. research with the Financial support from the Portuguese Foundation for Science and Technology (Ph.D. grant). During his academic career he taught several courses in different Universities including the University of Trás-os-Montes e Alto Douro, Letterkenny Institute of Technology – Ireland, and the University of Algarve, mainly regarding the fields of landscape architecture, urban and environmental planning and sustainability. Currently, is a researcher both at VALORIZA - Research Centre for Endogenous Resource Valorization – Polytechnic Institute of Portalegre, and CinTurs - Research Centre for Tourism, Sustainability and Well-being, University of Algarve, where he is a researcher on several financed research projects focusing on several different investigation domains such as urban planning, landscape reclamation and urban redevelopment, and the use of urban planning as a tool for achieving sustainable development.



Dr. Jesse I. Morrison is currently an Assistant Research Professor in the Department of Plant and Soil Sciences at Mississippi State University. Originally from western North Carolina, Dr. Morrison was first introduced to post-mining reclamation research while completing his Master's degree in Crop Science at the University of Kentucky. Since joining the Forage and Biomass Breeding and Agronomics team at MSU in 2013, Jesse has worked extensively in native plant germplasm development for increased service and function in conservation, revegetation, and forage utilization systems. A devoted outdoorsman, Dr. Morrison's research program strives to conserve genetic diversity in North American native plant species while increasing the value of native plants to contemporary ecosystem designs through the use of traditional breeding methods.



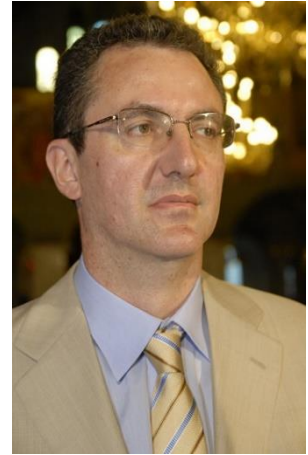
Dr. Michael P. Natrass is an Assistant Professor in the School of Agriculture at Tennessee Technological University. He received his PhD in Plant and Soil Sciences from Mississippi State. His research on constructed wetland phytoremediation earned him the 2020 Mississippi Agricultural and Forestry Extension Service Graduate Research Award. Michael is excited for the opportunity to develop and prepare students to overcome the environmental challenges ahead.



Ms. Alexys Nolan specializes in restoration ecology and land management. She obtained her BSc in Biology at Western Michigan University in 2015, and went on to work on habitat restoration at the Kalamazoo Nature Center in Southwest Michigan and The Wilds conservation center in Southeast Ohio. At The Wilds, she also studied the effects of various restoration techniques on pre-SMCRA forest, and monitored plant and insect communities at established prairies.



Dr. Thomas Panagopoulos is a Professor of landscape restoration at the University of Algarve, Portugal. In 1992 he obtained his MSc in renewable natural resources and a Ph.D. in forestry and natural environment in 1995 from the Aristotle University of Thessaloniki, Greece. He has been vice president of the Research Centre for Spatial and Organizational Dynamics, department head of landscape architecture, and a member of the coordinating body of the Ph.D. program in Innovation and Land Management of the University of Algarve. He has acted as principal investigator or co-investigator in a total of approved funding of over 8 million euros, which is a result of his research strategy that crosses many disciplinary boundaries to create a holistic transdisciplinary approach to science.



Dr. Rebecca Swab is an Ohio native; Rebecca attended the Ohio State University where she received combined bachelor's and master's degrees. She went on to complete her Ph.D. at the University of California Riverside, where she studied how plants respond to stressors such as changing fire intervals and climate change. Rebecca was the Director of Restoration Ecology at The Wilds from 2015-2020. Rebecca's goal as a restoration ecologist is to serve as a bridge between conservation managers and researchers. She couples restoration projects on reclaimed mine lands and other sites with research to determine which restoration methods work best. Information about which methods and projects are the most successful at reaching goals such as increasing native species diversity and ecosystem function are then shared with the larger conservation community to improve the field of restoration ecology.



Ms. Jing Zhou is a doctoral student at Michigan State University. She earned her B.S. in Animal Science in 2015 and M.S. in Zoology and Ecology, Evolutionary Biology and Behavior (EEB) in 2018 from Michigan State University. She has developed strong enthusiasm in zoo and welfare design and is currently working with Dr. Burley on related topics such as habitat model. During her academic career, she has worked with many local zoos in Michigan and interned at one of United States' largest zoo and aquarium design firm – PGAV Destination as zoology specialist who educated and helped designers with exhibit requirements and animal behaviors. Her philosophy is designing zoos and exhibits based on scientific perspectives to provide animals more suitable and sustainable captive environment which can improve their welfare including stimulating natural behaviors and reproduction.

