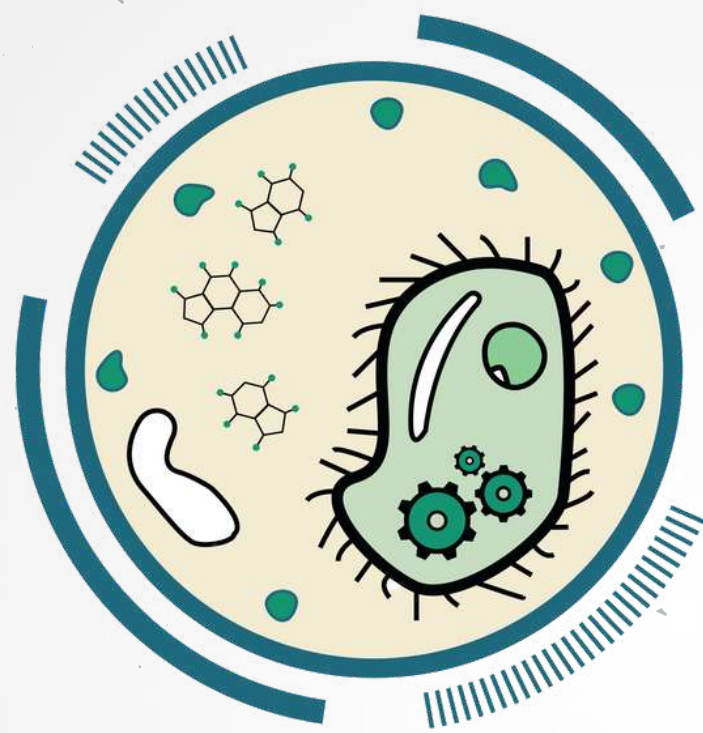


GEO BOOK

Team MIT_MAHE



manipal
biomachines





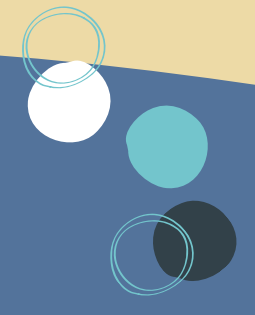
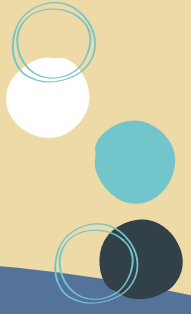
Team iGEM MIT_MAHE's GEO BOOK

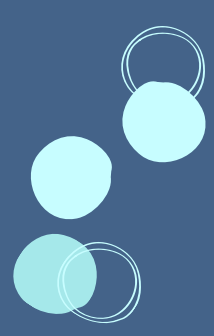


In the spirit of sharing and understanding seafood within the context of different cuisines and localities, MIT_MAHE's iGEM team decided to collaborate on a compendium of dishes that involve aquatic animals.

The main aim of this Geo Book is to celebrate diversity and bring more recognition to what affects our favourite palates of seafood.

We thank all the iGEM teams that contributed to this initiative, and hope that every reader has a fruitful experience!





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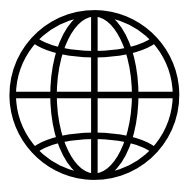
- Sea Bass Grilled—iGEM REC Chennai
- Laksa, Malaysian Noodle Soup—iGEM IISER Pune
- Shark Catfish Fry—iGEM REC Chennai
- Pickled Herring—iGEM Chalmers_Gothenburg
- Eastern Oysters—William and Mary iGEM
- Sparling, herring with potatoes, dressed herring—iGEM Vilnius-Lithuania 2022
- Hong Kong Style Scallops—iGEM HKUST
- Canadian maple Cedar Plank Salmon—iGEM Pinene Express
- Aguachile—iGEM TecCEM
- Cedar Plank Salmon—iGEM Queens_Canada
- Mangalorean Mackerel Fish Curry—iGEM MIT_MAHE



