

**all about dirt!**



[www.DirtTheMovie.org](http://www.DirtTheMovie.org)

# ALL ABOUT DIRT

We don't know enough about the ground beneath our feet, the skin of the earth that is our ultimate natural resource. It's time to learn more about the dirt that our very survival depends on! The following educational resources will help. We offer the discussion guide and educational links presented below will provide tools to help teachers, students, gardeners, and all dirt-loving communities learn more, to build soil awareness, and take action to keep dirt alive.

## INTRO:

Of all the planets in the known universe, only Earth has a living, breathing "skin", formed over the course of countless millennia and made up of the elements released in the Big Bang. **Dirt! The Movie** explores this outermost layer of our planet and the intimate, organic connection between "dirt" and all living things, including humans.

Dirt is the living matrix of all terrestrial life on Earth; as it nourishes all forms of life it is also full of life, a handful containing tens of millions of microorganisms. The central question of the film is: how are we caring for this precious resource? Experts point out that, as we draw upon the soil for our needs, we must also replenish what we take. Yet, there are numerous examples of humans' mistreatment of the soil: the blasting away of mountain tops in our search for coal, cutting down the rainforest to clear land for planting, using chemical fertilizers and pesticides in growing crops, and paving over large areas of our cities and suburbs, to name just a few. All of these human activities are detrimental to maintaining healthy, living soil and have led to serious environmental degradation including climate change.

Below we offer some Background Information about dirt – please don't be offended by the name – we are referring throughout to soils and we have used Dirt in the title to grab your attention. Now that we still have it – read on! Below you will find:  
*(click on chapters to jump to that area of this document)*

- 1. Background Information**
- 2. Educational Resource links for different ages and curricula, and interests.**
- 3. A discussion guide to use with screenings of the film.**
- 4. Suggested activities to help educate policy makers and communities interested in preserving and protecting soils.**

# 1. BACKGROUND INFORMATION

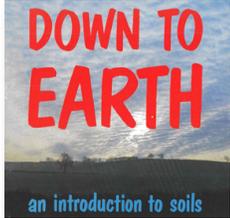
## What is dirt?

Dirt, or soil, is the loose top layer of Earth's crust, a mixture of mineral and organic materials plus air and water. Soil is formed slowly as rock (the parent material) erodes into tiny pieces near the Earth's surface. As organic matter decays, it mixes with inorganic material such as rock particles, minerals and water to form soil. Natural processes can take more than 500 years to form one inch of topsoil. Soil is made up of distinct horizontal layers called horizons. They range from rich, organic upper layers (humus and topsoil) to underlying rocky layers (subsoil, regolith and bedrock).

The contents of soil vary in different locations and are constantly changing. There are many different kinds and types of soils; these are the basic ones:

- **Sandy soil** is usually made up of granules of mineral and rock, is quite gritty, with large spaces between particles, allowing for easy flow of water and minerals.
- **Clay soil** has extremely small particles with little space between individual particles, allowing for virtually no drainage. Clay soil is not a good growing medium because water tends to not be able to escape, and it is difficult for root systems to break through the clay layer. Clay soils tend to be much older than sandy soils, since it takes many, many years for rock particles to break down to be small enough to form clay.
- **Silty soil** is one of the most fertile types of soil, with rich nutrients and good drainage. Silty soil is very similar in composition to sandy soil, albeit with more nutrients and minerals. It is generally quite dark and pungent, and is excellent for planting almost anything.
- **Loamy soil** is made up of a few different types of soil, with varying amounts of clay, silt, and sand mixed together. Loamy soil holds water well because of the heavy grittiness provided by the sand, has exceptional drainage so that the water doesn't build up too much and rot plant roots, and is nutrient rich. Loamy soil is the ideal soil for gardening.

## RESOURCES FOR: Basic Soil Information



‘Down to Earth’ is a 55 page booklet, providing an excellent overview of soil-related issues. It offers a basic introduction to soils and describes in non-specialist language what soil is, how it forms, how and why it is classified and mapped, and how soil is used and affected by mankind.

