

## Books & Journals

New releases  
Browse by subject  
Books  
Journals  
Book Series



Home Catalogue Journals Asian Journal of Water, Environment and Pollution

SHARE THIS JOURNAL

# Asian Journal of Water, Environment and Pollution

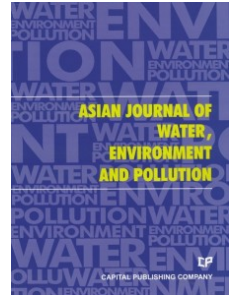
ISSN print 0972-9860  
ISSN online 1875-8568  
Volume 17; 4 issues  
Status Last issue (17:3) online on 14 August 2020  
Next issue 17:4 scheduled for November 2020  
Back volumes 1-16  
Subject Environmental Sciences, Social Sciences

INSTITUTIONAL SUBSCRIPTION FOR 2020

€287 / US\$343

Excluding VAT

Subscribe to Online



## Contents

Recommend this title to your librarian

**Do you Wish to Receive Updates?** – If you would like to receive news from the *Asian Journal of Water, Environment and Pollution*, sign up [here](#).  
View the latest newsletter [here](#).

[Aims & Scope](#) [Editorial board](#) [Manuscript submission & Author instructions](#) [Abstracted/Indexed in](#) [Metrics](#)

### Editor-in-Chief

Prof. V. Subramanian  
Jawaharlal Nehru University  
Environmental Science  
Delhi  
India  
Email: [ajwep@capital-publishing.com](mailto:ajwep@capital-publishing.com)

### Editorial Board

Prof. D. Datta  
Khulna University  
Khulna, Bangladesh

Prof. R.V. Grieken  
University of Antwerp  
Antwerpen, Belgium

Dr. L. Gupta  
Institute for Marine Exploration and Engineering  
JAMSTEC, Yokosuka, Japan

Prof. M. Haigh  
Oxford Brookes University  
Oxford, UK

Prof. V. Ittekkot  
Center for Tropical Marine Ecology  
Bremen, Germany

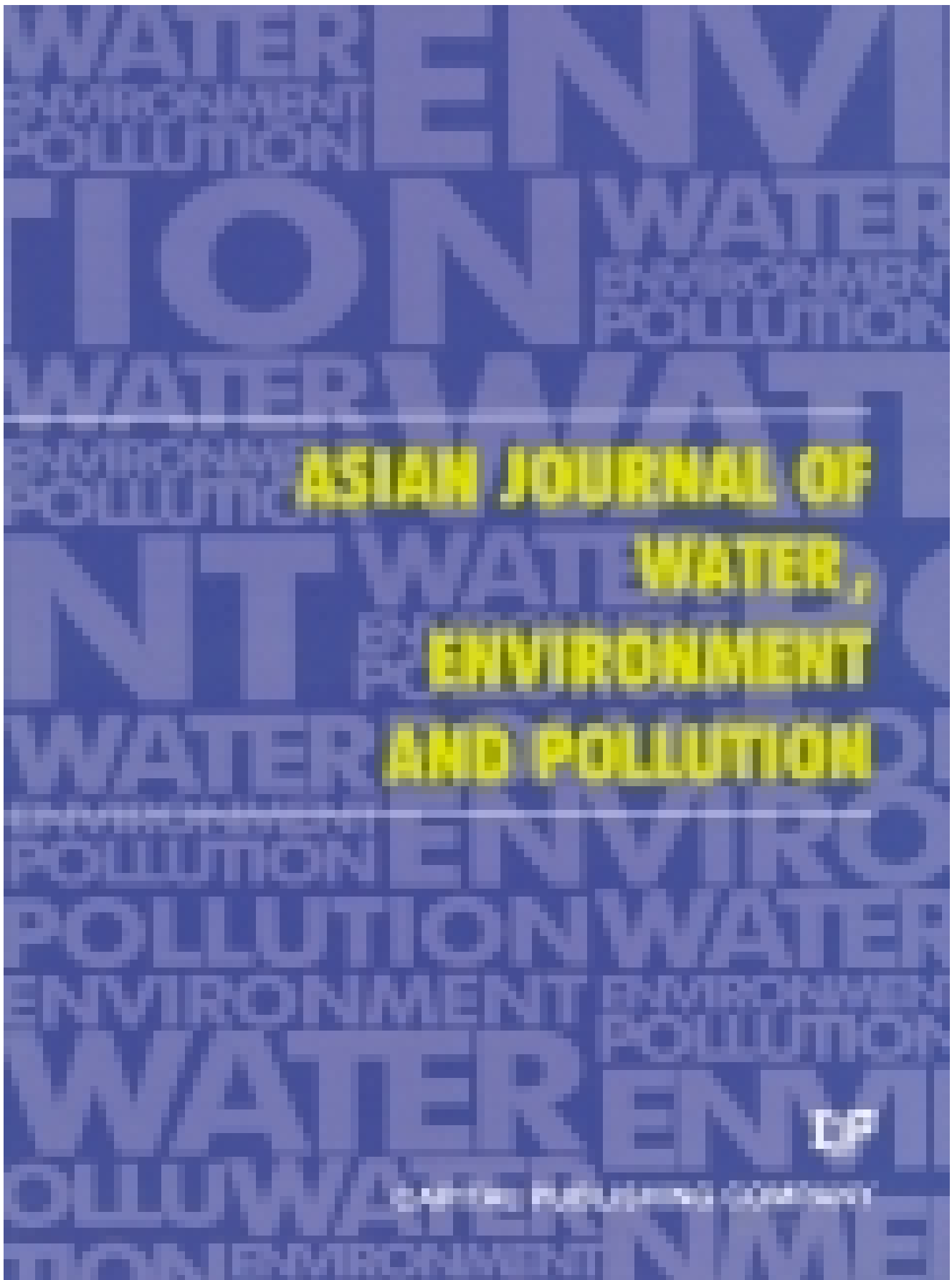
Prof. J. Krecek  
Czech Technical University  
Prague, Czech Republic

Prof. R. Ramesh  
National Centre for Sustainable Coastal Zone Management  
Anna University, Chennai, India

Prof. J. Zhang  
East China Normal University  
Shanghai, China

## **Asian Journal of Water, Environment and Pollution - Volume 17, issue 3**

Purchase individual online access for 1 year to this journal. **Price: EUR 70,00**



ISSN 0972-9860 (P)  
ISSN 1875-8568 (E)

Asia, as a whole region, faces severe stress on water availability, primarily due to high population density. Many regions of the continent face severe problems of water pollution on local as well as regional scale and these have to be tackled with a pan-Asian approach. However, the available literature on the subject is generally based on research done in Europe and North America. Therefore, there is an urgent and strong need for an Asian journal with its focus on the region and wherein the region specific problems are addressed in an intelligent manner.

In Asia, besides water, there are several other issues related to environment, such as; global warming and its impact; intense land/use and shifting pattern of agriculture; issues related to fertilizer applications and pesticide residues in soil and water; and solid and liquid waste management particularly in industrial and urban areas. Asia is also a region with intense mining activities whereby serious environmental problems related to land/use, loss of top soil, water pollution and acid mine drainage are faced by various communities.

Show: 50 results per page

Mark all

**[Editorial](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw201731)** (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw201731>),

**Authors:** [Subramanian, V.](https://content.iospress.com:443/search?q=author%3A%28%22Subramanian%2C+V.%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Subramanian%2C+V.%22%29>),

**Article Type:** Editorial

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. i-i, 2020

**[The Feasibility of Algae Treatment Treating Fecal Sludge Wastewater at Surabaya, Indonesia](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200027)** (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200027>),

**Authors:** [Farahdiba, Aulia Ulfah](https://content.iospress.com:443/search?q=author%3A%28%22Farahdiba%2C+Aulia+Ulfah%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Farahdiba%2C+Aulia+Ulfah%22%29>) | [Hidayah, Euis Nurul](https://content.iospress.com:443/search?q=author%3A%28%22Hidayah%2C+Euis+Nurul%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Hidayah%2C+Euis+Nurul%22%29>) | [Zara, Djuni Wulan](https://content.iospress.com:443/search?q=author%3A%28%22Zara%2C+Djuni+Wulan%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Zara%2C+Djuni+Wulan%22%29>) | [Linh, Nguyen Thi Thuy](https://content.iospress.com:443/search?q=author%3A%28%22Linh%2C+Nguyen+Thi+Thuy%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Linh%2C+Nguyen+Thi+Thuy%22%29>)

**Article Type:** Research Article

**Abstract:** This research work was preliminary, carried out to determine the performance of algae in the fecal sludge wastewater treatment. This study was conducted with a batch scale, using an algae reactor to treat fecal wastewater with high organic and nutrient contents. Cultured algae using *Chlorella* sp. was spiked in domestic wastewater with five days detention period. Environment conditions such as pH, dissolved oxygen, light and temperature were monitored. It was seen that light intensities directly could affect the temperature of the bioreactor. The algae reactor was able to remove 20-50% of COD, 30-40% of nitrate and 50% of phosphate. ... [Show more](#)

