PARIS, FRANCE, DEC. 7 – Chef Francois Pasteau happily describes the ecological principles that rule his one-room bistro, Epi Dupin, in Paris’ Left Bank. No reflexive vegetarian, Pasteau included five kinds of meat in one recent menu: duck, whiting, cod, herring, hare, and beef.

Yet, out of concern for the high carbon footprint of meat, and the degraded state of the oceans, he serves only modest portions of animal products. He says that five to ten percent of his appetizers and main dishes contain no meat at all. Turning the typical chef’s thinking on its head, he says, “when I build my recipes, I always start with the vegetables. I find a vegetable or two or three and I say okay, what am I going to put for meat or fish?” While slicing broccoli florets in his cramped kitchen, he explains that he also strives to minimize food waste, a wise environmental practice considering that about one-third of the world’s food is discarded. He says that later he’ll boil the fibrous broccoli stalk and puree it for soup.

Chef Pasteau’s mood becomes absolutely effusive when the conversation turns to truffles. The season for the prized Périgord, the “black diamond” of France, has just begun, and Pasteau is eager to add truffles to the menu. He says a piece of Périgord the size of his thumb adds the flavor of “countryside” to his creamy scallop soup. “It’s a combination of the sea and the earth,” he says. But last summer was dry in southern France where the Périgord grows underground, on the roots of oak and hazelnut trees. And truffles need moisture. The harvest this year might be poor, increasing Périgord prices.

Many of the harvesters who gather the rare natural fungus inherited their practice from parents and grandparents. They still negotiate sales by tapping fingers into a palm of the buyer. But, according to Ulf Buentgen, a scientist at the Swiss Research Institute near Zurich, Switzerland, their traditions and Pasteau’s truffle dishes are in danger. About five years ago, Buentgen noticed non-scientific reports that harvest figures for Périgord truffles over large parts of Italy, Spain, and southern France had been declining since the mid-1970s. Though there was no scientific explanation, Buentgen thought climate must play a role. “If you observe the same pattern over a wide geographic distance, we can exclude local effects,” says Buentgen, “it must be climatic.”

Buentgen set to work to discover what was going on. He befriended truffle hunters and traders and obtained tightly-held harvest figures. In a paper he later published in the journal Nature Climate Change, he showed that throughout its territory in Mediterranean Europe, the size of the Périgord truffle harvest correlates closely with the amount of rainfall falling the prior summer, possibly because the underground fungus competes with its host tree for moisture. Warmer summers also correlate with reduced harvests. Climate researchers predict that by and large the Périgord’s home in southern France and parts of Spain and Italy will continue warming and drying. Buentgen and his coauthors concluded that “the Mediterranean truffle yield will continue to decline.” Buentgen acknowledges that an unforeseen innovation might salvage the underground delicacy, such as the development of a method to irrigate plantation-raised Périogords.

**Wine joins truffles in being at risk**

Wine faces equally-serious challenges from deterioration of Mediterranean climate. And, more so than the truffle, wine figures profoundly in French cultural identity. It’s also the country’s largest export, after aerospace products. Three years ago, Lee Hannah, a scientist at Conservation International, published a paper in the publication Proceedings of the National Academy of Sciences on the prospects for wine globally if warming continues unabated. He and coauthors predicted that, as a result of warming and drying, 85 percent of current wine-growing land in the European Mediterranean region, including much of French wine country, might no longer support wine production by 2050. Twentieth century warming has already pushed vines in southernmost France, including Languedoc-Roussillon, Provence, and the Rhone Valley, to the limit of their ability to produce good grapes.

Jean Marc Touzard, an economist, says Hannah underestimated innovations that might prop-up French vineyards despite increasingly hostile conditions. Touzard directs research at France’s National Institute for Agricultural Research, one of the continent’s leading agricultural laboratories. He oversees a team of 80 scientists studying how vineyards can adapt to global warming.

In a conversation with Touzard at a restaurant near Paris’ Grand Palais art museum, the researcher exuded optimism. He said that if negotiators at the COP21 climate conference agree on a goal of keeping planetary warming to 1.5-2 degrees C above the pre-industrial level, and if policies subsequently implemented succeed in achieving the goal, French vintners will be able to cope by changing pruning practices; replacing vines with the most heat-tolerant variants of current grape varietals; and tweaking production practices.

But many scientists say the world has not yet demonstrated the will to make the massive economic and logistical commitments – which might include huge investments to suck carbon dioxide out of the air – to avoid higher temperatures, even if a 2 degree goal is technically achievable. If temperatures increase by 3-4 degrees – as it’s currently on course to do before the end of the century – the change will be “too big,” says Touzard. Radical alterations in growing and production practices would be required for France to continue producing wine. Growers would need to switch to different varietals. They might need to chemically processes their product to achieve acceptable acidity, alcohol content, and flavor. They might have to replant vineyards in cooler regions.

The future of wine and truffles may weigh heavily on the minds of some chefs and gourmets. But what gives humanitarian officials nightmares is the real possibility that increased warming will seriously disrupt agriculture. Their fears are supported by computer simulations of future crop yields. “There’s a real possibility of outcomes that are unacceptable,” said Chris Field, a prominent Stanford University biologist. Field co-chaired the committee of the U.N. International Panel on Climate Change (IPCC) that studied the impacts of and possible adaptations to future warming.

Speaking softly at a café table in one of the converted airplane hangers occupied by the climate conference, he explained that 20 percent of more than 1,000 simulations showed food harvests cut by 50 percent or more by the first decade of the 22nd century. Many scenarios for future warming were considered, though few of the simulations assumed that temperatures would rise by more than 4 degrees above pre-industrial levels. The highest temperature currently conceivable exceeds this limit.

“Do we want to put the world at risk for the outcome that makes it impossible to consistently grow crops in some parts of the world?” Field asked. He didn’t expect an answer.