April 1, 2009

By Post and Electronic Mail

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United States Environmental Protection Agency
1200 Pennsylvania Ave., NW
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Dr. Debra Edwards, Director
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Dear Administrator Jackson and Director Edwards:

We write on behalf of the Sierra Club, the Center for Biological Diversity, the Center for Environmental Health, Defenders of Wildlife, the Natural Resources Defense Council, and Pesticide Action Network North America to request that your office develop recommendations for proper pesticide regulation in this period of rapid climate change. Climate change will significantly alter the behavior and impacts of many pesticides, and EPA must move swiftly to address these new challenges. Addressing climate-linked pesticide impacts now is particularly appropriate because EPA is in the early stages of the registration review process, *see* 7 U.S.C. § 136a(g), and so has an important opportunity to recalibrate its practices even as the climate crisis becomes ever more acute. Failing to take climate into account, on the other hand, would result in registration decisions that do not reflect real world conditions. We would be pleased to work with you and your team to address this important new challenge.

We suggest that you work with your Scientific Advisory Panel and Science Review Board to identify a strategy, priorities, and a timeline for addressing this issue. This may be preceded by a public workshop with invited experts to describe these issues.

EPA may only register a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act ('FIFRA') if, among other criteria, it "will not generally cause unreasonable adverse effects on the environment." *See* 7 U.S.C. § 136a(c)(5)(C)-(D). To make its registration decisions, EPA turns to factors including a given pesticide's human exposure risks, *see* 40 C.F.R. pt. 158, subpt. K, ecological effects, *see* 40 C.F.R. pt. 158, subpt. G, and environmental fate, *see* 40 C.F.R. pt. 158, subpt. N. All of these factors are significantly affected by shifting climatic conditions.

A recent analysis by Dr. Alistair Boxall and colleagues, published by the National Institute of Environmental Health Sciences, provides strong evidence of why pesticide registration decisions can no longer responsibly be made without taking climate change into account.[1] Climate change will alter the effects of pesticides in at least the following regards:

• Total Pesticide Load Will Increase and the Geographic Distribution of Pesticide Use Will Change.

As farmers adapts to altered climatic conditions, they will use pesticides in new and different ways. These new practices should be reflected in EPA's regulations.

In particular, farmers will likely increasingly depend upon pesticides. Warming climates, altered precipitation regimes, and heightened carbon dioxide levels will all put stress on agricultural systems and may, in many cases, favor pests and disease vectors.[2] As the U.S. Climate Change Science Program recently explained, "[t]emperature is the single most important factor affecting insect ecology," and "plant pathogens will be highly responsive to humidity and rainfall, as well as temperature."[3] Indeed, elevated carbon dioxide "alone may affect plant-insect interactions"; in one study, early season soybeans grown under high carbon dioxide conditions had 57 percent more insect damage than control plants.[4] It should, therefore, not be surprising that "[t]here is currently a clear trend for increased insecticide use in warmer, more southern regions of the United States, compared to cooler, higher latitude regions."[5] As the climate warms, pesticide use levels now seen largely in the south may well appear in more northerly regions. In fact, the Climate Change Science Program has predicted that expenditures on pesticides will increase, by as much as 20% in some cases, "for most crops studied and for most regions."[6] The Climate Change Science Program naturally concluded that, without careful management, "[t]he increase in pesticide expenditures could increase environmental problems associated with pesticide use."[7]

It is worth noting, too, that this general increase in pesticide use will likely be quite complex on local and regional scales. Because the agricultural map of the United States may be quite different in a few decades, some regions will experience farming practices, including the use of some pesticides, which they presently do not. In other cases, novel combinations of pesticides will appear, as the present pattern of use shifts. Understanding this moving spatial

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[1] *See* Alistair Boxall et al., *Impacts of Climate Change on Indirect Human Exposure to Pathogens and Chemicals from Agriculture*, National Institute of Environmental Health Sciences, Environmental Health Perspectives (Dec. 10, 2008) ("*Impacts of Climate Change*") (attached to this letter).
[2] *See e.g.*, Alistair Boxall et al., *Impacts of Climate Change*, at 7.
[3] *See* J.K. Hatfield et al., *Agriculture*, in *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States,* A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research at 60 (2008).
[4] *Id.*
[5] *Id.*
[6] *See, e.g.*, John Reilly et al., *Climate Change and Agriculture in the United States*, in *Climate Change Impacts on the United States*, 379, 393 (2001).
[7] *Id.*

picture – and the chemical portrait that will also appear – is essential to understanding the impacts of climate-linked shifts in pesticide load.

• Likely Weather Patterns Will Often Exacerbate Pesticide Contamination of Non-Agricultural Environments and Will Also Alter Pesticide Break-down Pathways.

