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INSTITUTE FOR INITIATIVES IN LATIN AMERICA



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UNIVERSIDAD NACIONAL DE TRUJILLO
UNT



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DE MOQUEGUA



UNIVERSIDAD NACIONAL
SANTIAGO ANTÚNEZ DE MAYOLO
"Una Nueva Universidad para el Desarrollo"

Limpiar el agua afectada por la minería con soluciones basadas en la naturaleza



Jonathan O. (Josh) Sharp, PhD
Profesor, Ingeniería Civil y Ambiental
Director Asociado, Centro para la Minería Sostenible

Trabajo en equipo



Profs. Armando Arenazas, Juana Ticona, Lino Morales, & Giuliana Romero



Zhaoxun (Nancy) Yang



Weishi Wang



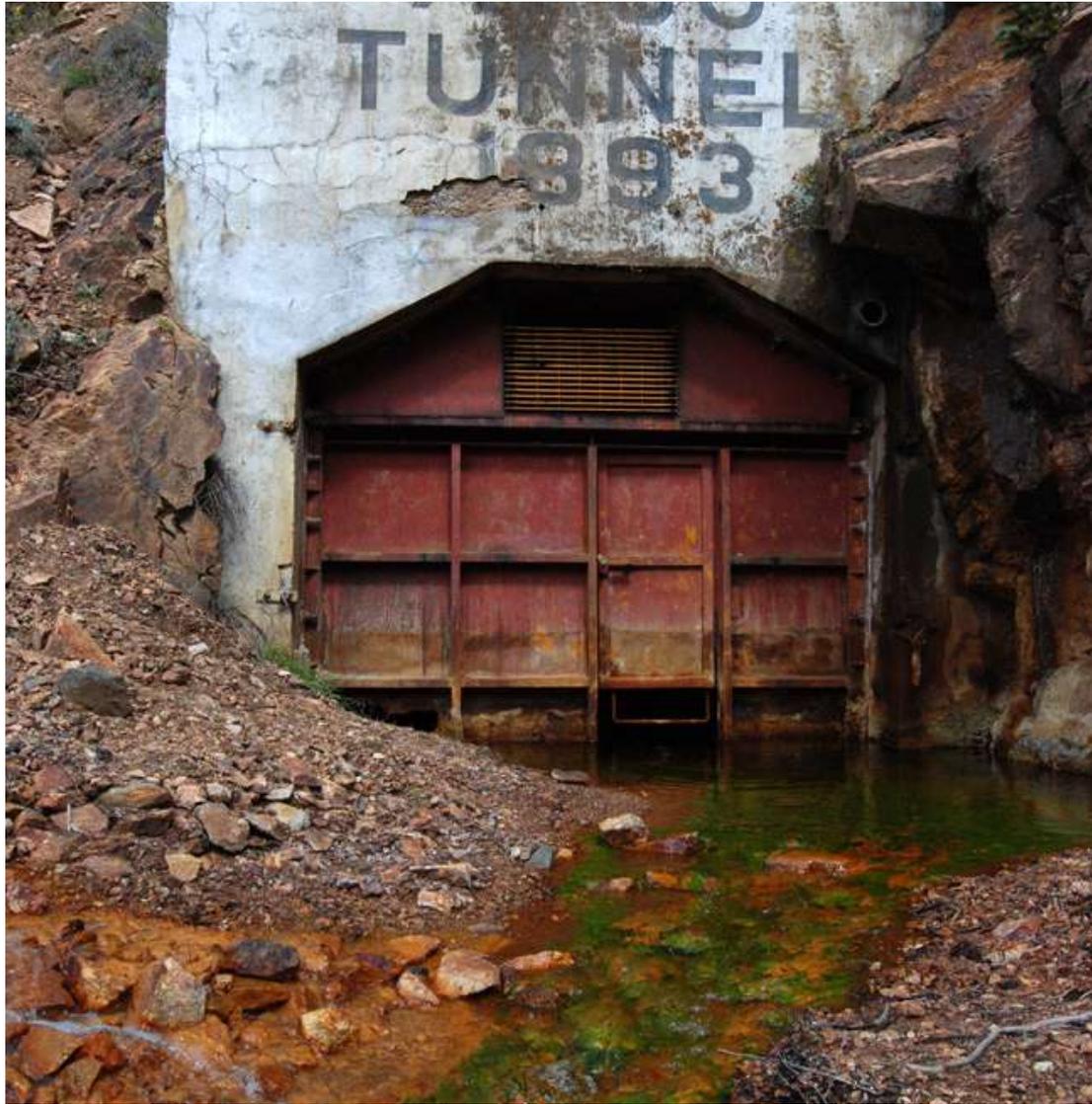