‘Down to Earth’ was written for the general reader who wishes to discover more about our most precious natural resource

[http://www.soil-net.com/downloads/Down\\_to\\_Earth.pdf](http://www.soil-net.com/downloads/Down_to_Earth.pdf)

<http://42explore.com/dirt.htm> - This educational site lists dozens of soil web sites.

<http://soil.gsfc.nasa.gov> –This Soil Science Education site lists information in a number of basic categories.

<http://forces.si.edu/soils> - The web site of the Smithsonian exhibit, “Dig It! The Secrets of Soil”, contains a wide range of information on soil, and includes videos and interactive features.

<http://www.doctordirt.com/soilfact.htm> - This web page contains an informative list of “soil facts”.

<http://www.rain.org/global-garden/soil-types-and-testing.htm> - This site explains some simple ways to analyze your soil.

Source: <http://www.wisegeek.com/what-are-the-different-types-of-soil.htm>

## What does dirt do?

**Basically Everything!**

### **Nature’s all-purpose material**

Soil is the foundation of life. It is the starting point for countless things we see in our environment and use in our daily life. Here is just a small list of the many uses and functions of soil:

- supports the growth of plants, which can be used for clothing, shelter and food for humans and animals
- pottery and dishes, made from clay soil
- bricks and other building material, made from mixtures of soil and animal excrement
- cooling medium (mud) for animals, especially pigs
- protection from insects (dirt “showers” used by elephants)
- facials and mud pack treatments in spas
- pigments derived from certain types of soil, used for painting and body decoration
- (in development) energy for operating lights and other equipment, created by microscopic organisms in soil

## Soil and the cycles of life

The soil is intimately tied to two processes that are essential for life on Earth:

**The Water Cycle** (or hydrologic cycle) describes the circulation of water from the land to the sky and back again. The Sun’s heat causes water to evaporate from the Earth’s land masses and bodies of water. Plants also lose water through transpiration. The water vapor forms clouds, and when the clouds meet cool air over land, the water vapor condenses, resulting in precipitation. Of the water that falls, some soaks into the ground and some of that gets trapped between rock or clay layers, forming groundwater. But most of the water flows downhill into streams and rivers, eventually returning to the seas as slightly salty water.

Problems for the environment: Runoff from precipitation will carry away whatever might be on top of the soil, such as fertilizer, and wash it into nearby rivers, streams and eventually to the ocean. Other substances contaminating the soil can get pushed down into the groundwater. And if there are no trees or other vegetation to hold the soil, runoff will wash away the topsoil.

See a graphic of the water cycle at: <http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Watercycle.shtml>

**The Carbon Cycle** is more complicated. Carbon exists in the nonliving environment as:

- carbon dioxide (CO<sub>2</sub>) in the atmosphere and dissolved in water
- carbonate rocks such as limestone and coral
- deposits of coal, petroleum, and natural gas derived from once-living things
- dead organic matter, e.g., humus in the soil

Carbon enters the biotic, or 'living' world when plants and algae use the energy of light to convert carbon dioxide to organic matter. Carbon returns to the atmosphere and water by:

- respiration (as  $\text{CO}_2$ ) by humans and animals
- burning
- decay, producing  $\text{CO}_2$  if oxygen is present, methane ( $\text{CH}_4$ ) if it is not.

Problems for the environment: If the uptake and return of  $\text{CO}_2$  are not in balance, the carbon dioxide content of the atmosphere will gradually and steadily increase. This is currently happening due to two human activities:

- burning fossil fuels (coal, oil, natural gas), which returns to the atmosphere carbon that has been locked within the earth for millions of years.
- clearing and burning of forests, especially in the tropics.



