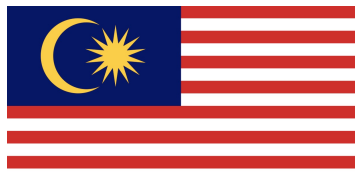


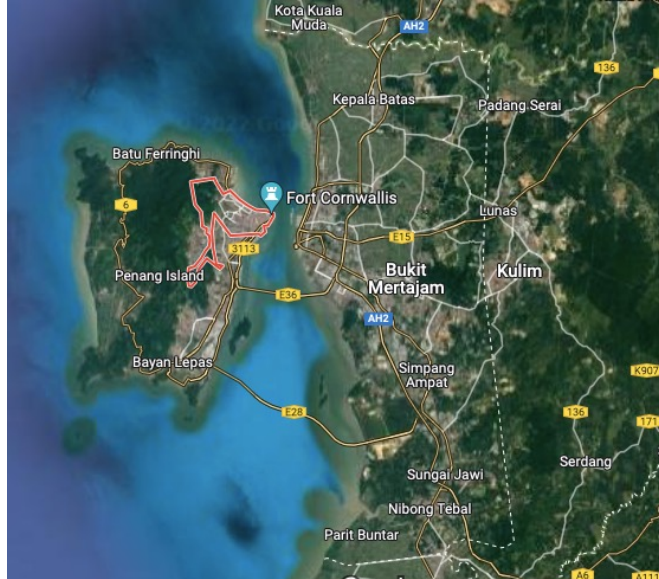
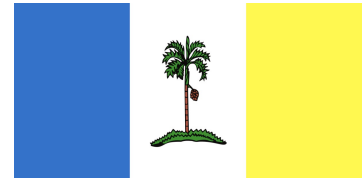
Marine Debris Pollution: Citizen Scientists Taking Charge!

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Centre for Marine and Coastal Studies
Universiti Sains Malaysia
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Penang, Malaysia



UNESCO World
Heritage Site
(Georgetown)

UNESCO Biosphere
Reserve
(Penang Hill)



Centre for Marine and Coastal Studies (CEMACS)
Universiti Sains Malaysia

Penang: Pride of its Citizens



Nature • Environment • Diversity • Culture • History • Festival • Arts



Penang: Pride of its Citizens



Food • Food • Food • Food • Food • Food



Penang (and the World): A persistent problem



Monkey Beach, Penang



Look closer: Plastics and trash on the beach strandline



Plastic Pollution

Paying attention to the plastic pollution threatening our marine environment





Unlikely places



Sea birds - Albatross





Plastic Pollution

Present situation

The ocean is teeming with microplastic – a million times more than we thought, suggests new research



Microplastics have spread right to the sea bed, study finds



A study in London, UK, discovered microplastics suspended in the air throughout the city. The study suggests that cities could be a source of microplastic pollution as the **AIRBORNE PLASTIC PARTICLES ENTER SOIL AND BODIES OF WATER, INCLUDING THE OCEAN, THROUGH RAIN AND SNOW** (Wright et al., 2020 *Environment International*).

Plastic Bag Found at the Bottom of World's Deepest Ocean Trench

Even one of the most remote places on Earth couldn't hide from the scourge of plastic trash.

https://www.nationalgeographic.org/article/plastic-bag-found-bottom-worlds-deepest-ocean-trench/?utm_source=BiblioRCM_Row

Rubber dust from car tires is one of the most common sources of microplastics in the coastal waters off California, USA, according to scientists (Sutton et al., 2019 *San Francisco Estuary Institute*). Another study found that toxins in these **TIRE PARTICLES CAN REDUCE THE SURVIVAL RATE OF SOME FISH HATCHLINGS** and cause deformities in their embryos. These particles may become more toxic to organisms as water temperature and turbulence from storm events increase with climate change (Kolomijeca et al., 2020 *Environmental Science & Technology*).

Microplastics and even smaller nanoplastics have been found in many of the food and beverage products we consume. Scientists found that **COMMON PLASTIC TEABAGS CAN RELEASE MORE THAN 11 BILLION MICROPLASTIC AND 3 BILLION NANOPLASTIC PARTICLES INTO YOUR BEVERAGE** (Hernandez et al., 2019 *Environmental Science & Technology*).

Original Research | October 1, 2019

Detection of Various Microplastics in Human Stool

A Prospective Case Series

Philipp Schwabl, MD ✉, Sebastian Köppel, Dipl-Ing(FH), Philipp Königshofer, DVM, Theresa Bucsics, MD,

Michael Trauner, MD, Thomas Reiberger, MD, Bettina Liebmann, PhD [View fewer authors](#) ✕

Article | [Open Access](#) | Published: 12 July 2019

Microplastic contamination of table salts from Taiwan, including a global review

Hyemi Lee, Alexander Kunz, Won Joon Shim & Bruno A. Walther ✉

Scientific Reports **9**, Article number: 10145 (2019) | [Cite this article](#)

Microplastics and human health

A. Dick Vethaak^{1,2}, Juliette Legler³

+ [See all authors and affiliations](#)

Science 12 Feb 2021:
Vol. 371, Issue 6530, pp. 672-674
DOI: 10.1126/science.abe5041



