Ghazala Yasmeen

International Fellow (Pakistan)
World Forestry Center

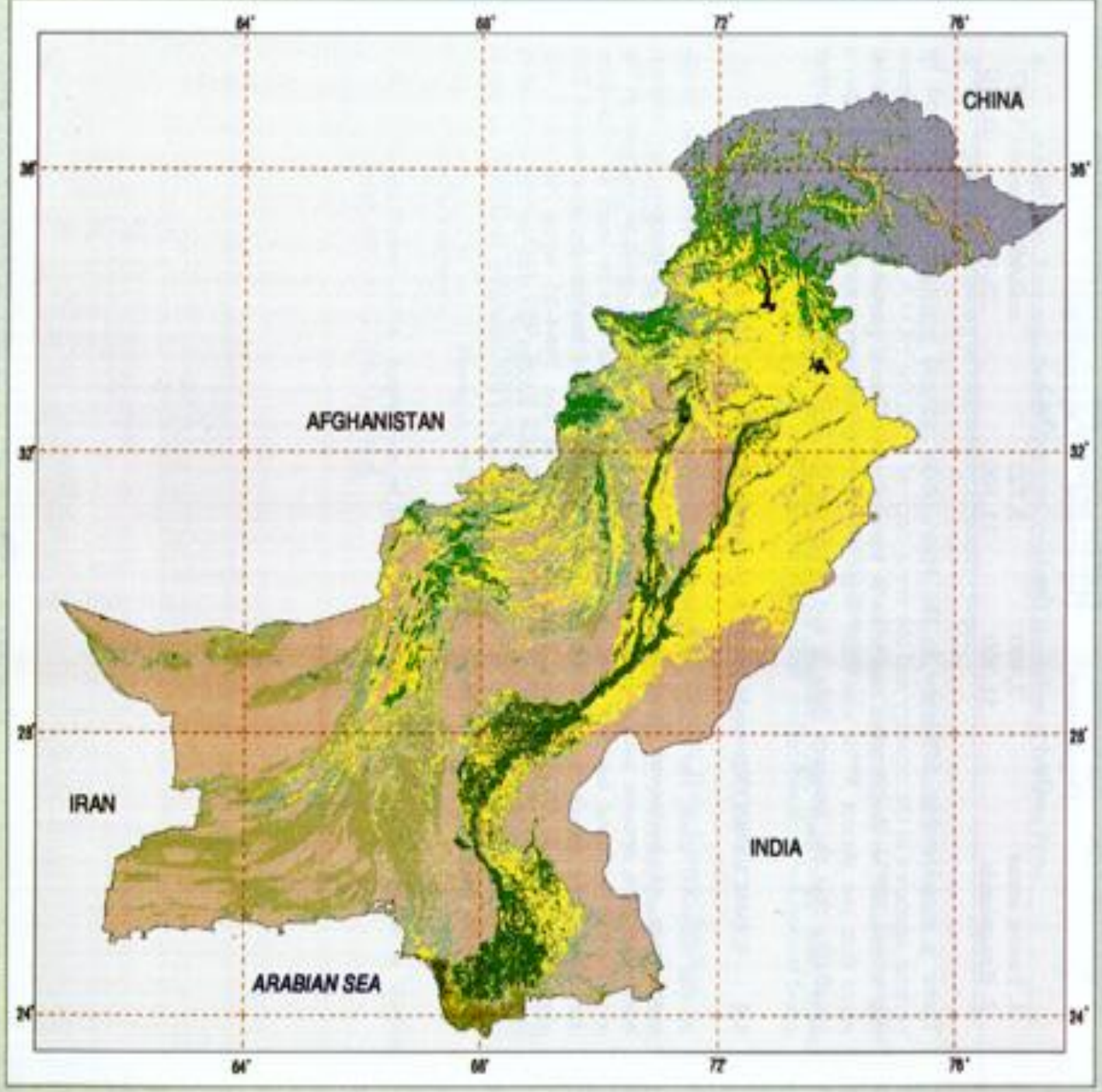
Welcome to

Solving the Science of Controversies

“Understanding the relationship between wildfires and climate change across the United States”

Project overview

- Introduction
- Project objectives
- Hypothesis
- Methodology
- Results
- Conclusion



