



# Wind Erosion and Soils



## **Factors**

There are several factors that affect the vulnerability of areas that lead to the conversion of soil to dust through wind erosion. Wind plays a significant role in erosion of soil and increased dust.

### **Wind speed and duration**

Wind erosion increases with increased velocity. Wind erosion increases with increased duration because the wind reduces moisture in the soil surface.

### **Moisture (rainfall, humidity, mulching or residue)**

Rainfall, humidity, and mulch or residue typically moisten the soil surface, which decreases the susceptibility to erosion from wind. However, rainfall can increase the susceptibility to erosion as it detaches particles and sorts erodible separate particles from the matrix of the soil surface.

### **Temperature**

Temperatures have an affect on erodibility when combined with periods of hot and dry or very cold and dry periods of weather. In summer, warmer temperatures cause soil to dry faster making them more susceptible to wind erosion. Likewise, during periods of very cold weather, the humidity of the air is low and winter wind freeze dries the soil and makes it susceptible to wind erosion where the moisture in the soil is not adequate to keep it frozen together.

### **Landscape**

How the land lays across the landscape affects wind speed, turbulence, concentration, and consequently, the susceptibility of a site to erosion. Typically, flat open areas lacking a wind barrier, such as a hedgerow, windbreak, or varied topography can be very susceptible to wind erosion. The tops of hills can be susceptible to increased wind erosion and the wind is compressed, increasing wind velocity.

### **Erodibility of the soil**

Generally, soils have a wind erodibility index assigned to them that is related to the soil surface texture. Soil textures refer to the amount of sand, silt, and clay sized particles within the soil layer. The texture of a soil influences how well it will hold together under different weather conditions. Generally, coarser textures soils have higher wind erodibility indices. There is a lot that can increase or decrease the susceptibility of erosion of the soil that is somewhat independent of this index. Soil moisture, soil cover, wind breaks, and disturbance have significant influence on the susceptibility to wind erosion.

### **Land management and disturbance**

A smooth, exposed soil surface is always more susceptible to erosion than a covered or protected surface. Implementation of no-till, strip till, and minimum tillage practices, cover cropping, timing of management with weather, windbreaks, and other methods of conservation management can help keep soil in place and help to prevent the generation of dust. Soils that are cloddy or have ridges and depressions created by tillage, and perpendicular to the wind direction, inhibit erosion.

### **Timing, duration, and overlap**

Timing of events can create increased wind erosion. Windy condition when the surface is dry, loosened by recent tillage, and lacking crop residue or growing crops lead to severe wind erosion events.



Conservation practices used to prevent all types of erosion have a positive benefit on vulnerability and susceptibility to wind erosion, especially those that slow windspeed at the soil surface, promote cover, help maintain surface moisture, and include minimum, strip, or no-till practices.

## **Safety Measures**

The National Weather Service issues dust storm warnings in a polygon and storm-based format, similar to the format of severe thunderstorm and tornado warnings.

### **Dust Storm Warning products**

The polygon-based Dust Storm Warning is issued when widespread or localized blowing dust is forecast to suddenly reduce visibility to less than one quarter mile with sustained winds greater than 25 mph, resulting in dangerous and life-threatening travel conditions.

The polygon-based Dust Storm Warning provides three discrete information segments, per the example below, when the following conditions are expected:

**HAZARD**—Visibility less than one quarter mile in blowing dust

**SOURCE**—Radar indicated and webcams

**IMPACT**—Dangerous and life-threatening travel

The zone-based Blowing Dust Warning will be issued if similar conditions are forecast over a long duration, generally greater than 90 minutes.

### **Dust Advisory products**

The polygon-based Dust Advisory will be issued when widespread or localized blowing dust suddenly reduces visibility to between one quarter of a mile and one mile, resulting in hazardous travel conditions. The polygon-based Dust Advisory will provide three discrete information sections, per the example below, when the following conditions are expected:

**HAZARD**—Visibility between one quarter and one mile in blowing dust

**SOURCE**—Radar indicated and webcams

**IMPACT**—Hazardous travel

The existing Blowing Dust Advisory will remain a zone-based product and will be issued if similar conditions persist over a long duration, generally greater than three hours.

### **Dust Advisory**

A sudden drop in visibility to one mile or less, but greater than one quarter mile, resulting in widespread or localized blowing dust.

### **Blowing Dust Advisory**

Long duration event of widespread or localized blowing dust reducing visibilities to one mile or less, but greater than one quarter mile.

### **Dust Storm Warning**

Widespread or localized blowing dust reducing visibilities to one quarter mile or less.

### **Blowing Dust Storm Warning**

A long duration event, widespread or localized blowing dust reducing visibilities to one quarter mile or less.

[https://www.weather.gov/otx/Watch\\_Warning\\_Advisory\\_Definitions#Blowing%20Dust%20Advisory](https://www.weather.gov/otx/Watch_Warning_Advisory_Definitions#Blowing%20Dust%20Advisory)