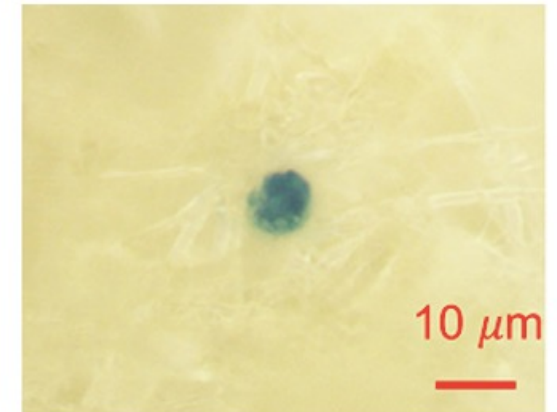
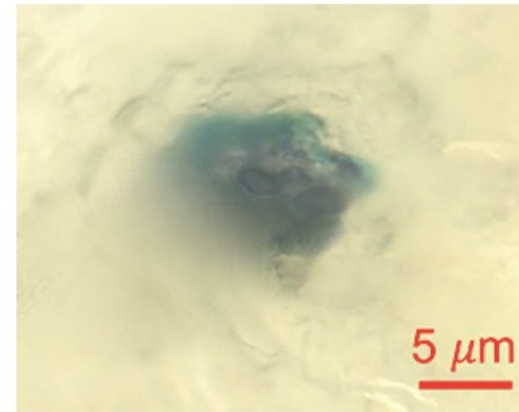
Environment International

Volume 146, January 2021, 106274



Plasticenta: First evidence of microplastics in human placenta

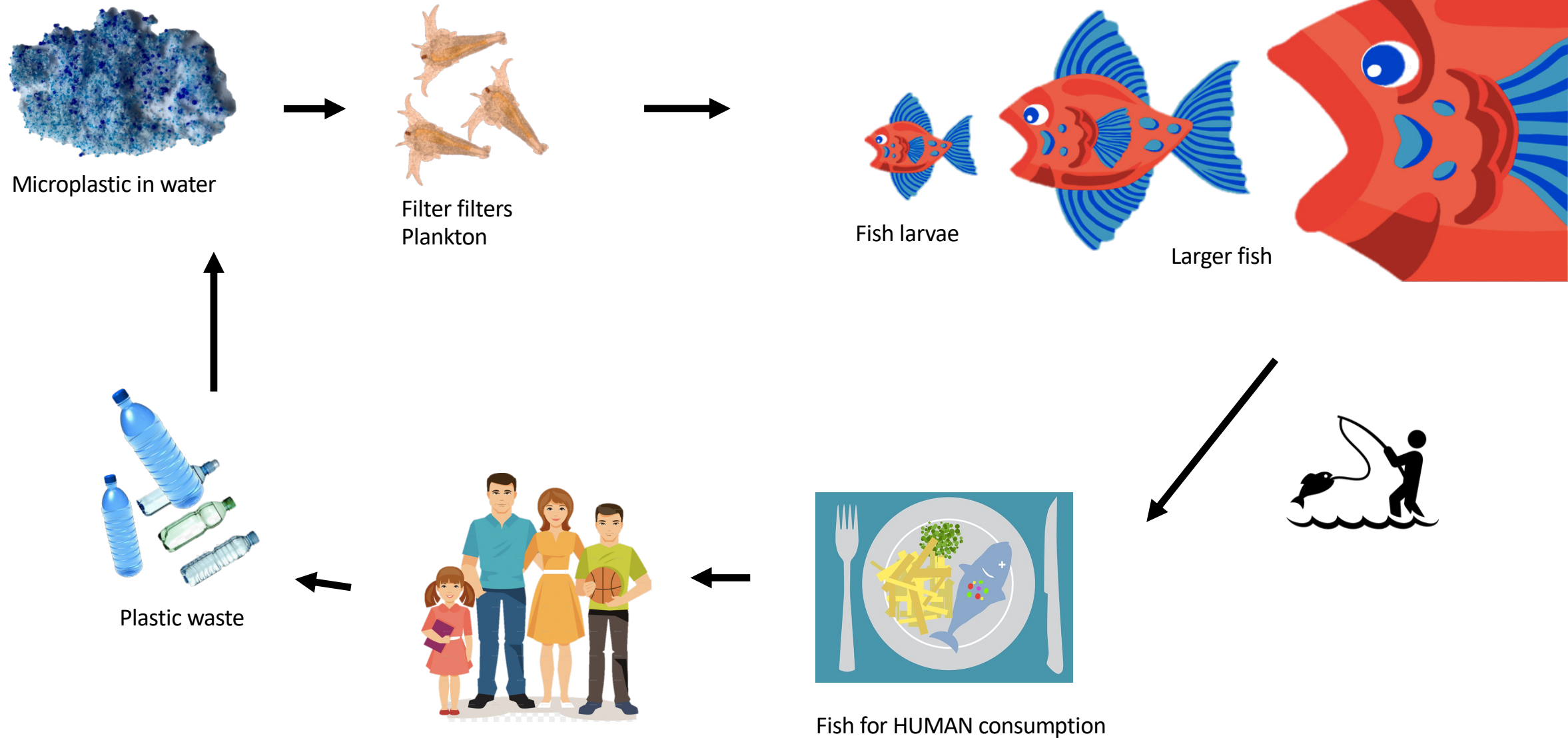
Antonio Ragusa ^a, Alessandro Svelato ^a ✉, Criselda Santacroce ^b, Piera Catalano ^b, Valentina Notarstefano ^c, Oliana Carnevali ^c, Fabrizio Papa ^b, Mauro Ciro Antonio Rongioletti ^b, Federico Baiocco ^a, Simonetta Draghi ^a, Elisabetta D'Amore ^a, Denise Rinaldo ^d, Maria Matta ^e, Elisabetta Giorgini ^c



Polypropylene particles found inside the human placentas. Image by Antonio Ragusa.

Recent evidence indicates that humans constantly inhale and ingest microplastics; however, whether these contaminants pose a substantial risk to human health is far from understood. The lack of crucial data on exposure and hazard represents key knowledge gaps that need to be addressed to move forward.

Microplastics in the marine ecosystem





Pollution Solution?

There's more to it than what meets the eye

THE OCEAN CLEANUP™

"Taking care of the world's ocean garbage problem is one of the largest environmental challenges mankind faces today."