SEA BASS GRILLED



Team Name:
iGEM
REC-CHENNAI



Team Location:
Chennai, India



Development of the sea bass grilled as a seafood dish:

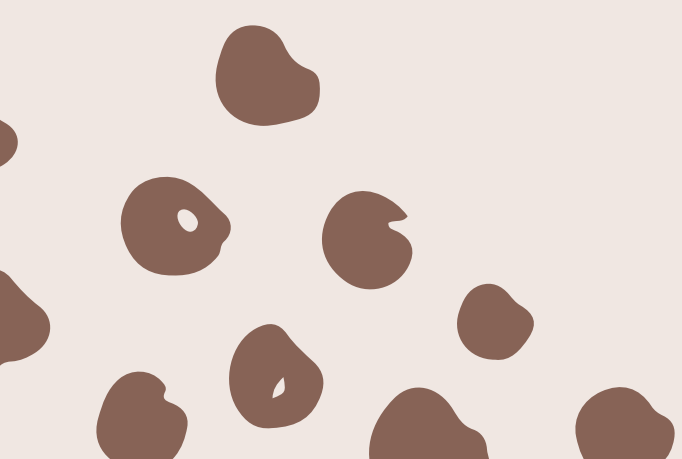
Often called as Koduva, sea bass is a commonly found fish species along the east coast of Tamil Nadu. Due to its rich omega-3 and omega-6 fatty acids, it helps keep cholesterol levels in check.

Other dishes that can be prepared from the above-mentioned aquatic animal:

Koduva fish fry, Tandoori Koduva, Koduva curry, Koduva Gravy, Pan-seared Chilean Sea Bass, Baked Chilean sea bass, Sticky Asian Sea Bass

A sea bass's natural habitat:

Sea bass is a saltwater species and can be found along the coastal regions of India. They prefer a tropical climate and high salinity.



Existing threats or pertinent issues associated with the sea bass, and measures being taken by the local authorities and aquaculture organisations:

Seabass are carnivorous fish that require more fish in their diet than they actually produce, leading to a net loss of marine proteins and oils; the fish used to make their feed cannot be assumed to be sourced from a sustainable supply. The government of Tamil Nadu issued a 45-day annual fishing ban in order to allow the breeding of fish. This prevents endangerment due to overfishing.



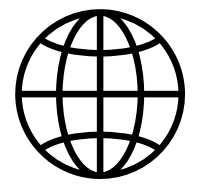
Sea Bass,
Grilled



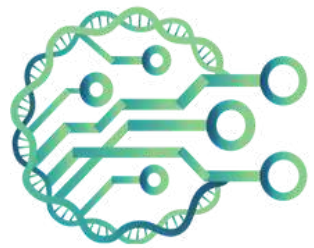
LAKSA (MALAYSIAN NOODLE SOUP)



Team Name:
iGEM
IISER Pune



Team Location:
Pune, India



iGEM
IISER PUNE

Development of the Laksa as a seafood dish:

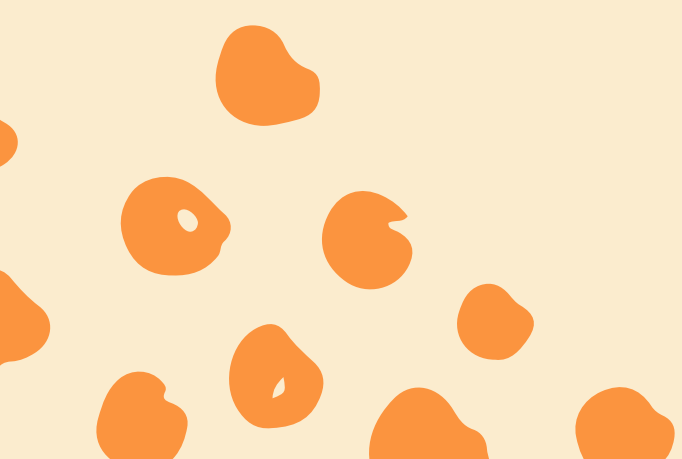
Laksa is not famous in our region; however as some of iGEM IISER Pune's members have lived in Singapore, they are familiar with some of their dishes. The word laksa is believed to actually originate from the Persian/Hindi word for vermicelli.

