

# Biodiversity Genomics in the Pacific Rim: Challenges and Future Opportunities



**Title: Advent of Genetics and Genomics paving way to manage the Malaysian biodiversity resources from 2021-2030**

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# SUSTAINABILITY CONSENSUS

## SUSTAINABILITY CONSENSUS

**50%**  
**DEVELOPMENTAL GOALS**  
ECONOMICS AND  
POVERTY ALLEVIATION ,  
FOOD SECURITY

**50%**  
**CONSERVATION PLANS**  
GIVEN IMPORTANCE TO  
ENSURE  
SUSTAINABILITY



Preferred browser : Internet Explorer 11 & Firefox 23.0.1 and also

**Genomsawit Website**  
Official Portal Of  
Malaysian Oil Palm Genome Programme (MyOPGP)

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Genomic sequences	1
Predicted genes sequences	2
Predicted transcript sequences	2
GeneThresher sequences	1
Markers	2

1) <i>Elaeis guineensis</i>
2) <i>Elaeis oleifera</i>

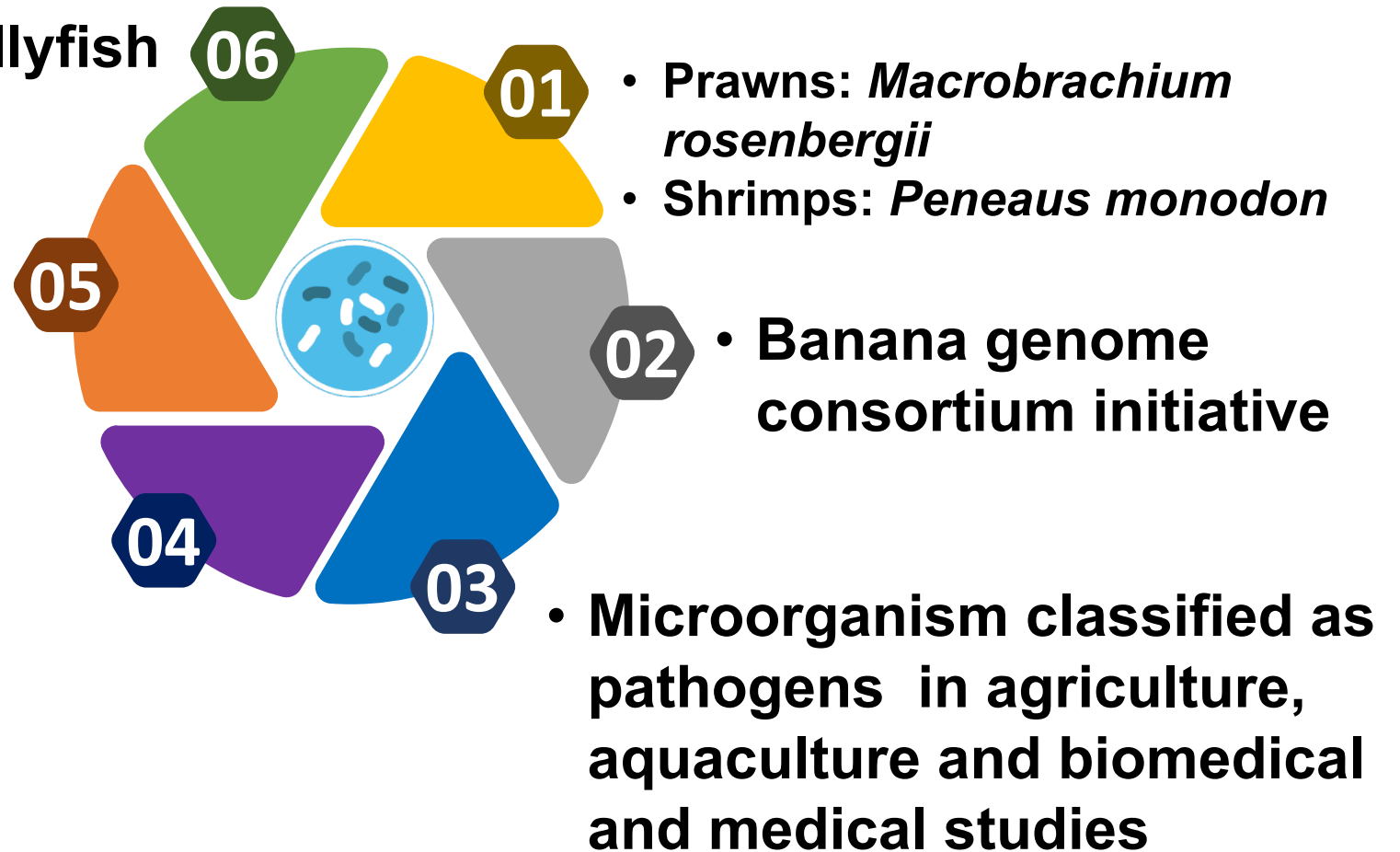
<http://genomsawit.mpob.gov.my/index.php?track=30&nu=1>