FOUNDED 2013

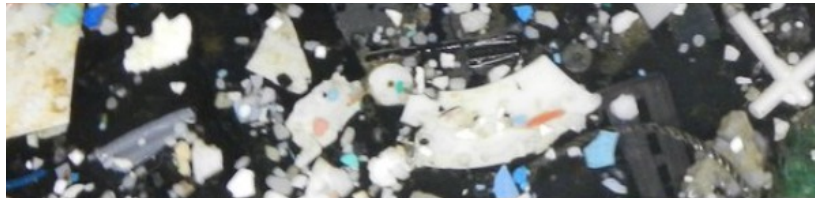
Dutch inventor Boyan Slat founded The Ocean Cleanup at the age of 18 in his hometown of Delft, the Netherlands.

NON-PROFIT FOUNDATION

We are a registered charity as a 'Stichting' in the Netherlands, and a 501(c)(3) in the US.

HQ ROTTERDAM

The Ocean Cleanup's team consists of more than 90 engineers, researchers, scientists and computational modelers working daily to rid the world's oceans of plastic.



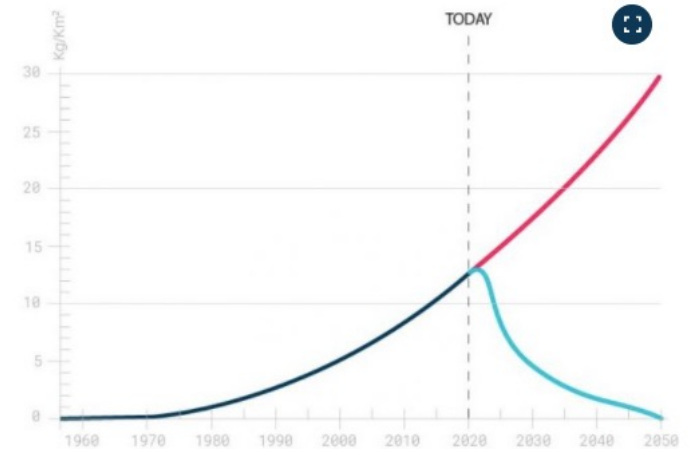
GENERAL 15 December 2015

WHY WE NEED TO CLEAN THE OCEAN'S GARBAGE PATCHES



ENGINEERING, GENERAL 2 October 2019

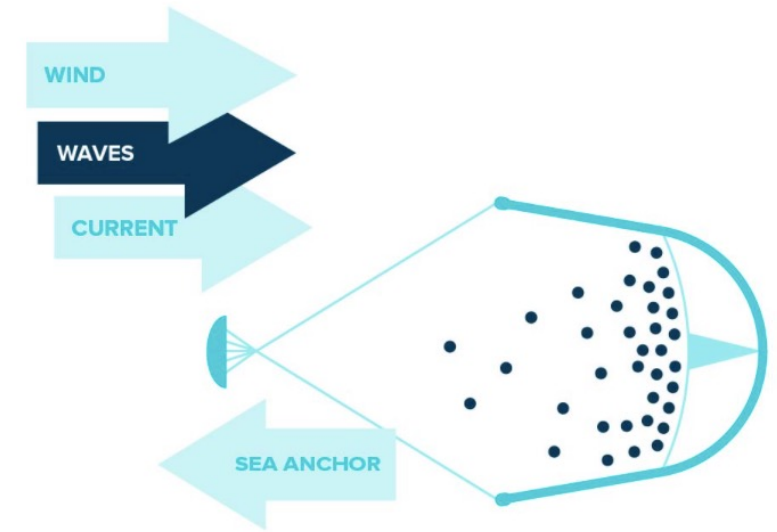
THE OCEAN CLEANUP SUCCESSFULLY CATCHES PLASTIC IN THE GREAT PACIFIC GARBAGE PATCH



Concentration of microplastics with and without cleanup in the Great Pacific Garbage Patch.

OCEANS

CLEANING UP THE GARBAGE PATCHES



Models show that a full-scale cleanup system roll-out could clean 50% of the Great Pacific Garbage Patch in just five years.

After fleets of systems are deployed into every ocean gyre, combined with source reduction, The Ocean Cleanup projects to be able to remove 90% of ocean plastic by 2040.

The combination of natural forces and a sea anchor create a drag, which makes the system move consistently slower than the plastic, while allowing the plastic to be captured.



Crazy to think that only a year ago, this was still harmful trash in the middle of the ocean, and now it's something useful and beautiful.

Boyan Slat, CEO

THE INTERCEPTOR

The Interceptor is The Ocean Cleanup's answer for river plastic waste. It is the first scalable solution to prevent plastic from entering the world's oceans from rivers.

It is 100% solar-powered, extracts plastic autonomously, and is capable of operating in the majority of the world's most polluting rivers.

KLANG RIVER

Klang, Selangor, Malaysia

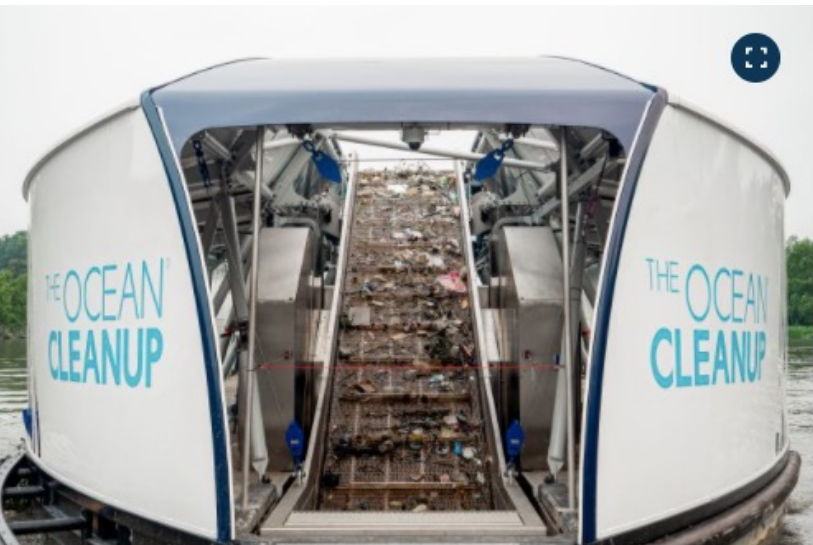
The Klang River runs through Kuala Lumpur. According to our research, the Klang River is one of the 50 most polluting rivers worldwide.