**Keywords:** Algae, domestic wastewater, nutrient, organic substance

**DOI:** 10.3233/AJW200027

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 1-6, 2020

**Price:** EUR 27,50

**[Effect of Salinity on Osmoregulation and Histopathology in Gills of Tilapia \(\*Oreochromis niloticus\*\)](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200028)** (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200028)

**Authors:** [Handayani, Kiki Syaputri](https://content.iospress.com:443/search?q=author%3A%28%22Handayani%2C+Kiki+Syaputri%22%29) (https://content.iospress.com:443/search?q=author%3A%28%22Handayani%2C+Kiki+Syaputri%22%29) | [Soegianto, Agoes](https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29) (https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29) | [Chang, Ching-Fong](https://content.iospress.com:443/search?q=author%3A%28%22Chang%2C+Ching-Fong%22%29) (https://content.iospress.com:443/search?q=author%3A%28%22Chang%2C+Ching-Fong%22%29)

**Article Type:** Research Article

**Abstract:** Experiments on Nile tilapia *Oreochromis niloticus* were conducted to assess serum osmolalities, ions and histopathological effects induced in gill tissues of 7 days exposure to different salinities (0, 10, 15 and 20 ppt). These tissues were investigated by light microscope. Blood serum osmolality (SO), sodium (Na<sup>+</sup>), chloride (Cl<sup>-</sup>) and potassium (K<sup>+</sup>) concentrations were assessed after 7 days of exposure. Serum osmolality and ionic content of exposed fish appeared differently affected by salinity throughout 7 days compared to the controls. Osmolality and Na<sup>+</sup> were increased at the two tested salinities (15 and 20 ppt), Cl<sup>-</sup> ... [Show more](#)

**Keywords:** Tilapia, salinity, freshwater, osmolality, ions, immunohistochemistry

**DOI:** 10.3233/AJW200028

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 7-11, 2020

**Price:** EUR 27,50

**[Effect of Mercury on Growth of Several Microalgae](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200029)** (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200029)

**Authors:** [Arsad, Sulastris](https://content.iospress.com:443/search?q=author%3A%28%22Arsad%2C+Sulastris%22%29) (https://content.iospress.com:443/search?q=author%3A%28%22Arsad%2C+Sulastris%22%29) | [Kholifah, Siti Nur](https://content.iospress.com:443/search?q=author%3A%28%22Kholifah%2C+Siti+Nur%22%29) (https://content.iospress.com:443/search?q=author%3A%28%22Kholifah%2C+Siti+Nur%22%29) | [Prabawati, Estuningdyah](https://content.iospress.com:443/search?q=author%3A%28%22Prabawati%2C+Estuningdyah%22%29) (https://content.iospress.com:443/search?q=author%3A%28%22Prabawati%2C+Estuningdyah%22%29) | [Sari, Luthfiana Aprilianita](https://content.iospress.com:443/search?q=author%3A%28%22Sari%2C+Luthfiana+Aprilianita%22%29) (https://content.iospress.com:443/search?q=author%3A%28%22Sari%2C+Luthfiana+Aprilianita%22%29) | [Kadim, Miftahul Khair](https://content.iospress.com:443/search?q=author%3A%28%22Kadim%2C+Miftahul+Khair%22%29) (https://content.iospress.com:443/search?q=author%3A%28%22Kadim%2C+Miftahul+Khair%22%29) | [Kilawati, Yuni](https://content.iospress.com:443/search?q=author%3A%28%22Kilawati%2C+Yuni%22%29) (https://content.iospress.com:443/search?q=author%3A%28%22Kilawati%2C+Yuni%22%29)

**Article Type:** Research Article

**Abstract:** This study aimed to analyse the effect of toxic heavy metal on microalgae growth. Several microalgae i.e cyanophyceae (*Spirulina maxima*), eustigmatophyceae (*Nannochloropsis oculata*), chlorophyceae (*Chlorella vulgaris*) and porphyridiophyceae (*Porphyridium cruentum*) were exposed to mercury with various concentrations (1, 3 and 5 mg. L<sup>-1</sup>). An experimental method was carried out in the laboratory scale with one control of microalgae culture without mercury exposure. The microalgae cultivated by using Walne medium with the initial cells were 10,000 cells.mL<sup>-1</sup> for *S. maxima* and *N. oculata* respectively and 100,000 cells.mL<sup>-1</sup> for *C. vulgaris* and ... [Show more](#)

**Keywords:** Heavy metal, microalgae, pollution, toxic

**DOI:** 10.3233/AJW200029

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 13-17, 2020

**Price:** EUR 27,50

**[Evaluation of Radioactivity in Surabaya Coastal Estuary Ecosystem with Spectrometry  \$\alpha\$ ,  \$\beta\$ ,  \$\gamma\$](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200030)**  (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200030>)

**Authors:** [Siswanto](https://content.iospress.com:443/search?q=author%3A%28%22Siswanto%2C+%22%29), (<https://content.iospress.com:443/search?q=author%3A%28%22Siswanto%2C+%22%29>) | [Taftazani, Agus](https://content.iospress.com:443/search?q=author%3A%28%22Taftazani%2C+Agus%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Taftazani%2C+Agus%22%29>) | [Prasetyo, Dedy](https://content.iospress.com:443/search?q=author%3A%28%22Prasetyo%2C+Dedy%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Prasetyo%2C+Dedy%22%29>)

**Article Type:** Research Article

**Abstract:** Radioactivity levels have been measured in sediment samples, *Echornia crassipes* and *Anadara granosa* at the Surabaya river estuary. Measurement data were obtained by spectrophotometric method, which is a way of measuring and identifying radionuclides through observations of the spectrum emitted with detector material. The results of measurements and calculations that have been done show that the mean concentration of activity  $\alpha$ ,  $\beta$ ,  $\gamma$  (gross) in water in the Morokrempangan estuary and Kenjeran river estuary is still below the threshold value of group C waters quality. Radionuclide identification results indicate the presence of natural radionuclides K 40, Tl ... [Show more](#)

**Keywords:** Radioactivity, water quality, spectrophotometry  $\alpha$ ,  $\beta$ ,  $\gamma$

**DOI:** 10.3233/AJW200030

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 19-23, 2020

**Price:** EUR 27,50

**[Health Risk Analysis of Cd, Pb and Hg in Blood Mussel \(\*Anadara granosa\*\) from Demak, Central Java, Indonesia](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200031)** (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200031>)

**Authors:** [Yulianto, Bambang](https://content.iospress.com:443/search?q=author%3A%28%22Yulianto%2C+Bambang%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Yulianto%2C+Bambang%22%29>) | [Andre Wijaya, Wahyu](https://content.iospress.com:443/search?q=author%3A%28%22Andre+Wijaya%2C+Wahyu%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Andre+Wijaya%2C+Wahyu%22%29>) | [Setyati, Wilis Ari](https://content.iospress.com:443/search?q=author%3A%28%22Setyati%2C+Wilis+Ari%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Setyati%2C+Wilis+Ari%22%29>) | [Sunaryo](https://content.iospress.com:443/search?q=author%3A%28%22Sunaryo%2C+%22%29), (<https://content.iospress.com:443/search?q=author%3A%28%22Sunaryo%2C+%22%29>) | [Santosa, Adi](https://content.iospress.com:443/search?q=author%3A%28%22Santosa%2C+Adi%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Santosa%2C+Adi%22%29>) | [Putranto, Trisnadi W. C.](https://content.iospress.com:443/search?q=author%3A%28%22Putranto%2C+Trisnadi+W.+C.%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Putranto%2C+Trisnadi+W.+C.%22%29>) | [Soegianto, Agoes](https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29>)

**Article Type:** Research Article

**Abstract:** The famous location of Wedung waters, Demak, Central Java, Indonesia, produces blood mussel, *Anadara granosa*. Anthropogenic activities can lead to contamination of heavy metals such as Pb, Cd and Hg to the living environment of *A. granosa*. This study was done to analyse heavy metals content in the

soft tissue of *A. granosa* and health risks arising to Wedung residents from consuming the mussels. Heavy metals were analysed using atomic absorption spectrometry (AAS). The result showed that Cd and Pb contents were found in *A. granosa* soft tissue in the range of 0.56 - 0.70 ... [Show more](#)

**Keywords:** Cd, Pb, Hg, health risk analysis

**DOI:** 10.3233/AJW200031

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 25-30, 2020

**Price:** EUR 27,50

- [Visualization of the Microbial Community and Elemental Mapping of \*Anadara granosa\* Media Used in a Slow Sand Filter Using a SEM-EDS](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200032) (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200032).