Climatic conditions are intimately involved in the spread (whether through water transport, airborne drift, or other means) and break-down of pesticides.[8] As a general matter, tomorrow's weather map suggests that pesticides will expand their influence far from farm fields. Among the changes to come are:

▫ *Shifts in precipitation patterns to favor periods of heavy rain followed by droughts*. In many temperate ecosystems, warmer and more violent weather will lead to fewer, but more intense precipitation events. This combination of intense precipitation and hard-packed soil may enhance pesticide spread. Specifically, "[c]limate change may lead to a greater frequency of macropore and overland flow events as the infiltration capacity of the soil is exceeded," along with "an increase in soil shrinkage cracks which may result in a more extensive and better connected macropore system."[9] Put a bit differently, hard rains falling on baked soil will send run-off further. And the floods associated with heavy run-off will "aid the dispersion of agricultural chemicals following immersion in floodwater."[10] The dry periods between storms will not help matters either: water bodies that presently absorb and dilute pesticide-laden run-off will be less able to do so, as they are likely to experience low flows in the summer months, decreasing dilution capacity.[11]

These impacts are not hypothetical. One recent study, for instance, documented extreme precipitation sending hundreds of pounds of pesticides into streams and wetlands in run-off from agricultural fields.[12] This sort of incident is likely to become the norm in the future, and should prompt EPA to rethink its assumptions about how pesticides will spread, and about the damage they may do.

▫ *Potentially enhanced spray drift and volatilization*. Toxic run-off is not the only danger ahead. Airborne pesticides pose significant environmental and human health risks, lofting toxins well beyond the fields to which they are applied. Pesticide drift from the farm fields of the Central Valley of California, for instance, is associated with the precipitous decline of California red-legged frog populations in the mountains bordering the valley.[13] Other aerial transport mechanisms, including volatile pesticides evaporating after application, also pose substantial risks. The warmer future world will likely see ever more pesticides mobilizing through these pathways.

First, because "[t]he extent of the spray drift depends on weather conditions such as wind speed," and because "the impacts of climate change on wind speed are uncertain," it is important to better characterize this pathway.[14] To the extent that winds pick up, the zone of influence of a given pesticide will increase. Second, volatilization and movement of pesticide-coated dust particles will also be affected by climate change.

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[8] *See, e.g.,* Alistair Boxall et al., *Impacts of Climate Change*, at 7-13.
[9] *Id.* at 9.
[10] *Id.* at 10.
[11] *Id.*
[12] *See* David Donald et al., *Mobilization of Pesticides on an Agricultural Landscape Flooded by a Torrential Stream*, 24 Environmental Toxicology and Chemistry at 2 (Dec. 8, 2003).
[13] *See* Carlos Davidson et al., *Declines of the California Red-Legged Frog: Climate, UV-B, Habitat, and Pesticides Hypotheses*, 11 Ecological Applications 464 (2001).
[14] *See* Alistair Boxall et al., *Impacts of Climate Change*, at 11.

Volatilization varies directly with "surface temperature, air temperature and wind speed, all of which are predicted to change as a result of climate change."[15] With temperatures moving steadily upward, pesticides will volatilize all the more quickly. And dispersion of pesticides on dust particles will also likely increase because "[t]he predicted hotter drier summers could lead to increased drying of soils and an increase in surface dust and hence increased transfer into the environment."[16] The upshot is that, with drier, warmer conditions, pesticides will likely travel further than they have before, with attendant ecological and human health risks.

▫ *Novel environmental fates for many pesticides*. Unsurprisingly, new configurations of soil and atmospheric conditions implicate the break-down pathways of many pesticides. In some cases, formerly aerobic waters may become anaerobic; in others, soil composition may lead to new compounds coming into contact with toxins.[17] Pathways of bioaccumulation may also change; there is, for instance, evidence that mercury becomes bio-available as methyl mercury more quickly at higher temperatures, and other systems may behave similarly as bacterial activity ratchets up in a warmer world.[18] Accurately predicting the environmental fates and break-down products of many pesticides thus depends upon characterizing their behavior under expected future climatic conditions.

• Ecosystems Will Be More Sensitive to Pesticide Loading.

A rapidly-growing body of data demonstrates that ecosystems are far more sensitive to damage when they are already under stress, and may in such circumstances reach ecological 'tipping points' where they can rapidly degrade.[19] Climate change will severely stress ecosystems across the United States. As a result, even pesticide loads that were formerly bearable may do increasingly serious damage as the climate crisis intensifies. And new toxins, or increased loads, will become ever harder for stressed ecosystems to bear. Forecasting the environmental impacts of a given pesticide, then, requires a careful understanding of the relevant ecological thresholds and stressors in the areas it affects.