# Malaysian experience sequencing genomes in their country

**Mangosteen genome, Jellyfish genome**

**E-DNA, Metagenomic and Metabarcoding projects**

- **Ginger genome**

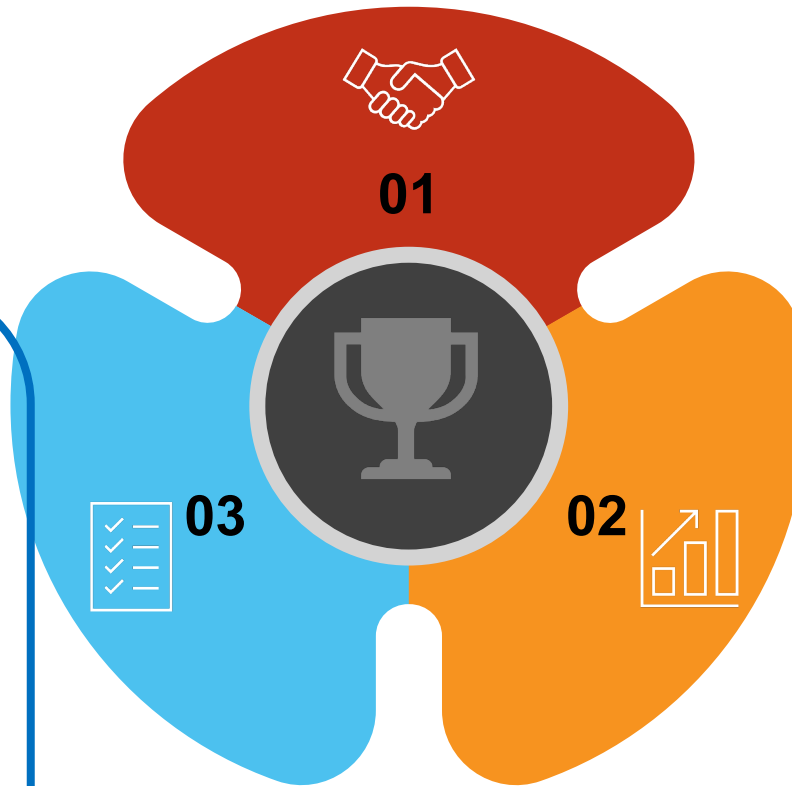


# Genome sequencing initiative in the country

**Collaboration with Academia and Industry ( Bioinformatic companies)**

- **Malaysian Genome Institute**
- **Centre of Research in Systems Biology, Structural Bioinformatics and Human Digital Imaging (CRYSTAL) University Malaya**

**Research Institution such as FRIM and Tropical Biodiversity Research Center in UM**



# Services and Consultation @ CRYSTAL

- Genomic Data Analysis
  - NGS Assembly and Alignment
  - Prokaryotic (De novo & reference-based)
  - Eukaryotic (Reference-based)
  - Whole Exome (Human)
- Transcriptomic Data Analysis
  - RNA-seq sequence assembly
  - Microarray data analysis
- Structural Bioinformatics
  - Protein 3D visualisation & refinement
  - Homology modelling
  - Active or binding site prediction
  - Molecular docking
  - Virtual screening
  - Molecular dynamics simulation
- Molecular Sequence Analysis & Biostatistics
  - Pairwise sequence alignment
  - Multiple sequence alignment
  - Molecular phylogenetic tree
  - Evolutionary Trace Analysis (ETA)
  - Codon bias analysis
  - Descriptive & Inferential Statistics
- System Biology
  - Biological pathway
  - Gene-gene interactions
- Next Generation Sequencing
  - Illumina MiSeq

# Utilization of Genomics in Key research of Aquatic freshwater ecosystem research in Malaysia

How Genetics and Genomics can facilitate in TerraAqua environment

## Host

- Mitochondrial genome
- Genome
- Signature of selection
- Signature of adaptation
- Genome duplication
- Functional adaptation based on different geographical location