An Indian prawn's natural habitat:

Indian prawns are harvested via aquaculture as it is one of the major commercial prawn species. Prawns generally live in calm freshwater environments. However, it is possible to get prawns which are fished sustainably.

Other dishes that can be prepared from the above-mentioned aquatic animal:

There are a wide variety of dishes that can be prepared from prawns—curries, noodles, and skewered prawns.



Unsustainable practices in their breeding methods:

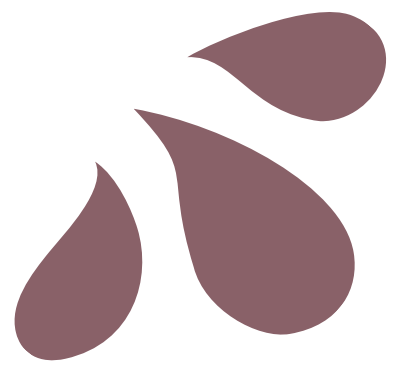
Prawn aquaculture is most unsustainable—it can be so on a smaller scale, but for commercial purposes, it is not sustainable.

Existing threats or pertinent issues associated with the sea bass, and measures being taken by the local authorities and aquaculture organisations:

Freshwater prawns are threatened or near-threatened species due to unsustainable farming practices. In India, freshwater prawn farming is not well received by the local fishermen as it causes havoc on the environment and displaces fisherfolk from their jobs. Local governments try and take down illegal fisheries.



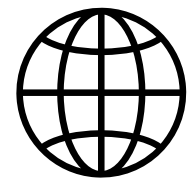
Laksa



SHARK CATFISH FRY (PANGASIUS FISH)



Team Name:
iGEM
REC-CHENNAI



Team Location:
Chennai, India



Development of the Pangasius fish as a seafood dish:

Pangasius is a healthy choice for families, particularly people who pay special attention to a healthy diet. Characteristics like a source of Omega 3 and richness in protein make it a highly preferred fish species.

A Pangas catfish's natural habitat:

Pangasius, the Pangas catfish, is a species of shark catfish native to the fresh and brackish waters of Bangladesh, India, Myanmar, and Pakistan. This species is benthopelagic, typically living within the ranges of pH 6.5–7.5 and 22–26 °C.

Other dishes that can be prepared from the above-mentioned aquatic animal:

Shark catfish curry, Baked shark catfish, fried shark fillet, Sura Puttu.

Unsustainable practices in their breeding methods:

There are no such practices. However, the aquaculture process for shark catfish is tedious. Primarily reared in ponds and cages, Pangasius is usually stocked at high densities (around 60–80 fish per metre square) and grown for about 6–8 months before reaching its harvest weight of about 1 kilogram. Males and females grow at similar rates, with the reproduction temperature between 26–28°C.



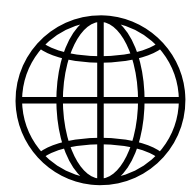
Shark catfish,
fry



PICKLED HERRING



Team Name:
iGEM Chalmers_
Gothenburg



Team Location:
Gothenburg,
Sweden



Development of the pickled herring as a famous seafood dish:

