

Global Climate Change is Affecting the San Juan Mountains

- How we can tell, what YOU can do, and how this relates to Agriculture

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Marsters

What makes good data?

What kind of data is used?

How is data collected?

What does it tell us?

Good Data.....

- Is measurable and can be compared with historical data.
- Has to provide information that will help solve the problem or give insight.
- CSAS
- NRCS (USDA)
- NCDC and NOAA
- Colorado State University, CCC

Climatic Indicators

- Temperature
- Precipitation
 - Snowpack
 - Rainfall
- Wind/weather patterns
- Biology
 - Plant communities
 - Dendrochronology
 - Insect habitats

Methods of data collection

Extensive sensor arrays (CSAS)

Temp

thermometers

Precipitation

snow surveys (Snotel, NRCS), rain gauges, soil monitors

Biology

studies and surveys

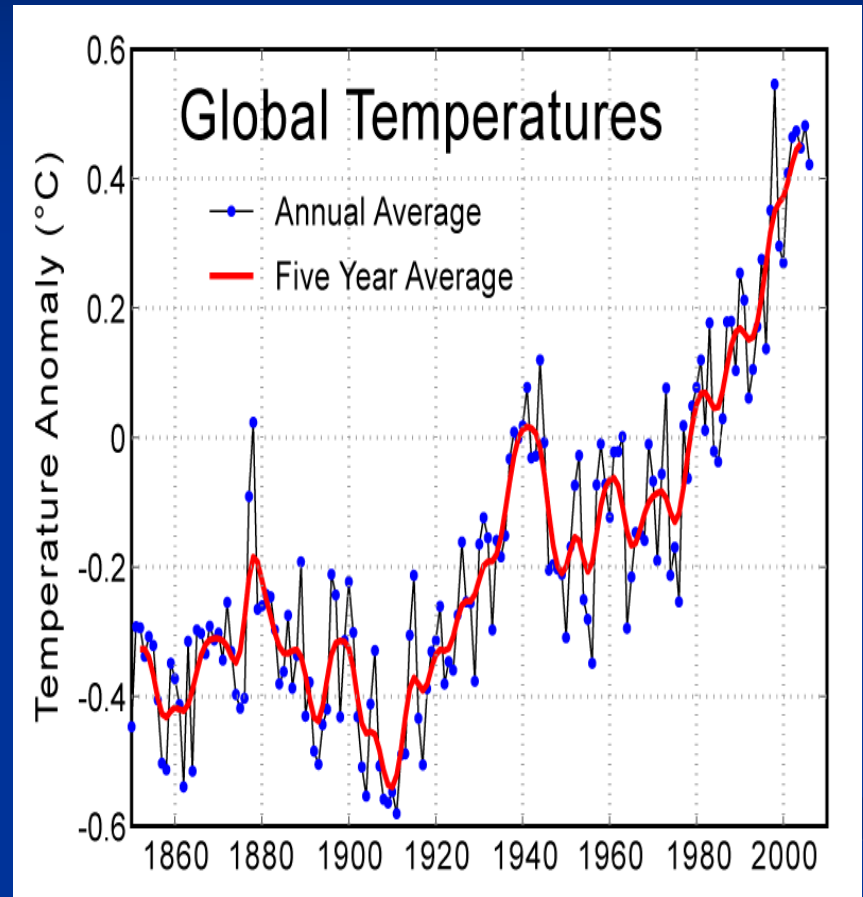
Wind/weather

wind monitor

Global Warming Defined:

The term *global warming* is a specific example of the broader term climate change, which can also refer to global cooling. In principle, global warming is neutral as to the period or causes, but in both common and scientific usage the term generally refers to recent warming and implies a human influence.

The **UNFCCC** uses the term "climate change" for human-caused change, and "climate variability" for other changes. Some organizations use the term "anthropogenic climate change" for human-induced changes



