



SOUTHEAST ASIA-EUROPE
JOINT FUNDING SCHEME FOR
RESEARCH AND INNOVATION

Dr. Surya Hermawan
Petra Christian University
INDONESIA

Enhancing Sustainable Brackish Water Treatment in Remote Indonesian Areas: A Zero-Waste Approach Integrating Renewable Energy and Circular Economy Amidst Global Climate Change (Ebranch).

Topic 1: Waste water treatment and reuse (industrial & municipal)

Brokerage Event – 9th Call

03 October 2024

Sustainable Brackish Water Treatment in Remote Indonesia: A Zero-Waste, Renewable Approach

Environmental & Hydraulics Engineering Laboratory
Civil Engineering Department
Petra Christian University



My and my institution's area of expertise

Ebranch

Name:

**Dr.rer.nat. Ir. Surya Hermawan,
ST.,M.Eng., IPM**

Position:

Lecturer and Researcher

Unit: Civil Engineering Department

Organisation:

Petra Christian University

City: Surabaya

Country: Indonesia

E-Mail: shermawan@petra.ac.id

My Expertise:

- ✓ Coastal Geoscience and Engineering
- ✓ Civil Engineering Department
- ✓ Climate Change
- ✓ Environmental: sustainable, circular economy, net zero emission

My institution's area of expertise

- Liberal Arts & Social Sciences:
- Engineering
- Business.
- Environmental Science.*
- Management and Marketing.
- Finance and Accounting
- Supply Chain Management



Social Media Accounts:
Facebook: Surya Coast
Instagram: surya_coast
Youtube: Shermawan

My and my institution's area of expertise

Expertise: The main Research Areas/ Business Fields are

Liberal Arts & Social Sciences: This includes, political science, sociology, and linguistics.

Engineering: Focus areas include materials science, mechanical engineering, electrical engineering, structural engineering, and **civil engineering**.

Business: Key topics include management, marketing, finance, advertising, and accounting.

Environmental Science: *Research in this field often intersects with sustainable development and environmental conservation.*

Management and Marketing: PCU has a strong focus on management and marketing, which are critical for business development.

Finance and Accounting: These fields are essential for business operations and financial planning.

Supply Chain Management: This area is crucial for optimizing business processes and logistics.

Research Question:

What is the international/bi-regional (Southeast Asia - Europe) aspect of the project?

The international/bi-regional (Southeast Asia – Europe) aspect of the project including: **knowledge exchange, capacity building, sustainable development goals (SDGS), community engagement, and funding and resources.**

What is the innovative aspect of the project?

The innovative aspect of the project is interdisciplinary approach, advanced technologies, community-centric models, sustainable practices and international collaboration

Proposed Project Activity:

Proposed Activity

Petra Christian University (PCU)

Local Expertise and Community Engagement:

Community Outreach: Engaging local communities in Indonesia through participatory research and education programs.

Field Research: Brackish water treatment with local material, conducting on-site studies and **data collection in local ecosystems**, such as brackish water, mangrove forests and coastal areas at remote area in Indonesia

Environmental Science and Engineering:

Sustainable Practices: Implementing and testing **sustainable agricultural and water management practices**. Technological Innovation: **developing and applying advanced technologies for environmental monitoring and water treatment.**

Proposed Research Activity: Only if required, additional slide about Activity

This project aligns well with your interests in sustainable development and advanced technologies, including:

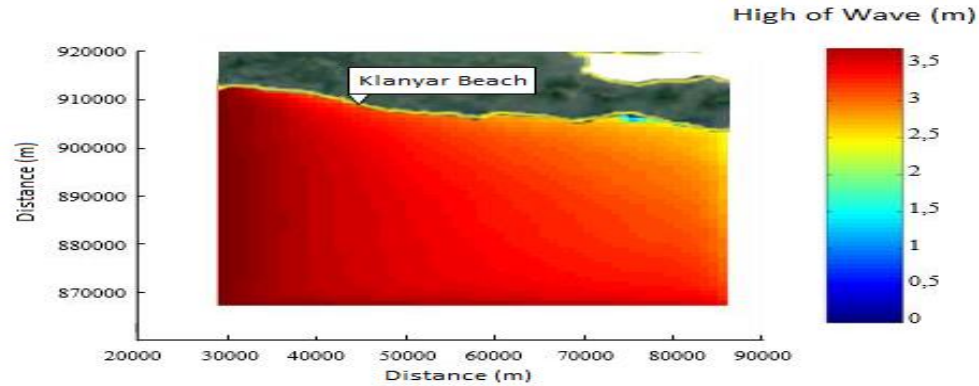
- ✓ Sustainable Brackish Water Treatment: Focuses on improving water treatment processes in remote areas of Indonesia, ensuring access to clean water.
- ✓ Zero-Waste Approach: Integrates principles of the circular economy to minimize waste and promote resource efficiency.
- ✓ Renewable Energy Integration: Utilizes renewable energy sources to power the water treatment systems, reducing reliance on non-renewable energy.
- ✓ Climate Change Adaptation: Addresses the impacts of global climate change, enhancing resilience in vulnerable communities.

The innovative aspect of the project is interdisciplinary approach, advanced technologies, community-centric models, sustainable practices and international collaboration

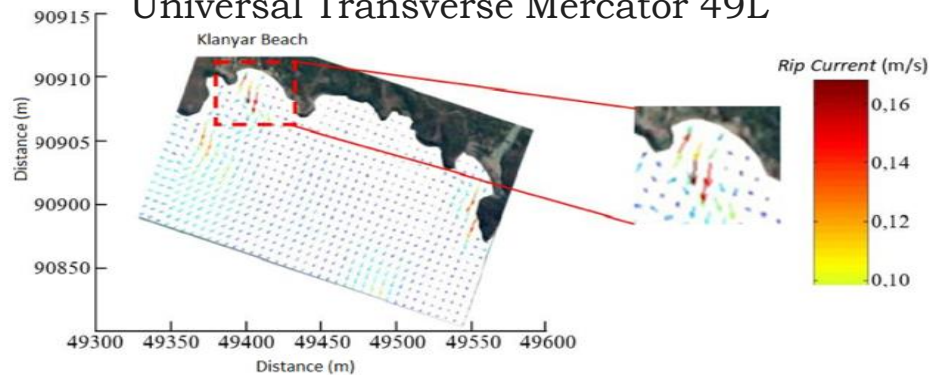
Proposed Research Activity: Only if required, additional slide about Activity



Rip current at South Java Sea Ebranch



Simulation Results of Wave Height at Klanyar Beach
Universal Transverse Mercator 49L



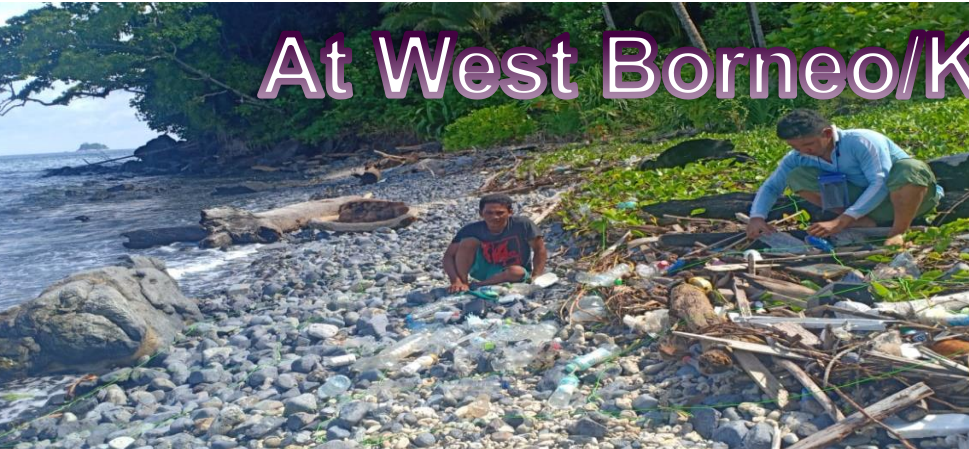
Simulation Results of Rip Current at Klanyar Beach
Universal Transverse Mercator 49L