Dr. Gary Vanzin



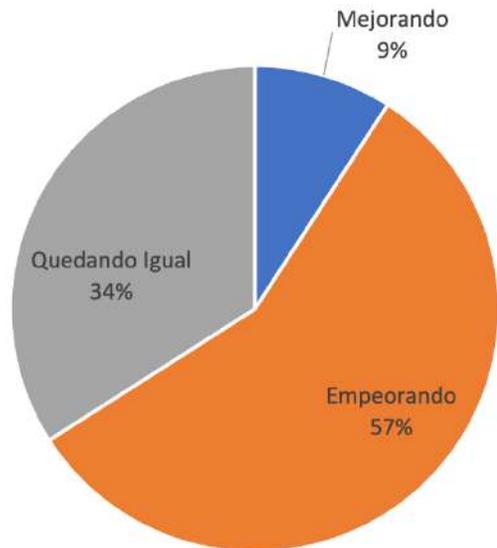
Dr. Pablo Garcia-Chevesich



Dr. Johan Vanneste



Pregunta 7: En general, ¿Cree usted que la calidad del agua del Rio Chili está mejorando, empeorando, o quedando igual? (n=678)



Percepciones sobre el Agua

Encuesta al público Arequipeño sobre calidad y tratamiento del agua

Convenio UNSA-Mines, Proyecto 2.4: Sistemas de humedales de ingeniería híbrida para tratar contaminantes del agua de metales y nutrientes en las aguas de los ríos en la Región de Arequipa.
Investigadores Principales: Dr. Lino Morales (UNSA), Dr. Jonathan Sharp (Mines).







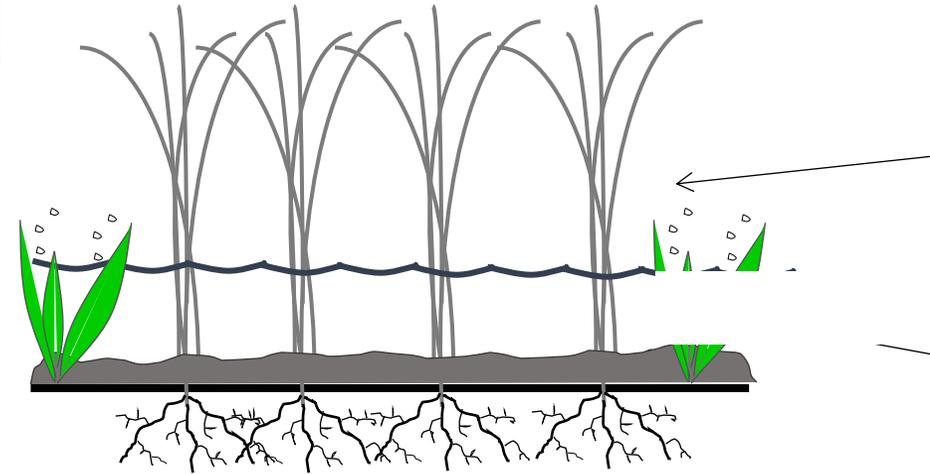
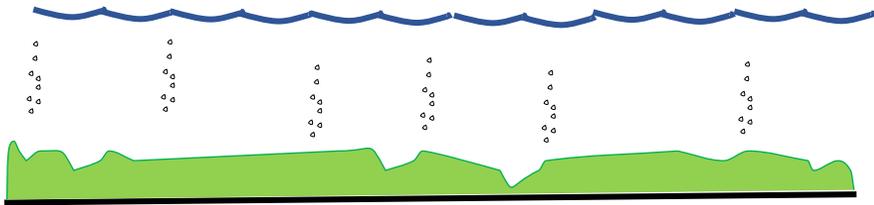
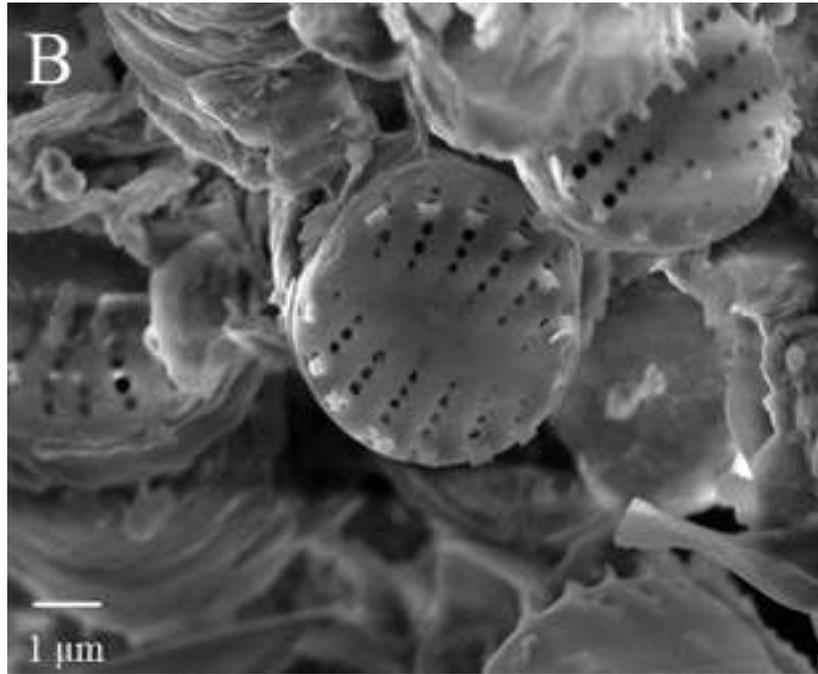