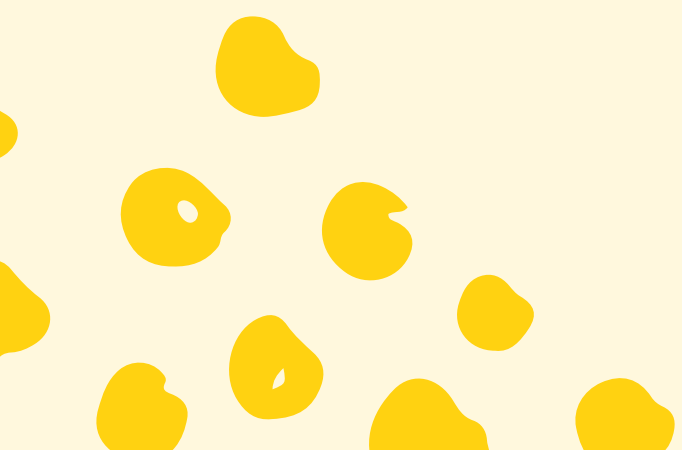
Herring has been an extensive food and trading resource for Sweden for a long time. The practice of pickling fish started in the 19th century. As a start to big meals, there was often a table with brännvin, which had pickled herring. The importance of pickled herring grew, as did the different spice combinations. Today, pickled herring is the main dish during all of Sweden's major celebrations.

A herring's natural habitat:

Herrings are found in all parts of the northern parts of the Atlantic. They thrive in large waters in sizeable groups. In Sweden, the Baltic herring is located on the east coast and are smaller and less fatty.

Other dishes that can be prepared from the above-mentioned aquatic animal:

Herrings can be fried whole and served with potatoes. It is also used to make surströmming, which is a traditional fermented dish.



Unsustainable practices in their breeding methods:

Herrings are not usually bred due to the requirement to live in large areas, and they are still easy to catch. They are a food source for bigger fish, such as tuna and salmon.

Existing threats or pertinent issues associated with the sea bass, and measures being taken by the local authorities and aquaculture organisations:

The amount of herring has declined recently. The declining water quality of the Baltic sea due to fertilizers is a threat to these herrings.



Pickled herring



EASTERN OYSTERS



Team Name:
William & Mary
iGEM



Team Location:
Williamsburg,
Virginia, United
States

WILLIAM & MARY iGEM



Development of the pickled herring as a famous seafood dish:

Before Europeans colonized the Chesapeake Bay, Native Americans harvested oysters, clams, and mussels for hundreds to thousands of years. After the depletion of their oyster sources, New England settlers came south to the Chesapeake Bay and started the first round of large-scale oyster fishing in the 1800s. The oyster fishing business quickly expanded.

An eastern oyster's natural habitat:

Eastern oysters (*Crassostrea Virginia*) are native to the middle and lower the Chesapeake Bay and inhabit down to 8 meters deep into the water.

Other dishes that can be prepared from the above-mentioned aquatic animal:

Baked half-shell oyster topped with butter, herbs, and bread crumbs



Unsustainable practices in their breeding methods:

Early New England settlers dredged oyster reefs and caused substantial damage to the subtidal oyster population, and unsustainable oyster fishing was performed over the 1800s and 1900s. Nutrient pollution caused the algae population to increase in the Bay and created many large dead zones inhabitable for Eastern oysters

Existing threats or pertinent issues associated with the sea bass, and measures being taken by the local authorities and aquaculture organisations:

Eastern oysters, a keystone species for the Chesapeake Bay, are a crucial component of the Bay's ecosystem. Decreases in the Eastern oyster population have led to changes to the Bay's ecosystem, which needs to be restored.



Eastern Oysters



SPARKLING, HERRING WITH POTATOES, DRESSED HERRING



Team Name:
iGEM Vilnius-
Lithuania 2022



Team Location:
Vilnius

Development of sparkling. herring with potatoes, and dressed herring as famous seafood dish:

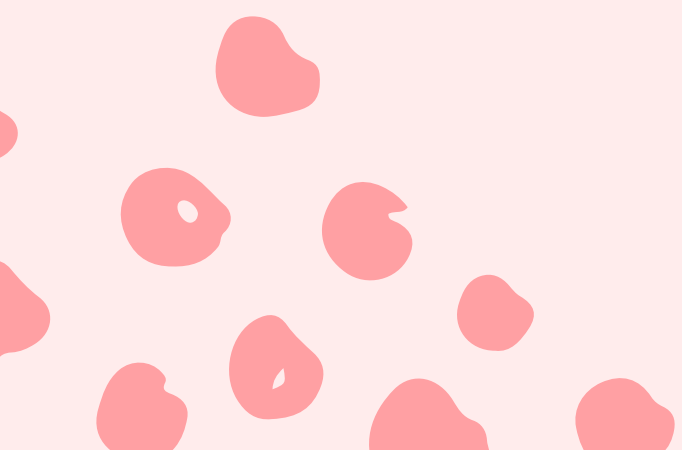

This dish came to Lithuanian cuisine from Russia since the Lithuanian homeland was occupied.