Global Temperature Anomalies

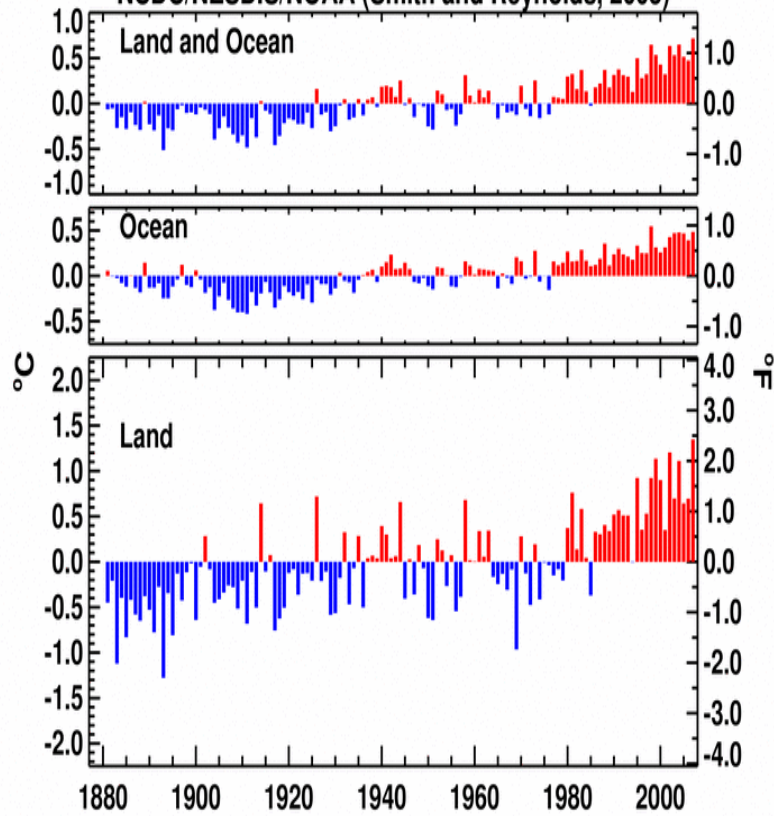
December 2006-February 2007

December-February	Anomaly	Rank	Warmest Year on Record
Global			
Land	+1.35C (+2.43F)	warmest	2002 (+1.20C / 2.16F)
Ocean	+0.48C (+0.86F)	2 nd warmest	1998 (+0.55C / 0.99F)
Land and Ocean	+0.72C (+1.30F)	warmest	2004 (+0.65C / 1.17F)
Northern Hemisphere			
Land	+1.59C (+2.86F)	warmest	2002 (+1.55C / 2.79F)
Ocean	+0.50C (+0.90F)	2 nd warmest	1998 (+0.52C / 0.94F)
Land and Ocean	+0.91C (+1.64F)	warmest	2002 (+0.82C / 1.48F)
Southern Hemisphere			
Land	+0.59C (+1.06F)	7 th warmest	1998 (+0.81C / 1.46F)
Ocean	+0.48C (+0.86F)	3 rd warmest	1998 (+0.57C / 1.03F)
Land and Ocean	+0.49C (+0.88F)	4 th warmest	1998 (+0.61C / 1.110F)

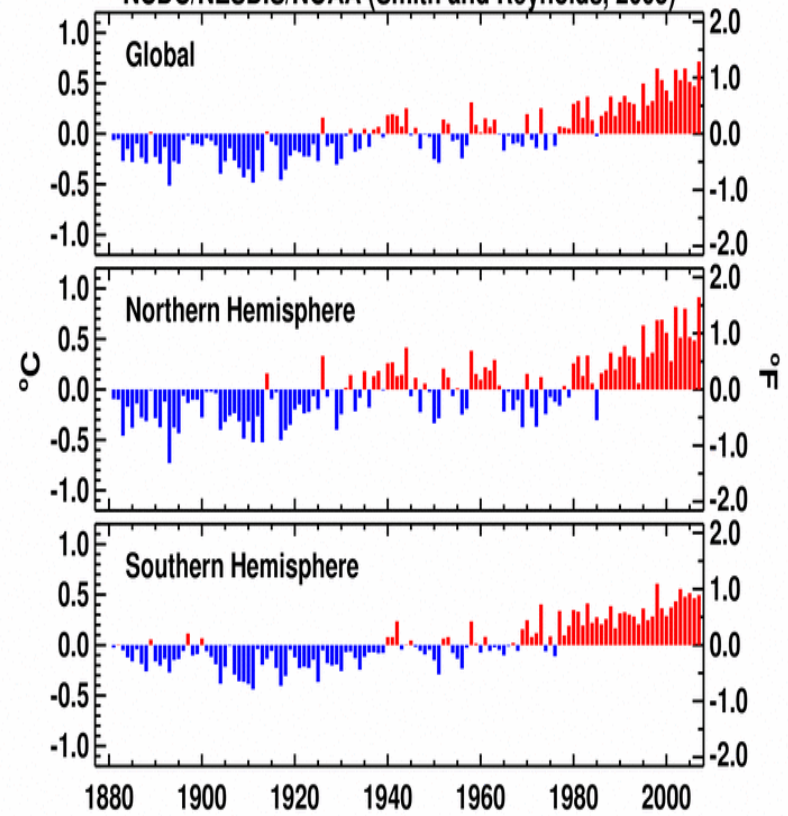
Source: <http://www.ncdc.noaa.gov/oa/climate/research/2007/feb/global.html#Year-to-date>