**Authors:** [Ni'matuzahroh](https://content.iospress.com:443/search?q=author%3A%28%22Ni%E2%80%99matuzahroh%2C+%22%29), [Fitriani, Nurina](https://content.iospress.com:443/search?q=author%3A%28%22Fitriani%2C+Nurina%22%29), [Soedjono, Eddy Setiadi](https://content.iospress.com:443/search?q=author%3A%28%22Soedjono%2C+Eddy+Setiadi%22%29), [Kuncoro, Eko Prasetyo](https://content.iospress.com:443/search?q=author%3A%28%22Kuncoro%2C+Eko+Prasetyo%22%29), [Radin Mohamed, Radin Maya Saphira](https://content.iospress.com:443/search?q=author%3A%28%22Radin+Mohamed%2C+Radin+Maya+Saphira%22%29), [O'Marga, Timothy Tjahja Nugraha](https://content.iospress.com:443/search?q=author%3A%28%22O'Marga%2C+Timothy+Tjahja+Nugraha%22%29)

**Article Type:** Research Article

**Abstract:** The removal of contaminants in slow sand filters occurs mainly in the biofilm above the filter media called schmutzdecke - a thin biological layer consisting of various microbial communities of algae, bacteria, diatoms and zooplankton. The layer formed ripens along with continuous straining and adsorption mechanism of impurities in raw water. *Anadara granosa* shell has been broadly used as an adsorbent to trap organic matter, turbid particles and heavy metal ion in raw wastewater. This research is aimed to visualise the microbial community grown on schmutzdecke in 2-weeks ripening period and maps the elemental characterisation of a grinded *Anadara* ... [Show more](#)

**Keywords:** Visualization, Schmutzdecke, slow sand filter, *Anadara granosa* shell

**DOI:** 10.3233/AJW200032

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 31-36, 2020

**Price:** EUR 27,50

- [Consortium of \*Marsilea crenata\* and \*Ludwigia adscendens\* for Linear Alkylbenzene Sulfonate Detergent Phytoremediator](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200033) (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200033).

**Authors:** [Rachmadiarti, F.](https://content.iospress.com:443/search?q=author%3A%28%22Rachmadiarti%2C+F.%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Rachmadiarti%2C+F.%22%29>) | [Asri, M.T.](https://content.iospress.com:443/search?q=author%3A%28%22Asri%2C+M.T.%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Asri%2C+M.T.%22%29>) | [Bashri, A.](https://content.iospress.com:443/search?q=author%3A%28%22Bashri%2C+A.%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Bashri%2C+A.%22%29>) | [Yuliani,](https://content.iospress.com:443/search?q=author%3A%28%22Yuliani%2C+%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Yuliani%2C+%22%29>) | [Pratiwi, I.A.](https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+I.A.%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+I.A.%22%29>)

**Article Type:** Research Article

**Abstract:** Water clover (*Marsilea crenata* Presl.) and water primrose (*Ludwigia adscendens* L.) are plants grow in wetlands, polluted by inorganic or organic materials, including detergent. This study aims to evaluate the capability of *M. crenata* and *L. adscendens* individually or as a consortium to remediate linear alkylbenzene sulfonate (LAS) detergent-polluted water, and to measure the growth and chlorophyll content of these plants. *M. crenata* and *L. adscendens* were grown in a hydroponic system exposed to LAS at 0, 10, 20, and 30 ppm for 10 days. Concentration of LAS (as anionic detergent) in treated media ... [Show more](#)

**Keywords:** Phytoremediation, aquatic plants, *Marsilea crenata*, *Salvinia molesta*, detergent

**DOI:** 10.3233/AJW200033

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 37-41, 2020

**Price:** EUR 27,50

[Microalgae \*Skeletonema costatum\* for Cd and Cu Remediation](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200034)  
(<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200034>)

**Authors:** [Pratiwi, Dwi Candra](https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+Dwi+Candra%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+Dwi+Candra%22%29>) | [Pratiwi, Niken](https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+Niken%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+Niken%22%29>) | [Yona, Defri](https://content.iospress.com:443/search?q=author%3A%28%22Yona%2C+Defri%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Yona%2C+Defri%22%29>) | [Sasmita, Respati Dwi](https://content.iospress.com:443/search?q=author%3A%28%22Sasmita%2C+Respati+Dwi%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Sasmita%2C+Respati+Dwi%22%29>) | [Pratiwi, Intan Ayu](https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+Intan+Ayu%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+Intan+Ayu%22%29>)

**Article Type:** Research Article

**Abstract:** Cadmium (Cd) and copper (Cu) are types of heavy metals that can have an adverse effect on the ecosystem. Even copper is an essential metal but in limited concentrations, however, it leads to a toxic effect on the environment when used in high concentrations. Bioremediation of these metals can be done using microalgae *Skeletonema costatum*. In this study, bioremediation tests of Cd and Cu were carried out on a laboratory scale using various concentrations, control, 0.7, 1.3 and 1.9 ppm, respectively. The metals exposure was carried out for 96 hours. During the test the microalgae population was monitored, and ... [Show more](#)

**Keywords:** Bioaccumulation, bioremediation, heavy metal, microalgae

**DOI:** 10.3233/AJW200034

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 43-48, 2020

**Price:** EUR 27,50





## **Effects of Cd, Zn and Cd+Zn Combination on Osmoregulation of Tilapia (*Oreochromis niloticus*)** (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200035>)

**Authors:** [Putranto, Trisnadi Widyaleksono Catur](https://content.iospress.com:443/search?q=author%3A%28%22Putranto%2C+Trisnadi+Widyaleksono+Catur%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Putranto%2C+Trisnadi+Widyaleksono+Catur%22%29>) | [Shinta, Dewi](https://content.iospress.com:443/search?q=author%3A%28%22Shinta%2C+Dewi%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Shinta%2C+Dewi%22%29>) | [Affandi, Mochammad](https://content.iospress.com:443/search?q=author%3A%28%22Affandi%2C+Mochammad%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Affandi%2C+Mochammad%22%29>) | [Soegianto, Agoes](https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29>)

**Article Type:** Research Article

**Abstract:** The objectives of this study were to evaluate the effects of cadmium (Cd), zinc (Zn) and Cd+Zn combinations on serum osmolality and ions in *Oreochromis niloticus*. A total of 60 *O. niloticus* with five fish per tank and two tanks per group were used during this experiment. Group I was held in media without metal (as control) and other groups were exposed to 7.5 mg/L Zn, 15 mg/L Zn, 2.5 mg/L Cd, 7.5 mg/L Zn + 2.5 mg/L Cd and 15 mg/L Zn + 2.5 mg/L Cd for 7 days. The osmolalities of fish exposed to Cd, ... [Show more](#)

**Keywords:** Fish, cadmium, zinc, osmolality, ions, serum

**DOI:** 10.3233/AJW200035

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 49-53, 2020

**Price:** EUR 27,50

## **Ability of Mangrove Fungi in Biodegradation of Hexadecane** (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200036>)

**Authors:** [Kuswytasari, Nengah Dwianita](https://content.iospress.com:443/search?q=author%3A%28%22Kuswytasari%2C+Nengah+Dwianita%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Kuswytasari%2C+Nengah+Dwianita%22%29>) | [Elhaque, Riva Ariny](https://content.iospress.com:443/search?q=author%3A%28%22Elhaque%2C+Riva+Ariny%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Elhaque%2C+Riva+Ariny%22%29>) | [Kurniawati, Alfia R](https://content.iospress.com:443/search?q=author%3A%28%22Kurniawati%2C+Alfia+R%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Kurniawati%2C+Alfia+R%22%29>) | [Alami, Nur Hidayatul](https://content.iospress.com:443/search?q=author%3A%28%22Alami%2C+Nur+Hidayatul%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Alami%2C+Nur+Hidayatul%22%29>) | [Zulaika, Enny](https://content.iospress.com:443/search?q=author%3A%28%22Zulaika%2C+Enny%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Zulaika%2C+Enny%22%29>) | [Shovitri, Maya](https://content.iospress.com:443/search?q=author%3A%28%22Shovitri%2C+Maya%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Shovitri%2C+Maya%22%29>) | [Tri Puspaningsih, Ni Nyoman](https://content.iospress.com:443/search?q=author%3A%28%22Tri+Puspaningsih%2C+Ni+Nyoman%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Tri+Puspaningsih%2C+Ni+Nyoman%22%29>) | [Ni'matuzahroh](https://content.iospress.com:443/search?q=author%3A%28%22Ni%20E2%80%99matuzahroh%2C+%22%29), (<https://content.iospress.com:443/search?q=author%3A%28%22Ni%20E2%80%99matuzahroh%2C+%22%29>)

**Article Type:** Research Article

**Abstract:** Oil pollution, especially in the marine environment, has become a serious environmental problem. Hexadecane (HXD) is a major alkane component and it is present in the aliphatic fragment of crude oil, which can be used by fungi as a sole carbon source. Biosurfactant which is produced by fungi facilitates HXD degradation. This study investigated the ability of mangrove fungi to be used as HXD and produce biosurfactant. The medium used to determine the ability of fungi to use hexadecane is MSM-HXD 2%, whereas Hua medium is used for determining the potential for producing biosurfactants. Biosurfactant production by fungi strains was ... [Show more](#)

**Keywords:** Biodegradation, fungi, hexadecane, mangrove

**DOI:** 10.3233/AJW200036

**Citation:** [Asian Journal of Water, Environment and Pollution \(https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution\)](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 55-59, 2020

**Price:** EUR 27,50

**[Effect of Feed Supplement on Sperm Quality and Total Intestinal Bacteria of Fish Exposed by Cadmium](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200037)** (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200037>)