## Pathogen

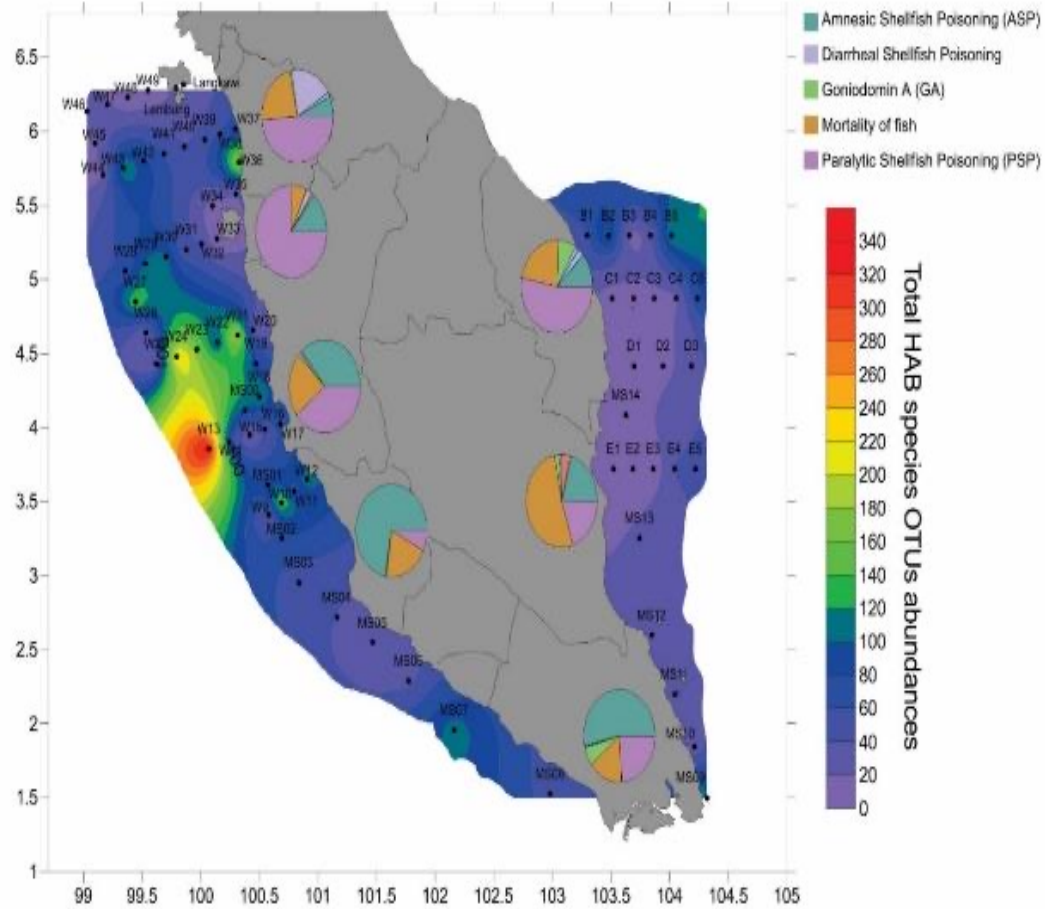
- Viral
- Bacteria
- Parasites
- Pathogen genome and adaptation and survival in host
- Host pathogen interactions
- Diagnostics platform

## Environment

- Climatic change
- Heavy metal contamination
- Agricultural waste and pesticide
- Toxicity level
- Food safety contamination
- Food security and biosafety and biosecurity