Global Temperature Anomalies December 2006-February 2007

Dec-Feb Global Surface Mean Temp Anomalies
NCDC/NESDIS/NOAA (Smith and Reynolds, 2005)



Dec-Feb Land & Ocean Surface Mean Temp Anomalies
NCDC/NESDIS/NOAA (Smith and Reynolds, 2005)



Drought

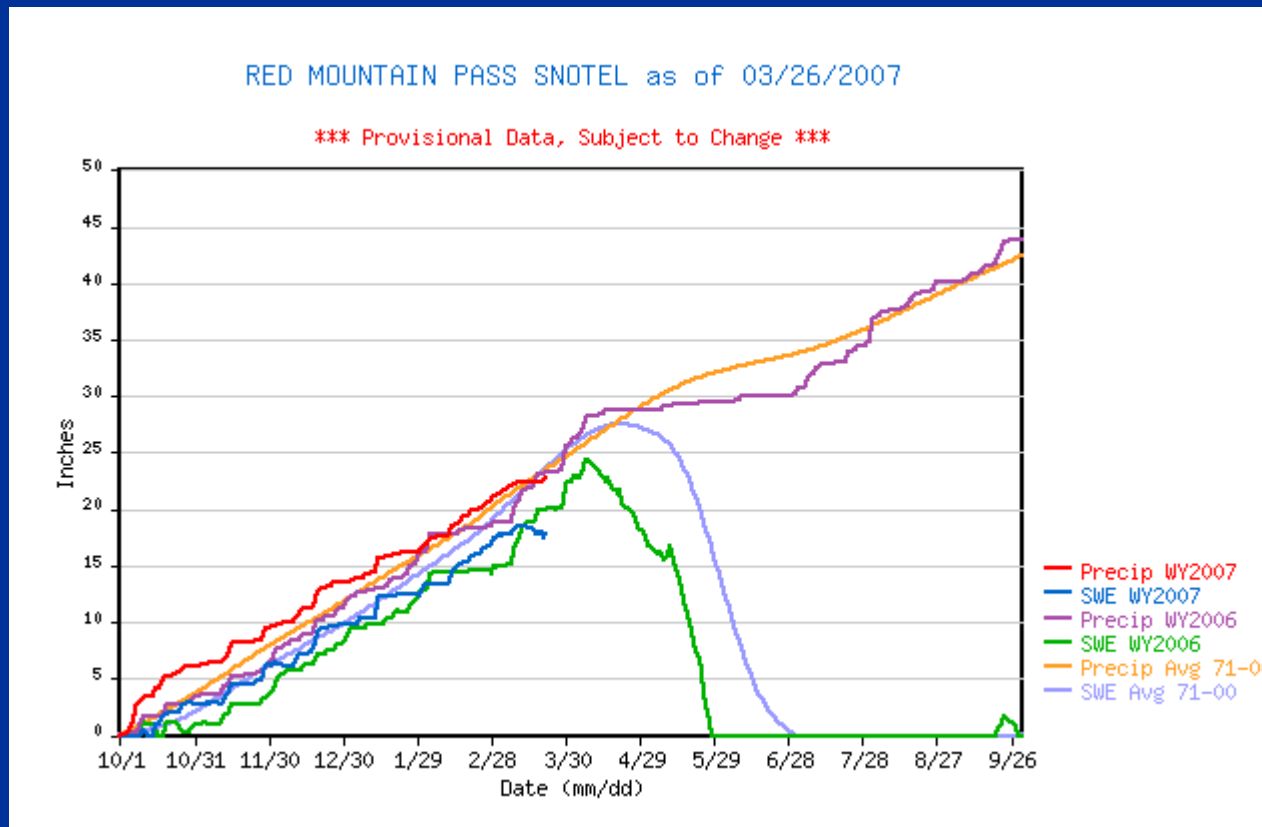
- 1890-1894 DRY Severe but brief drought in 1890, particularly east of mountains, followed by a very wet 1891. Dry 1893 with severe drought 1894, again most pronounced over eastern Colorado.
- 1898-1904 DRY Sustained and very severe drought over southwestern Colorado. Worst drought on record in Durango area. Some dry years elsewhere in Colorado, but not as severe or sustained. Very wet 1900 for northeast Colorado.
- 1905-1929 WET Longest recorded wet period in Colorado history with greatest areal extent in 1905-1906, 1914-15, 1921, 1923, and 1927. Significant but brief droughts did occur during this period, most notably 1910-11, and 1924-25.
- 1930-1940 DRY Most widespread and longest lasting (and most famous) drought in Colorado recorded history. Severe drought developed 1931 and peaked in 1934 and early 1935. Drought was interrupted by heavy rains in the spring of 1935 and more widespread heavy rains in 1938. The 1930s drought culminated with one more extremely dry year in 1939 when several stations along the Front Range recorded their driest individual year in history. Buena Vista only recorded 1.69 inches of precipitation for the entire year, the least annual precipitation ever reported at any Colorado weather station.
- 1941-1949 WET Widespread wet weather, especially 1941-42, 1947, and 1949. Wet period interrupted with dry mountain winters – 1944-45 and 1945-46 with very low snowpack accumulation.
- 1950-1956 DRY Extremely dry period statewide except for one very snowy mountain winter 1951-52. Most of state was affected, and this drought was more severe than the 1930s in some areas such as the immediate Front Range.
- 1957-1958 WET 1957 brought persistent widespread drought-breaking precipitation across nearly all of Colorado – wettest year in recorded history.

