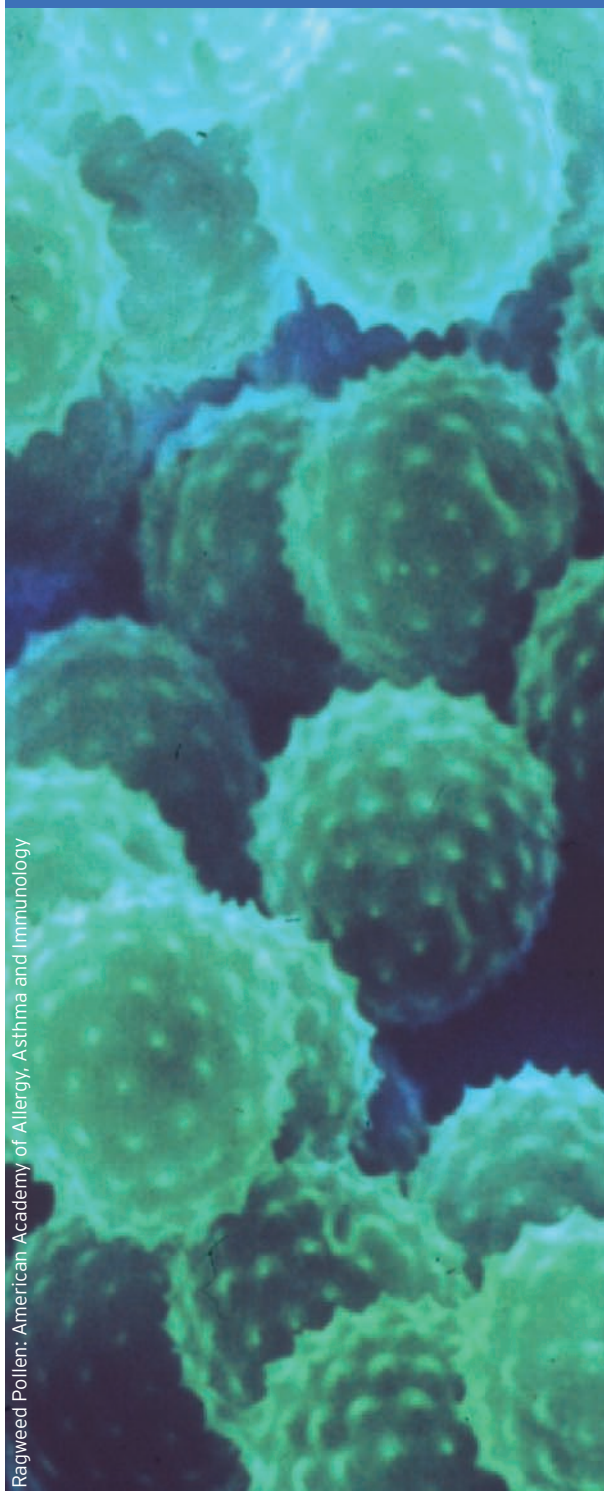


# Extreme Allergies and Global Warming

NATIONAL WILDLIFE FEDERATION

2010



Ragweed Pollen: American Academy of Allergy, Asthma and Immunology

Unchecked global warming will worsen respiratory allergies for approximately 25 million Americans. Ragweed—the primary allergen trigger of fall hay fever—grows faster, produces more pollen per plant, and has higher allergenic content under increased carbon dioxide levels. Longer growing seasons under a warmer climate allow for bigger ragweed plants that produce more pollen later into the fall. Springtime allergies to tree pollens also could get worse. Warmer temperatures could allow significant expansion of the habitat suitable for oaks and hickories, which are two highly allergenic tree species. Changing climate conditions may even affect the amount of fungal allergens in the air.

More airborne allergens could mean more asthma attacks for the approximately 10 million Americans with allergic asthma. Global warming may also exacerbate air pollution, which interacts with allergens to trigger more severe asthma attacks. Cities pose the biggest health threats for asthmatics because the urban heat island effect can exacerbate both pollen production and air pollution. These potential impacts of global warming could have a significant economic impact: allergies and asthma already cost the United States more than \$32 billion annually in direct health care costs and lost productivity.

Poison ivy also grows faster and is more toxic when carbon dioxide increases in the atmosphere. More than 350,000 cases of contact dermatitis from exposure to poison ivy are already reported in the United States each year. These numbers are likely to increase if poison ivy grows faster and becomes more abundant. The reactions may also become more severe because poison ivy produces a more potent form of urushiol, the allergenic substance, when carbon dioxide levels are higher.

We must act now to reduce risks for allergy and asthma sufferers. An essential first step is to reduce global warming pollution to avoid the worst impacts, and enable allergy sufferers to continue enjoying the great outdoors. At the same time, states, communities, and homeowners should undertake smart community planning and landscaping, with attention to allergenic plants and urban heat island effects, to limit the amount of pollen and other allergens that become airborne.