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The climate-linked impacts discussed above are likely not an exclusive list; EPA will no doubt confront surprises down the road. It is clear, though, that we already know that climate change will profoundly alter the calculus of pesticide regulation. Unchecked climate-linked impacts could significantly increase human and environmental exposure to pesticides, as well as increasing the damage associated with each exposure. In many cases, interactions between climate change and pesticide use very likely have the potential to cause "unreasonable adverse

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[15] *Id.*
[16] *Id.*
[17] *See id.* at 13.
[18] *Id.* at 8.
[19] *See*, *e.g.*, Andreas Fischlin et al., *Ecosystems, their properties good and services. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* at 241 (2007); Daniel B. Fagre et al., U.S. Climate Change Science Program, *Synthesis and Assessment Product 4.2: Thresholds of Change in Ecosystems*, Public Review Draft at 6 (Aug. 14, 2008); *See* A.C. Janetos, Lara Hansen, et al., U.S. Climate Change Science Program, *Biodiversity*, in *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States* 151-81 (2008); David Bello, *World without Frogs: Combined Threats May Croak Amphibians*, Scientific American (Oct. 30, 2008).

effects on the environment," *see* 7 U.S.C. § 136a(c)(5)(C)-(D), such that pesticide registrations should be either denied, altered, or withdrawn.

These changing circumstances are substantial and they permeate every aspect of a pesticide's use and ultimate disposal. As a result, if EPA does not take climate change into account in its registration and registration review decisions, its decisions will not fulfill FIFRA's mandate that it carefully analyze each pesticide's impacts, and will ultimately be arbitrary, capricious, and not in accordance with law. *See* 7 U.S.C. § 136n, 5 U.S.C. § 706(2)(A). The result will be a growing class of invalid pesticide registrations, and resulting inadequate protections for the public and the environment. To maintain the integrity of the registration and registration review processes, as well as to fulfill FIFRA's protective mandate, EPA should move swiftly to address climate change in the pesticide context.

The most sensible place to begin addressing these complex issues is the Scientific Advisory Panel ('SAP') and Science Review Board. The SAP process is designed to provide EPA with "operating guidelines to improve the effectiveness and quality of scientific analyses made" to carry out the purposes of FIFRA, and members are selected on the "basis of their professional qualifications to assess the effects of the impact of pesticides on health and the environment." *See* 7 U.S.C. § 136w(d)(1). Indeed, the panel's charter specifies that determining "[m]ethods to ensure that pesticides do not cause unreasonable adverse effects on the environment," is among its "major objectives." The group is, in short, eminently well-qualified to provide EPA and the public with recommendations for action on this matter.

We therefore ask that EPA promptly refer the climate and pesticide interaction problem to the SAP. We recognize, of course, that developing appropriately specific charge questions and policy proposals is a substantial challenge and that EPA may well want to flesh out the issues further before presenting research questions to the SAP. We would be happy to work with you throughout the process. Initially, to the extent that additional data would be helpful, EPA should request it from pesticide registrants and other interested parties. *See* 7 U.S.C. § 136a(c)(2)(B)(i). It may also be helpful to start off by hosting a public workshop on interactions between climate change and pesticide impacts, attended by SAP and Science Review Board members along with EPA staff and interested organizations and members of the public. The workshop could begin the process of honing discrete issues for the SAP to address within the larger context of climate/pesticide interactions. Ultimately, though, the formal SAP process should be used to ensure that recommendations are fully vetted by the experts on the SAP and Scientific Review Board.

We suggest that the following issues be addressed:

• What is the universe of climate-linked impacts EPA should be aware of as it regulates pesticides under FIFRA and other relevant statutes, and when and where will they occur?

• What synergisms between climate-linked impacts and other pesticide impacts should EPA address in its regulatory process?

• Which regions and ecosystems are most likely to experience substantial adverse impacts as a result of interactions between pesticides and climate change, and what will be the nature and magnitude of those effects?

• Which groups of people and which communities are most likely to experience substantial adverse impacts as a result of interactions between pesticides and climate change, and what will be the nature and magnitude of those effects?

• What data, tests, and models are needed to adequately characterize these climate-linked impacts on a regional and national scale?

• How should EPA integrate these data, testing, and modeling requirements into the registration and registration review processes? In particular, what new rules, guidelines, and operating procedures are necessary or useful?

• Are there classes of pesticides and substances for which climate-linked impacts are likely to be particularly acute?

• What practices, restrictions, or other requirements should be used to limit or mitigate climate-linked impacts on the environment and human health?

• Are there pesticides and substances that, in light of these climate-linked impacts, warrant suspension, cancellation, or special review?

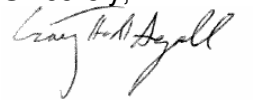
• What existing or ongoing regulatory processes and rulemakings should be halted or modified in light of climate change?

Other appropriate inquiries will, of course, arise as the SAP (and, as appropriate, workshop) process continues.

The integrity of pesticide regulation depends upon integrating climate change into the FIFRA process. We look forward to working with EPA to begin to address these challenging questions. Devoting significant attention to this matter this year is the appropriate place to start.

Please be in touch with any questions or concerns. Because of the urgency of the task ahead, and the amount of work that remains to be done, we would appreciate an initial response within a month of your receipt of this letter so that we can begin figuring out the right next steps. We look forward to working with you.

Sincerely,



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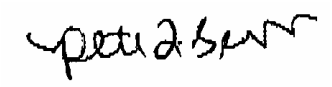

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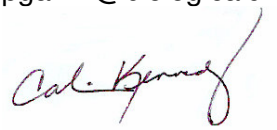

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