

# Impacts of climate change on wine in France



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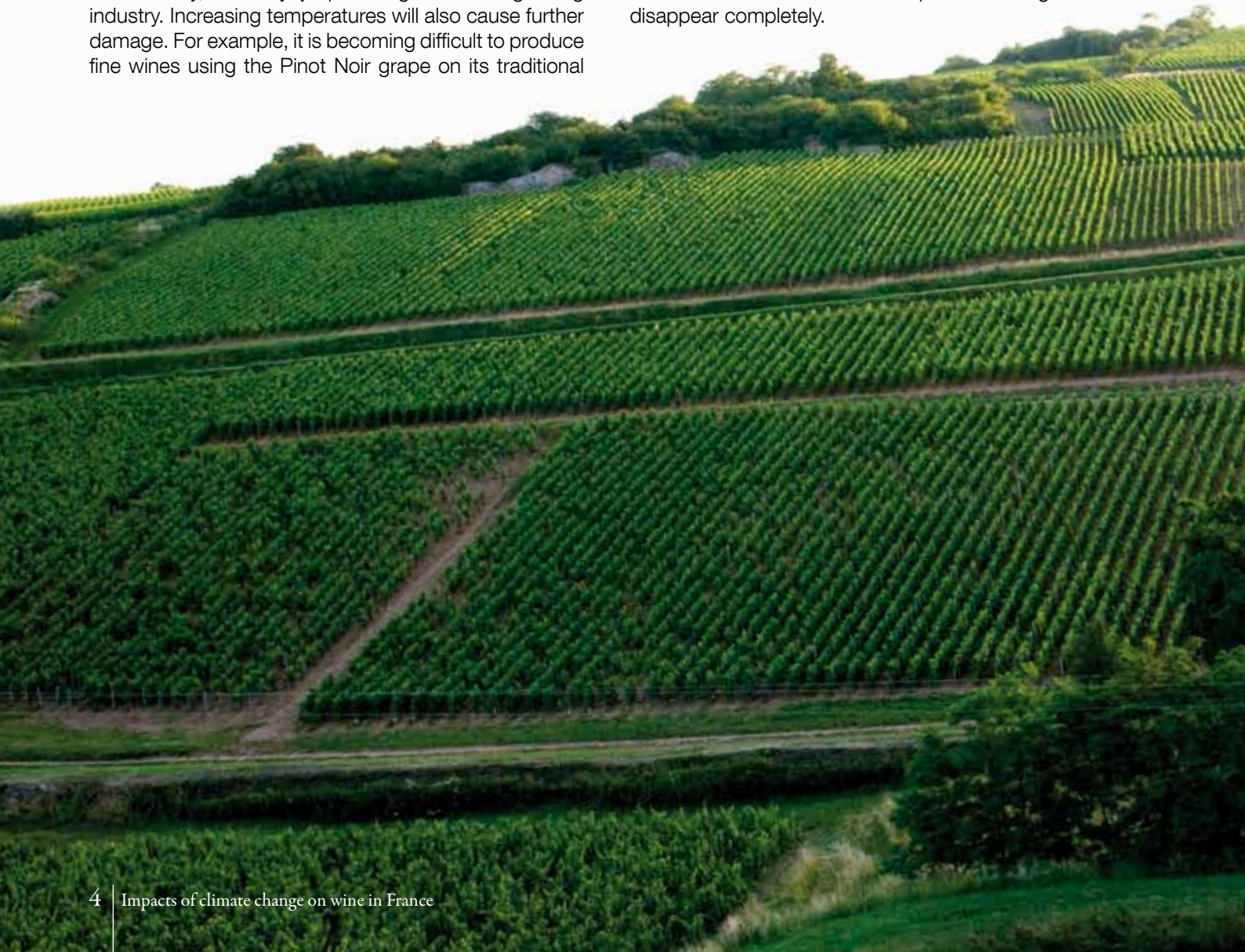
# Introduction

French wines are an important component of the world's cultural heritage. But today, they are in danger. French viticulture is a climatically-sensitive process and it is already feeling the impacts of global warming - summer heat waves, recent hail storms in the Bordelais and the emergence of new diseases. These impacts will soon get even worse. The experts from the Intergovernmental Panel on Climate Change (IPCC) state categorically that if we do not limit temperature rise to 2°C (above pre-industrial levels), it will lead to uncontrollable consequences for our ecosystems.