Photo Credits: Erica Gies

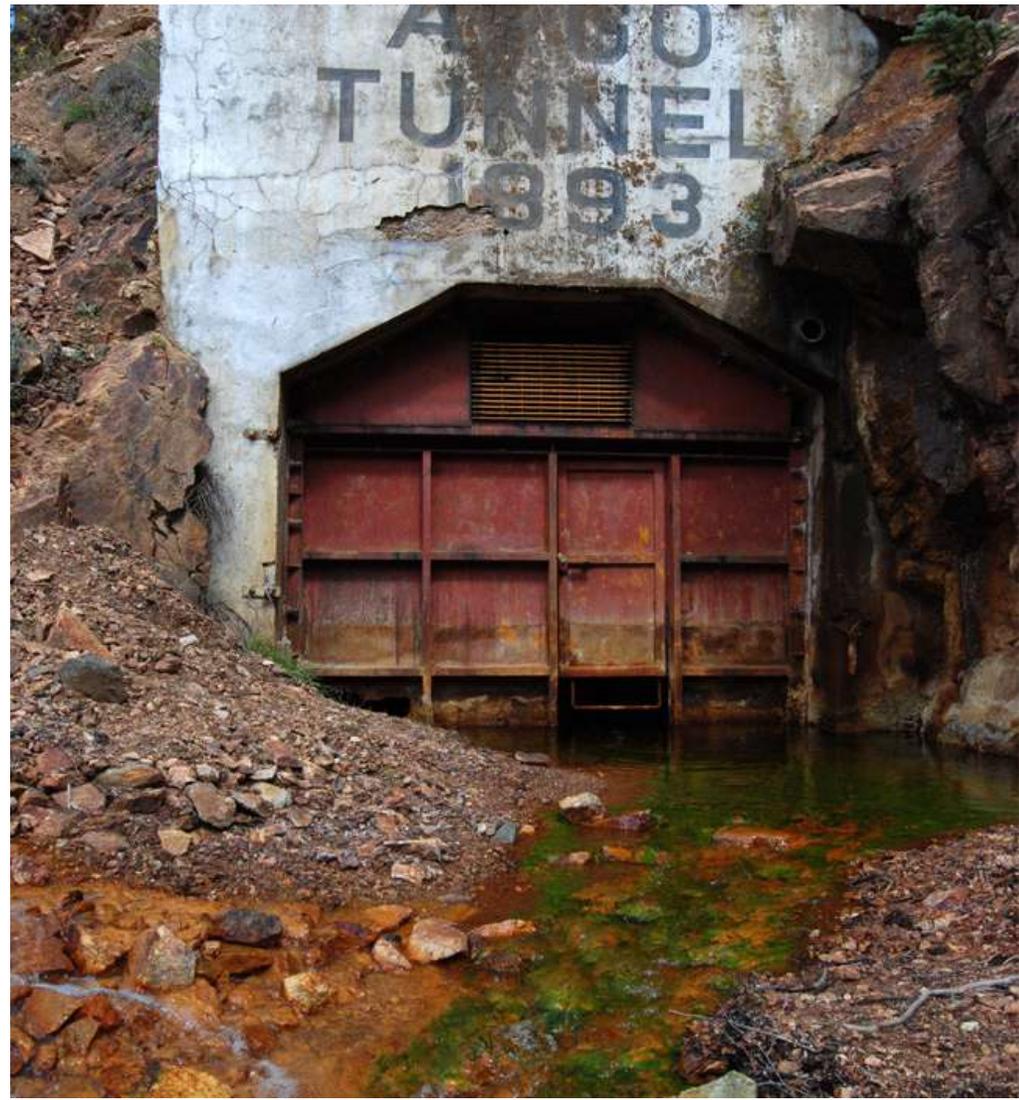
<https://www.bbc.com/future/article/20210510-perus-urgent-search-for-slow-water>