1/2 The Interceptors™ will be placed in strategic locations in rivers to make sure the main plastic flow is intercepted, meanwhile allowing for boats to pass.



2/4 Operational Interceptor™ in Klang River, Malaysia



1/4 Conveyor belt in the Interceptor™



When the interceptor is almost full, it automatically sends a text message to the local operators to come and collect the waste. Operators then remove the barge, bring it to the side of the river, empty the dumpsters, send off the debris to local waste management facilities, and return the barge back into the Interceptor™.

Malaysian Government Action



MALAYSIA'S ROADMAP TOWARDS ZERO SINGLE-USE PLASTICS 2018-2030

Towards a sustainable future



THE PRINCIPLES



Shared Responsibility

The responsibility to eliminate single-use plastics waste from the natural environment has to be shared by all the stakeholders including the government, industries, civil society and the consumers.



Sustainable Development

This Roadmap will support the wider national agenda on sustainable development that includes the consideration of economic, technology, environment, development and social factors.



Precautionary Principle

Plastics, as reported have an impact on biodiversity, environment and human health and some of these impacts are still being studied. When an activity raises threats or harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.



Participatory

Planning and execution of the Roadmap will be carried out by engaging all the relevant stakeholders in an open and transparent manner.



Good Governance

Good governance with appropriate mechanisms including accountability and transparency is crucial for the implementation of the Roadmap.



Living Document

This Roadmap will be updated from time to time taking into account advances in technology and real-time circumstances in accordance with national priorities.

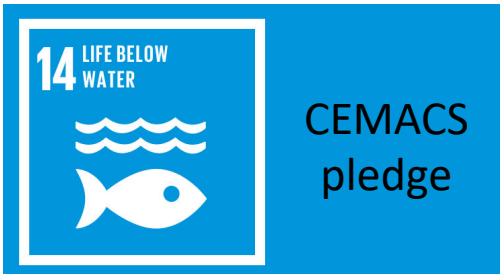
Centre for Marine and Coastal Studies



Research, Education, Awareness, Community, Collaboration, Engagement



A multi-stakeholder partnership which brings together all the actors working on marine litter and plastic pollution prevention and reduction.



Empowering the public: Calling on Citizen Scientists!

Members of public assisting scientist to collect data



Initiatives:

Collecting data besides trash

1. International Coastal Cleanup Day: annual strategy
2. COLLECT: POGO & Local school
3. Pulau Gazumbo: an island revived

#1 Calling on Citizen Scientists: International Coastal Cleanup Day

Penang's World Cleanup Day 2018



15 September 2018

Volunteers: 1,100

Trash collected: 1,539 kg (2 hours)

Location:
coastal area near Queensbay Mall and second Penang bridge

Top items collected:

Cigarette butts

Straws

Plastic bags

2020 INTERNATIONAL COASTAL CLEANUP

TOP 10 ITEMS COLLECTED

1. CIGARETTE BUTTS
1,166
2. PLASTIC GROCERY BAGS
991
3. FOOD WRAPPERS
602
4. PLASTIC BEVERAGE BOTTLES
460
5. OTHER PLASTICS / FOAM PACKAGING
458
6. STRAWS / STIRRERS
427
7. POLYSTYRENE FOAM PIECES
398
8. UNIDENTIFIABLE PLASTIC PIECES, < 2.5 CM
336
9. PLASTIC BOTTLE CAPS
244
10. PLASTIC TAKE AWAY CONTAINERS
210



88
PEOPLE



7,347
TOTAL ITEMS

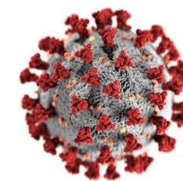


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Universiti Sains Malaysia

Covid-19 version cleanup: 2020



COVID-19 RELATED ITEMS FOUND
DURING 2020 INTERNATIONAL
COASTAL CLEANUP MONTH
(19 SEPT-18 OCT)



Face Mask: 115



Gloves: 49



Plastic Face Shield
(PPE): 6



12 Locations



88 Participants





International Coastal Cleanup 2021

Organize your own beach or river cleanup

Date: 18 September - 18 October 2021
(Choose any day)

Venue: Coastal area or river of your choice

Watch the tutorial to get started:
<http://bit.ly/cemacs2021>

Online data collection form:
http://bit.ly/cemacs_form
Printable data sheet: https://bit.ly/data_cemacs

(e-certificate will be provided for participants)

Tag us:
#cemacsUSM
#ICC2021

Questions?
Connect: cemacsUSM
Email: cemacsUSM@gmail.com

*Please comply to government Covid-19 SOP. Everyone is responsible for their own safety & health.