A herring's natural habitat:

Herring lives in the Baltic sea as well as the North Atlantic Ocean. These fishes require shallow temperate waters.

Other dishes that can be prepared from the above-mentioned aquatic animal:

Herring is usually eaten with different side dishes, for instance, mushrooms, potatoes, sour cream, and bread.



Unsustainable practices in their breeding methods:

The impact of water pollution is noticed as it levels up the amount of PCB and dioxin in the fish organism.

Existing threats or pertinent issues associated with the sea bass, and measures being taken by the local authorities and aquaculture organisations:

Herrings are projected to become extinct due to overfishing.



Sparling, herring with potatoes, dressed herring

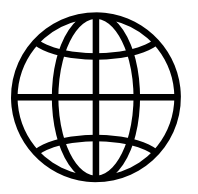


HONG KONG STYLE SCALLOPS



Team Name:
HKUST iGEM

Development of the hong kong style scallops as a famous seafood dish:



Team Location:
Hong Kong

Like other seafood dishes, the Hong Kong Style Scallops are very common in local restaurants and is cooked in the simple, traditional Chinese way. Especially since Hong Kong is surrounded by water, seafood like fish and scallops have always been a huge part of the local cuisine.

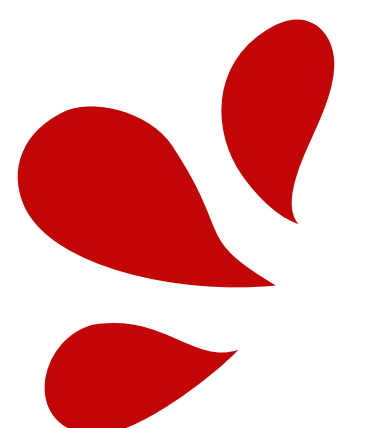
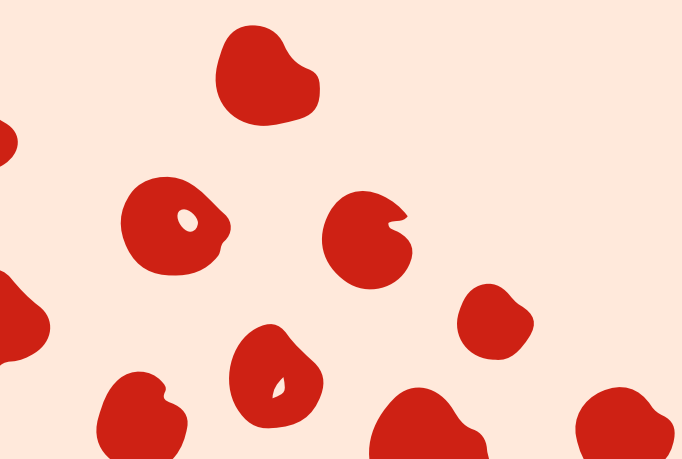


A scallops's natural habitat:

Scallops generally live in saltwater—either near the seagrass at the bottom of the water body or attached to rocks.

Other dishes that can be prepared from the above-mentioned aquatic animal:

There are other dishes that involve scallops that arise via different cooking methods. They are a part of the traditional Lithuanian cuisine.



Existing threats or pertinent issues associated with the sea bass, and measures being taken by the local authorities and aquaculture organisations:

Shellfish toxins and microbial contamination; the government has implemented general guidelines in regulating and assuring quality control.