Asthma and Allergy  
Foundation of America

CONFRONTING GLOBAL WARMING

# Report

# Nature Is Noticing the Changing Climate

The evidence that climate is changing due to human activities is stronger than ever.<sup>1</sup> The average global temperature in 2009 tied for the second highest year on record and the decade from 2000-2009 is the hottest on record.<sup>2</sup> Due largely to the burning of fossil fuels, this warming is expected to continue for the foreseeable future. By the 2080s average annual temperatures in the United States could be another 3 to 10 degrees Fahrenheit warmer than today, depending upon how aggressively we move to reduce emissions of carbon dioxide and other greenhouse gases to the atmosphere.<sup>3</sup>

Many aspects of nature are sensitive to the changes in atmospheric composition and climate. Impacts on nature will vary regionally. Individual plant and animal species will respond differently, sometimes causing ecosystem processes to get out of synch. At the same time, ecosystems

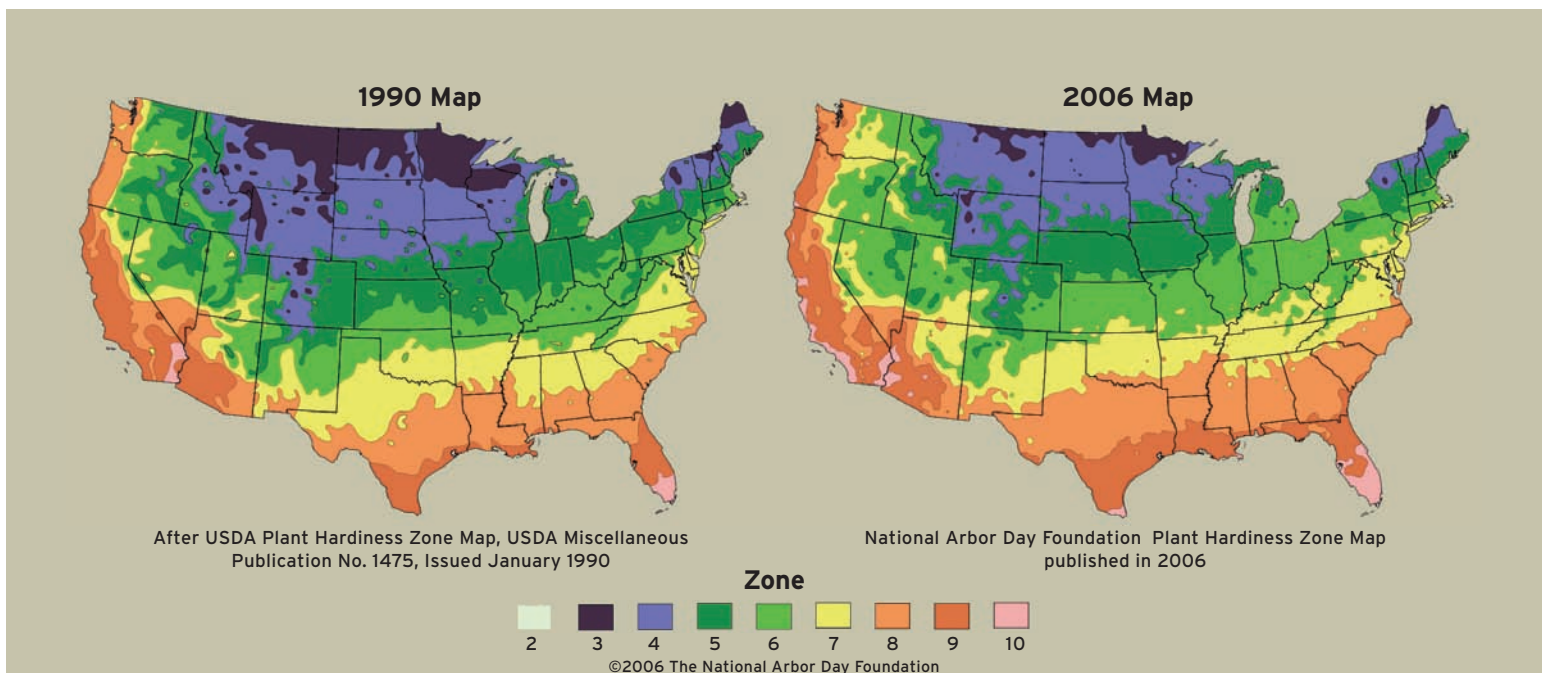
will continue to be under threat from changing land use, urbanization, transportation, and energy production.<sup>4</sup>

For example, trees and other plants are beginning to respond to the much higher levels of carbon dioxide to which they are being exposed. Carbon dioxide levels in the atmosphere have increased by about 40 percent since the 1700s.<sup>5</sup> They are now at their highest level in 800,000 years<sup>6</sup> and perhaps as long as 15 million years.<sup>7</sup> Because carbon dioxide is essential for plant survival, many plants can grow faster and larger as carbon dioxide levels increase. However, not all plants are responding the same way, sometimes reflecting inherently different abilities to use the increased carbon dioxide, or other limitations such as the availability of water or other nutrients.<sup>8</sup>

Longer growing seasons and warmer temperatures are also shifting where and when plants can grow. Across the

country, spring arrives an average of 10 to 14 days earlier than it did just 20 years ago.<sup>9</sup> The preferred ranges for many species are shifting northward and to higher elevations as trees and other plants are unable to tolerate hotter summer conditions. In 2006, the National Arbor Day Foundation revised maps of plant hardiness zones to reflect a distinct northward shift (see below).