Drought

- 1959-1973 DRY/WET Interesting roller coaster ride with alternating very wet and fairly dry periods and large spatial variations. Local drought was prevalent in 1959, 1960, 1962, 1963, 1964, 1966, and 1972. Very wet weather was reported in 1961, 1965, 1969, 1970, and 1973 with episodes of flooding.
- 1974-1978 DRY Colorado's most recent period of sustained multi-year drought culminating in the record-breaking winter drought of 1976-1977, the driest winter in recorded history for much of Colorado's high country and Western Slope.
- 1979-1980 WET Brief but pronounced wet period with heavy winter snows helping replenish reservoirs.
- 1981 DRY An extreme but brief drought period from the fall of 1980 into the summer of 1981. This drought again took aim at the Colorado high country and ski industry and initiated a huge investment in snow making equipment. It also stimulated the writing of the "Colorado Drought Response Plan" and the formation of the "Water Availability Task Force" which has been meeting several times each year since 1981.
- 1982-1999 WET Colorado's second longest sustained wet period in recorded history and the most drought-free period since 1890. Extremely abundant snow pack and surface water supplies 1982-1987 – largest annual stream flow volumes this century on several rivers. Interesting period, 1987-1994 with only modest snow pack accumulation and consistently below average stream flows, but with low elevation precipitation above average reducing demand for surface water. Significant but brief drought in 1989 to early 1990 in southwest Colorado. A brief growing season drought in 1994 in northeast Colorado, and another localized drought over SW Colorado from late 1995 into 1996. Very wet statewide in 1995, 1997, and 1999. The decade of the 1990s have been the wettest in recorded history over much of southeastern Colorado.

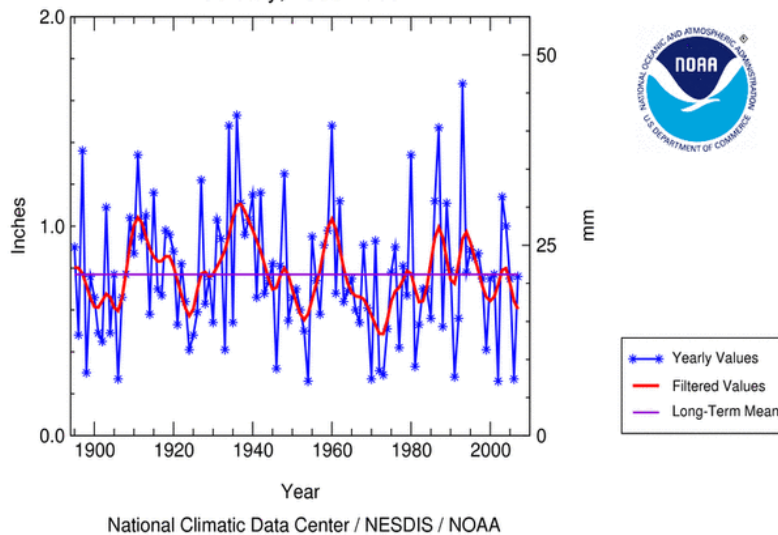
Snowpack data

- <http://www.wcc.nrcs.usda.gov/snow/snotel-wereports.html>
- <http://www.snowstudies.org>