**Authors:** [Hayati, Alfiah \(https://content.iospress.com:443/search?q=author%3A%28%22Hayati%2C+Alfiah%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Hayati%2C+Alfiah%22%29) | [Nurbani, Farah Annisa \(https://content.iospress.com:443/search?q=author%3A%28%22Nurbani%2C+Farah+Annisa%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Nurbani%2C+Farah+Annisa%22%29) | [Amira, Meirizka \(https://content.iospress.com:443/search?q=author%3A%28%22Amira%2C+Meirizka%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Amira%2C+Meirizka%22%29) | [Seftiarini, Windy \(https://content.iospress.com:443/search?q=author%3A%28%22Seftiarini%2C+Windy%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Seftiarini%2C+Windy%22%29) | [Wanguyun, Aken Puti \(https://content.iospress.com:443/search?q=author%3A%28%22Wanguyun%2C+Aken+Puti%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Wanguyun%2C+Aken+Puti%22%29) | [Muchtarmah, Bayyinatul \(https://content.iospress.com:443/search?q=author%3A%28%22Muchtarmah%2C+Bayyinatul%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Muchtarmah%2C+Bayyinatul%22%29)

**Article Type:** Research Article

**Abstract:** In the ecological environment, cadmium, a heavy metal produced from human activities and industry toxic material, has polluted the water and affects the reproductive health of aquatic biota. Many fish farmers use water from the river for freshwater fish cultivation. This study examined the effects of supplementation feed (probiotics and vitamin C) on sperm quality and total bacteria in fish intestine, *Oreochromis niloticus*, after Cadmium (Cd) exposure. We found that probiotics did not seem to colonise fish intestine or change the overall amount of the intestinal microbiota. However, probiotic supplementation actually changed the total amount of bacteria in the ... [Show more](#)

**Keywords:** Fish, probiotic, sperm quality, intestinal bacteria, cadmium

**DOI:** 10.3233/AJW200037

**Citation:** [Asian Journal of Water, Environment and Pollution \(https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution\)](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 61-64, 2020

**Price:** EUR 27,50

**[Effect of Media on Constructed Wetlands Performance with \*Equisetum hyemale\*](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200038)** (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200038>)

**Authors:** [Wahyudianto, Febri Eko \(https://content.iospress.com:443/search?q=author%3A%28%22Wahyudianto%2C+Febri+Eko%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Wahyudianto%2C+Febri+Eko%22%29) | [Imron, Muhammad Fauzul \(https://content.iospress.com:443/search?q=author%3A%28%22Imron%2C+Muhammad+Fauzul%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Imron%2C+Muhammad+Fauzul%22%29) | [Oktavitri, Nur Indradewi \(https://content.iospress.com:443/search?q=author%3A%28%22Oktavitri%2C+Nur+Indradewi%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Oktavitri%2C+Nur+Indradewi%22%29) | [Nisa' AlFikry, Salsabilla Choirun \(https://content.iospress.com:443/search?q=author%3A%28%22Nisa%2C+AlFikry%2C+Salsabilla+Choirun%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Nisa%2C+AlFikry%2C+Salsabilla+Choirun%22%29) | [Rahmatullah, Lintang Tubagus \(https://content.iospress.com:443/search?q=author%3A%28%22Rahmatullah%2C+Lintang+Tubagus%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Rahmatullah%2C+Lintang+Tubagus%22%29) | [Rahman, Danar Arifka \(https://content.iospress.com:443/search?q=author%3A%28%22Rahman%2C+Danar+Arifka%22%29\)](https://content.iospress.com:443/search?q=author%3A%28%22Rahman%2C+Danar+Arifka%22%29)

**Article Type:** Research Article

**Abstract:** The objective of this study is to find the effect of the media on constructed wetlands capacity with *Equisetum hyemale* to remove chemical oxygen demand (COD) and phosphate ( $\text{PO}_4^{3-}$ ) in laundry wastewater. Four reactors of constructed wetlands made of the plastic container were used. Three units of reactors used different media that had different diameter media for each, which were sand (SM), expanded clay (CM) and gravel (GM) while the fourth reactor was used without using the media as a control. The environmental parameters and performance of constructed wetlands were monitored every day until the fifth day ... [Show more](#)

**Keywords:** Constructed wetlands, sand media, gravel media, expanded clay media

**DOI:** 10.3233/AJW200038

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 65-69, 2020

**Price:** EUR 27,50

- [Heavy Metals \(Cd, Pb, Cu, Zn\) in Green Mussel \( \*Perna viridis\*\) and Health Risk Analysis on Residents of Semarang Coastal Waters, Central Java, Indonesia](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200039) (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200039>).

**Authors:** [Yulianto, Bambang](https://content.iospress.com:443/search?q=author%3A%28%22Yulianto%2C+Bambang%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Yulianto%2C+Bambang%22%29>) | [Radjasa, Ocky Karna](https://content.iospress.com:443/search?q=author%3A%28%22Radjasa%2C+Ocky+Karna%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Radjasa%2C+Ocky+Karna%22%29>) | [Soegianto, Agoes](https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29>)

**Article Type:** Research Article

**Abstract:** Increasing environmental metal concentrations are usually attributed to the impact of urbanisation. This study emphasises on the metal contamination in green mussel (*Perna viridis*) from the coastal urban area. The field survey was carried out to evaluate the concentration of metals, i.e., Cd, Pb, Cu and Zn in green mussel captured from Semarang coastal waters, Central Java, Indonesia. Green mussels are the important species that are consumed by the local people as a source of animal protein. Therefore, keeping the mussels away from a wide range of contaminants, including heavy metals, has become an essential factor for people's health. ... [Show more](#)

**Keywords:** Green mussel, *Perna viridis*, heavy metal, pollution, Hazard Quotient, Hazard Index

**DOI:** 10.3233/AJW200039

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 71-76, 2020

**Price:** EUR 27,50

- [Characterization and Lipase Production of \*Micrococcus\* sp. L69 Isolated from Palm Oil-contaminated Soil](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200040) (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200040>).

**Authors:** [Sumarsih, Sri](https://content.iospress.com:443/search?q=author%3A%28%22Sumarsih%2C+Sri%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Sumarsih%2C+Sri%22%29>) | [Fatimah,](https://content.iospress.com:443/search?q=author%3A%28%22Fatimah%2C+%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Fatimah%2C+%22%29>) | [Hadi, Sofijan](https://content.iospress.com:443/search?q=author%3A%28%22Hadi%2C+Sofijan%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Hadi%2C+Sofijan%22%29>) | [Adhiningsih, Ragil Tri](https://content.iospress.com:443/search?q=author%3A%28%22Adhiningsih%2C+Ragil+Tri%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Adhiningsih%2C+Ragil+Tri%22%29>) | [Prasetyo, Fakhrudin Eka](https://content.iospress.com:443/search?q=author%3A%28%22Prasetyo%2C+Fakhrudin+Eka%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Prasetyo%2C+Fakhrudin+Eka%22%29>)

**Article Type:** Research Article

**Abstract:** This research aims to characterise and study the lipase production of *Micrococcus* sp. L69 isolated from palm oil-contaminated soil. Lipase production was carried out by cultivating the bacteria in the medium containing vegetable oils. The lipase activity was determined by spectrophotometric method toward p -nitrophenyl palmitate as a substrate. The results of this research showed that the bacteria isolate L69 was a unique lipolytic bacteria. Based on sequence of 16S rRNA gene, the bacteria had low similarity level ( $\leq 93\%$ ) to sequences data listed in GenBank. Olive oil and coconut oil are good carbon sources for bacterial growth and ... [Show more](#)

**Keywords:** Lipase, *Micrococcus*, palm oil-contaminated soil

**DOI:** 10.3233/AJW200040

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 77-80, 2020

**Price:** EUR 27,50

[Effect of Water Quality on Community Structure of Bivalve at Segoro Tambak Estuary, Sidoarjo, East Java, Indonesia](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200041)

(<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200041>).

**Authors:** [Hutami, Widya Wahyu](https://content.iospress.com:443/search?q=author%3A%28%22Hutami%2C+Widya+Wahyu%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Hutami%2C+Widya+Wahyu%22%29>) | [Sari, Luthfiana Aprilianita](https://content.iospress.com:443/search?q=author%3A%28%22Sari%2C+Luthfiana+Aprilianita%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Sari%2C+Luthfiana+Aprilianita%22%29>) | [Masithah, Endang Dewi](https://content.iospress.com:443/search?q=author%3A%28%22Masithah%2C+Endang+Dewi%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Masithah%2C+Endang+Dewi%22%29>) | [Sahidu, Adriana Monica](https://content.iospress.com:443/search?q=author%3A%28%22Sahidu%2C+Adriana+Monica%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Sahidu%2C+Adriana+Monica%22%29>) | [Pursetyo, Kustiawan Tri](https://content.iospress.com:443/search?q=author%3A%28%22Pursetyo%2C+Kustiawan+Tri%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Pursetyo%2C+Kustiawan+Tri%22%29>).