Precipitation and storm patterns will also be affected. As warmer air is able to evaporate and hold more moisture, the trend will be toward more and longer dry periods punctuated by heavier storms. More heavy rainfall events have already been observed during the last 50 years, during which the amount of rain falling in the heaviest events has increase by 20 percent on average across the United States.<sup>10</sup> Climate change is also expected to shift storm tracks and to bring more extreme thunderstorms and wind events.<sup>11</sup>



**Plant hardiness zone maps are used by gardeners to decide what to plant where. Most areas of the country shifted to a warmer hardiness zone when the National Arbor Day Foundation revised these maps in 2006 to account for recent climate conditions. This shift means that plants that used to thrive in a certain place are now more suitable for farther north locations. Each zone represents an average of 10 degrees Fahrenheit temperature difference.**

# Ragweed Pollen: More Fall Hay Fever on the Way

Hay fever symptoms are familiar to many: eye irritation, runny nose, stuffy nose, puffy eyes, sneezing, and inflamed, itchy nose and throat. The offending allergen for about 75 percent of people suffering from hay fever is ragweed. An herbaceous relative of the sunflower, ragweed produces highly allergenic pollen that is readily dispersed by the wind.<sup>12</sup> Native ragweed plants are found across the country, surviving under a range of habitat conditions, and are renowned for colonizing disturbed areas. Ragweed provides important wildlife habitat, even though it can be a nuisance for people. The plants flower in late summer and fall. With each plant able to produce about a billion grains of pollen each season—pollen that can be carried up to 400 miles by the wind—it is no surprise that ragweed allergies already affect so many Americans.<sup>13</sup>

As atmospheric carbon dioxide levels and temperatures continue to rise, ragweed pollen loads will increase and possibly become more potent.

Global warming is expected to affect ragweed in several ways:

- Ragweed growth rates increase and the plants produce more pollen when carbon dioxide in the atmosphere increases. If fossil fuel emissions continue unabated, pollen production is projected to increase by 60 to 100 percent by around 2085 from this carbon dioxide effect alone.<sup>14</sup>
- Ragweed pollen itself may become more allergenic if carbon dioxide increases. One study found that production of Amb a 1, the allergenic protein in ragweed, increased by 70 percent when carbon dioxide levels were increased from current levels

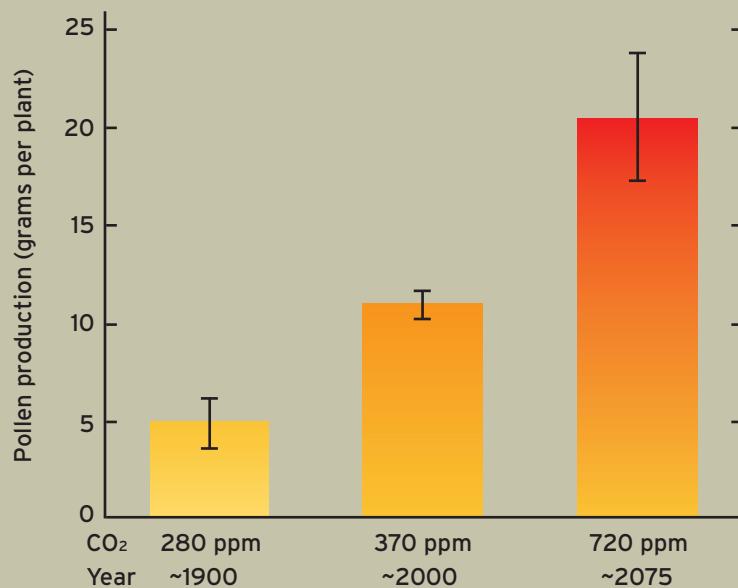
## BY THE NUMBERS: ALLERGIES IN THE UNITED STATES

- 18.0 million adults suffer from hay fever allergies<sup>20</sup>
- 7.1 million children suffer from hay fever allergies<sup>20</sup>
- 13.1 million doctor's visits for hay fever each year<sup>20</sup>
- \$11.2 billion in medical costs to treat allergic rhinitis each year<sup>21</sup>
- 4 million missed or low productivity workdays each year due to hay fever allergies<sup>22</sup>
- \$700 million in lost productivity due to hay fever allergies each year<sup>22</sup>



Kim the ragweed friend on flickr

## RAGWEED POLLEN COUNTS RISE WITH INCREASING CARBON DIOXIDE



Scientists have grown ragweed in chambers where they can control the atmospheric carbon dioxide levels. These studies have found that ragweed plants produce much more pollen when carbon dioxide levels are increased.