Decision Support System at Poso Regency Central Sulawesi

Ebranch



Marine Debris & Marine Nature Reserve Area At West Borneo/Kalimantan Island



Ebranch

Pulau genting
-1°35'19", 108°45'0", -1.1m, 229°
01/11/2020 7:53:43 AM

Pulau genting
-1°35'18", 108°45'0", -0.5m, 238°
01/11/2020 9:29:38 AM

Pulau genting
-1°35'18", 108°45'0", -5.0m, 112°
01/11/2020 9:13:57 AM



Green turtles (*Chelonia mydas*)

Source:

[https://commons.wikimedia.org/wiki/File:Green_Turtle_\(Chelonia_mydas\)_\(6133097542\).jpg](https://commons.wikimedia.org/wiki/File:Green_Turtle_(Chelonia_mydas)_(6133097542).jpg)



Hawksbill turtles (*Eretmochelys imbricata*)

Source:

[https://commons.wikimedia.org/wiki/File:Green_Turtle_\(Chelonia_mydas\)_\(6133097542\).jpg](https://commons.wikimedia.org/wiki/File:Green_Turtle_(Chelonia_mydas)_(6133097542).jpg)



Ebranch

Olive ridley sea turtle (*Lepidochelys olivacea*)

Source:

https://commons.wikimedia.org/wiki/File:Lepidochelys_olivacea.jpg



Leatherback turtles (*Dermochelys coriacea*)

Source:

https://en.wikipedia.org/wiki/Leatherback_sea_turtle

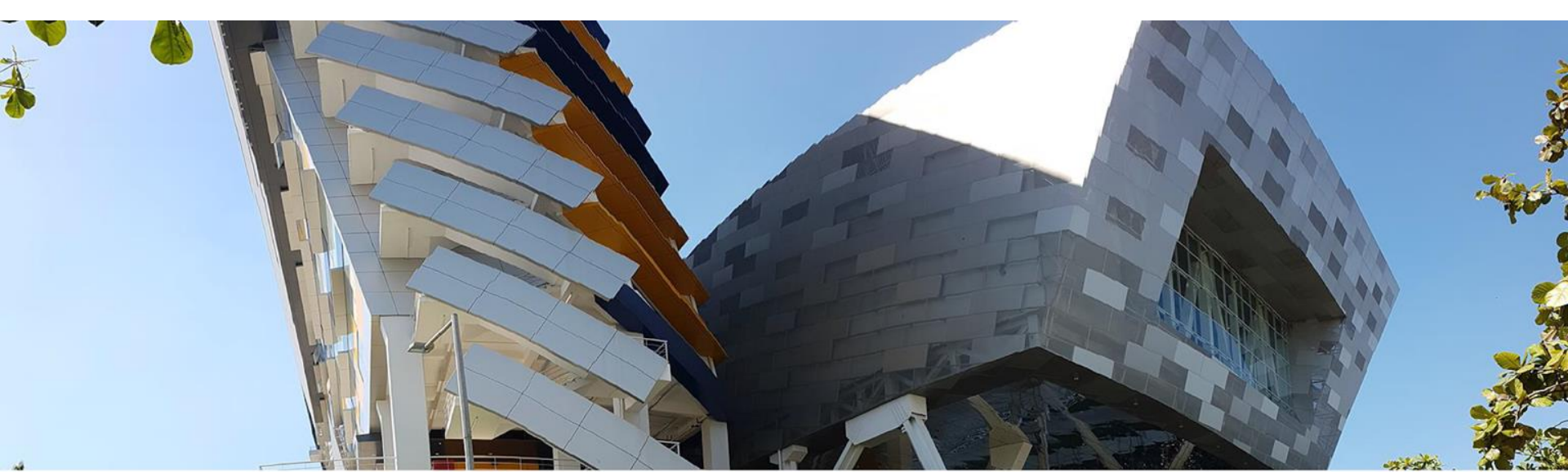


Pic 2. Turtle carcass found in Paloh

Source: <http://ksdae.menlhk.go.id/info/3256/kejadian-luar-biasa--kematian-penyu--di-pantai-belacan-kec.-paloh-kabupaten-sambas.html>

Flood Tide at Sidoarjo Regency East Java





Enhancing Sustainable **B**rackish Water Treatment in **R**emote Indonesian
Areas: A Zero-Waste **A**pproach Integrating Re**n**ewable Energy and
Circular Economy Amidst Global Climate **C**hange

EBRANCH

PROBLEM STATEMENT

- **Sustainability Challenge**
Addressing the need for sustainable brackish water treatment solutions in remote areas of Indonesia.
- **Zero-Waste Goal**
Developing a treatment method that produces no waste, aligning with circular economy principles.
- **Renewable Integration**
Incorporating renewable energy sources to power the treatment process.
- **Climate Resilience**
Ensuring the approach is adaptable to the impacts of global climate change.

PROJECT OVERVIEW

- **Project Goal**
The project aims to develop a zero-waste, renewable energy-based brackish water treatment using local materials (**BALAM**).
- **Readiness**
The project is at Technology Readiness Level (TRL) 5, indicating component validation in a relevant environment.
- **Research Activities**
The team conducts research on water quality, social capital's impact on technology adoption, and financial modeling.
- **Timeline**
The first-year activities involve collecting data on wind, tides, and solar energy, and testing the BALAM prototype in multiple locations.

INNOVATION AND UNIQUENESS OF OUR PROJECT

Solar Energy-Based Water Treatment Systems: Employing small-scale brackish water treatment systems associated with **solar thermal** or photovoltaic applications can produce clean fresh water with **low capital cost and easy operation**.

Circular economy practice: Utilizing solar energy efficiently for water treatment.

Integrated Water Management and Climate Risk Reduction.

These innovations align with circular economy principles, promote zero-waste approaches, and contribute to Indonesia's sustainable future.

IMPACTS AND TARGET BENEFICIARIES

IMPACTS

The proposed project is expected to have several positive impacts: **improved water quality, energy access, climate resilience, circular economy practices, community health, as well as economic growth.**

Overall, this project aims to create a holistic impact by addressing water, energy, and environmental challenges in remote Indonesian areas.

TARGET BENEFICIARIES

The targeted beneficiaries of the proposed initiative are the coastal communities in Indonesia, **comprising approximately 14 million people from 10,639 villages.**

These communities, living in remote areas of Indonesia, rely on brackish water sources for their daily needs.

EXPECTED OUTPUTS/OUTCOMES

The project aims to achieve outcomes and outputs: **solar energy-based brackish water treatment**: considering **low population density**, geographical inaccessibility, and **lack of electricity**, a **small-scale brackish water treatment system** powered by solar energy could produce clean fresh water. This system is characterized by **low capital costs**, **easy operation**, and **minimal maintenance requirements**. Overall, this project aims to enhance water treatment, energy efficiency, and sustainability in remote Indonesian areas, contributing to a more resilient and climate-friendly future.