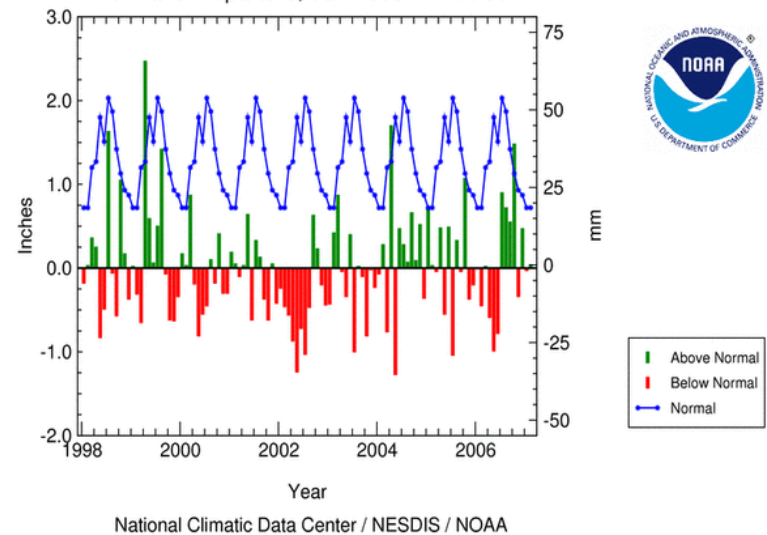


Colorado Statewide Precipitation Comparison

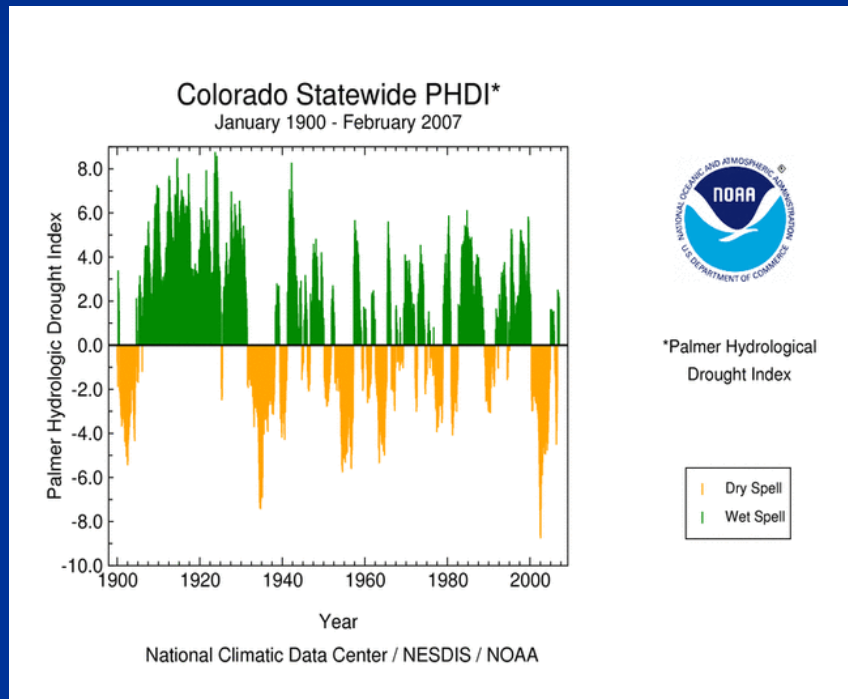
Colorado Statewide Precipitation
February, 1895 - 2007



Colorado Statewide Precipitation
Normal & Departure, Jan 1998 - Feb 2007



Decreasing Precipitation ?



Does the data provided by the National Climatic Data Center prove global warming?