SOURCE: Ziska and Caulfield (2000)



A.Y. Jackson on flickr

**Ragweed is for the birds. Although its pollen causes much human suffering from allergies, ragweed seeds are an important winter food source for many birds and the larvae of many butterflies and moths feed on the plants themselves. Finding a good balance between the needs of wildlife and humans will be a challenge in managing allergies.**

of about 385 ppm to 600 ppm,<sup>15</sup> the levels expected by mid-century if emissions are not reduced.<sup>16</sup>

- The earlier arrival of spring could allow for a longer growing season, resulting in a significant increase in pollen production. In one study, allowing spring to arrive 30 days earlier resulted in a 54.8 percent increase in ragweed pollen production.<sup>17</sup>

Climate change impacts on ragweed are amplified in urban areas. Buildings, roads, and other infrastructure can make cities several degrees warmer than surrounding rural areas, creating what are known as urban heat islands. At the same time, the large number of polluting vehicles, power plants, and industry in cities increases carbon dioxide levels in the immediate vicinity.<sup>18</sup> One study found that ragweed production could be seven times higher than surrounding rural regions for a city that averaged 3.6 degrees Fahrenheit warmer and had 30 percent more carbon dioxide.<sup>19</sup>

# Tree Pollen on the Move

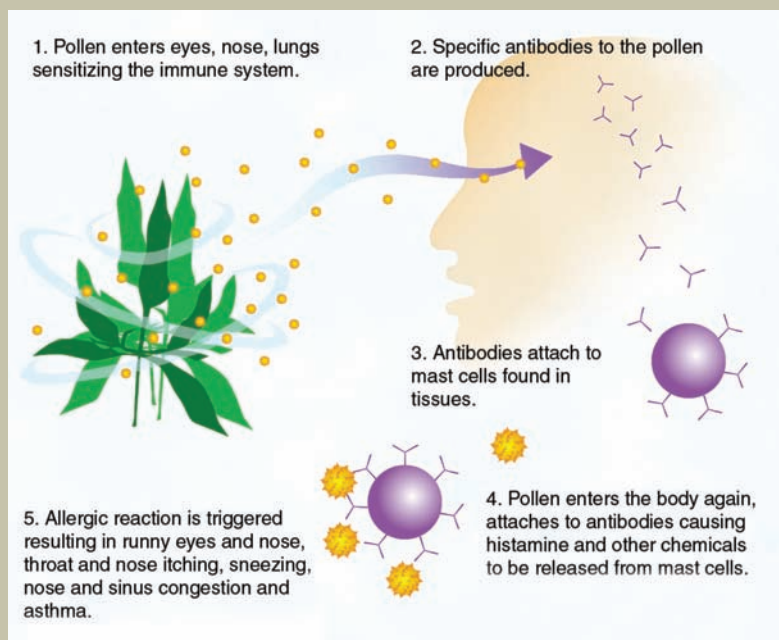
From the majestic to the showy, trees are integral to the fabric of the American landscape and invaluable for wildlife. Yet, some tree species that rely upon the wind for pollination and have highly allergenic pollen, can bring misery to people who get springtime hay fever allergies.<sup>23</sup> Unfortunately, it appears that climate change may favor the growth of trees with more allergenic pollen. In particular, habitat suitable for highly allergenic oak and hickory species may expand at the expense of habitat where much less allergenic pine, spruce, and fir trees currently dominate.<sup>24</sup> These shifts might be most dramatic along the Appalachian Mountains, Northeastern states from Pennsylvania to Maine, in the Upper Midwest, and along the lower Mississippi River (see maps).

The earlier start to spring could also affect the timing of tree pollination

and allergy symptoms. Satellite images of land cover have shown an advancement of spring by 10 to 14 days over the past 20 years in the Northern Hemisphere. Some of the best direct observations of spring bud bursts come from Europe. For example, birch trees in several European locations show a trend toward earlier flowering and pollen release correlated with warming trends over the last 35 years.<sup>25</sup> A recent study in one region of Italy found that increases in pollen season length since the 1980s for several tree species are correlated with increasing numbers of patients allergic to those types of pollen.<sup>26</sup>

The more intense thunderstorms and stronger winds expected with climate change could further expand the reach of tree and other pollen. The winds and precipitation associated with severe thunderstorms can cause

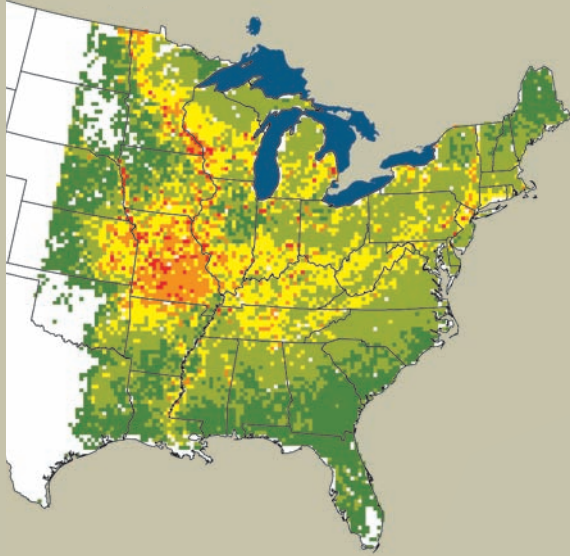
## HOW POLLEN MAKES US SNEEZE AND WHEEZE