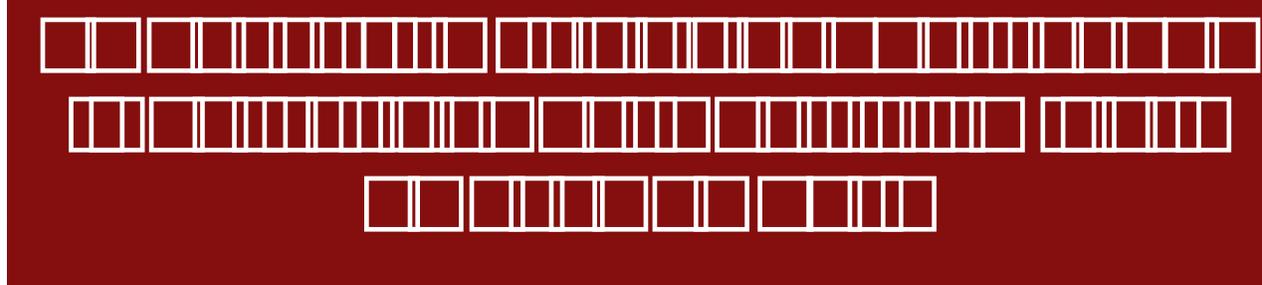
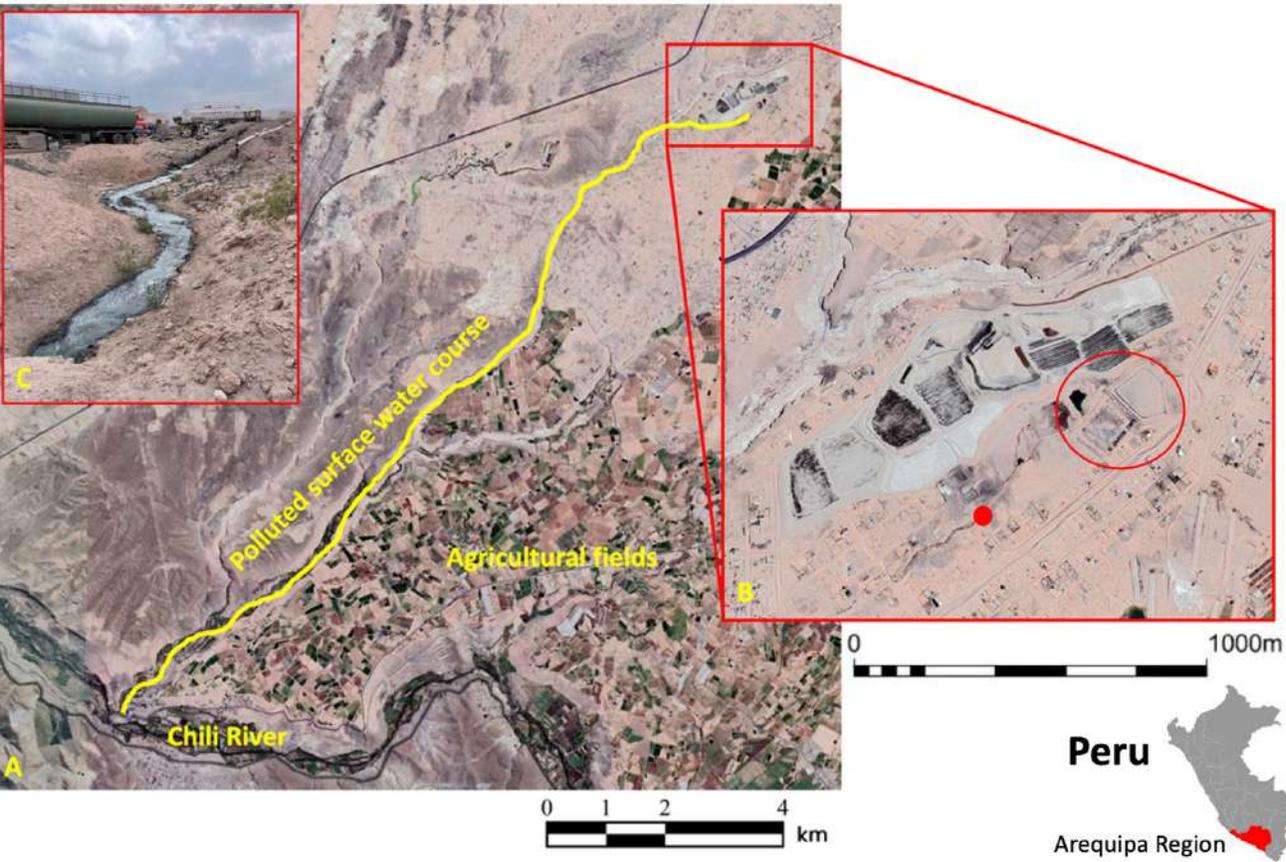