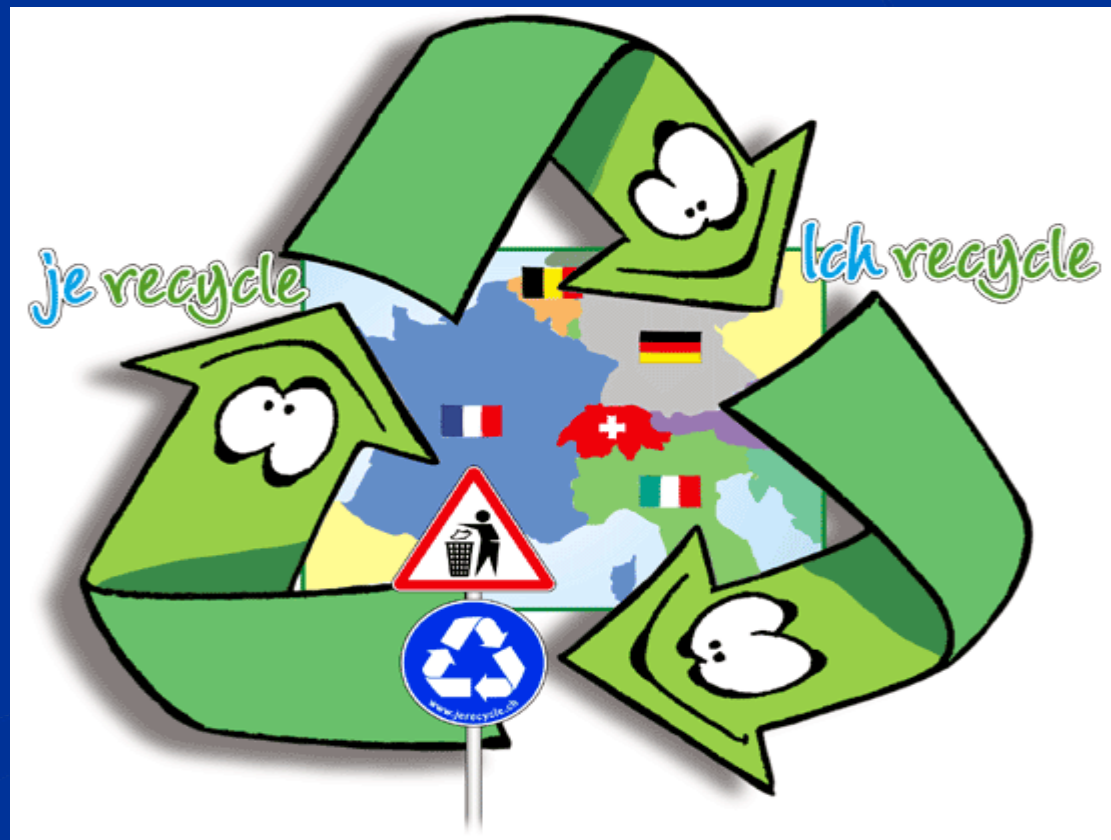
Is the increasing intensity of Colorado's dry spells a direct affect of climate change?

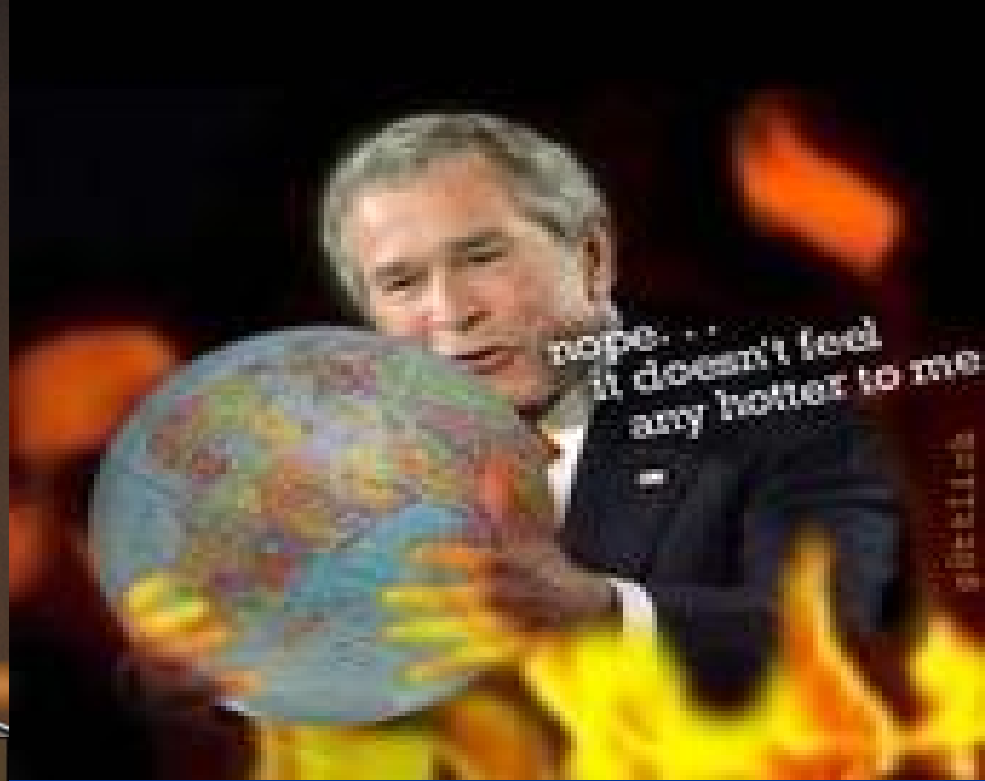
Is there anything that we as individuals can do to make a difference if the world is warming up?