International Coastal Cleanup Day 18 Sept 2021



Volunteers: 12

Trash collected: 51.5 kg (1 hour)

Top trash:

Plastic bags (242)

Plastic beverage bottles (141)

Straws (79)

Covid-19 related: Mask (10)

International Coastal Cleanup Day 2021

Using social media and YouTube to reach the public

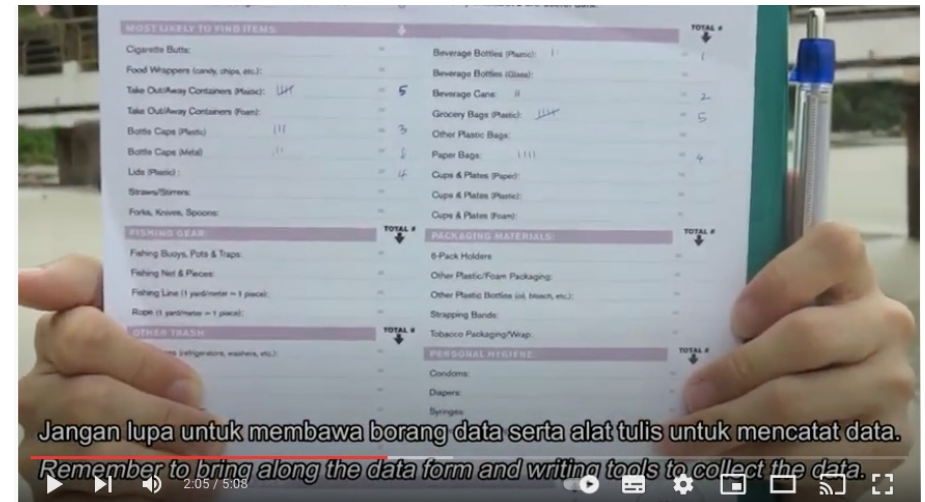


2021 CEMACS: International Coastal & River Cleanup

327 views • 30 Aug 2021

12 DISLIKE SHARE CLIP SAVE ...

Video tutorial <https://www.youtube.com/watch?v=oCE3DRz-XWg>



INTERNATIONAL COASTAL CLEAN UP 2021

These are the top ten items collected :



2001

Beverage
bottles (plastic)



842

Food wrappers
(candy, chips,
etc)



794

Bottle caps
(plastic)



757

Grocery bags
(plastic)



745

Cigarette butts



709

Take away
containers
(plastic)



510

Straws/Stirrers



388

Take away
containers
(Foam)



343

Forks, knives,
spoons



317

Lid plastics



143 PEOPLE



27 GROUPS



12,256
TOTAL ITEMS

#2 Calling on Citizen Scientists: COLLECT

Citizen Observation of Local Litter in Coastal ECosysTems

Project Collaborators

- Nubi Olubunmi Ayoola (NIOMR), Nigeria
- Francis Emile Asuquo (UNICAL), Nigeria
- Zacharie Sohounkoko (IRHOB), Benin
- Kouame Lazare Akpetou (CURAT), Cote d'Ivoire
- Pericles Neves Silva, Ivanice Monteiro (IMar), Cabo Verde
- Soukaina Zizah, Mohammed Malouli, Mostapha Benomar (INRH), Marrocos
- Aileen Tan Shau Hwai (CEMACS), Malaysia
- Marine Severin (VLIZ), Belgium
- Pavanee Angelee Annasawmy, (Lynker technologies) France
- Sophie Seeyave, Lilian Anne Krug, Fiona Beckman (POGO)
- Other POGO collaborators (Japan, Portugal, Belgium, Angola, UK)