**Article Type:** Research Article

**Abstract:** Identification of water quality is an important factor because water supports the community structure of an organism. Bivalves are one of bioindicators in aquatic ecosystems in Segoro Tambak Estuary, which receive wastewater from landfill waste disposal. The bivalve community structure needs to be evaluated because the environmental changes that occur in waters can lead to structural changes of the bivalve community. The sampling was conducted in January – March, 2018. The water quality and environmental parameters observed were dissolved oxygen (DO), biochemical oxygen demand (BOD), temperature, salinity, current speed and wind speed. The bivalve community structure can be seen from ... [Show more](#)

**Keywords:** Water quality, community structure, bivalve, East Java

**DOI:** 10.3233/AJW200041

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 81-86, 2020

**Price:** EUR 27,50

[Economic Efficiency of Mineral Fertilizers Applied for Sorghum Growing in the Forest-Steppe Zones of the Southern Urals](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200042)

(<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200042>).

[pollution/ajw200042](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200042))

**Authors:** [Ara%20slanbaev, Irek](https://content.iospress.com:443/search?q=author%3A%28%22Ara%20slanbaev%20C%20Irek%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Ara%20slanbaev%20C%20Irek%22%29>) | [Avsakhov, Firdavis](https://content.iospress.com:443/search?q=author%3A%28%22Avsakhov%20C%20Firdavis%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Avsakhov%20C%20Firdavis%22%29>) | [Ableeva, Alisa](https://content.iospress.com:443/search?q=author%3A%28%22Ableeva%20C%20Alisa%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Ableeva%20C%20Alisa%22%29>) | [Nurlygajanov, Razit](https://content.iospress.com:443/search?q=author%3A%28%22Nurlygajanov%20C%20Razit%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Nurlygajanov%20C%20Razit%22%29>) | [Lukyanova, Milyausha](https://content.iospress.com:443/search?q=author%3A%28%22Lukyanova%20C%20Milyausha%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Lukyanova%20C%20Milyausha%22%29>) | [Salimova, Guzel](https://content.iospress.com:443/search?q=author%3A%28%22Salimova%20C%20Guzel%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Salimova%20C%20Guzel%22%29>).

**Article Type:** Research Article

**Abstract:** During the period 2016-2018, field experiments were conducted in the Scientific Training center of Bashkir State Agrarian university. The aim of the experiments was to study the effect of introducing calculated doses of mineral fertilizers on the expected sugar sorghum fresh-yield in the southern forest-steppe zone of the Republic of Bashkortostan. The purpose of the research work is to determine the amount of mineral fertilizers applied to get the expected sugar sorghum fresh yield. During the research work, it was revealed that doses of mineral fertilizers applied for sugar sorghum growing should be defined taking into account the expected fresh ... [Show more](#)

**Keywords:** Characteristics of sorghum varieties, sugar sorghum, sorghum durra, sorghum-sudangrass hybrids, soil treatment, application of fertilizers, efficiency

**DOI:** 10.3233/AJW200042

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 87-92, 2020

**Price:** EUR 27,50

[Hydrogeochemical Evolution and Quality Assessments of Streams Water in the Bhagirathi Basin, Garhwal Himalaya, Uttarakhand](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200043)  
(<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200043>)

**Authors:** [Ansari, Zabiullah](https://content.iospress.com:443/search?q=author%3A%28%22Ansari%20C%20Zabiullah%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Ansari%20C%20Zabiullah%22%29>) | [Ahmad, Sarfaraz](https://content.iospress.com:443/search?q=author%3A%28%22Ahmad%20C%20Sarfaraz%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Ahmad%20C%20Sarfaraz%22%29>).

**Article Type:** Research Article

**Abstract:** Hydrogeochemical studies were carried out to assess the quality and evolutions of the streams in the Bhagirathi basin during high and low flow of water in the given environment. The hydrochemical characteristics of the streams water indicated that silicate and mixed type of weathering dominated in the Bhagirathi watersheds. The stream's water chemistry is mostly influenced by deeper sources of water through joints and fissures in the stream watersheds. A comparison between ion concentrations in the samples suggested that few samples have high sodium and fluoride exceeding the permissible limits. Based on dissolved ions in stream water, the water quality ... [Show more](#)

**Keywords:** Hydrochemical, Bhagirathi river basin, water quality index, Kelly ratio, base ion exchange index

**DOI:** 10.3233/AJW200043

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 93-100, 2020

**Price:** EUR 27,50

**[Investigation of Variability of Some Gaseous and Particulate Pollutants over Delhi, Northern India \(28°40'N, 76°50'E\)](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200044)**

(<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200044>)

**Authors:** [Sharma, Ram Chhavi](https://content.iospress.com:443/search?q=author%3A%28%22Sharma%2C+Ram+Chhavi%22%29) (<https://content.iospress.com:443/search?q=author%3A%28%22Sharma%2C+Ram+Chhavi%22%29>)

**Article Type:** Research Article

**Abstract:** Air pollution has become a serious concern these days as the pollutants added in the air have a great impact on human health and ecological environment. The pollutants like particulate matter that have a diameter less than 2.5 micrometer (PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>) and sulphur dioxide (SO<sub>2</sub>) are mainly responsible for causing respiratory problems, asthma and heart and lung disorder. In the present study, data collected by the Central Pollution Control Board (CPCB) Delhi at Netaji Subhash Chander Institute of Technology (NSIT) location, Dwarka, Delhi, Northern India for airborne particulate and gaseous pollutants PM<sub>2.5</sub> ... [Show more](#)

**Keywords:** Air pollution, pollutants, health, meteorological variables, regression analysis

**DOI:** 10.3233/AJW200044

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 101-109, 2020

**Price:** EUR 27,50

**[Environment News Futures](https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw201732)** (<https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw201732>)

**Article Type:** News

**Citation:** [Asian Journal of Water, Environment and Pollution](https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution) (<https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution>), vol. 17, no. 3, pp. 111-116, 2020

[i](#) [x](#)

## molecutrack

**Carbon Capture Technologies**

We Focus on Clean Energy Solutions That Replace Hazardous and Carbo Intensive Fuel.

molecutrack.com

OPEN

# Asian Journal of Water, Environment and Pollution

<b>Country</b>	Netherlands - <a href="#">IIII</a> <a href="#">SJR Ranking of Netherlands</a>	<h1 style="font-size: 48px; margin: 0;">8</h1> <p>H Index</p>
<b>Subject Area and Category</b>	Environmental Science Pollution Water Science and Technology	
<b>Publisher</b>	IOS Press	
<b>Publication type</b>	Journals	
<b>ISSN</b>	09729860, 18758568	
<b>Coverage</b>	2011-2020	
<b>Scope</b>	<p>Asia, as a whole region, faces severe stress on water availability, primarily due to high population density. Many regions of the continent face severe problems of water pollution on local as well as regional scale and these have to be tackled with a pan-Asian approach. However, the available literature on the subject is generally based on research done in Europe and North America. Therefore, there is an urgent and strong need for an Asian journal with its focus on the region and wherein the region specific problems are addressed in an intelligent manner. In Asia, besides water, there are several other issues related to environment, such as; global warming and its impact; intense land/use and shifting pattern of agriculture; issues related to fertilizer applications and pesticide residues in soil and water; and solid and liquid waste management particularly in industrial and urban areas. Asia is also a region with intense mining activities whereby serious environmental problems related to land/use, loss of top soil, water pollution and acid mine drainage are faced by various communities. Essentially, Asians are confronted with environmental problems on many fronts. Many pressing issues in the region interlink various aspects of environmental problems faced by population in this densely habited region in the world. Pollution is one such serious issue for many countries since there are many transnational water bodies that spread the pollutants across the entire region. Water, environment and pollution together constitute a three axial problem that all concerned people in the region would like to focus on.</p>	
	<p><a href="#">? Homepage</a></p> <p><a href="#">How to publish in this journal</a></p> <p><a href="#">Contact</a></p> <p><a href="#">Join the conversation about this journal</a></p>	

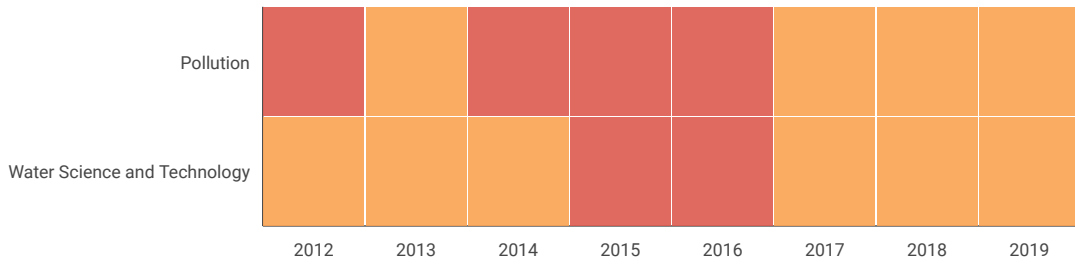
## Capai tujuan bisnis Anda

Platform Iklan Layanan Mandiri. Jangkau target audiens Anda di TikTok. Trafik berkualitas