SOURCE: American Academy of Allergy, Asthma and Immunology

## ANNUAL ALLERGENIC TREE POLLEN POTENTIAL

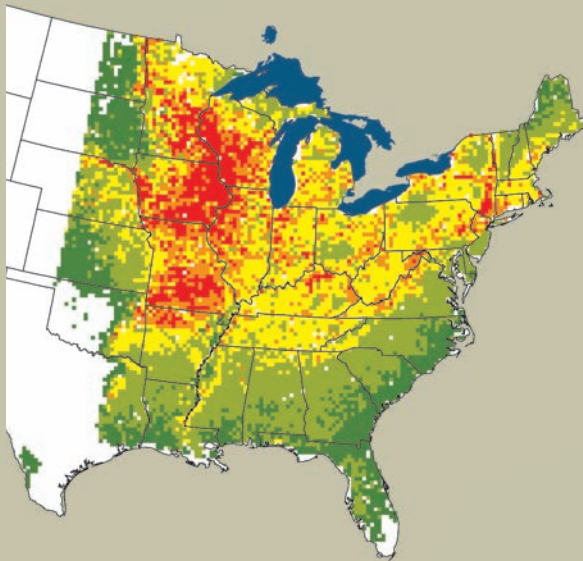
Current Tree Habitat Distribution



### Allergenic Level

- Very low
- Low
- Moderate
- High
- Very high

2100 Tree Habitat Distribution—Low Emissions Scenario

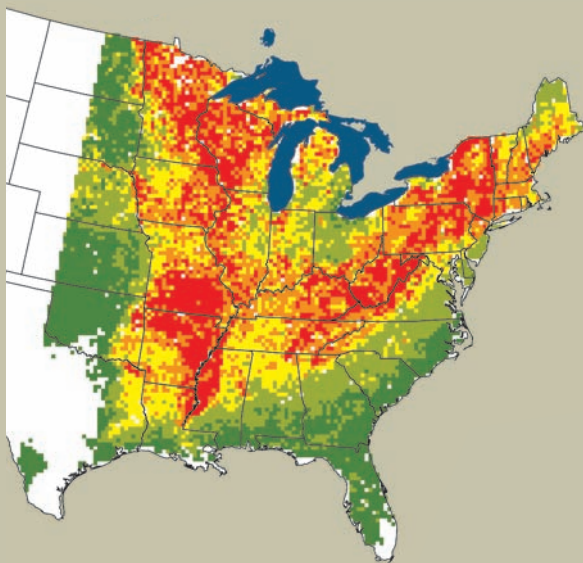


### Allergen Hotspots

**States with a risk of large increases in allergenic tree pollen:**  
Iowa

**States with a risk of moderate increases in allergenic tree pollen:**  
Illinois  
Minnesota  
Wisconsin

2100 Tree Habitat Distribution—High Emissions Scenario



### Allergen Hotspots

**States with a risk of large increases in allergenic tree pollen:**  
Arkansas  
Iowa  
Maine  
Minnesota  
New Hampshire  
New York  
Pennsylvania  
Vermont  
West Virginia

**States with a risk of moderate increases in allergenic tree pollen:**  
Connecticut  
Illinois  
Kentucky  
Massachusetts  
Mississippi  
Tennessee  
Wisconsin

Choices we make now about global warming pollution can make a big difference in the future potential for allergenic tree pollen. These maps show the annual allergenic potential from tree pollen for the current distribution of tree species habitat and for projected distributions of tree species habitat under two future climate scenarios—one in which greenhouse gas emissions are higher and one with lower emissions. Following the lower emissions pathway will help curb the possibility of expanding the range of trees, like oaks and hickories, that are known to produce highly allergenic pollen.

### How the Maps Were Made:

The potential tree habitat distributions for 134 species are from the USDA Forest Service's Climate Change Tree Atlas, available at <http://www.nrs.fs.fed.us/atlas/tree>. Future distributions based on the average of three global climate models, each run for two emissions scenarios (low: carbon dioxide increases to 550 ppm by 2100; high: carbon dioxide increases to 970 ppm by 2100). The Tree Atlas calculates Importance Values (IV) for each species for each 20 km by 20 km gridbox in the Eastern half of the United States. We scaled these Importance Values by how allergenic the pollen from each species is, as indicated in the Researchers Allergy and Botany Library available at <http://www.pollenlibrary.com> (highly allergenic =  $IV \times 3$ , moderately allergenic =  $IV \times 2$ , low allergenic =  $IV \times 1$ , not allergenic =  $IV \times 0$ ). Then, we summed the contributions from all 134 species to calculate the total annual allergenic potential for each grid box. Note that the actual future distribution of trees and annual allergenic potential will also depend on many factors that this model does not consider, such as fragmentation of landscapes and competition with other species.

pollen grains to burst, releasing much smaller allergen particles, granules that are less than 2.5 micrograms, which can reach the small airways of the lung.<sup>27</sup> Indeed, emergency department visits for asthma in Atlanta, Georgia are significantly correlated with intense thunderstorms.<sup>28</sup> Changing storm tracks could also affect the dispersion of pollen.

It is important to note that most native tree species, even those that

cause human allergies, have significant value as sources of food and shelter for wildlife, and generally are desirable to retain. In fact, global warming will make these trees even more valuable as places to store carbon, for providing shade that can help reduce cooling costs, and for helping naturally manage our water supply. A major challenge for future urban design will be to weigh the pros and cons of planting strategies to address these multiple different utilities.