Project PIs



Edem Mahu
University of Ghana, Ghana



Ana Catarino
VLIZ, Belgium



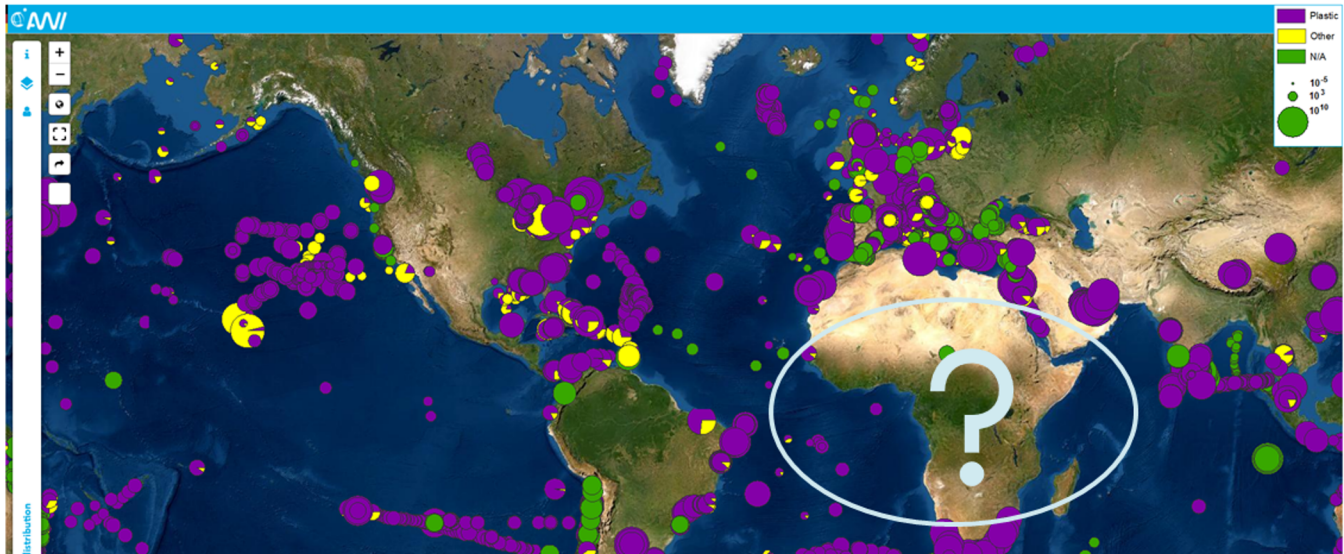
RICHARD LOUNSBERY FOUNDATION
EST. 1959

COLLECT Africa



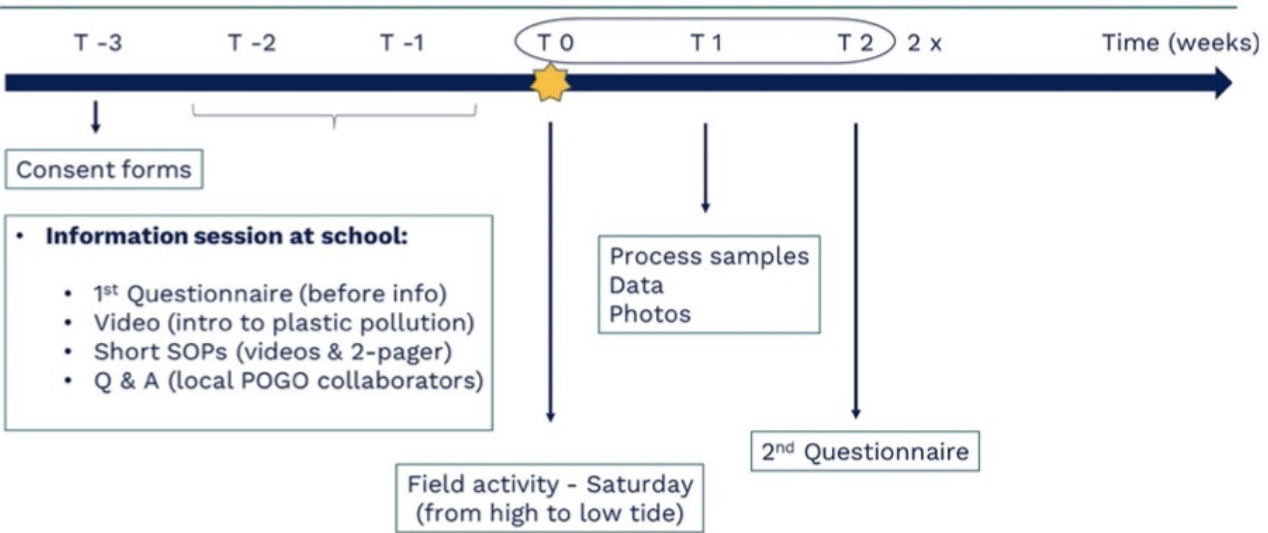
Photos: Edem Mahu

Distribution of litter types in different realms (1,093 publications)



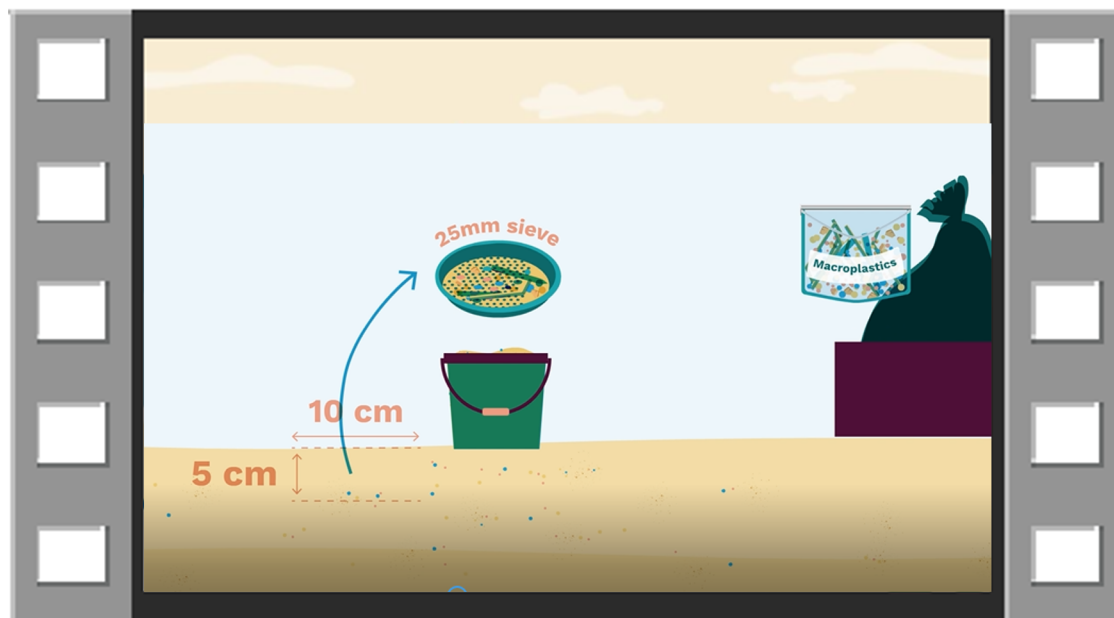
Timeline of Main Tasks:

Citizen Observation of Local Litter in Coastal ECosysTems



Citizen Scientists Training

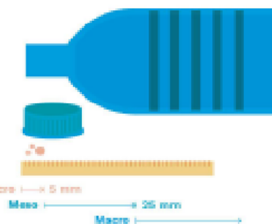
Information session with students:



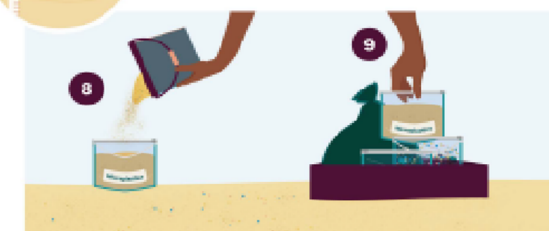
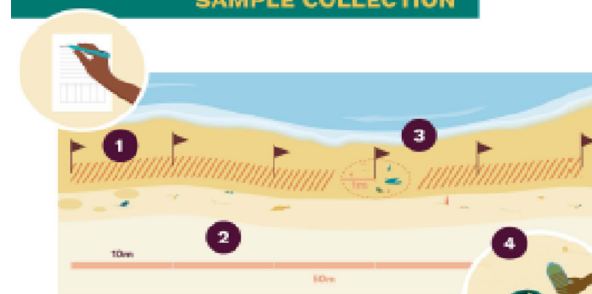
Video tutorial



Welcome citizen scientists!
You can help us collect and analyse
macroplastics, mesoplastics and
microplastics in sandy beaches.