If nothing is done to reduce global greenhouse gas emissions, vineyards will be displaced more than 1,000 km beyond their traditional boundaries by the end of this century, radically jeopardising the wine-growing industry. Increasing temperatures will also cause further damage. For example, it is becoming difficult to produce fine wines using the Pinot Noir grape on its traditional

territory in Burgundy. The average annual temperature has significantly increased in the region over the last years, leading to major shifts in the wine production calendar. Some wines have already lost elements of their specific personality: they are marked by higher alcohol strengths and sugar content.

These changes put France's 'wine producing pedigree' at risk. Great French wines derive all their finesse and elegance from their *terroir*. The idea of *terroir* alludes to a very specific combination of climate and a well-defined territory, sometimes no bigger than a single plot of land. It is the combination of these characteristics, together with age-old practices and know-how, which produces exceptional wines. A culture that has taken centuries to build is now in peril and might even disappear completely.



# Issues surrounding climate change

## International context

The international scientific consensus on climate change is clear. The IPCC's Fourth Assessment Report (AR4) stated that 'warming of the climate system is unequivocal'. In this report, published in 2007, the IPCC painted a clear picture of climate disturbance.<sup>1</sup> Since then, new studies have shown that climate change is developing more quickly than indicated in the IPCC's worst case scenarios.

The range of effects expected as a result of past, current and future emissions of greenhouse gases are shown in the IPCC AR4. With no reduction in emissions, global mean temperature will rise by between 1.7°C and 7°C above pre-industrial levels, depending on the rate at which we continue to emit greenhouse gases. Present emissions are at the top of the projected ranges and, if no action is taken, warming towards the upper end of the range is likely. An increase of just 2°C could lead to irreversible phenomena (such as the melting of the Greenland Ice Sheet), while an increase of more than 2°C would risk triggering catastrophic changes to the climate. The current rate of emissions corresponds to the IPCC scenario known as A2. This scenario describes a world where we fail to control our emissions of greenhouse gases, leading to an average increase in temperature of between 4°C and 6°C, by 2100.<sup>2</sup> It is therefore crucial that we increase pressure on our decision makers now, to ensure that a fair and ambitious policy is decided upon in Copenhagen in December.

## Copenhagen

The Kyoto protocol was signed in 1997. Following 8 years of tough negotiations, it was implemented in 2005. Today, 184 countries in both the North and the South have ratified the treaty, with 37 industrialised nations plus the European Union obligated to decrease their greenhouse gas emissions by 5.2% between 2008 and 2012, compared to 1990 levels. In Copenhagen, the international community will have to negotiate the next phase of the Kyoto Protocol, which will commit its signatory nations for the period 2013-2017. This meeting will take place between 7 and 18 December, 2009.

Greenpeace wants governments to draw up an agreement based on three major undertakings:

1. Industrialised countries commit as a group to legally-binding emission reductions of at least 40% below 1990 levels by 2020, three quarters of which needs to be met by domestic action.
2. Industrialised nations release €110 billion each year to help developing countries to:
  - construct a sustainable and low-carbon energy model using renewable energy and energy efficiency (€40 billion each year);
  - adapt to the impacts of climate change (€40 billion each year);
  - halt deforestation and the degradation of forests, which are responsible for 20% of global greenhouse gas emissions (€30 billion each year).
3. Developing countries, in turn, undertake to limit the increase in their greenhouse gas emissions to between 15% and 30%, between now and 2020.

## Climate change and the economic crisis

The crisis we are facing now is nothing compared to the climate crisis that we will experience in the future if we do not act. The cost of inaction is equivalent to 5% of global GDP (collateral damage could even increase this cost to 20% of global GDP, possibly even more), while it would be necessary to invest 1% of global GDP per year to counter the effects of climate change.<sup>3</sup>

Furthermore, taking action against climate change carries with it many benefits: energy savings, improved air quality, decreased health risks, etc. Several studies show that the means to combating climate change through investments in renewable energy and energy efficiency will create more jobs than the exploitation of fossil fuels.<sup>4</sup>