## NON-NATIVE SPECIES AND ALLERGIES: HOW POLLEN IN TUCSON, ARIZONA INCREASED 10-FOLD

After World War II, thousands of allergy and asthma sufferers flocked to Tucson, Arizona, where they found relief from their symptoms. Relatively few allergenic species were native to the region, so pollen levels were extremely low. As Gregg Mitman, a medical historian, recounts in his book *Breathing Space*, Tucson aggressively marketed itself as a place where those with asthma and allergies could find relief and healthy air. Roughly 30 percent of people who moved to Tucson in the two decades following World War II did so for health reasons.<sup>29</sup>

Yet, by the 1970s, pollen levels in Tucson had increased by a factor of 10. Why? Many of the people who moved to the city planted non-native trees and grasses that reminded them of their former homes. Some of these were the same tree and grass species that caused their allergy and asthma symptoms in the first place. The worst offenders were mulberry trees, Russian olive trees, and Bermuda grasses. At the same time, the rapid urbanization of the area created an urban heat island effect that further exacerbated pollen production, not to mention led to unhealthy levels of air pollution.<sup>30</sup>

Tucson was not the only Western city where allergenic pollen levels increased significantly since the mid 20th century. Similar stories can be told for Phoenix, Arizona; Albuquerque, New Mexico; El Paso, Texas; and Las Vegas, Nevada. These cities now prohibit the sale or require labeling of certain species known to produce significant windborne and allergenic pollen.<sup>31</sup>



IMC on Wikipedia



UGArdener on flickr

# More Fungal Spores in Store for the United States?

Pollen is not the only natural allergen that global warming might intensify. Fungal spores, which can cause allergic and asthmatic reactions in both outdoor and indoor air,<sup>32</sup> could also become more abundant as carbon dioxide and temperatures increase.<sup>33</sup> One experimental study found that doubling atmospheric carbon dioxide levels led to a 4-fold increase in airborne fungal spores released from leaf litter.<sup>34</sup> Increases in plant growth associated with higher carbon dioxide levels could also accelerate fungal activity, for example, if more plant biomass is available for decomposition.<sup>35</sup> It is likely that more fungus will result in more spore production, however, improved observations are needed to confirm this assumption.

Changes in temperature and precipitation regimes due to global

warming may also affect the abundance of fungal spores in indoor air following extreme floods or droughts,<sup>36</sup> both of which are expected to become more common in the coming decades.<sup>37</sup> For example, heavy rainfall and flooding events often are followed by a proliferation of indoor fungal spores due to the increased dampness. The aftermath of hurricanes, which are also projected to become more severe and have about 22 percent more rainfall by the end of the century,<sup>38</sup> provide a striking illustration of how flooding can increase mold and affect respiratory health. Following Hurricane Katrina, mold problems were widespread and hospitals in New Orleans reported an increase in patients with allergy symptoms, nagging cough, and childhood asthma.<sup>39</sup>



Reggie Rachuba on flickr

Extremely hot and dry conditions might also exacerbate fungal allergies, especially as more people rely on air conditioning. Improper installation or management of air conditioning systems can create conditions ripe for growing mold (a type of fungus). Fortunately, this problem can be addressed through proper management of air conditioning systems.

## BY THE NUMBERS: ASTHMA IN THE UNITED STATES<sup>46</sup>

- 16.4 million adults have asthma
- 7.0 million children have asthma
- 3,600 deaths from asthma each year
- 3 black people die from asthma for every 1 white person
- 14.2 million days of work missed each year
- 14.4 million days of school missed each year
- \$15.6 billion a year in hospitalization costs due to asthma
- \$5.1 billion a year in lost earnings due to asthma

## Double Threat for Asthmatics: Allergies and Air Pollution

About 10 million Americans have “allergic asthma,” in which their asthma attacks are triggered by a reaction to pollen or other airborne allergens.<sup>40</sup> Thus, the risk of asthma attacks is likely to go up if global warming increases these allergens. Air pollution also increases the risk and severity of asthma attacks. If air pollution gets worse because of global warming, as several studies indicate,<sup>41</sup> asthmatics may have to deal with the double threat of more allergens and more air pollution.<sup>42</sup>

To make matters worse, air pollutants and allergens can interact in ways that amplify their individual effects. For example, when ground-

level ozone pollution levels are high, it takes much less ragweed pollen to trigger an asthmatic or allergic response. In effect, the ozone primes the bronchial airways to be more sensitive to the allergen. Particles emitted from diesel exhaust also increase allergic responses by extending how long the allergens stay in the body. The airborne allergens in pollen grains can stick to the tiny exhaust particles, which then penetrate deep in the lungs and remain there a long time. Some studies have even found that plants grown in places with more air pollution produce pollen with increased levels of allergenic proteins.<sup>43</sup>