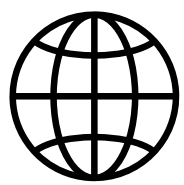
Hong Kong style scallops



CANADIAN MAPLE CEDAR PLANK SALMON



Team Name:
iGEM Pinene
Express



Team Location:
Waterloo, Ontario

Development of the Canadian cedar plank salmon as a famous seafood dish:

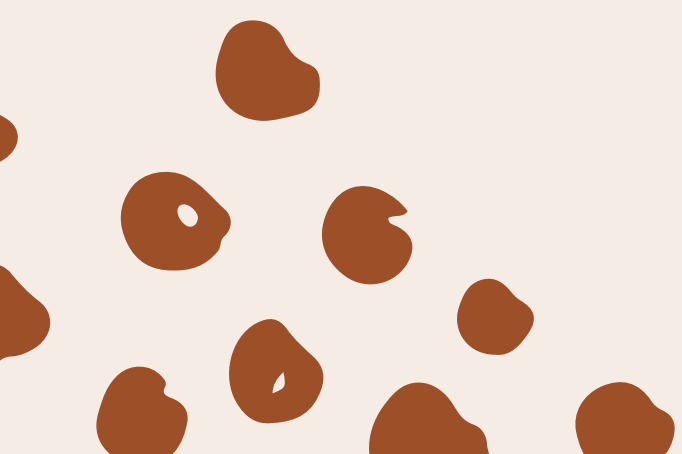
There is a lot of salmon in the lakes surrounding Waterloo, so naturally, there are quite a few salmon dishes in the region.

A salmon's natural habitat:

Within Ontario, salmon thrive in Lake Huron and Lake Ontario, as well as associated rivers and creeks flowing into these lakes. They are also found in the North Atlantic tributaries and the Pacific Ocean. Salmon are anadromous, so, they can live in fresh and salt water.

Other dishes that can be prepared from the above-mentioned aquatic animal:

Salmon can also be pan-fried, broiled, grilled, roasted, poached, baked and more.



Unsustainable practices in their breeding methods:

One unsustainable practice of their breeding method is how salmon are farmed. This cycle lasts 3 years where they start production in freshwater environments and then transported to seawater cages, eventually harvesting the farmed salmon at a harvestable size. This is very unsustainable, especially for the environment and ecosystem.

Existing threats or pertinent issues associated with the sea bass, and measures being taken by the local authorities and aquaculture organisations:

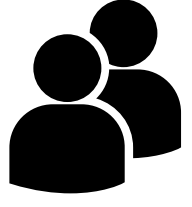
Some threats associated with salmon are primarily climate change, overfishing, and pollution. Since these issues are interrelated, the iGEM Pinene Express team has been trying to help by cleaning their local water bodies.



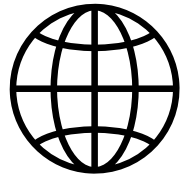
Canadian maple
cedar plank
salmon



AGUACHILE



Team Name:
iGEM TecCEM



Team Location:
Mexico



Development of the Canadian cedar plank salmon as a famous seafood dish:

The origins of this delicious dish go back to the mountain region of Sinaloa in colonial times when the colonized inhabitants of the area were rewarded for offering delicious dishes to those figures of authority. At that time, it was prepared with meat mashed in boiling water, adding a few chiltepin peppers-characteristic of the region to give it that spicy touch that distinguishes it.

A salmon's natural habitat:

It is a decapod crustacean that can live in fresh and salt water. It lives in temperate, tropical, and cold regions. It inhabits shallow rocky and sandy areas with an abundance of algae.

Other dishes that can be prepared from the above-mentioned aquatic animal:

Cóctel de camarón, camarones mantaraya, camarones a la diablo, camarones al mojo de ajo, camarones al ajillo, camarones embarazados.