SAMPLE COLLECTION



*All bags should be labelled with the group number, spot number, bag number and date.

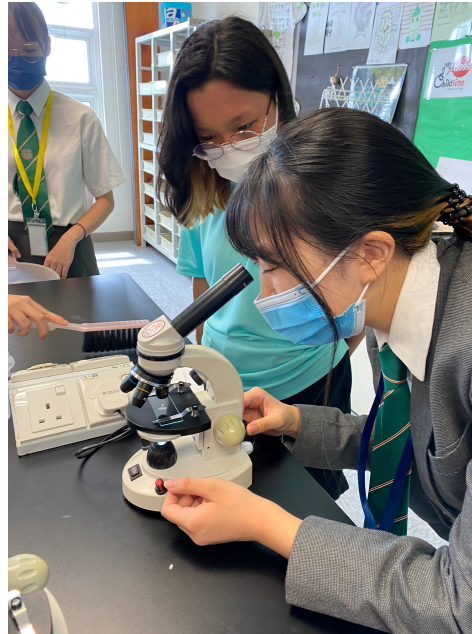
1. Identify the high tide line and register the details of the sampling site. Look for a line of deposition, marked by a change in sand moisture.
2. Define a 50 m sampling transect along the tide line, and use flags to mark sampling spots every 10 m.
3. Draw a 1m-radius circle in the sand around each flag.
4. Collect all the plastic items >25mm visible at the sand surface in a large bag (Bag #1).*
5. Within each circle, randomly draw a 10x10cm quadrat.
6. Sample the top 5cm of sand through a 25mm sieve and collect the particles caught in the mesh in a Ziplock bag (Bag #2).* Even the ones that do not look like plastic.
7. Sieve the same sample of sand through a 5mm sieve and place all the particles collected into a Ziplock bag (Bag #3).*
8. Place the remaining sieved sand into another Ziplock bag (Bag #4).*
9. Repeat the process in all spots.

Infographic sheet

#2 Calling on Citizen Scientists: COLLECT Malaysia



Sampling at Beach



Processing & Analysis @school

1. acquire data on marine plastic debris distribution and abundance
2. training citizen scientists (secondary school students) and promoting knowledge transfer between local communities, researchers and members of the Partnership for Observation of the Global Ocean (POGO).

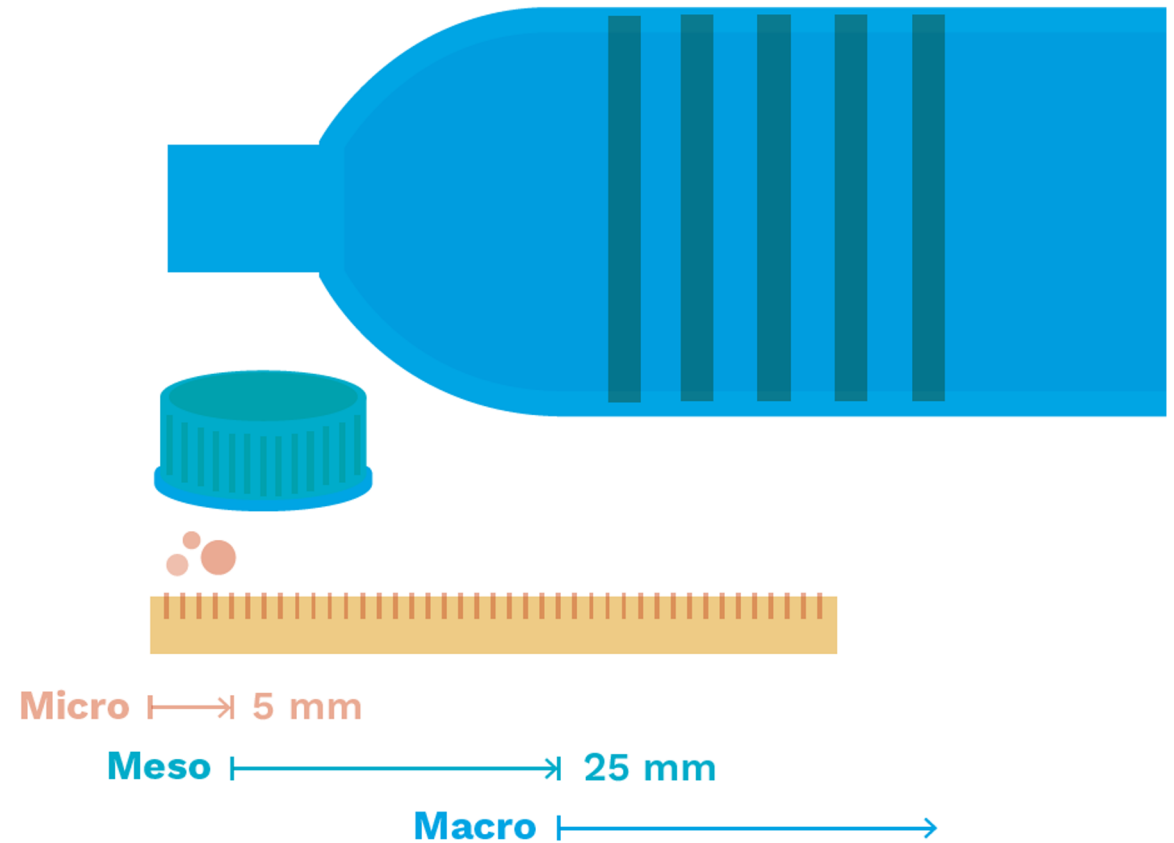
Citizen Scientists

First school in Malaysia to undertake COLLECT: Prince of Wales Island International School, Penang