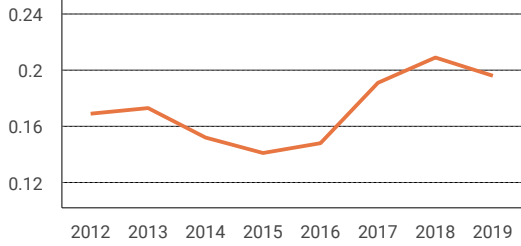
TikTok For Business



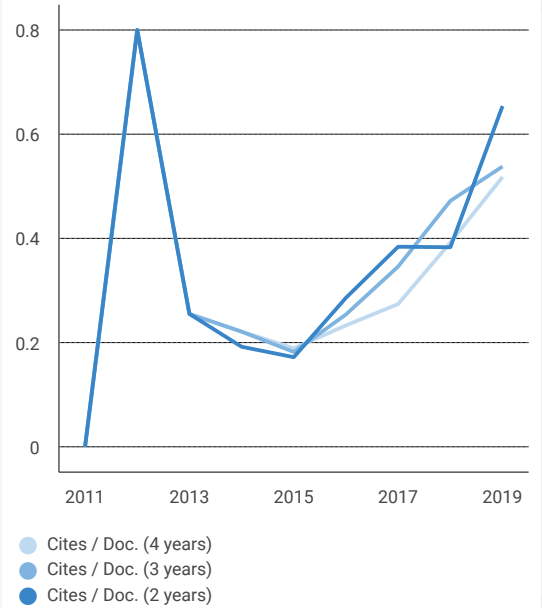
Quartiles



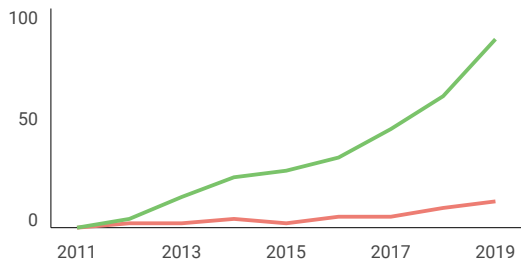
SJR



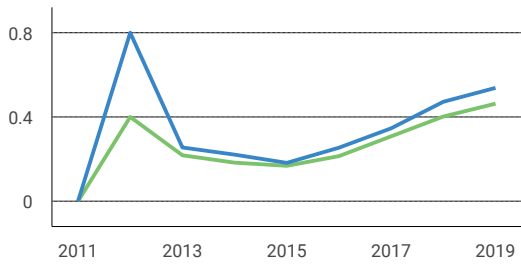
Citations per document



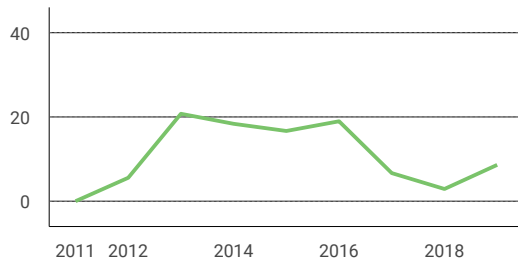
Total Cites Self-Cites



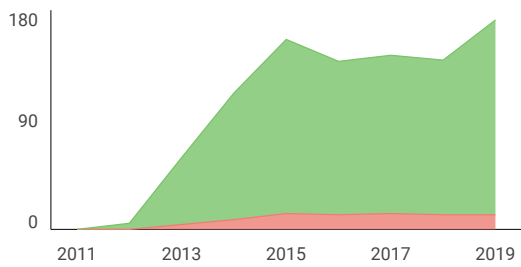
External Cites per Doc Cites per Doc



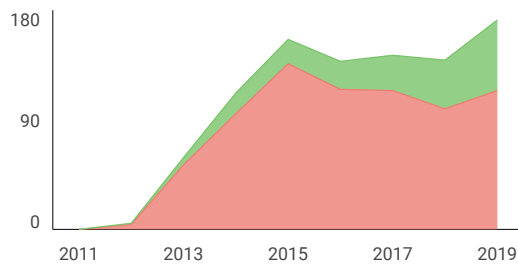
% International Collaboration



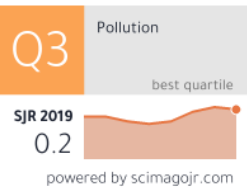
Citable documents Non-citable documents



Cited documents Uncited documents



Asian Journal of Water, Environment and Pollution



Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimagojr.com" style="display: inline-block; width: 100px; height: 15px; background-color: #f0f0f0; border: 1px solid #ccc;">
```



# Visualization of the Microbial Community and Elemental Mapping of *Anadara granosa* Media Used in a Slow Sand Filter Using a SEM-EDS

Ni'matuzahroh\*, Nurina Fitriani, Eddy Setiadi Soedjono<sup>1</sup>, Eko Prasetyo Kuncoro, Radin Maya Saphira Radin Mohamed<sup>2</sup> and Timothy Tjahja Nugraha O'Marga<sup>1</sup>

Department of Biology, Faculty of Science and Technology, Universitas Airlangga, Kampus C UNAIR  
Jalan Mulyorejo, Surabaya 60115, Indonesia

<sup>1</sup>Department of Environmental Engineering, Institut Teknologi Sepuluh Nopember  
Kampus ITS-Keputih Sukolilo, Surabaya 60111, Indonesia

<sup>2</sup>Department of Water and Environmental Engineering, Faculty of Civil and Environmental Engineering  
Universiti Tun Hussein Onn, 86400 Parit Raja, Batu Pahat, Johor, Malaysia

✉ nimatuzahroh@fst.unair.ac.id

Received February 2, 2020; revised and accepted June 5, 2020

**Abstract:** The removal of contaminants in slow sand filters occurs mainly in the biofilm above the filter media called schmutzdecke - a thin biological layer consisting of various microbial communities of algae, bacteria, diatoms and zooplankton. The layer formed ripens along with continuous straining and adsorption mechanism of impurities in raw water. *Anadara granosa* shell has been broadly used as an adsorbent to trap organic matter, turbid particles and heavy metal ion in raw wastewater. This research is aimed to visualise the microbial community grown on schmutzdecke in 2-weeks ripening period and maps the elemental characterisation of a grinded *Anadara granosa* shell media after the ripening period using a Scanning Electron Microscope with Energy Dispersive X-ray Spectroscopy (SEM-EDS). The result shows that mostly algae and diatoms have been recognised without species identification. Calcium (67%) and oxygen (21%) dominate the major chemical element contained in grinded *Anadara granosa* shell media, indicating that calcium carbonate and calcite can replace conventional sand as a more-efficient slow sand filter media, with longer maturing period. Such result can lead to further research about the increase of clamshell usage as a slow sand filter media to treat any types of wastewater, especially in rural areas in developing countries

**Key words:** Visualization; Schmutzdecke; slow sand filter; *Anadara granosa* shell.

## Introduction

It is well understood that access of safe and healthy clean water is one of the basic needs of human beings. Access to clean water shows that human rights are being highly appreciated. Clean water also sustains life. An inadequate production of safe clean water contributes

to the increase in mortality and morbidity in the third world countries. Therefore, an effort to improve the quality of sanitation and clean water must be carried out immediately. Indonesia, as one of the developing countries, has tried to fulfill this global program of Sustainable Development Goals goal 6, to achieve 100% universal access of clean water and sanitation. The

\*Corresponding Author

concrete evidence to boost the supply of clean water and sanitation in Indonesia was regulated in President Decree No. 185, 2014.

Slow sand filtration is one of the conventional technology and most successful potable water treatment techniques available for rural regions. High efficiency of water treatment is mostly achieved by the slow filtration rate in range of 0.1 to 0.3 m/hour and fine effective size grain in range of 0.15 to 0.35 mm. In comparison with rapid sand filter, biological process which occurs in the upper layer of sand filter bed plays the most important role. The contaminant removal mainly occurs in the *schmutzdecke* – a biological active layer or biofilm formed at the surface of sand filter bed (Campos et al., 2002).

Long *schmutzdecke* ripening period required at the beginning of filter run is the main limitation while operating slow sand filters. *Schmutzdecke* ripening involves continuous complex physical and biological mechanisms. As the filter runs, the biologically active layer keeps on developing and contributes to removal of water impurities (Dizer et al., 2004). Apart from the advantages of relatively high removal efficiency, slow sand filter is also profound in the other aspects, namely its simple design, ease to operate and maintain and low cost in construction. The operation does not require any electric supply, electric equipment and additional particular chemical substances. Furthermore, it does not need special cognitive skills from the workers and operators. All materials needed for constructing filter tank, filter bed, plumbing system and clean water reservoir are widely available in low price. Especially for the filter bed media, there is no particular type of sand used and so it is a possible option to utilise existing nearby local natural resources instead (Khudair and Jasim, 2018).

One of the potential material that acts as an alternative filter media is seashell solid waste. There are some types of seashells quite well-known by the Indonesian people, such as blood cockle (*Anadara granosa*), green mussel (*Perna viridis*), cockle (*Anadara antiquata*) and baby clam (*Paphia undulata*). The *Anadara granosa*, in particular, has been in existence along the seashore where the sandy mud substrate is found between 10 and 30 meters depth. In terms of its price, *Anadara granosa* is very economical because it is as cheap as IDR 7000 per kg (Suwignyo, 2005). In 2010, its production quantity level might reach as high as 34.482 metric tons with 5% to 10% annual growth based on data at the Ministry of Marine and Fisheries Republic of Indonesia (Pemerintah RI, 2011).

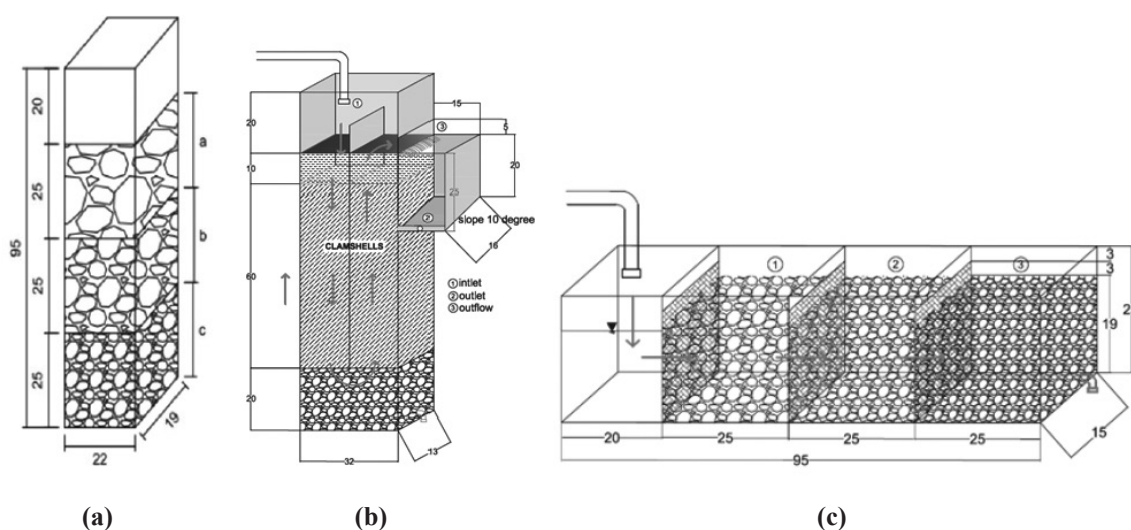
It turns out that the increasing quantity level of *Anadara granosa* production pushes the increase of number of its shell solid waste consequently. Nowadays, this waste is mostly being used as raw materials of seashell craft, room decoration, as well as food for cattle, whereas the number of shell solid waste absorbed are still definitely low (Agustini et al., 2011). Yet, Awang-Hazmi et al. (2005) stated that clamshell as a commodity contains approximately 98% content of calcium carbonate ( $\text{CaCO}_3$ ), which is potentially substitutable for usage in water filtration. Moreover, research done by Surest et al. (2012) observed that high calcite (CaO) content obtained from grinded *Anadara granosa* shell solid waste could remove BOD, COD, TSS and turbidity water quality parameters in treating swamp water. This still huge quantity of *Anadara granosa* shell solid waste but high pollutant removal efficiency of *Anadara granosa* shell in treating polluted water had then inevitably brought about the new concept to take place this seashell solid waste as an alternative of the slow sand filter media.