# Climate change and wine production

## Impacts of climate change on global wine production

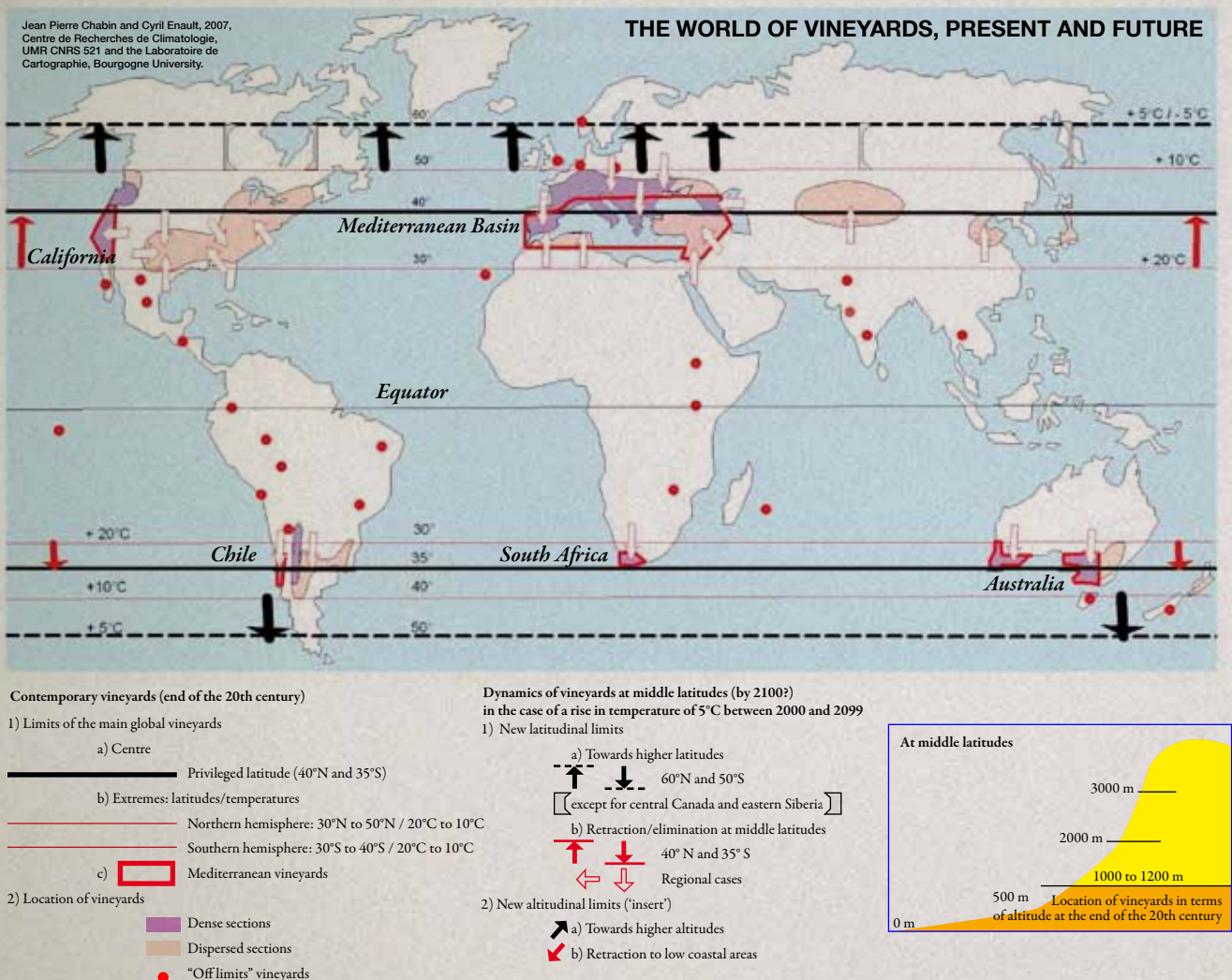
Given current emission levels, we are at present on a path towards an increase in temperature of 4°C or even 6°C between now and 2100. Such a climate scenario would lead to the displacement of vineyards 1,000 km beyond their traditional boundaries, reaching up to 60 degrees north and 50 degrees south (except for continental interiors). At the same time, a large section of traditional vineyards, such as the Mediterranean vineyards, could disappear.