For a graphic of the carbon cycle and information about other greenhouse gases, see <http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/C/CarbonCycle.html>



## 2. EDUCATIONAL RESOURCES

**Grades K-6**

***Soil Safari:*** Soil Worksheets and Teacher Notes

Worksheets:

[http://www.soil-net.com/downloads/SoilSafari\\_SoilsWorksheets.pdf](http://www.soil-net.com/downloads/SoilSafari_SoilsWorksheets.pdf)

Teacher Notes:

[http://www.soil-net.com/downloads/SoilSafari\\_TeacherNotes.pdf](http://www.soil-net.com/downloads/SoilSafari_TeacherNotes.pdf)

The Soil Worksheets offer a 12 page set of soil-related activity sheets for classroom use together with 10 pages of accompanying teacher notes, (aimed at Primary Schools (or Grades 1 through 3) but equally appropriate for older students). Topics covered include: Learning about the site; Finding out what is growing in the soil and digging a soil pit; Looking at a soil profile; Looking for minibeasts; Soil colour; and Soil texture – the feel of the soil; Water in the soil. The materials are sourced from the [British Society of Soil Science](#) (BSSS).

### [“SOILS - Tools for Educators” CD, Version 3.0](#)

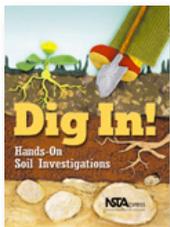
Information on ordering a CD that contains many of the items listed here.

### [Lesson Plans](#)

Art using soils, soil profile cards, and other projects with soils.

### [Soil Songs](#)

Songs about soil from the National Resources Conservation Service



[“Dig In”](#)© Hands-On Soils Investigations Information on ordering this popular publication by the National Science Teachers Association.

### [USDA for Kids](#)

A link to the U.S. Department of Agriculture’s website for kids.



### [S. K. Worm](#)

S. K. Worm, the official annelid (or worm) of the Natural Resources Conservation Service answers questions about soil.



### [Claude's Got the Scoop on Soil!](#)

Targeted for young students in grades 4-6, students learn about how soil is made, who really needs soil, and what happens to soil if you don't take care of it.

### [Soil Biological Communities, Just for Kids](#)

A link to the Bureau of Land Management's National Science and Technology Center. The website was developed for students from ages 9 through 11 although sections may appeal to older and younger students. Includes a section on adopting a soil critter.

### [Agriculture in the Classroom](#)

A link to the USDA Cooperative State Research website. Includes a Kid's Zone and State Agricultural Profiles.

### [Food, Land, and People](#)

A nonprofit organization committed to helping people of all ages better understand the interrelationships among agriculture, the environment, and people of the world.

### [Soil Science Education](#)

A NASA Website supported by the National Science Foundation.

### [Conservation Education](#)

A link to the Forest Service's curriculum page.

### [Field Museum - Underground Adventure](#)

This site contains virtual movies of the exhibit "Underground Adventure" at The Field Museum, science experiments you can do at home or school, and even a virtual terrarium.

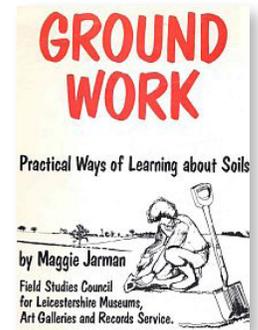
## Grades 7-12

### **Ground Work** – *Practical Ways of Learning about Soils*

by Maggie Jarman

**Ground Work** is a 16 page booklet, providing a series of practical ways to learn about soil. The booklet covers themes such as: Digging in, Broadening your horizons, Making a good record; Soil and slopes; Taking the rough with the smooth; Soils are not just brown; Experimenting with soil chemistry; Water in soil; What lives in the soil; Common soil mini-beasts; Types of plant and types of soil; And did those feet?; How will your 'garden' grow?; and a Glossary game.

[http://www.soil-net.com/downloads/Ground\\_Work.pdf](http://www.soil-net.com/downloads/Ground_Work.pdf)



### [Dr. Dirt](#)

Links to teaching resources and activities to encourage interest in science, soil, engineering, agriculture, and natural resources.