TIME LINE

Enhancing Sustainable Brackish Water Treatment in Remote Indonesian Areas: A Zero-Waste Approach Integrating Energy and Circular Economy Amidst Global Climate Change (Ebranch)

First Year Research Activities

Market

Technology Readiness Level (TRL5)

Component and/or breadboard validation in relevant environment
Brackish Water Treatment with Local Material (BALAM)

Product

Surya Hermawan/Team Leader

1 Paten Granted

1 publication at reputable journal : draft: **Water Quality Monitoring for Brackish Water Treatment with Local Material**

Technology

Research Member 1 & 2

1 publication at reputable Journal: **The Effect of Social capital and Knowledge Sharing to Absorptive capacity**

Research Member 2

- The absorptive model for science and technology influenced by social capital.
- UTAUT 2 Model for *zero waste technology*

Research Member 1

Model calculation with SPSS, PLS-SIM

- Pemodelan keuangan mitra
- Asset Assessment

Team Leader

Analysis Model and Experimental Research for *zero emission technology towards sustainable future*

- The scene of potential for *zero emission*
- Quality and Quantity of the Brackish Water Treatment with Local Material (BALAM)
- Collecting wind data for 10 years, tides along with solar energy
- Realtime data measurement for water quality with Internet of Things
- Test the prototype of BALAM at multiple locations

Research & Development

Dr. Dhyah Harjanti /Research Member 2

- The impact of social capital on the process of knowledge sharing
- The effect of social capital on absorptive capacity in the knowledge absorption of technology

Prof. Njo Anastasia/ Research Member 1

- Financial behavior
- Personal Finance
- Financial Real Estate

Dr.rer.nat. Surya Hermawan/Team Leader : BALAM prototype for Portable BALAM: zero emission towards Sustainable Future

Assesment for potential new renewable energy

Collecting, Experiment, and Analysis

- Tides at nearest location i.e: river
- Windspeed- ~~Weather Station & Anemometer~~
- Solar Energy from Weather Station

2 nd month

6th month

10th month

TECHNICAL FEASIBILITY

Technical feasibility for the critical challenges faced by coastal communities in Indonesia.

- **Zero-Waste Approach**

This approach aims to minimize waste generation during water treatment processes. By optimizing resource utilization and recycling, it contributes to environmental sustainability.

- **Renewable Energy Integration**

The initiative emphasizes using renewable energy sources (such as wind and solar power) to power water treatment systems. This integration reduces reliance on fossil fuels and promotes clean energy.

- **Circular Economy Principles**

Circular economy practices involve reusing, repurposing, and recycling materials. In this context, it means maximizing the value of water treatment by-products and minimizing their environmental impact.

- **Climate Change Resilience**

Given the challenges posed by climate change, this initiative seeks to enhance water treatment methods that can withstand its effects, especially in remote areas.

Overall, this holistic approach aims to provide sustainable, efficient, and climate-resilient brackish water treatment solutions for coastal communities in Indonesia.

ORGANIZATION AND TEAM

Research Team Leader

- Dr.rer.nat. Ir. Surya Hermawan, ST, MT.,IPM

Research Team Member

- Prof. Dr. Njo Anastasia, S.E. M.T.
- Dr. Dhyah Harjanti, S.E.,M.Si

Dr.rer.nat. Ir. Surya
Hermawan, ST, MT.,IPM

Dr. Dhyah Harjanti, S.E.,M.Si

Prof. Dr. Njo Anastasia, S.E. M.T

Brackish Water Treatment with Local Material (BALAM) PLUS for Drinking Water In Bahasa: Alat Pemurni Air Payau dengan Material Lokal (ALPAMAL)

Patent
Certificate



REPUBLIK INDONESIA KEMENTERIAN HUKUM DAN HAK ASASI MANUSIA SERTIFIKAT PATEN SEDERHANA

Menteri Hukum dan Hak Asasi Manusia atas nama Negara Republik Indonesia berdasarkan Undang-Undang Nomor 13 Tahun 2016 tentang Paten, memberikan hak atas Paten Sederhana kepada:

Nama dan Alamat Pemegang Paten : LPPM UNIVERSITAS KRISTEN PETRA
Jl. Siwalankerto No. 121-131,
Kelurahan Siwalankerto, Kecamatan Wonocolo,
Surabaya 60236 Jawa Timur,
INDONESIA

Untuk Invensi dengan Judul : ALAT PEMURNI AIR PAYAU DENGAN MATERIAL LOKAL

Inventor : Surya Hermawan
Tanggal Penerimaan : 20 November 2021
Nomor Paten : IDS000005138
Tanggal Pemberian : 31 Oktober 2022

Pelindungan Paten Sederhana untuk invensi tersebut diberikan untuk selama 10 tahun terhitung sejak Tanggal Penerimaan (Pasal 23 Undang-Undang Nomor 13 Tahun 2016 tentang Paten).