## Impacts of climate change on wine production in France

While developing countries will be, and already are being subjected to the worst consequences of climate change, France will also experience developments in its climate that will have an important impact on its economy, agriculture, and health. If action is not taken now, there is a strong likelihood that the rise in temperatures in France will have reached 6°C by the end of the century. Climate change will then have major repercussions on the French wine production sector, which will be faced with a potentially radical challenge.<sup>5</sup>

Figure 1

Impacts of climate change on vineyards throughout the world



Global warming will allow for the improvement of wines in some regions where the product is not currently of the highest quality. It will, however, pose serious problems for regions that are already producing the best quality wines, such as Burgundy.<sup>6</sup>

The findings of Working Group II of the IPCC (IPCC, 2007) describe changes that would shift the wine production calendar to earlier in the year. Similar changes will occur in all natural or managed ecosystems in French wine-producing regions.<sup>7</sup> The shift of the wine production calendar means grapes would mature in late July or early August, rather than during the second half of August or early September.<sup>8</sup>

While a day of high temperatures is relatively harmless, a repetition over several successive days (two or three weeks) will damage the grapevine.<sup>9</sup>

## Importance of the wine production sector in France<sup>10</sup>

- Vines are present in 80 French *départements* (subdivision of a region).
- Wine production, which generated €9 billion in 2000, is France's second biggest crop, after cereals (€10 billion) in terms of national production.
- The French wine harvest is around 60 million hectolitres a year.
- Wine is France's biggest export, ahead of aeronautics. In 2006, France exported €8.74 billion worth of wines and spirits.
- The wine production sector represents 189,000 jobs.

### Wine, its *terroir* and its climate

France's wine production industry is very dependent on its *terroir*, the combination of soil, weather conditions, grapes and winemaking know-how, all of which contribute to the specific characteristics of the wine. Climate change causes a change in the specificity of great French wines, which are losing their unique characteristics. Furthermore, wine is the product of an exquisite alchemy between the age-old know-how of impassioned men and women and the environment, and as such reveals all the subtlety of its original *terroir*. If climate change persists, this heritage will not survive.

## The example of Burgundy

The Burgundy region has not escaped from this last problem: the rise in temperature has led to early harvests and in the short term, good vintages. However, "we are also led to anticipate, in future, a possible calling into question (which was observed in 2003) of the typical character of the wine, of the geographical distribution, even of the hierarchy of the vineyards in terms of quality".<sup>11</sup>

### An introduction to Burgundy wine<sup>12</sup>

Burgundy holds around a hundred *appellations* (a seal of quality for a wine), which often cover a single field and are sometimes the property of a single producer.

Burgundy is home to **two superior types of vine**, Chardonnay and Pinot Noir, and to two other types of vine, Gamay and Aligoté.

Wines are classified into four levels - Regional *appellation*, Village, premier cru (premium wine), grand cru (great wine).

### Changes to the wine production calendar

The premature dates of harvests can be observed for all of the types of vine grown in Burgundy. As Figure 3 on the following page shows, the earlier dates of the phenological stages lead to earlier harvest dates for Pinot Noir. A comparison of dates from 1973-87 and 1988-2006 shows harvests taking place 13 days earlier in Beaune (from 27 September to 14 September), and 12 days earlier at La Rochepot (from 6 October to 24 September).

Over the same period in Beaune, the time it takes for grapes to go from ripening to maturity has been reduced from 50 to 40 days. (**Figure 3**)



Figure 2

Global warming in Burgundy

In Macon and in Dijon, average yearly temperatures have increased by 1.2°C between 1950-1979 and 1990-2006.