### [“SOILS - Tools for Educators” CD, Version 3.0](#)

Information on ordering a CD that contains many of the items listed here.

### [Lesson Plans](#)

Art using soils, soil profile cards, and other projects with soils.

This publication requires [Acrobat Reader](#).

[From the Surface Down](#) (PDF; 1.5 MB) - An introduction to soil surveys for agronomic use.

### [Urban Soil Issues](#)

Soil concerns in urban environments.

### [Soil Biology Primer](#)

### [Soil Quality](#)

### [Soil Quotations](#)

## [USDA for Kids](#)

A link to the U.S. Department of Agriculture's website for kids.



## [Soil Biological Communities, The Dirt on Dirt](#)

A link to the Bureau of Land Management's National Science and Technology Center's web page explaining the aspects and benefits of soil.

## [Agriculture in the Classroom](#)

A link to the USDA Cooperative State Research website. Includes a Kid's Zone and State Agricultural Profiles.

## [Soil Science Education](#)

A NASA Website supported by the National Science Foundation.



## [Conservation Education](#)

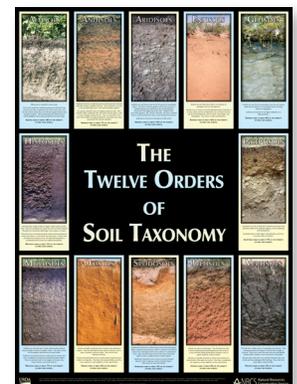
A link to the Forest Service's curriculum page.

## [Field Museum - Underground Adventure](#)

This site contains virtual movies of the exhibit "Underground Adventure" at The Field Museum, science experiments you can do at home or school, and even a virtual terrarium.

Additional specific educational resources for teachers:

- [Soil Facts](#) -- definitions of soil and soil survey, information on careers, some basics on soil formation and classification, soil science glossary, and regulations for moving soils
- [Key Messages](#) -- 10 key messages to understanding soils
- [State Soils](#) -- find out about your state soil
- [The Twelve Orders of Soil Taxonomy](#) poster



- Links for students and teachers

- [Grades K-6](#)
- [Grades 7-12](#)
- [College level](#)



- Dig It! The Secrets of Soil

- [Smithsonian National Museum of Natural History](#)
- [Soil Science Society of America](#)
- [National Association of Conservation Districts](#)

### 3. SCREENING DISCUSSION GUIDE

#### TOPICS AND ISSUES RELEVANT TO **Dirt! The Movie**

A screening of **Dirt! The Movie** can be used to spark interest in any of the following topics and inspire both individual and community action. In planning a screening, consider finding speakers, panelists or discussion leaders who have expertise in one or more of the following areas:

- Soil conservation
- Organic farming/gardening
- Environmental policy
- Urban gardening
- Environmental education
- Agricultural policy
- Ecological restoration
- Urban planning & design
- Social justice
- Globalization
- International development



- Government Policy, Globalization and the Soil  
U.S. agricultural policy has a tremendous impact on farming livelihoods, how food is grown, and what kinds of foods are grown. The “Farm Bill” is the omnibus package of federal farm and food legislation and represents billions of dollars in government expenditures that set the farm, food, and rural policy goals and priorities for the United States. Congress passed the most recent version of the farm bill, the Food, Conservation, and Energy Act (H.R. 2419), on May 22, 2008, authorizing \$289 billion over the next five years. As its name suggests, the bill addresses more than just farming. About two-thirds of Farm Bill spending goes towards nutrition programs, the federal safety net for lower-income families, that includes food stamps and the school lunch program.