Sertifikat Paten Sederhana ini dilampiri dengan deskripsi, klaim, abstrak dan gambar (jika ada) dari invensi yang tidak terpisahkan dari sertifikat ini.



an MENTERI HUKUM DAN HAK ASASI MANUSIA
DIREKTUR JENDERAL KEKAYAAN INTELEKTUAL
u.b.
Direktur Paten, Desain Tata Letak Sirkuit Terpadu dan
Rahasia Dagang



Drs. YASMON, M.L.S.
NIP. 196805201994031002

ALPAMAL, Alat Pemurni Air Payau Karya Dosen di Surabaya

Konten Media Partner **BASRA (Berita Anak Surabaya)**

15 November 2023 18:09 WIB · waktu baca 3 menit



beritajatim.com

PERISTIWA POLITIK PEMERINTAHAN HUKUM & KRIMINAL

Home » Pendidikan & Kesehatan » Warga Tegalsari Sidoarjo Nikmati Air Bersih Setelah Penantian 30 Tahun

PENDIDIKAN & KESEHATAN

Warga Tegalsari Sidoarjo Nikmati Air Bersih Setelah Penantian 30 Tahun

Shohibul Anwar | 16 November 2023 | 18:00

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Supporting Document



Recent

TRL 5 - BALAM



Future/Target

TRL 6 - New BALAM

Project Consortium

My organisation:

Role:

This project requires a **multidisciplinary expertise in environmental engineering, renewable energy systems, and water resource management.**

The focus is on **developing sustainable brackish water treatment solutions for remote Indonesian areas, emphasizing a zero-waste approach.**

Key areas of expertise include:

Renewable Energy Integration: Utilizing solar, wind, or other renewable energy sources to power water treatment processes.

Circular Economy Principles: Implementing strategies to minimize waste and promote resource reuse and recycling.

Climate Change Adaptation: Addressing the impacts of global climate change on water resources and treatment systems.

Local Context Understanding: Knowledge of the specific challenges and needs of remote Indonesian communities.

This expertise ensures the development of efficient, cost-effective, and environmentally friendly water treatment solutions.



Further existing partners (if any):

Partner 1: Name of Organisation, Country

Expertise: Description of Expertise

Role: Description of Role

Partner 2: Name of Organisation, Country

Expertise: Description of Expertise

Role: Description of Role

Project Consortium

Partners that we are seeking for our project consortium:

Ebranch

Region: Belgium, Spain, Switzerland

Expertise: Environmental science and sustainability, Circular economy practices, Climate change adaptation

Role: Description of Role

Circular Economy Implementation: Develop and promote circular economy strategies to manage waste and by-products from the water treatment process.

Climate Change Adaptation: Study and propose adaptation measures to ensure the water treatment systems are resilient to climate change impacts.

Region: Philipines, Vietnam

Expertise: Renewable energy integration, Environmental impact assessment

Role: Description of Role

Renewable Energy Integration: They will design and implement systems that integrate renewable energy sources, such as solar and wind, into the water treatment process.

Environmental Impact Assessment: Conduct comprehensive assessments to ensure the technologies are environmentally friendly and align with zero-waste principles.



SOUTHEAST ASIA-EUROPE
JOINT FUNDING SCHEME FOR
RESEARCH AND INNOVATION



Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR)
German Aerospace Center

DLR Project Management Agency | Department European and international cooperation | Division A:

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