— Macon  
— Dijon

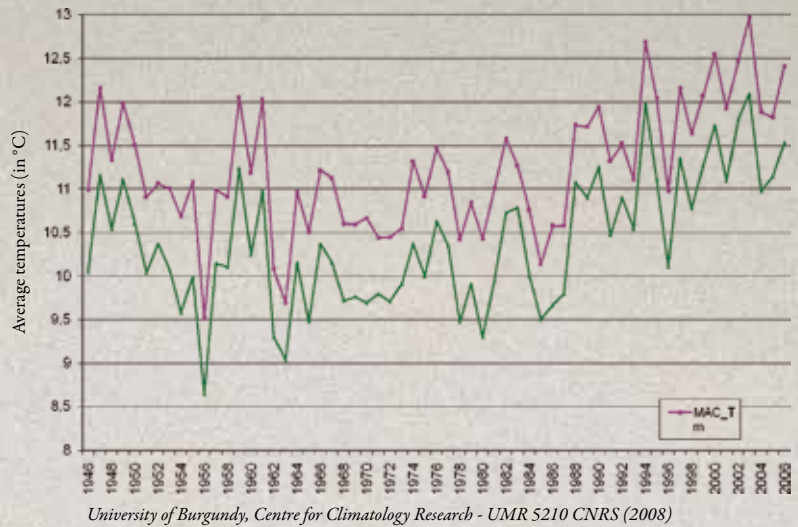
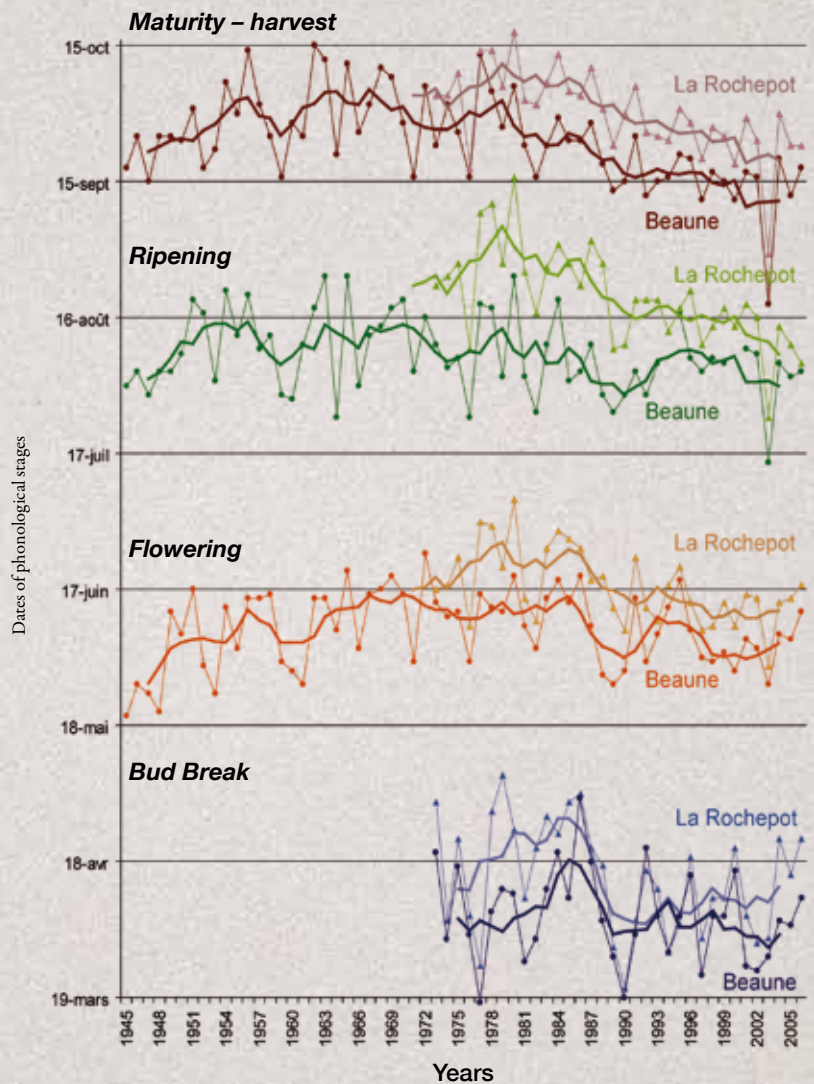
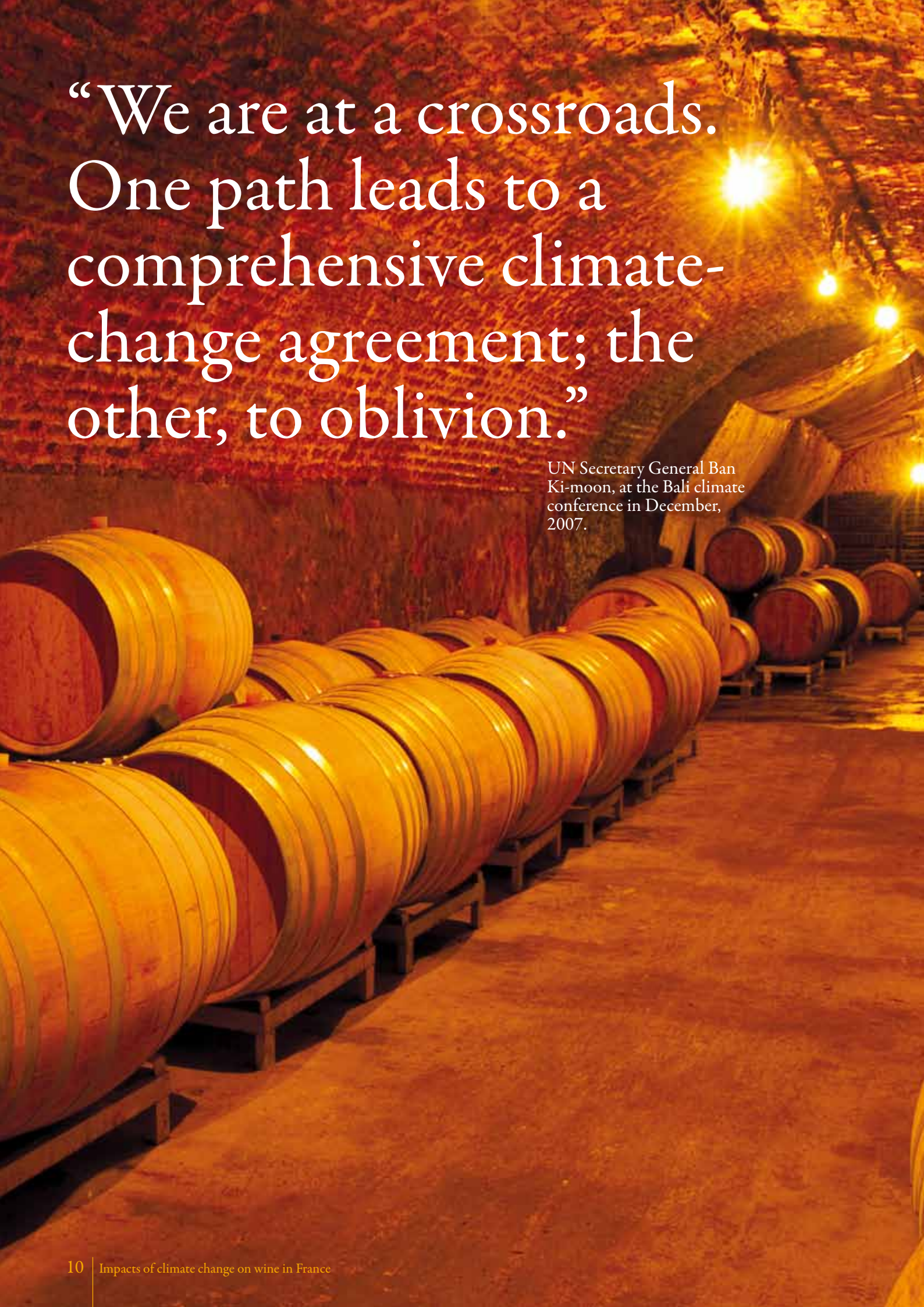