Article

Acute ecotoxicity potential of untreated tannery wastewater release in Arequipa, Southern Peru

Kevin Tejada Meza¹, Armando Arenazas-Rodriguez², Pablo A. Garcia-Chevesich^{3,4*}, Carmen Flores-Farfan⁵, Lino Morales-Paredes⁶, Giuliana Romero-Mariscal⁷, Juana Ticona-Quea⁸, Gary Vanzine⁹, and Jonathan O. Sharp¹⁰

Review

Peruvian Wetlands: national survey, diagnosis, and further steps toward their protection

Giuliana Romero¹, Pablo A. Garcia-Chevesich^{2,3*}, Lino Morales⁴, Armando Arenazas⁵, Juana Ticona⁶, Gary Vanzin⁷, and Jonathan O. Sharp⁸



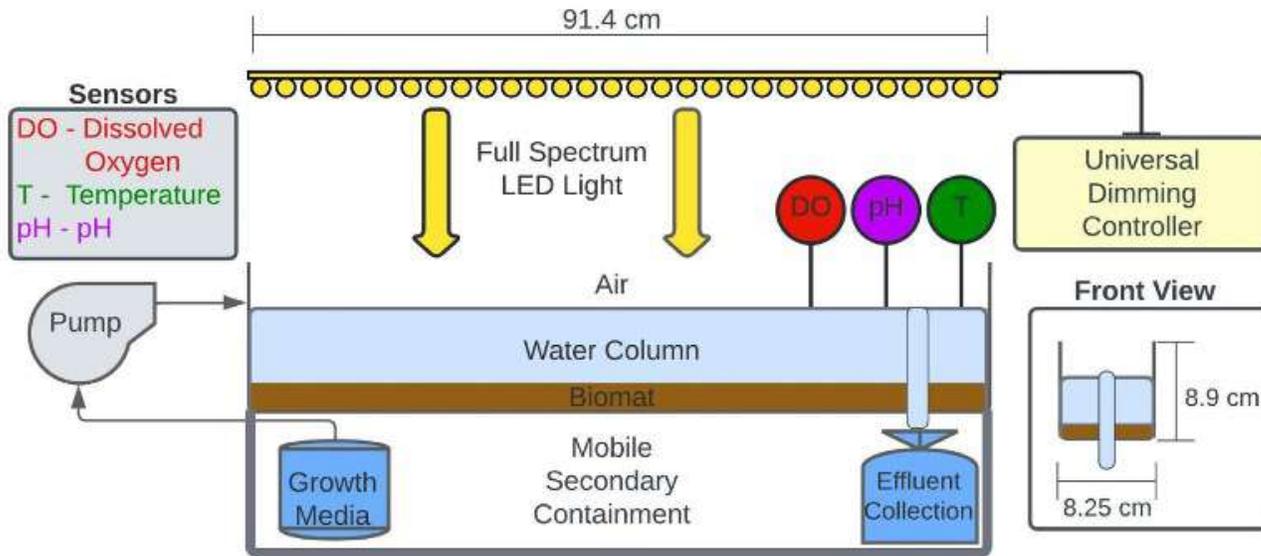


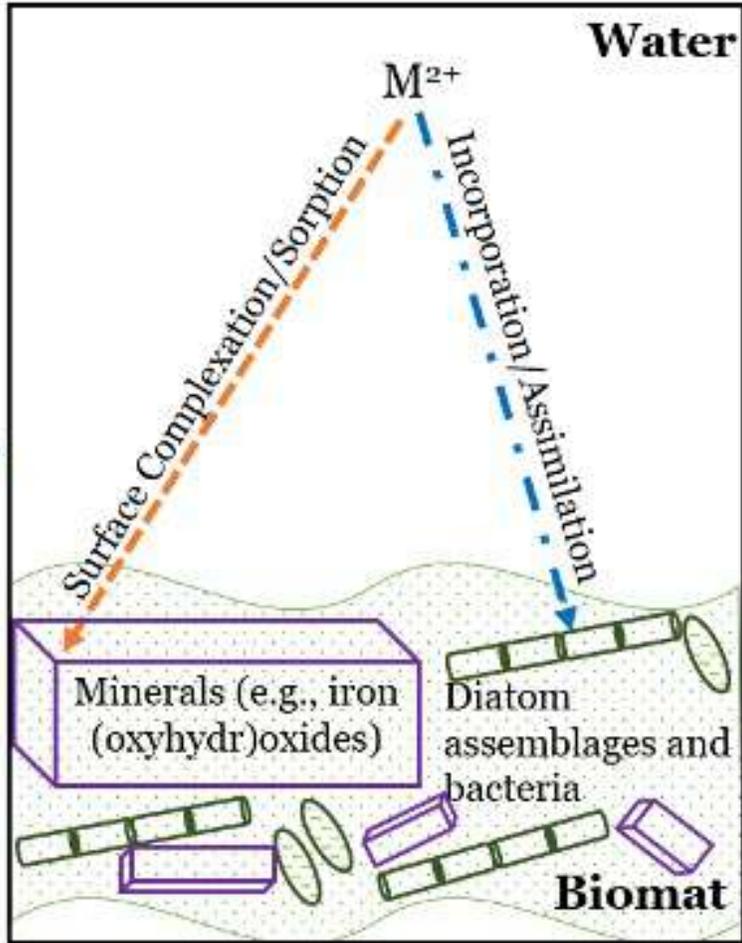
Method Article

Scalable and customizable parallel flow-through reactors to quantify biological processes related to contaminant attenuation by photosynthetic wetland microbial mats

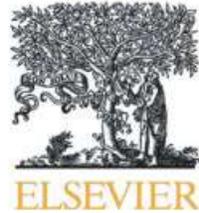
Gary Vanzin^{a,*}, Henry Peel^a, Weishi Wang^a, Lily Bosworth^a, Zhaoxun Yang^a, Michael A.P. Vega^a, Colin Root^a, Adam Brady^a, Giuliana Romero Mariscal^b, Armando Arenazas Rodríguez^b, Juana Ticona^b, Lino Morales Paredes^b, Jonathan O. Sharp^a