- The other major piece of the Farm Bill establishes federal government payment programs for specific crops-- the “commodity crops”, including corn, wheat, sorghum, barley, oats, rice, cotton, and soybeans. For the most part, the 2008 Farm Bill renews existing policy that has encouraged the overproduction of these crops. Farmers who grow “specialty crops,” such as fruits and vegetables, are not eligible for these loans and payments. The policy indirectly encourages the practice of large-scale farming, characterized by monoculture and the use of chemical fertilizers and pesticides, and industrial animal production-- practices that have harmful effects on the soil and waterways.



- Trade liberalization, which is central to globalization, means that a country’s own farm products may be more expensive than those imported from another country, undermining the domestic farm economy. As smaller farms fail, particularly in developing countries, they are taken over by large, multi-national agribusinesses that use industrial farming methods. In the U.S., family farms are often sold to developers. In either case, the environment suffers.

- Portions adapted from <http://www.foodandwaterwatch.org/food/agricultural-policy/us-farmbill> and <http://sustainableagriculture.net>

## THINKING MORE DEEPLY

1. How do most Americans react to the idea of children playing in dirt? Why do you think they react that way?
2. Several people in the film indicate that working in dirt is calming or satisfying. In your experience, is this true? If so, why?
3. What is your reaction to hearing about the number of farmer suicides in rural India over the past decade? (The film reports there were 200,000.) If such a thing occurred in this country, what do you think would happen?
4. Is it possible to reconcile food sovereignty and globalization? In other words, how can people retain and exercise their right to produce and control their own food resources in the face of international market forces?
5. In the film, mycologist Paul Stamets characterizes the human species as a virus because of the harmful effects our activities have had on the land. Do you accept his analogy? Why or why not?
6. How can humans “listen to nature” and bring their needs and activities into alignment with those of nature? Are there ways you can be more attentive to the natural world in your daily life? How?
7. Keeping in mind the hummingbird story told in the film, do you think doing the best you can is enough to preserve the health of the planet, even if millions of people do their best? What responsibility do governments have to help maintain a healthy planet for future generations?
8. What about business and industry? What power do people have to get them to make changes that would be less harmful to nature while still meeting human needs?
9. What feelings are you left with after seeing this film? Do you feel motivated or empowered to make changes, either personally or as part of a group effort, to keep Earth’s soil healthy? What part(s) of the film especially resonated with you?

## **PARTICIPANTS APPEARING IN THE FILM TO LEARN MORE ABOUT:**

### Activists / Farmers

Wangari Maathai – Nobel Laureate & Founder, Green Belt Movement  
Vandana Shiva – Physicist/ Farmer/ Activist  
Pierre Rabhi – Farmer/ Environmental activist  
Benjamin Shute – Co-owner, Hardy Roots Farm  
Miriam Latzer – Co-owner, Hardy Roots Farm  
Danny Percich – Farmer, Hardy Roots

### Scientists/ Academics

Jeremy Narby – Anthropologist/ Author  
William Bryant Logan – Urban Arborist/ Author  
Peter Girguis – Biologist, Harvard University  
Paul Stamets – Mycologist/ Author  
John Todd - Biologist/ Eco-Designer  
David Orr – Professor of Environmental Studies, Oberlin College  
Miguel Altieri – Entomologist, UC Berkeley  
Juan Vicente Sanchez – Professor of Agriculture, Argentina  
Jerry Glover – Soil Scientist, The Land Institute  
Will Brinton – Founder, Woods End Laboratory, Mt. Vernon, Maine

### Designers/ Builders

Kevin Rowell – Natural Builder  
Marisha Farnsworth – Natural Builder  
Richard Register – Eco-Designer  
Barbara Damrosch – Journalist/ Garden Designer  
Majora Carter – Founder, Sustainable South Bronx

### Directors of Environmental Programs & Nonprofits

Andy Lipkis – Founder & President, Tree People  
Janine Benyus – Founder, The Biomimicry Institute  
Wes Jackson – Founder, The Land Institute  
James Jiler – Director, The Greenhouse Program  
John Cannizzo – Director, The Green Team