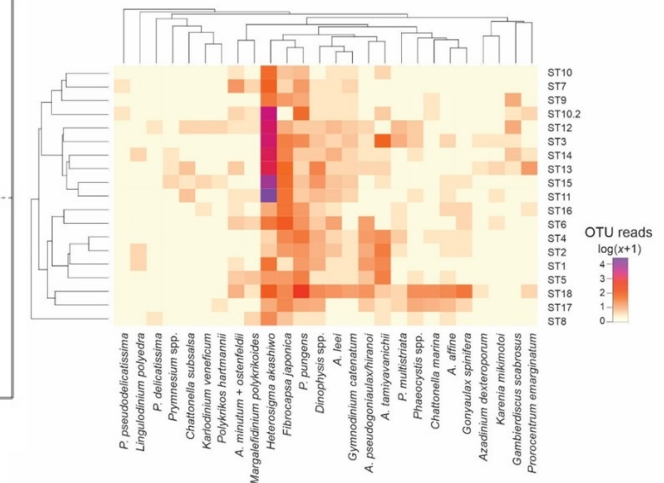
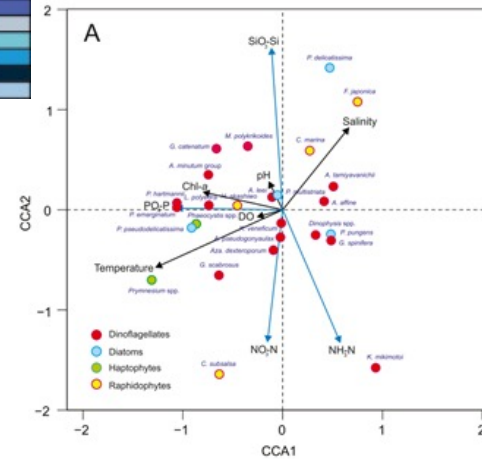
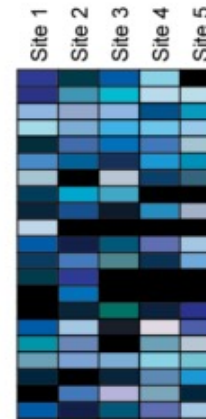
# Metabarcoding in Harmful Algal Blooms Research



Funded by MOHE LRGS Program on Coastal productivities and climate change, 2021-2024

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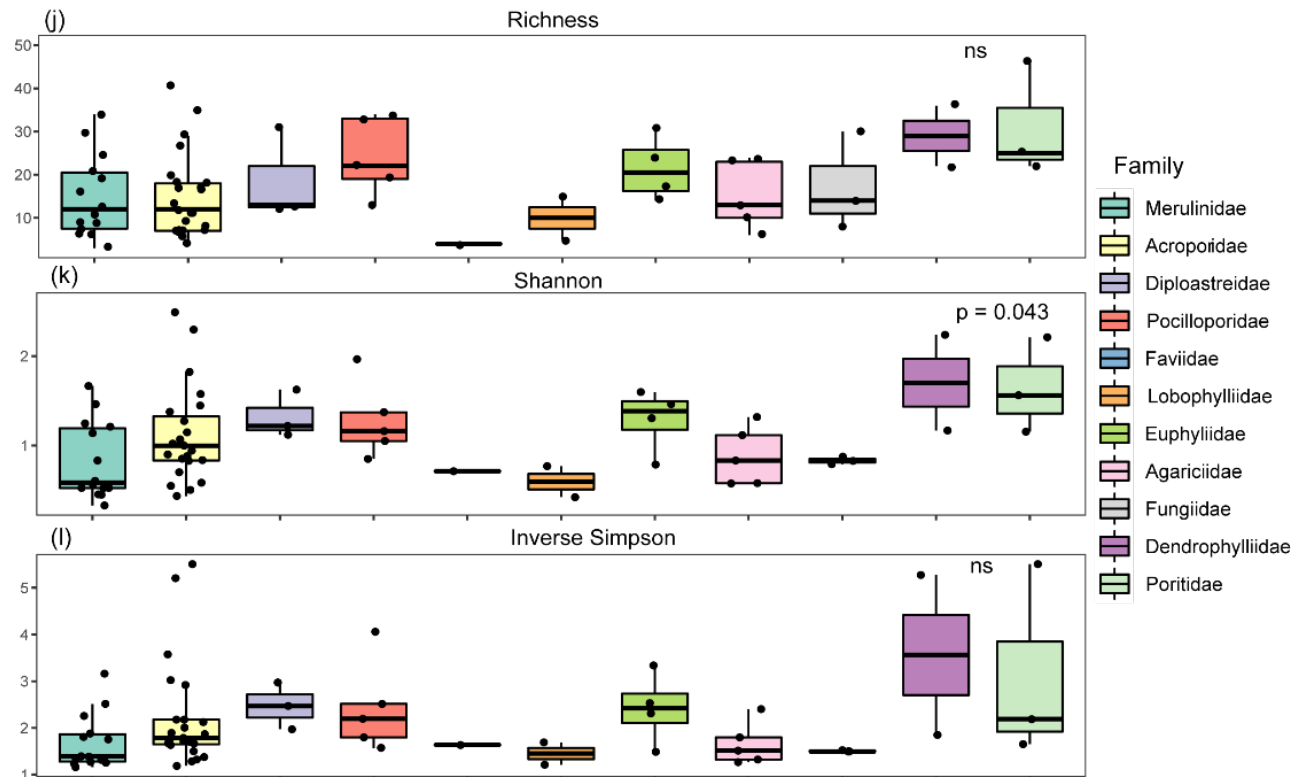
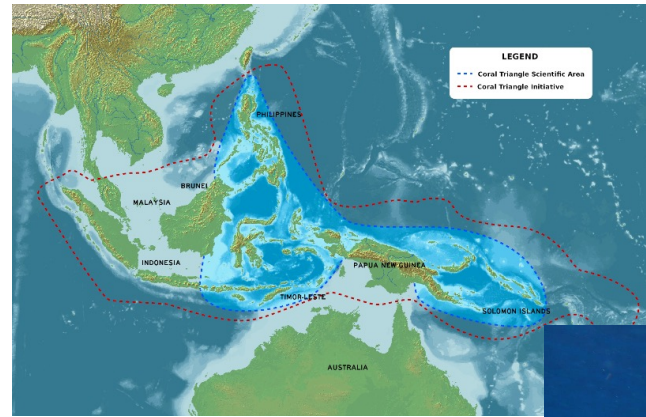
Ecological analysis