Global warming will likely make it even harder to reduce ozone in cities that already have problems with air pollution. Warmer temperatures accelerate the chemical reactions in the atmosphere that create unhealthy ozone. At the same time, warmer conditions increase emissions of ozone precursors. One study found that global warming could increase the daily maximum 8-hour average concentration of ground-level ozone 3 to 5 parts per billion (ppb) by 2050 in the Midwest and Northeast, even if ozone precursor emissions are decreased as required by the Clean Air Act. During heat waves, higher temperatures and increased stagnation could lead to increases exceeding 10 ppb.<sup>44</sup> This climate penalty will require some cities to take even more aggressive steps to meet the ozone standard, which is currently 75 ppb and which the U.S. Environmental Protection Agency is now considering lowering to somewhere between 60 and 70 ppb.<sup>45</sup>



Andrew Bain on flickr

## WORST CITIES IN THE UNITED STATES FOR ASTHMATICS AND FOR SPRING AND FALL ALLERGIES

	Asthma Capitals™ 2010 <sup>47</sup>	Spring Allergy Capitals™ 2010 <sup>48</sup>	Fall Allergy Capitals™ 2009 <sup>49</sup>
1	Richmond, VA	Knoxville, TN	McAllen, TX
2	St. Louis, MO	Louisville, KY	Wichita, KS
3	Chattanooga, TN	Chattanooga, TN	Louisville, KY
4	Knoxville, TN	Dayton, OH	Oklahoma City, OK
5	Milwaukee, WI	Charlotte, NC	Jackson, MS
6	Memphis, TN	Philadelphia, PA	Dayton, OH
7	Tulsa, OK	Greensboro, NC	Augusta, GA
8	Philadelphia, PA	Jackson, MS	Tulsa, OK
9	Augusta, GA	St. Louis, MO	Knoxville, TN
10	Atlanta, GA	Wichita, KS	Little Rock, AR
11	Little Rock, AR	Madison, WI	Madison, WI
12	Springfield, MA	Columbia, SC	San Antonio, TX
13	Dayton, OH	Richmond, VA	Dallas, TX
14	Allentown, PA	Providence, RI	New Orleans, LA
15	Scranton, PA	Birmingham, AL	Baton Rouge, LA
16	Birmingham, AL	Memphis, TN	Charlotte, NC
17	Madison, WI	Oklahoma City, OK	St. Louis, MO
18	Detroit, MI	Baton Rouge, LA	Birmingham, AL
19	Pittsburgh, PA	Allentown, PA	El Paso, TX
20	Nashville, TN	New Orleans, LA	Virginia Beach, VA

Each year, the Asthma and Allergy Foundation of America ranks the 100 most populated cities in the United States to identify which are the most challenging places to live for people who have asthma, spring allergies, or fall allergies. The asthma rankings are derived from 12 factors measuring the prevalence of asthma, environmental and other risks, and access to medical treatment. The allergy rankings are based on observed pollen levels and access to medical treatment.

SOURCE: Asthma and Allergy Foundation of America.



# Poison Ivy: More Toxic and More of It

Poison ivy already ranks among the top ten “medically problematic” plants in the United States, with more than 350,000 cases of contact dermatitis reported each year.<sup>50</sup> About half to two-thirds of people have an allergic reaction to urushiol present in oils found in the leaves, stems, and roots of poison ivy, oak, and sumac. The rash, known as allergic contact dermatitis, consists of itchy red bumps and blisters, and in severe cases can be debilitating.<sup>51</sup>

A landmark study by Duke University examined the response of poison ivy to increasing concentrations of carbon dioxide in the atmosphere to about 570 ppm, levels that are expected by midcentury if fossil fuel emissions continue unabated. Poison ivy plants exposed to more carbon dioxide produced a more allergenic form of urushiol, the substance responsible for the itchy response.<sup>52</sup> To make matters worse, increasing carbon dioxide also caused the poison ivy

vines to grow even faster. More abundant vines will likely mean more opportunities for people to come in contact with them in places where poison ivy already grows naturally.<sup>53</sup>

While many animal species rely on poison ivy berries as a food source, larger poison ivy vines could have a negative impact on forest ecosystems, reducing tree regeneration and increasing tree mortality because vines tend to respond more vigorously to elevated carbon dioxide than trees.<sup>54</sup> In fact, more abundant growth of vines has been documented around the world.<sup>55</sup> Poison ivy joins a list of other aggressive vines that will likely benefit from global warming, including Japanese honeysuckle, English ivy, and kudzu.<sup>56</sup>



Stockphoto, www.istockphoto.com

## A STINGING TREND FOR ALASKANS

**People in Alaska are seeing increased incidence of allergic reactions to insect stings in recent years. This trend—including two unprecedented cases of fatal anaphylaxis due to yellow jacket stings in Fairbanks in 2006—has led scientists to investigate whether global warming may be playing a role.<sup>57</sup> Research suggests that higher average winter temperatures and a decrease in the frequency and intensity of cold snaps in the region can allow more yellow jacket queens to survive over the winter.<sup>58</sup> In fact, a significant increase in the number of insect stings across the state has occurred in regions where the average annual temperature increase is 3.4 degrees Fahrenheit or average winter temperature has risen at least 6 degrees Fahrenheit during the past 50 years.<sup>59</sup>**



Alpert, Harvard University, www.forestryimages.org

# Actions We Can Take Now to Reduce Allergy Risks

Although the future for allergy sufferers may appear grim, it is not too late to change course. We need to immediately start reducing the air pollution that contributes to global warming. At the same time, we can begin preparing for some climate changes that have already been put into motion. Through smart urban planning and attention to allergenic plants, communities may be able to limit how much their residents are exposed to allergens.