Figure 3

Impacts of global warming on the dates of maturation and harvesting of Pinot Noir



Source : SRPV Beaune / M. Pouleau



“We are at a crossroads.  
One path leads to a  
comprehensive climate-  
change agreement; the  
other, to oblivion.”

UN Secretary General Ban  
Ki-moon, at the Bali climate  
conference in December,  
2007.



### Modification of the wine's singularity

Changes to the climate can lead to excess sugar and acidity defects in wine.<sup>14</sup> In 2000, some red wines (Pinot Noir) from the Côte de Beaune area had characteristics typical of the wines from the Côtes du Rhône area.<sup>15</sup>

### Effects of increased productivity on quality

Warmer weather, without extreme peaks in temperature, can increase the productivity of vines. However, this increased yield poses major risks in terms of quality,<sup>16</sup> and may cause great French wines to lose their elegance and specificity.

(Figure 4)

### Temperature peaks could lead to falling production

Climate change could have consequences for the amount of wine produced. In Burgundy, the 2003 heat wave led to a fall in production of 30% compared to 2002. The scientific community sees this as a worrying situation: years such as 2003 could be the norm by the end of the century.<sup>18</sup>

### Short and long-term impacts

The impacts that can be felt today will become more pronounced over the coming years: in particular, impacts on the *terroir* and on the geographical distribution of vineyards should be noted.