^a Department of Civil and Environmental Engineering, Colorado School of Mines, CO 80401, United States
^b Centro de Minería Sostenible, Universidad Nacional de San Agustín de Arequipa, Arequipa 040000, Peru





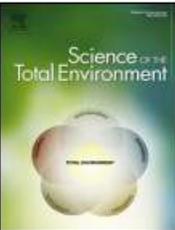
Science of the Total Environment 876 (2023) 162478



Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv



Heavy metal removal by the photosynthetic microbial biomat found within shallow unit process open water constructed wetlands



Zhaoxun Yang^{a,b}, Sarah M. Acker^{a,b}, Adam R. Brady^{a,2}, Armando Arenazas Rodríguez^{b,c}, Lino Morales Paredes^{b,d}, Juana Ticona^{b,d}, Giuliana Romero Mariscal^{b,e}, Gary F. Vanzin^{a,b}, James F. Ranville^{b,f}, Jonathan O. Sharp^{a,b,g,*}

^a Department of Civil and Environmental Engineering, Colorado School of Mines, Golden, CO 80401, United States of America

^b Center for Mining Sustainability, United States of America

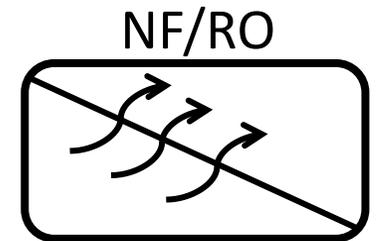
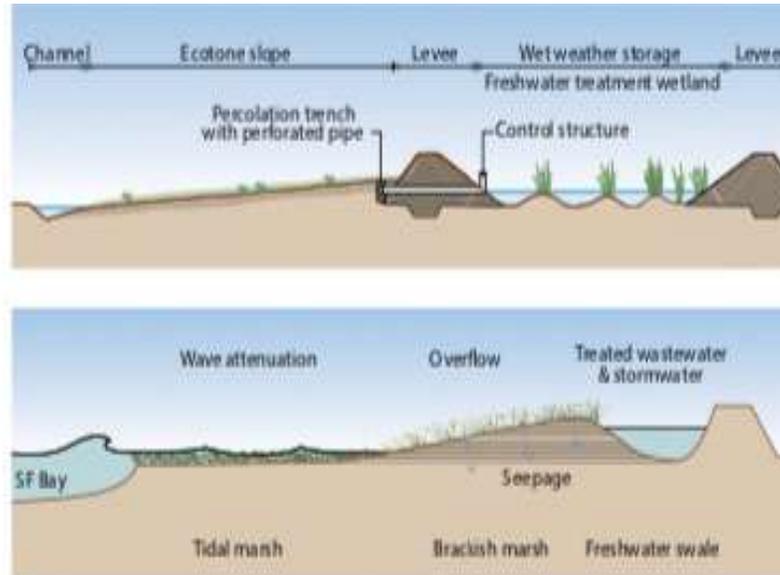
^c Facultad de Ciencias Biológicas, Universidad Nacional de San Agustín de Arequipa, Arequipa, Peru