**Reduce global warming pollution to minimize future allergy risk.** To limit the magnitude of changes to the climate and the impacts on those who suffer from allergies, we must curb global warming pollution as much and as quickly as possible. It is important that policy makers, industry, and individuals work together to reduce global warming pollution from today's levels by at least 80 percent by 2050. This target is achievable with technologies either available or under development, but we must take aggressive action now to avoid the

most worrisome impacts.

Some emission reductions offer a win-win in terms of both limiting global warming and improving air quality. Shifting from reliance on burning fossil fuels to solar energy sources has the combined benefits of reducing air pollution and producing plentiful energy when electricity demand for air conditioning peaks during hot summer days. Methane is both an ozone precursor and a potent greenhouse gas, which makes a strong case for reducing its emissions.<sup>60</sup> Curbing emissions of tiny particles, which include black carbon that directly absorbs incoming solar heat, would have similar benefits. These particles can exert a strong local warming effect and have significant impacts on respiratory and cardiovascular health.<sup>61</sup>

**Minimize exposure to dangerous airborne allergen levels** using smart community, regional, and state planning as well as landscaping by homeowners.<sup>62</sup> As trees and other plants begin producing more pollen

there may be increased pressure to place restrictions on planting of certain pollen-producing species. Such strategies may be workable, but must be considered a long-term solution because trees have long life spans. Any such restrictions would need to be carefully weighed against the value of the plants for wildlife, providing shade that reduces cooling costs, storing carbon, storm water reduction, and other natural benefits. A good first step will be for qualified arborists and foresters to conduct citywide tree inventories and evaluate surrounding pollen and climate conditions to determine whether regulations can actually influence pollen levels.<sup>63</sup>

Well-designed urban areas can also reduce the urban heat island effect that accelerates pollen production and increases air pollution levels. Roof coatings and other materials that are more reflective absorb less heat and the use of green space—parks, trees, and “green” roofs—can greatly reduce the urban heat island effect. Urban vegetation absorbs less incoming sunlight than pavement, concrete, and other building materials, and also provides some cooling through evapotranspiration.

**Support research of the allergy-climate connection.** Much is still unknown about the incidence of asthma and allergies, trends in airborne allergens, the relationship between allergies and climate, and the interconnections between airborne allergens and both climate and non-climate risk factors.<sup>64</sup> With millions of Americans already suffering some allergy symptoms, many would benefit from investing in research to better understand how global warming is affecting allergies and what we can do to minimize the impacts.



The Udall Legacy Bus Tour: Views from the Road on Flickr

## ALLERGIES WON'T STOP ME FROM GETTING OUT AND GARDENING

While many know me as lover of the outdoors, it's less well known that I also suffer from severe allergies to pollen and poison ivy. While I can appreciate the humor of a "naturalist that's allergic to nature", the potential that global warming will make my allergies even worse is no laughing matter. Even so, I don't let my allergies keep me inside now, and don't plan to let them do so in the future. Here are some tips to make your time outdoors more enjoyable, even during allergy season.

- **Get an allergy test.** Knowing which plants trigger your allergies and when they are in bloom will help you decide the best times to be outdoors.
- **Ask your medical practitioner about air pollutants and allergens, how to minimize exposure, and what synergistic effects to look out for.** Allergy medications can minimize your symptoms.
- **Check daily pollen counts and plan your outdoor time when pollen levels are low.** Wear a pollen-filtering mask when you're outside on days with high pollen counts to minimize exposure.
- **Pollen gets trapped in hair and clothing, so shower after spending time outdoors, wash bedding and clothing frequently, and vacuum regularly. Use saline spray or a neti pot to flush pollen from your nasal passages.**
- **Choose plants for your garden that don't produce airborne pollen. Luckily, most plants with large, showy blooms have heavy pollen grains designed to stick to insects rather than blow in the wind and aren't big allergy triggers.**
- **Plant female trees and shrubs. Male plants don't produce fruit or seeds, which some consider messy, but female plants don't produce pollen and the fruits and seeds they do produce will help attract birds.**

While these steps can minimize your personal exposure to allergens, it's important to realize that pollen can be carried long distances by the wind and you will always be exposed to some level of allergens in the environment. Ultimately, we'll all need to work together to slow global warming and minimize the potential increases in allergies.

**David Mizejewski**  
**Naturalist**  
**National Wildlife Federation**



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## Endnotes

<sup>1</sup> McMullen, C.P., and J. Jabbour, 2009. *Climate Change Science Compendium 2009*. United Nations Environment Programme, Nairobi, EarthPrint.

<sup>2</sup> NASA Goddard Institute of Space Studies, 2010. 2009: Second Warmest Year on Record; End of Warmest Decade. Available at <http://www.giss.nasa.gov/research/news/20100121/> (Accessed March 22, 2010).

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