### Global warming and environmental risks for vines in Burgundy

Global warming leads to three types of environmental risks:<sup>19</sup>

- new diseases coming up from the South (*flavescence dorée*);
- increased risks of flooding and of erosion due to torrential rain;
- ongoing risks: the risk of freezing in Spring (April) will persist if bud break occurs early (March); increased rotting of the grapes due to the rise in temperature and in CO<sub>2</sub> content.

### Modification of the specificity of the wine

Pinot Noir may be particularly vulnerable to climate change. According to Pichery and Bourdon: “the Pinot Noir grape has reached its limit in terms of adaptation for producing fine and elegant wines in Burgundy and/or laying down wines; it has few chances of being able to adapt on the traditional *terroir* in which it is currently planted and to reveal the totality of its characteristics and of its aromatic complexity should temperatures rise permanently”.<sup>20</sup> Recent wine production models created by Garcia de Cortazar Aauri support these findings,<sup>21</sup> which “could lead to the disappearance of Pinot Noir in the Côte de Beaune area, and to its being replaced by other types of vine”.<sup>22</sup>

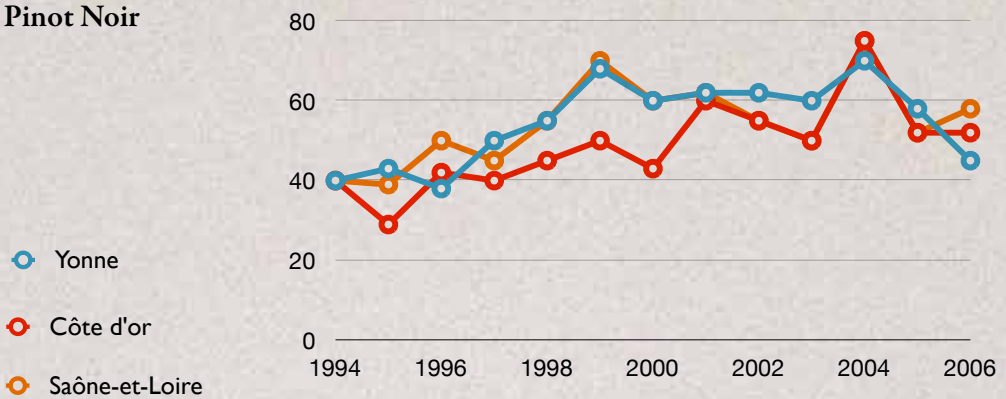
### Impacts over the long term on the geographical distribution of vineyards

In the long term, the present climate conditions in Burgundy that give the region's wine its specificity will have disappeared<sup>23</sup>, as this region will be confronted with a 'Mediterranean' type of climate (see Figure 5). Furthermore, no French region will be able to produce similar wines, because the specificity of the wines from Burgundy has been developed on a particular *terroir*.

Figure 4

Evolution of the unit weight of bunches of grapes measured at the moment of closing of the bunch (in grams) <sup>24</sup>