Previously, SEM has been used to visualise the sand samples removed from a slow sand filter with varying success and describing further about its morphological information (Joubert and Pillay, 2008; Law et al., 2001). In contrast, energy dispersive X-ray spectroscopy (EDS) chemical element analysis feature has not previously been studied together with the SEM visualisation of microbial community within a slow sand filter. Therefore, it is envisaged that this research could aid in the study of the development of microbial community on *schmutzdecke* grown on grinded *Anadara granosa* shell particles of a slow sand filter. In addition, the chemical element was observed with EDS analysis software programme linked with the SEM tools. The microorganisms found on the micrograph were generally identified based on any morphological evidences compared to the control sample.

## Materials and Methods

### Design and Operation of Slow Sand Filter

An experimental laboratory-scale slow sand filter reactors had to be designed and constructed, including vertical-flow and horizontal-flow roughing filter as pretreatment units. These reactors were designed and construction met the standard design criterias regulated in SNI 3981:2008 about 'design of slow sand filter installation'. The dimensions of the reactors are described in Figure 1 and Table 1.



**Figure 1: Schematic representation of the (a) vertical-flow roughing filter, (b) horizontal-flow roughing filter, and (c) slow sand filter.**

**Table 1: The dimensional details of vertical-flow roughing filter (VRF), horizontal-flow roughing filter (HRF), and slow sand filter (SSF)**

<i>Design</i>	<i>VRF</i>	<i>HRF</i>	<i>SSF</i>
Grain/gravel size (mm)	10–30	5–30	0.25–0.42
Filter length (cm)	22	95	32
Filter width (cm)	19	15	13
Freeboard height (cm)	10	3	20
Supernatant height (cm)	10	3	10
Amount of compartment	3	4	-
Compartment height (cm)	25	25	-
Sand bed depth (cm)	-	-	60
Gravel bed depth (cm)	-	19	20
Filter height (cm)	95	25	110

The slow sand filters were constructed using 10 mm-thick flat glass sheet, as this material is more anti-fouling, longlasting, does not erode, easy to clean and has a cheaper cost to maintain. While the vertical-flow roughing filter and horizontal-flow roughing filter were assembled using 10 mm-thick flat acrylic sheet, as this material is easily obtainable, low cost and light in weight yet strong. The filter was made by local aquarium-made craftsmen. The original dry clean shell was mechanically crushed and grinded, and then using sieve/mesh no. 40 and 60 in order to get an effective size of range 0.25–0.42 mm.

Raw municipal wastewater from one of low-middle apartment in Surabaya City was previously pre-treated by making it flow through the vertical-flow roughing

filter and horizontal-flow roughing filter by means of one-way sequence. This should be done in order to meet the quality of the slow sand filter intake water, which requires turbidity as low as 5 NTU. The rate of filtration was controlled by the inflow valve exactly 0.1 m/hr. The water debit was monitored twice a day. The water level above the horizontal-flow roughing filter media was continuously kept fully submerged. The entire reactors were housed outdoor in a partially shaded place that received minimum direct sunlight. Consequently, this was carried out to prevent the excessive growth of the algae.

#### Sampling of Sand

Samples of filter media and schmutzdecke were taken once at the end of two-week ripening period. In addition, a control sample (clean media) was taken at the beginning of the filter run (time 0). A sterile modified long-handed spatula was inserted into the grinded shell to a depth of approximately 1 cm below the surface of media to make the particles remain intact. Only a small amount of 2 g sample is needed that is a sufficient quantity for SEM-EDS analysis. The execution was taken carefully to ensure minimal handling and possible disturbance of samples.

#### Scanning Electron Microscopy and Energy Dispersive X-Ray Spectroscopy (SEM-EDS)

No specific preservation method was performed to prepare samples. Samples were stored in glass bottles and dried naturally under room temperature. Dry samples were mounted onto aluminium stubs and stuck

using carbon double-sided tape. Initially, the specimens were coated with gold (Au) ion under vacuum condition using the COXEM SPT-20 Ion Sputter Coater. These samples were viewed under high vacuum (approximately  $10^{-6}$  Torr) to obtain high quality images, with HITACHI FlexSEM 1000 VP-SEM at 15.0 kV, 6.1 mm Work Distance (WD) in four different magnification (5.0k, 10.0k, 15.0k and 30.0k). Images have a detector labelled as SE on the databar. Then, one micrograph with 5.0k magnification was analysed using an Energy Dispersive X-Ray Spectroscopy (EDS) software programme to map eight chosen chemical elements (i.e., O, Na, Mg, Al, Si, K, Ca and Fe). The obtained data was visualised in sum spectrum graphic and smart quantitative result.

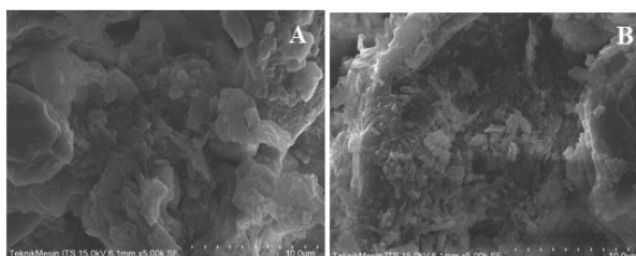
## Results and Discussion

### Scanning Electron Microscopy (SEM)

#### Visualization Analysis

Under the SEM visualisation, it is observed that grinded *Anadara granosa* shell particles takes irregular forms and its edges are sharp in nature. Unfortunately, there is no empirical evidence on the attachment of microbial communities or other particles on them. This sample acted as a control variable and a comparison for post ripening period sample. Each grinded shell particle dimension could not be described precisely, but the majority of the particles fell into the size range between 250 and 400  $\mu\text{m}$  in accordance to the sieving standard. In this context, the image demonstrates that initially grinded shell particles are still independent and are not attached to other particles. Joubert and Pillay (2008) reported the same bareness result of sand particles control sample in their SEM micrograph.

After two-weeks ripening period of schmutzdecke, there was a small evidence of difference in colonisation of grinded shell particles by bacteria and diatoms. It is beyond the normal confidence that bacteria appear to be the initial inhabitant occupying in the schmutzdecke layer. The obvious evidence was found that first, a sticky glue-like mucilage footage had been spotted, as shown in Figure 2. Surely, extracellular polymeric matrix had been firmly in contact, attached and covered surrounding the shell particle. Therefore, the initial formation of an attached-growth with schmutzdecke is aided by the production of mucilage excreted by bacteria. This could not be done unless there is an enough supply of nutrient or organic impurities contained in the slow sand filter intake raw water. This mucilage product acts as push on towards the attachment process of bacteria to surface of filter media particles (Law et al., 2001).

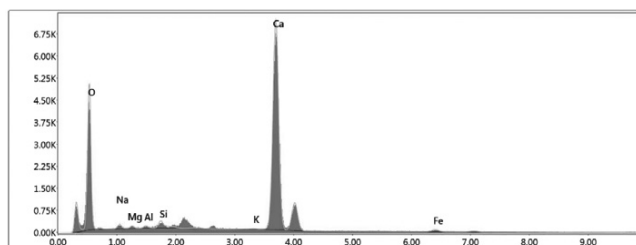


**Figure 2: (a) Micrograph of the control sample and (b) sample after two-weeks ripening period showing the sign of mucilage production by bacteria and diatoms (magnification 5.00 k) Energy Dispersive X-Ray Spectroscopy (EDS) Elemental Mapping**

Due to some inevitable handicaps and limitations, there is a limited biofilm drying procedure, which takes place at room temperature. It is not advised to store this delicate sample under room temperature in an open air, but should be prepared very carefully. During the biofilm preparation step, some special approaches ought to be done, for example the fixation in glutaraldehyde cross-linking, ethanol dehydration, critical-point drying (CFD) or less-invasive low-temperature drying by vacuum sublimation (lyophilisation) method.