^d Facultad de Ciencias Naturales y Formales, Universidad Nacional de San Agustín de Arequipa, Arequipa, Peru

^e Facultad de Ingeniería de Procesos, Universidad Nacional de San Agustín de Arequipa, Arequipa, Peru

^f Department of Chemistry, Colorado School of Mines, Golden, CO 80401, United States of America

^g Hydrologic Science and Engineering Program, Colorado School of Mines, Golden, CO 80401, United States of America



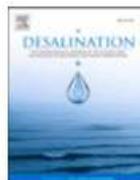
Options for more resilient levees, habitats and shoreline protection. Top: moving the levee inland and buffering it with a wetland; middle, elements of Oro Loma experiment; bottom: profile of possible future

<https://oroloma.org/wp-content/uploads/horizontal-levee-overview.pdf>



Contents lists available at ScienceDirect

Desalination

journal homepage: www.elsevier.com/locate/desal

Pressure-driven membrane processes for boron and arsenic removal: pH and synergistic effects

Aina Orell Regis^a, Johan Vanneste^{a,*}, Sarah Acker^a, Gisella Martínez^b, Juana Ticona^b, Vilma García^b, Francisco D. Alejo^b, Julia Zea^b, Richard Krahenbuhl^a, Gary Vanzin^a, Jonathan O. Sharp^a

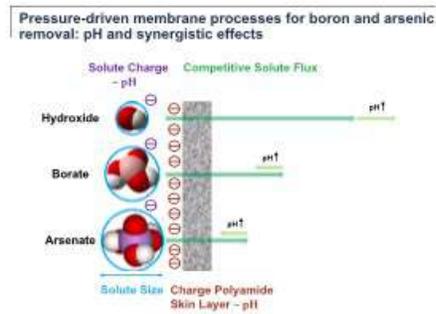
^a Colorado School of Mines, Center for Mining Sustainability, Department of Civil and Environmental Engineering, Golden, CO 80401, USA

^b Universidad Nacional de San Agustín de Arequipa, Centro de Minería Sostenible, Arequipa 04000, Peru

HIGHLIGHTS

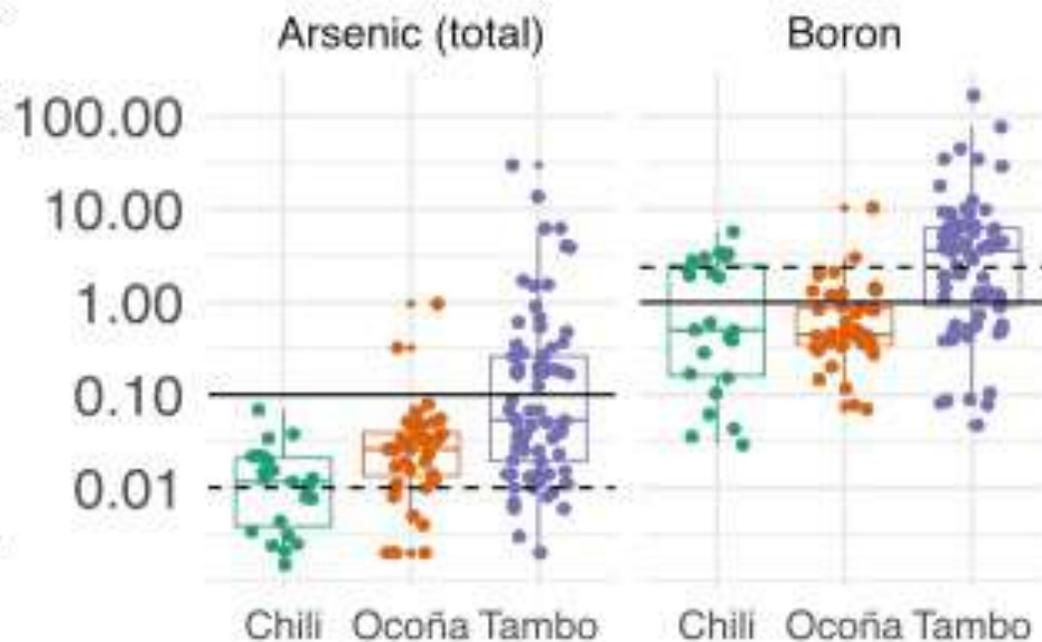
- B and As frequently co-occur in waters in volcanically active regions, as Arequipa.
- Boron and As(III) exhibit a strong increase in membrane rejection with increasing pH.
- Rejection of As(III) and As(V) increases in the presence of boron and vice versa.
- pH and synergistic effect allow a doubling in feed concentration of As(V) for BW30.
- The cost to increase pH to 9.5 for a representative surface water is \$0.03–0.08/m³.