Pinot Noir



Chardonnay

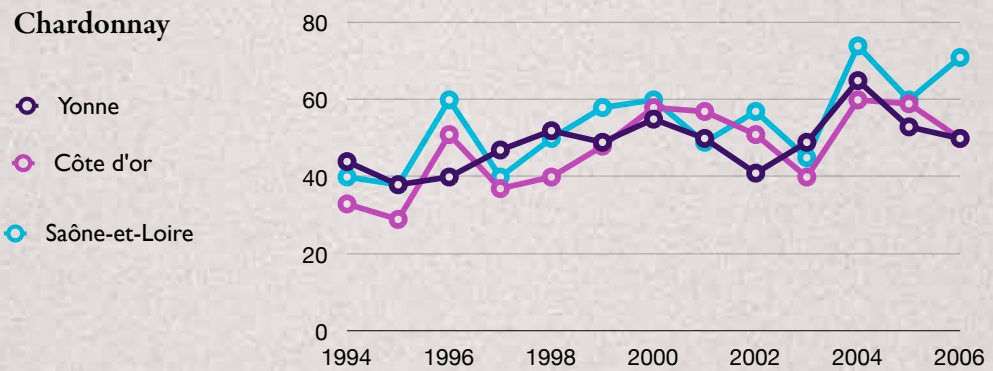
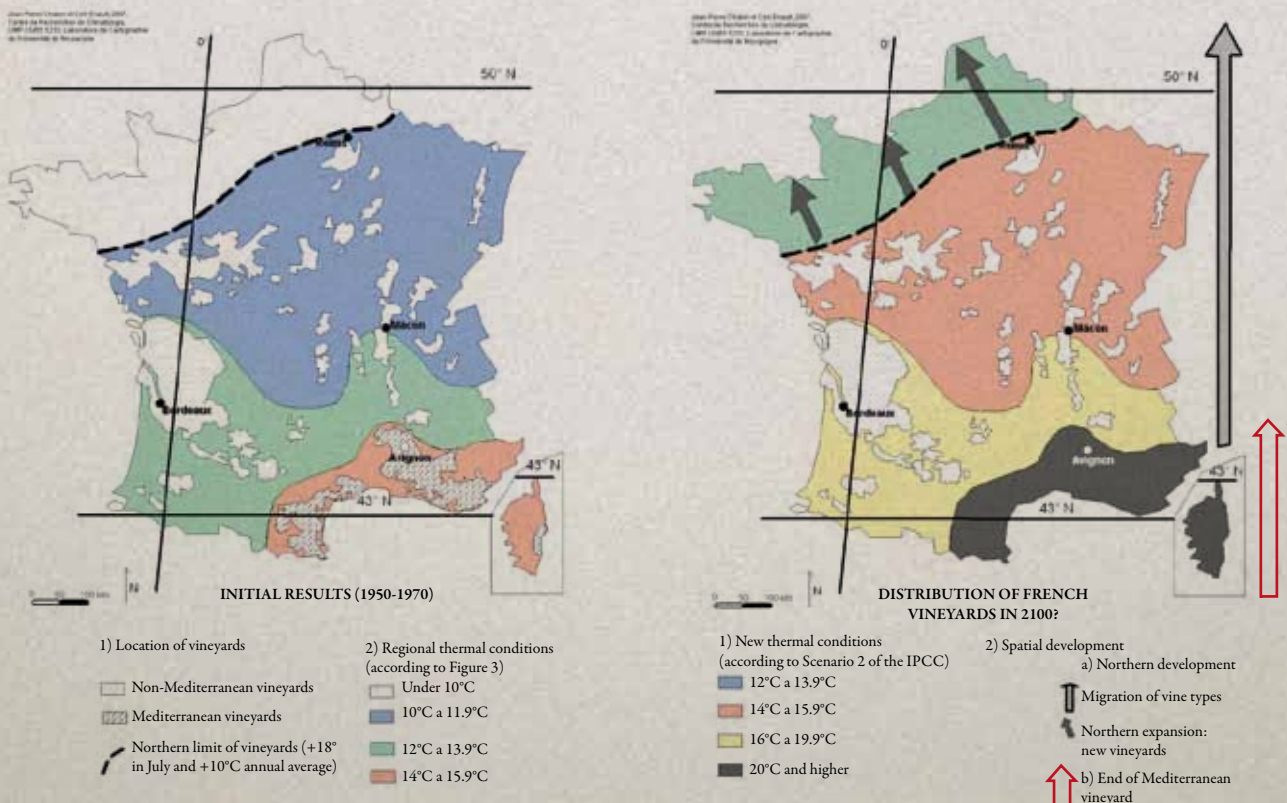


Figure 5

The vineyards of France in 2100



# Conclusion

There is no longer any doubt that climate change will have a devastating impact on French quality wines. What has taken centuries to create is now at risk of being obliterated. Wine production is a common cultural heritage built over time through specific knowledge and *terroirs*. Ensuring a better protection for this unique heritage is in our common interest.

Climate change will cause serious impacts in France. But the consequences of global warming will be felt even harder in other parts of the world and developing countries are already experiencing the most severe effects of global warming. While it is clear that the economic development of industrialised nations is largely responsible for climate change, emerging countries will be the most strongly hit by its impacts in the coming decades.

To break this destructive cycle, we need to take immediate action and urge our leaders to step up to the challenge of climate change. The international conference on climate change in Copenhagen in December 2009 will determine the future of humanity. During that summit, our leaders will debate and decide upon the commitments necessary for the transition to a sustainable development path. An ambitious deal in Copenhagen is the only way to prevent an irreversible and unprecedented climate catastrophe.



# Notes

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