28 HAB species were annotated from OTUs, with 7 new records in Malaysian waters.

High OTU abundance of HAB species were mainly found in Malacca strait.

*Assessing the symbiont composition in different corals species is crucial to understand the resilience and susceptibility of the reef ecosystems*

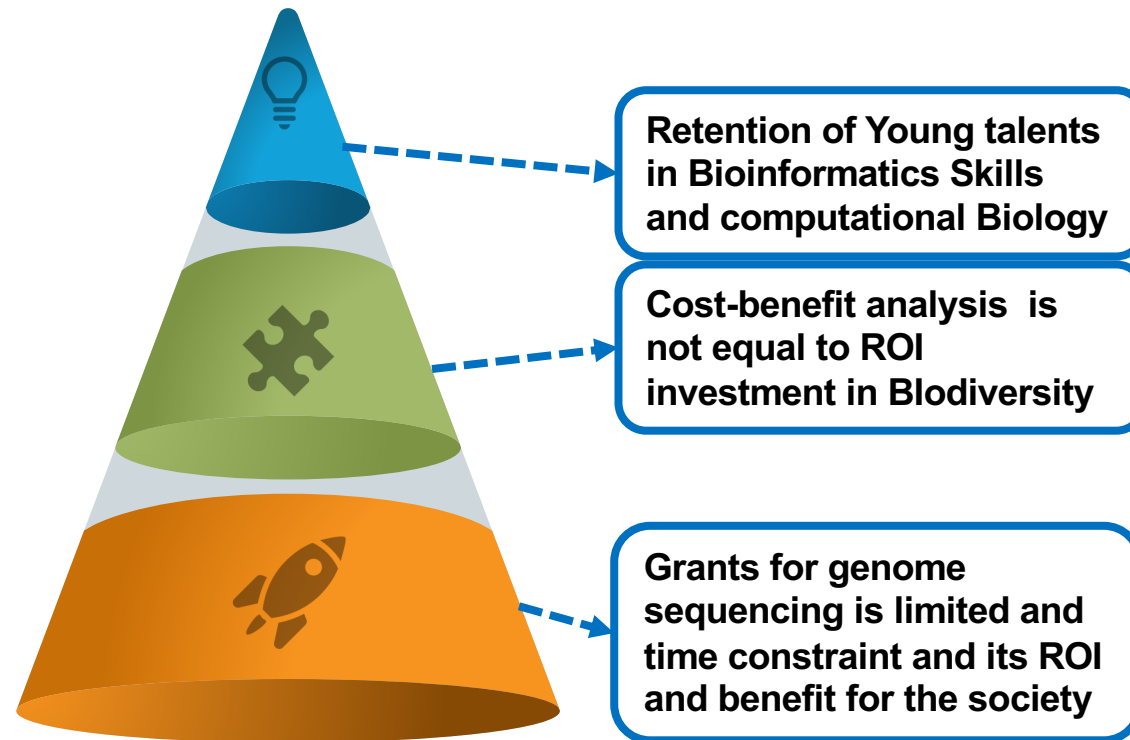


Symbiont diversity is significantly different among coral families

Symbiont diversity will enhance resilience to environmental stress



# Challenges with Cost, Sampling and Bioinformatics skills and training



# STRATEGIES