### Others

Gary Vaynerchuk – Host, “Wine Library TV”  
Jeanette Armstrong – Okanagan Indian Land Speaker  
Alice Waters – Chef-Owner, Chez Panisse & Founder, The Edible Schoolyard  
Hilda Krus – Horticultural Therapist

## DEFINITIONS OF TERMS USED IN THE FILM:

- Agroecology can refer to a science, a movement or a practice. Interdisciplinary in nature, agroecology uses and promotes farming methods that encourage organic practices suitable within a specific context. Agroecology emphasizes a partnership between scientific knowledge and traditional farming practices
- Biomimicry is an emerging discipline that examines nature-- its models, systems, processes, and elements— and emulates or takes inspiration from them to solve human problems sustainably.
- Monoculture is the agricultural practice of producing or growing one single crop over a wide area.
- Mycelium is the vegetative part of a fungus, consisting of a mass of branching, thread-like filaments. Mycelium plays a vital role in the decomposition of plant material on land and in water. (Mycology is the branch of biology concerned with the study of fungi.)
- VOCs or volatile organic compounds are organic chemical compounds that have high enough vapor pressures so that they can evaporate or vaporize readily under normal conditions and enter the atmosphere. VOCs are a very broad set of chemicals and are used in such things as carpet adhesives, paint, and furniture coatings. Releases of VOCs may affect the environment or human health.

### **Bonus definition:**

- Food sovereignty refers to the right to produce food on one's own territory. It is a policy framework advocating the right of peoples to define their own food, agriculture, livestock and fisheries systems, in contrast to having food largely subject to international market forces.

## 4. SUGGESTIONS FOR COMMUNITY ENGAGEMENT THROUGH EDUCATION

Together with other audience members, brainstorm actions that you might take as an individual and that people might do as a group. Here are some ideas to get you started:

1 – Explore the possibility of your city joining the Urban Farming network. See <http://www.urbanfarming.org> for details. As an alternative, identify a vacant lot in your community and obtain permission to turn it into a garden. Enlist the support of students and other local citizens to prepare the lot and help with planting and harvesting. Consider donating the produce you grow to a local food bank.



2 – How well do you care for the soil in your own yard or garden? Use vegetable and other foods scraps from your kitchen to improve your soil by turning them into compost. Two web sites that offer clear instructions on different ways to compost are <http://www.wikihow.com/Compost> and [http://www.eartheasy.com/grow\\_compost.html](http://www.eartheasy.com/grow_compost.html). Other ways to keep your soil and the surrounding environment in good condition are to plant trees and native plants appropriate to your region, and refrain from using chemical fertilizers that can run off into nearby waterways or leach into groundwater.

3 – Support local, low-impact agriculture. Think about signing up for Community Supported Agriculture (CSA) so you can receive weekly deliveries of fresh, local produce. Go to <http://www.localharvest.org/csa> to find a CSA in your area. Ask supermarkets and restaurants in your community to offer local produce on their shelves and in their menus, and support establishments that follow such a policy.

4 – If you are an avid gardener, share your passion with a group of young people. Find out if you can plant a garden with students at a local school. Other community facilities, such as churches, Boys & Girls Clubs, or nursing homes might also be open to sponsoring a youth garden.

5 – Learn about U.S. agriculture policy and how it affects your food choices and the quality of the food you eat. Visit the web site of the National Campaign for Sustainable Agriculture <http://sustainableagriculture.net> and read about their Grassroots Guide to the 2008 Farm Bill, the Senate Food Safety Bill (S510) and other food-related legislation.



6 – Help to 'heal' the Earth. Consult your local nature center or agricultural extension service about tree-planting activities or wetlands restoration efforts in your area and volunteer to take part in one of these activities. Ask your Congressional representatives to support the Best Management Practice initiative, which helps farmers reduce the use of nitrogen fertilizers that create dead zones in oceans and rivers. Go to the American Farmland Trust's Action Center ([www.farmland.org](http://www.farmland.org)) for more information.