Existing threats or pertinent issues associated with the sea bass, and measures being taken by the local authorities and aquaculture organisations:

It is not an animal that is in danger. However, it is an animal with great relevance in the ecosystem. Therefore, illegal fishing presents a risk. To avoid this, there is a national coast guard that deploys protection units in areas where these animals reside.

Unsustainable practices in their breeding methods:

Currently, several shrimp farms convert their mass consumption into safe practices. However, continuous illegal fishing of this product thstilluts the ecosystem at significant risk.



Canadian cedar plank salmon



CEDAR-PLANK SALMON



Team Name:
iGEM
Queens_Canada



Team Location:
Kingston, Ontario,
Canada



Development of the Canadian cedar plank salmon as a famous seafood dish:

Cedar-plank salmon involves the cooking of salmon on cedar planks, a unique method of cooking that was initially practised by Native Americans who mostly used Western red cedar.

A atlantic salmon's natural habitat:

Atlantic salmon currently reside in the Atlantic Ocean on Canada's East Coast. Thus, the fish live off the coast of Quebec and the Maritimes. However, salmon do sometimes exist outside salty waters. This salmon species is anadromous, meaning individuals live in salt water but were born in fresh water.

Other dishes that can be prepared from the above-mentioned aquatic animal:

Many people prepare salmon in a variety of ways such as Sushi.