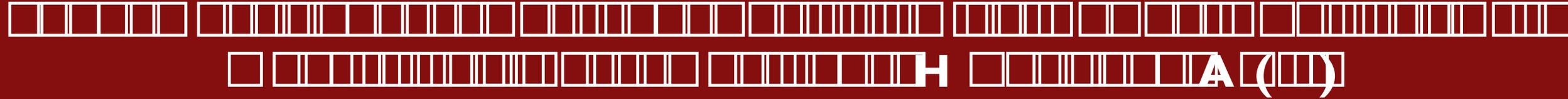
GRAPHICAL ABSTRACT



A

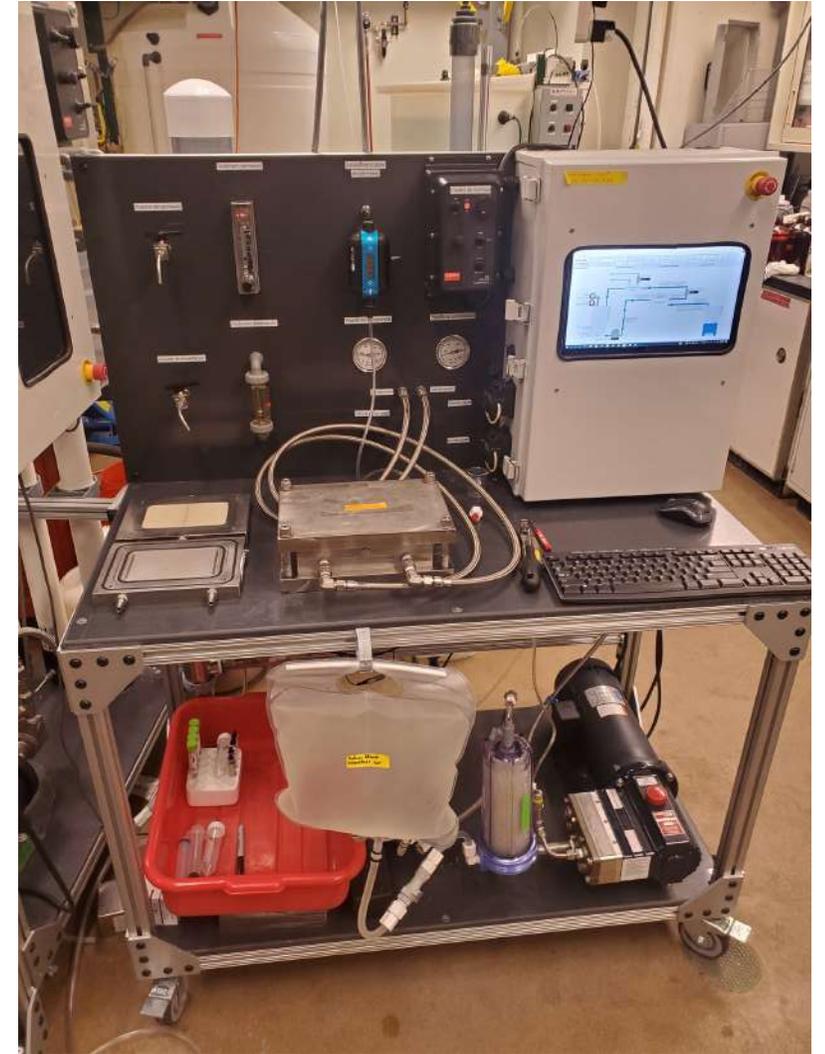
Analyte concentration (ppm)





¡Combinar ambos sistemas!

Tratamiento sostenible que no requiere adición de productos químicos (y produce menos residuos)



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Thank You! – ¡Muchas Gracias!