Hence, it is advisable to apply the latest method mentioned above, lyophilisation, as it is suitable for the preservation method of bacterial cells sample and many forms of extracellular matrix structure, this method is a fast and inexpensive nondestructive preparatory method for SEM analysis of biofilm. Lyophilised material could be imaged with high resolution using Conventional High-Vacuum SEM (CSEM) (Karcz et al., 2012). Under difficult circumstances, the final method that can be applied is by visualising under Environmental SEM (ESEM) tool, which can accept wet biofilm sample condition in similar high resolution image quality (Joubert and Pillay, 2008).

According to the sum spectrum graphic result as shown in Figure 3 and quantitative results in Table 2, calcium and oxygen were seen as two dominant



**Figure 3: The sum spectrum graphic of EDS chemical element analysis.**

**Table 2 : The smart quantitative results of EDS chemical element analysis**

<i>Element</i>	<i>Weight (%)</i>	<i>Atomic (%)</i>	<i>Net Int.</i>	<i>Error (%)</i>	<i>K ratio</i>	<i>Z</i>	<i>A</i>	<i>F</i>
O	47.65	69.21	75.44	10.24	0.0803	1.0824	0.1557	1.0000
Na	0.81	0.82	2.51	15.31	0.0029	0.9797	0.3603	1.0012
Mg	0.28	0.27	1.52	22.24	0.0015	0.9955	0.5147	1.0022
Al	0.24	0.20	1.51	21.35	0.0015	0.9578	0.6577	1.0041
Si	0.64	0.53	4.84	8.91	0.0049	0.9779	0.7721	1.0068
K	0.08	0.04	0.36	63.32	0.0007	0.9028	0.9924	1.0664
Ca	48.86	28.33	183.78	2.00	0.4509	0.9184	1.0022	1.0032
Fe	1.44	0.60	2.16	16.21	0.0117	0.8115	0.9770	1.0274

chemical contents in the grinded *Anadara granosa* shell sample. It had been done because the grinded clamshells mostly consist of calcium carbonate compound which took effect to the level of shell hardness. In accordance with Afranita et al. (2013) results, *Anadara granosa* shell consists of several chemical compounds such as calcium carbonate, calcium hydroxyapatite, calcium phosphate and chitin. Combined with calcium carbonate, chitin produces a much stronger composite. Addition of only 1% calcium carbonate can reduce the turbidity value on water treatment as grinded shell has more amounts of microporous. Microporous take an important role to trap organic impurities and heavy metal which had existed in the inflow raw water of a slow sand filter. A rich-nutrient environment provides an ideal condition for the schmutzdecke to grow and develop.

### Conclusion

This research result visualises the variety of microbes that grew in the biologically active schmutzdecke layer of a modified slow sand filter with grinded *Anadara granosa* shell media. After two weeks ripening time to develop the schmutzdecke layer, it can be concluded that bacteria and diatoms are two microorganisms which promote the formation of this complex matrix layer. It was also concluded that due to improper sample preparation handling, visualisation of bacteria and diatoms morphology using SEM was not well-executed and difficult to find out the best enlargement spot for further analysis. The EDS element analysis proved that calcium and oxygen element dominates the main composition of shell media, in accordance with clamshell which consists approximately 97% to 99% calcium carbonate (CaCO<sub>3</sub>) or calcite (CaO) compound.

Higher content of calcium and oxygen has pushed on the performance of pollutant straining and adsorption mechanism. Hence, it created an ideal environment for enhancing the attachment process of exopolysaccharides or extracellular polymeric mucilage by bacteria, followed by diatoms. Unfortunately, it is recommended that further research should be done to investigate the correlation between the chemical elements composition of media and microbial biodiversity, microorganism identification, water quality analysis of the slow sand filter outflow during the ripening period, as well as doing the proper biofilm sample preservation method, to explain in depth about the relationship between the usage of grinded *Anadara granosa* shell and the pollutant removal efficiency. With such a conventional technology such as slow sand filter, the sixth goal of the 17 Sustainable Development Goals (SDGs) of creating well management and supply of clean water and sanitation can be achieved. This research can be further improved and modified to another project with similar objectives and needs.

### Acknowledgements

This is the right time for the authors to express their deepest thanks and gratitude to the following personnels and organisations: The Research and Innovation Body (Lembaga Penelitian dan Inovasi) Universitas Airlangga for fully financial support; Mr. Luki, SEM Laboratory, Department of Mechanical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia for assistance with SEM-EDS; lecturers from Department of Biology, Faculty of Science and Technology, Universitas Airlangga for personal guidance who have helped the authors with all assistance needed to complete the paper.

## References

- Afranita, G., Anita, S. and T. Hanifah (2013). Potensi Abu Cangkang Kerang Darah (*Anadara granosa*) sebagai Adsorben Ion Timah Putih. Pekanbaru: Universitas Riau (in Indonesian language).
- Agustini, T., Fahmi, A., Widowati, I. and A. Sarwono (2011). Pemanfaatan Limbah Cangkang Kerang Sumping (*Amusium pleuronectes*) dalam Pembuatan Cookies Kaya Kalsium, **14**: 8-13 (in Indonesian language).
- Awang-Hazmi, A. et al. (2005). Mineral composition of the cople (*Anadara granosa*) shells of West Coast of Peninsular Malaysia and it's potential as biomaterial for use in bone repair. *Journal of Animal and Veterinary Advances*, **6**: 591-594.
- Campos, L., Su, M., Graham, N. and S. Smith (2002). Biomass development in slow sand filters. *Water Research*, **36**: 4543-4551.
- Dizer, H. et al. (2004). Contribution of the colmation layer to the elimination of coliphages by slow sand filtration. *Water Science and Technology*, **50**: 21-214.
- Joubert, E.D. and B. Pillay (2008). Visualisation of the microbial colonisation of a slow sand filter using an Environmental Scanning Electron Microscope. *Electronic Journal of Biotechnology*, **11**: 1-7.
- Karcz, J. et al. (2012). Application of lyophilization to prepare the nitrifying bacterial biofilm for imaging with scanning electron microscopy. *Scanning*, **34**: 26-36.
- Khudair, B. and S. Jasim (2018). Improvement of domestic wastewater treated effluent from sequencing batch reactor using slow sand filtration. *Association of Arab Universities Journal of Engineering Sciences*, **25**: 159-172.
- Law, S.P., Melvin, M.M. and A.J. Lamb (2001). Visualisation of the establishment of a heterotrophic biofilm within the schmutzdecke of a slow sand filter using scanning electron microscopy. *Biofilm*, **6**.
- Pemerintah, R.I. (2011). Statistik Perikanan Tangkap Indonesia 2010. *Jakarta: Kementerian Kelautan dan Perikanan RI* (in Indonesian language).
- Surest, A., Wardani, A. and R. Fransiska (2012). Pemanfaatan Limbah Kulit Kerang untuk Meningkatkan pH pada Proses Pengelolaan Air Rawa Menjadi Air Bersih. *Teknik Kimia*, **18**: 10-15 (in Indonesian language).
- Suwignyo, R. (2005). Regrowth acceleration for rice seeds in post flooded after "plant phyto regulator" and nitrogen treatments. *Jurnal Tanaman Tropika* (in Indonesian language), **8**: 45-52.