

OCEAN SCIENCE IN ACTION

9.5 HOW STABLE ARE THE PILLARS OF FOOD SECURITY? PILLAR TWO: FOOD ACCESS

VIDEO DURATION– 07:24

This lecture will look at the two final dimensions of food security, Food Utilisation and Food Stability. We will start with addressing what role the utilisation of food has in maintaining levels of food security. Also, what factors limit or enable better utilisation of fish in coastal communities?

Utilisation is commonly understood as **the way the body makes the most of various nutrients**. People need to have access to a sufficient quantity and diversity of foods to meet their nutritional needs, but must also be able to eat and properly metabolise the food. Besides that, utilization includes such aspects as food preparation, and storage processes.

Fish is filled with omega-3 fatty acids and vitamins. It is rich in calcium and phosphorus and a great source of minerals. Africa relies on fish for 20% of their total animal protein intake, which is higher than Europe's average of 10.9%. Looking at Tanzania specifically, the country, on average, relies on fish for 23.4% of their total animal protein intake.

The total average seafood consumption per capita per year in Tanzania, is estimated at around 7.2kgs, while consumption of fishery products in coastal regions and in Zanzibar has been estimated at 20kgs per capita. This is a large portion of protein intake given the total poultry consumption per capita per year is around 1.8kgs, with beef consumption per capita per year around 6kgs.

The nutritional importance of small pelagics is well known and researched. Small pelagics contain all the elements of a healthy and nutritionally optimal food source for humans.

Here is **Narriman Jiddawi** to tell us more.

“I can say that the diet composition of the community of Zanzibar is mainly fish.

Here in Zanzibar people eat a lot of anchovies because it's the cheapest type of food. You can get a heap for half a dollar, and the whole family can eat those anchovies.

The local community can still afford to buy the Indian mackerel, sardines, anchovies. However, the tourists love different types of fish than the local communities, favour the large pelagics, marlin, king fish, sail fish, red snapper.”

Often in underdeveloped fisheries, post-harvesting processes could be hindered by limited storage facilities such as freezers. This is not the case with certain small pelagics, as the ability to smoke, salt, and dry anchovies for example, is an enabler for greater utilisation. They are usually dried in the sun on mats that are stretched out on the ground. This initially introduced hygiene issues due to sand blowing onto the dried fish, and rain disrupting both the drying process and the quality of the fish. The drying techniques have since adapted to improve the process, and the drying mats are now mostly elevated off of the ground to prevent a decrease in quality and sanitation.

We have seen the important role fish plays in providing protein and ensuring food security in coastal communities. The final pillar we will now address is **Food Stability**.

This refers to **the supply on a household level remaining constant during the year and in the long-term.**

Even if your food intake is adequate today, you are still considered to be food insecure if you have limited access to food during other periods. Extreme weather conditions, political instability, or economic factors such as unemployment and rising food prices, could impact the stability of a food source. For our example of the small pelagics, this pillar is the most challenging one. This is because stocks of the small pelagics can be best described by two adjectives: variability and instability.

These stocks are prone to large fluctuations and even collapses on seasonal, interannual and interdecadal timescales. We are also beginning to see the signs of the anthropogenic climate change, with increasing frequency and duration of marine heatwaves, changing currents, areas of upwelling and ocean productivity, which are critical for small pelagics.

When we consider fluctuations at a seasonal scale, such as differences in catches between monsoon and inter-monsoon periods, there are strategies to cope with this variability, which have been employed by the local population for hundreds of years:

Narriman Jiddawi:

“Most fishermen in Zanzibar don’t only depend on fisheries. For example, the small pelagic fish are only fished during the dark periods of the moon. So, when it’s full moon they can’t go fishing, and they take this time to repair their nets. They can do other activities, some of them are farmers and some of them are builders. They do other alternative jobs.”

But how can a family or a community dependent on the small pelagics cope, when a whole year, or even decade, is characterised by abnormally low catches; or when a declining trend is spanning multiple decades in the background of a growing population? This is the area where progress in marine science is most urgently needed.

Despite constant improvements in the understanding of the complex process involved in variability of the small pelagic stocks, our ability to predict this variability is low. Understanding the key environmental factors driving the small pelagic stocks, and ability to characterise and forecast these factors in a particular region, is a critical step to develop capacity to predict the stock fluctuations and to manage these stocks sustainably.

The stability of small pelagic stock are under the influence of both fishing pressure and environmental factors.

Let’s have a closer look at the environmental factors impacting these species. Small pelagics feed on phytoplankton and zooplankton. This graph shows the Tanzanian small pelagic fish catch per year in pink, which exhibits a high correlation with chlorophyll in green.

Chlorophyll is observed from space and is a good proxy for ocean phytoplankton and primary production, and thus can explain some features of variability in the small pelagic fish biomass. For example, the strong El Niño of 1997 caused considerable warming to occur in the western Indian Ocean, which reduced primary production, and led to a decline in the small pelagic catch.

Contrastingly, in years of enhanced ocean productivity, the fish catch is greater.

In this lecture, we have learned about two important pillars of food security – Utilisation and Stability of the food supply. Using our example of the small pelagic fishery of Tanzania, we have discussed research challenges of understanding stability of the small pelagic fish stocks, which are well known for their variability, instability and collapses.

In the next lectures we will have a look at how some of these challenges can be addressed using marine technologies. We will learn about the first steps in our mission to understand, characterise and predict the key environmental factors influencing this important element of the food security of the coastal population, in order to understand how these stocks can be exploited sustainably.