Upcycling, repurposing plastic wastes into new material

Marine Plastic Debris



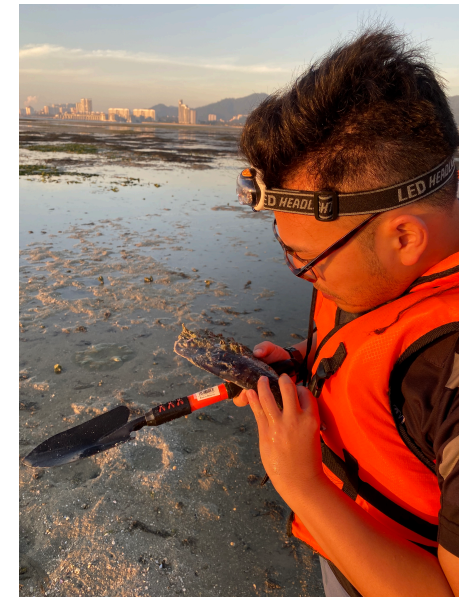
#3 Calling on Citizen Scientists: Gazumbo Island



Pulau Gazumbo was created during the construction of the first Penang bridge and has the largest seagrass meadow in the Straits of Melaka. (Penang Seagrass Project Facebook pic)

Chief minister Chow Kon Yeow said the state government will be working to gazette the island as a sanctuary, to be called the "Middle Bank Marine Sanctuary".

Middle Bank Marine Sanctuary: Gazumbo Island



#3 Calling on Citizen Scientists: Gazumbo Island



The harsh reality!

#3 Calling on Citizen Scientists: Gazumbo Island



A total of 174 sacks were filled up with rubbish during the clean-up on tiny Pulau Gazumbo.



Volunteers: 35

Trash collected: 768.4 kg (3 hours)

Location:
Gazumbo Island

Top items collected:

Recyclable Plastic bottles - 366.4kg

Non-recyclable items - 251.0kg

Glass - 78.0kg

Ghost nets - 73.0kg



What can we do?

Be responsible

Be considerate

Start now, do something

Spread the knowledge

Lifestyle adjustments

Take action!

Time to act: Behavioural change



Rope and netting that were found inside the dead whale in Scotland. Scottish Marine Animal Stranding Scheme

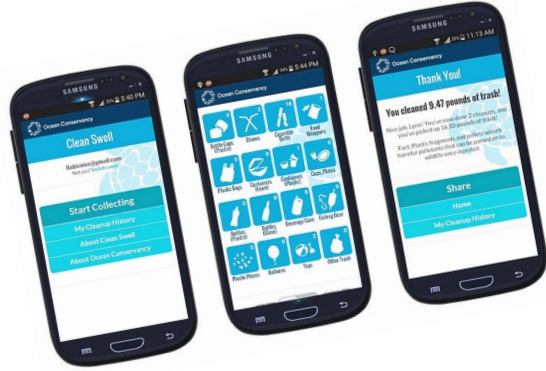


Sewage surfer by Justin Hofman (US)

This tiny estuary seahorse 'almost hopped' from one bit of bouncing natural debris to the next, bobbing around on a reef near Sumbawa Island, Indonesia. As a brisk surface wind picked up, the seahorse took advantage of something that offered a stable raft: a waterlogged plastic cottonbud. Finalist 2017, The Wildlife Photojournalist Award: Single Image

Photograph: Justin Hofman/2017 Wildlife Photographer of the Year

Get creative: start today



Beach Clean-up
App: Ocean Swell
Be a citizen scientist

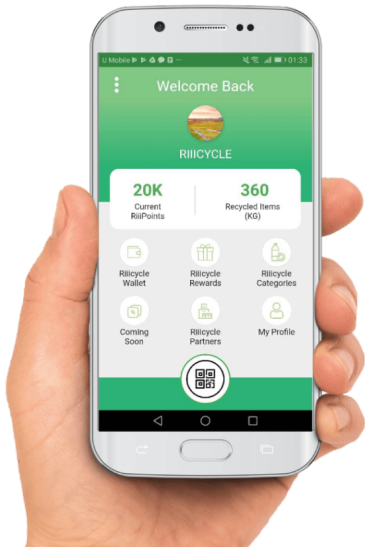


Talk about it!
Start your own **podcast**
Engage your circle



Clubhouse

Highlight people from different industries on how to address this problem



Recycle
App: Riicycle
Get rewards



Stay connected
Recycling, Zero waste communities
Support and education



Education
Awareness

“Turn off the plastic tap”



Start with ONE small action.

The best time to act is NOW.

WE can make a change!

Research, Education & Community Engagement @CEMACS



MSc and PhD research at CEMACS, USM

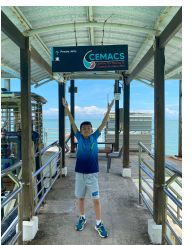
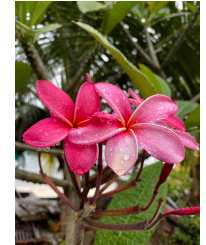
Open for registration to local and international scholars
Internship and Volunteers welcome too!

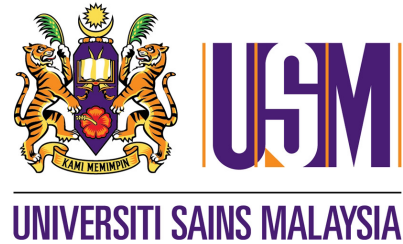




Selamat Datang: Welcome to visit us at CEMACS, USM

We warmly welcome you to Malaysia!





Centre for Marine and Coastal Studies
Universiti Sains Malaysia

<http://cemacs.usm.my>



@cemacsUSM

Connect with us!
#cemacsUSM

annettejr@usm.my



@cemacs_USM