Solutions



www.recycle.co.nz





Start at home

- Turn off lights.
- Turn off other electric things, like TVs, stereos, and radios when not in use.
- Use rechargeable batteries.
- Do things manually instead of electrically, like open cans by hand.

<http://www.geocities.com/enchantedforest/8319/savetheearth.html>

- Use fans instead of air conditioners.
- In winter, wear a sweater instead of turning up your thermostat.
- Insulate your home so you won't be cold in winter.
- Use less hot water.
- Whenever possible, use a bus or subway, or ride your bike or walk.

- Try to buy organic fruits and vegetables if you're concerned about pesticides. (Organic food is grown without man-made fertilizers and/or pesticides).
- Don't waste products made from forest materials.
- Use recycled paper and/or recycle it. Reuse old papers.
- Don't buy products that may have been made at the expense of the rainforest.
- Support products that are harvested from the rainforest but have not cut down trees to get it.

- Avoid products that are used once, then thrown away.
- Buy products with little or no packaging.
- Encourage your grocery store sell environmentally friendly cloth bags for people to use when they shop, or bring your own.
- REDUCE, REUSE, & RECYCLE.
- Compost.
- Buy recycled products.
- Don't buy pets taken from the wild.
- Cut up your six-pack rings before throwing

7 action steps You can take to reduce global warming

- Use energy star recommended compact Fluorescent light bulbs
- Insulate and weatherstrip your home
- Buy energy star recommended appliances
- Walk, ride a bike, take public transportation
- Drive your car efficiently
- Buy the most fuel efficient car you can
- Join the global warming solutions campaign

Earth Day Footprint Quiz

quiz results



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this page

CATEGORY	ACRES
FOOD	4.4
MOBILITY	0.7
SHELTER	4.4
GOODS/SERVICES	3.5
TOTAL FOOTPRINT	13

IN COMPARISON, THE AVERAGE ECOLOGICAL FOOTPRINT IN YOUR COUNTRY IS 24 ACRES PER PERSON.

WORLDWIDE, THERE EXIST 4.5 BIOLOGICALLY PRODUCTIVE ACRES PER PERSON.

IF EVERYONE LIVED LIKE YOU, WE WOULD NEED 2.9 PLANETS.



→ TAKE ACTION!!

→ DONATE



ecological footprint QUIZ

ECOLOGICAL FOOTPRINT CAMPAIGN

- ▶ Join the Campaign!
- ▶ Who are We?
- ▶ About the Footprint Quiz
- ▶ Support the EF Quiz

EMAIL

- ▶ Email a Friend
- ▶ Email Results to Yourself

WHAT YOU CAN DO

- ▶ Individuals
- ▶ Community Members and City Officials
- ▶ Businesses
- ▶ Nation
- ▶ Schools and Campuses

COMMENTS AND QUESTIONS

- ▶ Comment on the Footprint Quiz
- ▶ Frequently Asked Questions (FAQ)
- ▶ What about other Species?
- ▶ What about Population?

RESET

Agricultural Affects due to Global Climate Change

1. Increasing weather fluctuations
 1. Drought
 2. Flooding
 3. Freezes
2. Unpredictable growing seasons
 1. Longer
 - 2.
3. Possible effects / ideas for sustainability