Climate change affecting food supply

By Vaishnavi Chandrashekhar, Christian Science Monitor

On an early Friday morning, the wholesale fish market at Mumbai's historic Sassoon Dock is in full, cacophonous swing. As fishermen unload their catch, local fish-sellers, restaurant cooks, and housewives swarm the slick wharf, haggling over their favorites – salmon, pomfret, and king mackerel.

There are fewer takers for a new fish on the ice block – the small, oily sardine. Until two decades ago, these fish were found only off the southwest coast of India, but warming seas have expanded their territory north and east. In Mumbai, on the northwest coast, fishermen say sardines have become especially plentiful in the past five years. But they have yet to become popular with local residents.

Reno chef Mark Estee demonstrates how to cut a whole pig. Photo/LTN file

"We can always eat them at home if we don't sell them," says Bhavna Tandel, who is selling a big basketful for less than $10.

Mumbai’s new sardine bounty is an example of how warmer temperatures may be redrawing the world’s geographic distribution of food – with potential implications for what and how we eat.

The global average temperature has risen by 1.3 degrees Fahrenheit over the past century, according to the Intergovernmental Panel on Climate Change. Further temperature increases and greater climatic variability are expected to alter production of food staples such as wheat, rice, and maize worldwide in the coming decades. Warming is also expected to shift or expand the cultivation of foods, especially to the north.

In southern England, where average temperatures have risen by 3 degrees F since the mid-20th century, some farmers have started growing foods associated with the sunny Mediterranean – olives, apricots, and grapes.

In the northeastern United States, warming temperatures and a decrease in snowpack are shrinking the maple syrup season. Climatic changes are likely to move production north, according to a 2007 study by the U.S. Forest Service and Cornell University. Sugar-maple tree sap depends on cold nights and warm spring days.

While farmers in Vermont may be able to maintain yields by adapting to an earlier tapping season, maple farmers farther south in Pennsylvania will see production decline sooner, the Cornell study found.

And shifts in fish stocks aren’t restricted to the Indian Ocean. Warming sea temperatures along with ocean oscillations have drawn mackerel northward into Iceland’s waters – triggering a fishing conflict with Scotland – and brought sardines back into the North Sea and Baltic Sea after a 50-year absence.

English wine has boomed in recent years, with the number of

hectares of vineyard more than tripling since the mid-1980s, according to the English Wine Producers Association. Climatic factors are partly responsible for the boost especially of red wines, the grapes for which usually fare poorly in rainy, chilly British weather. Red wine production increased from 72,000 bottles a year to more than 600,000 in the 2000s.

But as the surplus of sardines in Mumbai shows, adapting to new foods isn't always easy.

Fishermen in this region "should be happy with the increase in sardine catch but that's not the case," says Vinay Deshmukh, the scientist in charge at the Mumbai branch of the government of India's Central Marine Fisheries Research Institute (CMFRI). Because locals aren't used to eating sardines, he says, "fishermen don't know what to do with them."

The fish are sold so cheap – at about 1 cent per pound – they are even used as poultry feed. "The northern way of cooking fish doesn't seem to suit them," he says.

Mumbai's residents tend to favor larger, meaty fish. Shivani Jogle, a working-class mother of three, says her children don't like sardines for their fried fish because they have so many bones. "They're always asking for Chinese or pizza," she says.

Changing diets and the increasing popularity of seafood restaurants has also hiked up demand for fancier varieties, like pomfrets and tiger prawns, says city chef Anando Solomon.

Some of the sardine catch in the state of Maharashtra, of which Mumbai is the capital, is thus dispatched south to states like Kerala – where the fish is traditionally eaten and sells at much higher prices.

Oil sardine catches only started to increase on the northwest and eastern coasts of India in the 1990s, says Elayuperumal Vivekanandan, the senior CMFRI scientist who has done the

principal work on this subject.

Sardines are known to have cycles of abundance and scarcity that correspond with natural ocean system changes. But Viveknandan says there has been no significant change other than warmer temperatures to explain the northern movement of sardines in this region. Sea surface temperature increased by 0.2 Celsius to 0.3 C along the Indian coastline between 1960 and 2005, and is projected to increase by another 2 to 3.5 degrees C by 2099.

Sardines are not the only small fish to benefit from warming waters – Indian mackerel have also expanded their territory north and are also going deeper.

How long the gains will last is unclear. “Right now, we’re experiencing the beneficial aspects of this trend,” says Vivekanandan. “But in the future, that may change.”

Indian oil sardines have expanded – not relocated – northward. But temperatures in southern waters may eventually become too warm for them, say scientists. Meanwhile, in the waters off the northeastern coastal city of Calcutta, sardines could compete for plankton with another small fish, the hilsa, which is a local delicacy.

The ripple effect on larger fish is even less certain. An increased small fish population may boost numbers of larger, predator fish – or they may eventually replace them. Large fish are generally more sensitive to environmental change and are already under pressure from increased commercial fishing in the region.

In the state of Maharashtra, overfishing has caused a decline in most fish catches, save for small fish like sardines and mackerel, which have doubled in the past five years.

That makes adaptation even more important. A new government initiative on climate change is looking to give fishing

communities here access to better fish dryers and deboning machines to help them sell their sardine catch.

As for Mumbai’s fish lovers, they may have no choice but to change their tastes, given the declining stock and rising price of traditional favorites like Bombay Duck. CMFRI’s Mr. Deshmukh notes that humans have adapted to changes in food availability before – including in this region.

Decades ago, tuna was unpopular here because of its bloody appearance, he recalls. But there was a shift in consumption, partly because of low prices.

“People are now eating it,” he says.