Additional sources for Community Action:

### Farming / Gardening / Land Use

<http://www.urbanfarming.org> - Urban Farming is an international nonprofit organization headquartered in Detroit, Michigan that plants food on unused land and other spaces and gives it to the needy.

<http://www.verticalfarm.com> – The Vertical Farm Project describes a method of farming in urban centers where land is in short supply.

\*<http://www.landinstitute.org/vnews/display.v> - The Land Institute works to promote the practice of, and research on Natural Systems Agriculture, in order to develop an agriculture that will save soil from being lost or poisoned.



<http://www.farmland.org> - American Farmland Trust is the leading national organization dedicated to saving America's farm and ranch land, promoting healthy farming practices and supporting farms and farmers. Contains suggestions for citizen action.

<http://www.landstewardshipproject.org/index.html> - The Land Stewardship Project is a nonprofit grassroots membership organization that fosters an ethic of stewardship for farmland and works to promote sustainable agriculture and to develop sustainable communities. Contains suggestions for citizen action.



\*<http://sustainableagriculture.net> - The National Sustainable Agriculture Coalition is an alliance of family farm, food, conservation, rural and urban organizations that take common positions on federal agriculture and food policies, and engage and support the broad and vital grassroots efforts across the country to win long-term policy change. It contains a section of information on the Farm Bill.

### **Food Supply / Food Safety**

<http://www.foodandwaterwatch.org/food/agricultural-policy/us-farmbill> - Food & Water Watch is a non-profit organization using research, public and policymaker education, media, and lobbying to work with grassroots organizations around the world to create an economically and environmentally viable future. Click on Farm Bill 101 for an overview of US agricultural policy and its effects.

<http://www.ams.usda.gov/AMSV1.0/farmersmarkets> - This USDA site contains information on farmer's markets as well as other food marketing done by the Dept. of Agriculture, including the school lunch program.

\*<http://www.foodsafetynow.org> - The Center for Food Safety (CFS) is a public interest and environmental advocacy organization that challenges harmful food production technologies and promotes sustainable alternatives, using litigation and other legal actions as well as public education, grassroots organizing and media outreach.

\* <http://www.organicconsumers.org> - The Organic Consumers Association (OCA) is an online grassroots public interest organization that deals with crucial issues of food safety, industrial agriculture, genetic engineering, children's health, corporate accountability, Fair Trade, environmental sustainability and other key topics. Their web site lists a plethora of actionable issues for concerned citizens.

## Environmental Action

<http://www.nrcs.usda.gov> – The Dept. of Agriculture’s Natural Resources Conservation Service has a link to the conservation provisions of the Farm Bill.

\*<http://www.treepeople.org> - TreePeople is an environmental nonprofit working in Los Angeles to inspire, engage and support people to take personal responsibility for the urban environment, making it safe, healthy, fun and sustainable and to share the process as a model for the world.



\*<http://www.ran.org> – The Rainforest Action Network is an international grassroots organization that uses hard-hitting market campaigns to align the policies of multinational corporations with widespread public support for environmental protection.

\*<http://www.conservation.org> - Conservation International helps societies adopt sustainable approaches to development in order to ensure a stable climate, clean air, fresh water, abundant food, cultural resources, and biodiversity.



\*<http://www.bioneers.org> – Bioneers is a nonprofit organization of engaged citizens from all backgrounds and fields, who work to solve environmental problems using methods that mimic natural processes.

\*<http://www.nrdc.org> – The Natural Resources Defense Council is an environmental action organization that combines grassroots power with legal action to protect the planet’s wildlife and wild places and to ensure a safe and healthy environment for all living things.



\*<http://www.biomimicryinstitute.org> The Biomimicry Institute promotes learning from and then emulating natural forms, processes, and ecosystems to create more sustainable and healthier human technologies and designs.

## RESOURCES

\*Resources marked with an asterisk are partnered with, or featured in, the film.

<http://www.dirtthemovie.org> – The official web site of the film