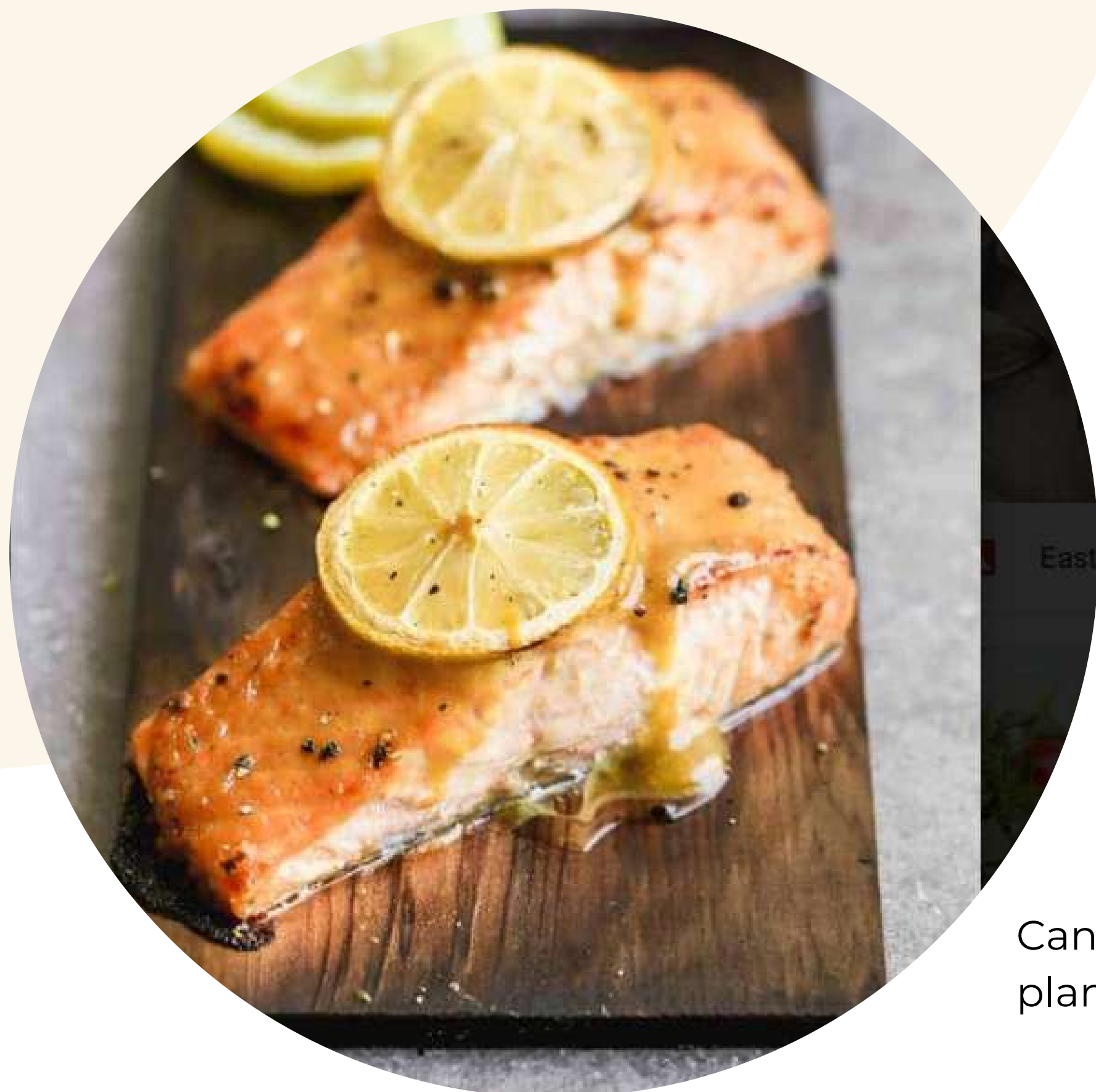


Existing threats or pertinent issues associated with the sea bass, and measures being taken by the local authorities and aquaculture organisations:

The most significant threats to Atlantic salmon survival include flowing water impediments such as dams and culverts that block their access to quality habitats.

Unsustainable practices in their breeding methods:

Salmon farming is wreaking ruin on marine ecosystems through pollution, parasites and high fish mortality rates, causing damage to billions of pounds a year.

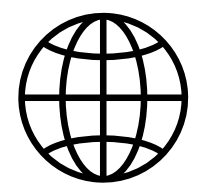


Canadian cedar plank salmon

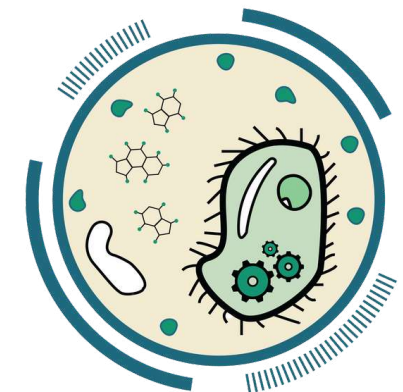
MANGALOREAN MACKEREL FISH CURRY



Team Name:
iGEM MIT_MAHE



Team Location:
Manipal, India



manipal
biomachines

Development of the Mangalorean Mackerel Fish Curry as a famous seafood dish:

Mangalorean Mackerel fish curry originated from a coastal town situated in the Udupi district of Karnataka, India. The dish has its roots in the villages of the coastal regions of Mangalore, being easily accessible at the seashores and freshly captured by the fisherfolk.

An Indian mackerel's natural habitat:

The Scombrid family of mackerel includes the Indian mackerel (*Rastrelliger kanagurta*). The Indian mackerel lives in warm shallow waters around the coastlines of the Indian and Western Pacific oceans. It is a well-known fish dish in Kudla and widely available around the coasts of Tamil Nadu and Karnataka.

Other dishes that can be prepared from the above-mentioned aquatic animal:

The Indian Mackerel is an important food fish and is commonly used in South and Southeast Asian cuisine. The dishes that can be prepared are Bangude Pulimunchi, Tawa fry and masala fry, and Fish sukka.

Existing threats or pertinent issues associated with the Mackerel, and measures being taken by the local authorities and aquaculture organisations:

The Indian Mackerel has significant challenges as a result of the buildup of microplastics. They originate from a variety of places, but ultimately make their way into the oceans, where they pose a severe threat to marine life by amassing along sandy beaches and shorelines to the animals that reside in these habitats.

Unsustainable practices in their breeding methods:

The most commonly faced challenge of unsustainable practice includes overfishing and the use of unsanctioned antibiotics.



Mangalorean
Mackerel Fish
Curry