Map 15

PAKISTAN

NOAA AVHRR DATA

14 October 1992

Land Cover

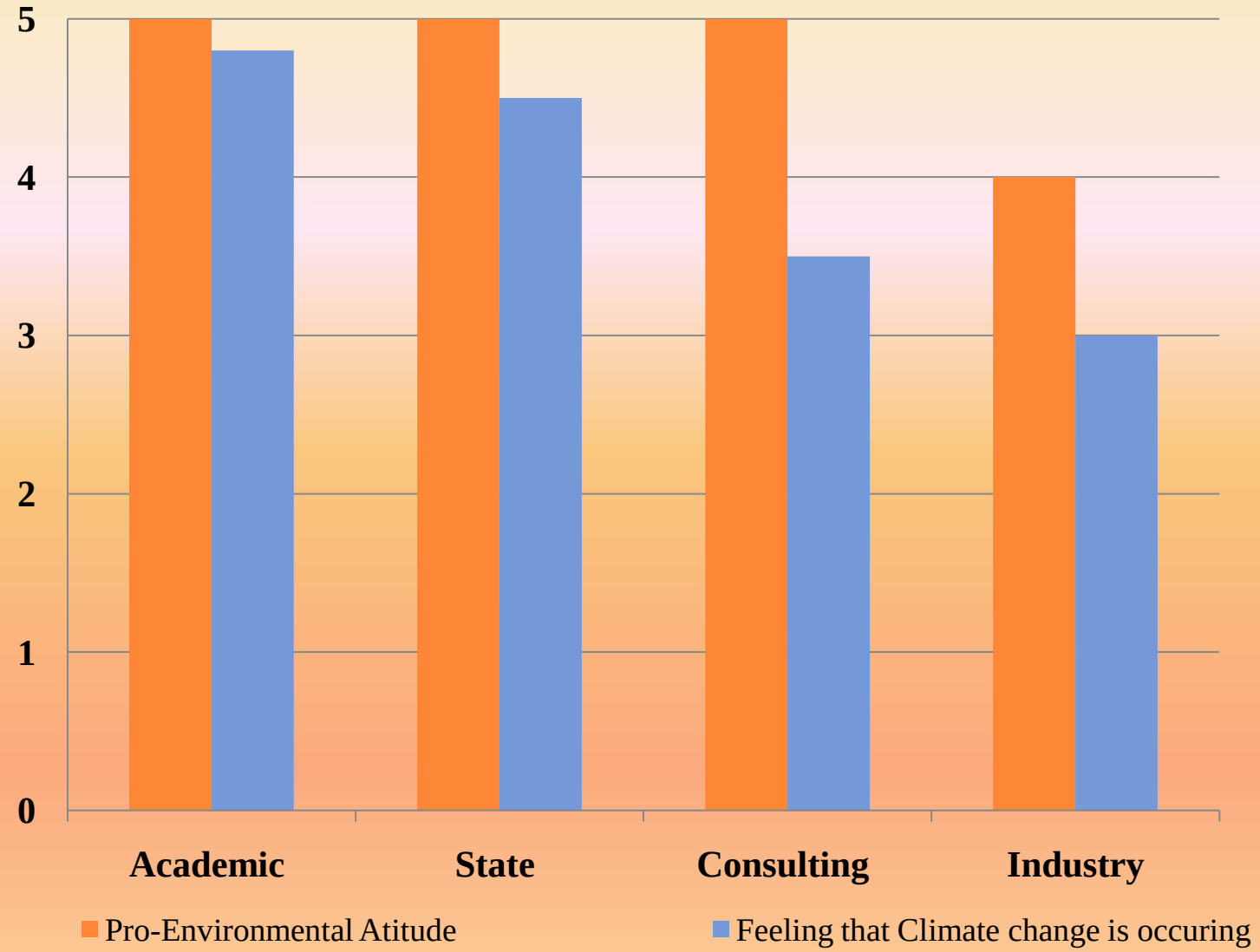
LEGEND

- Snow and Ice
- Water Bodies
- Agricultural Land
- Forest (Coniferous etc.)
- Mangrove Forest
- Riverain Forest
- Rangeland
- Degraded Rangeland
- Barren Land

Country Boundary based on
Digital Chart of the World (DCW)
1:1,000,000 scale (1993)

0 100 200 300 Km

ICIMOD
MENRIS '96



Responses of foresters in different employment groups on climate change (1=weak; 5=strong).

Source: NYSAF Perception of climate change (Journal of forestry-March 2011)

Climate change is occurring ?
Yes ☹ NO ☺

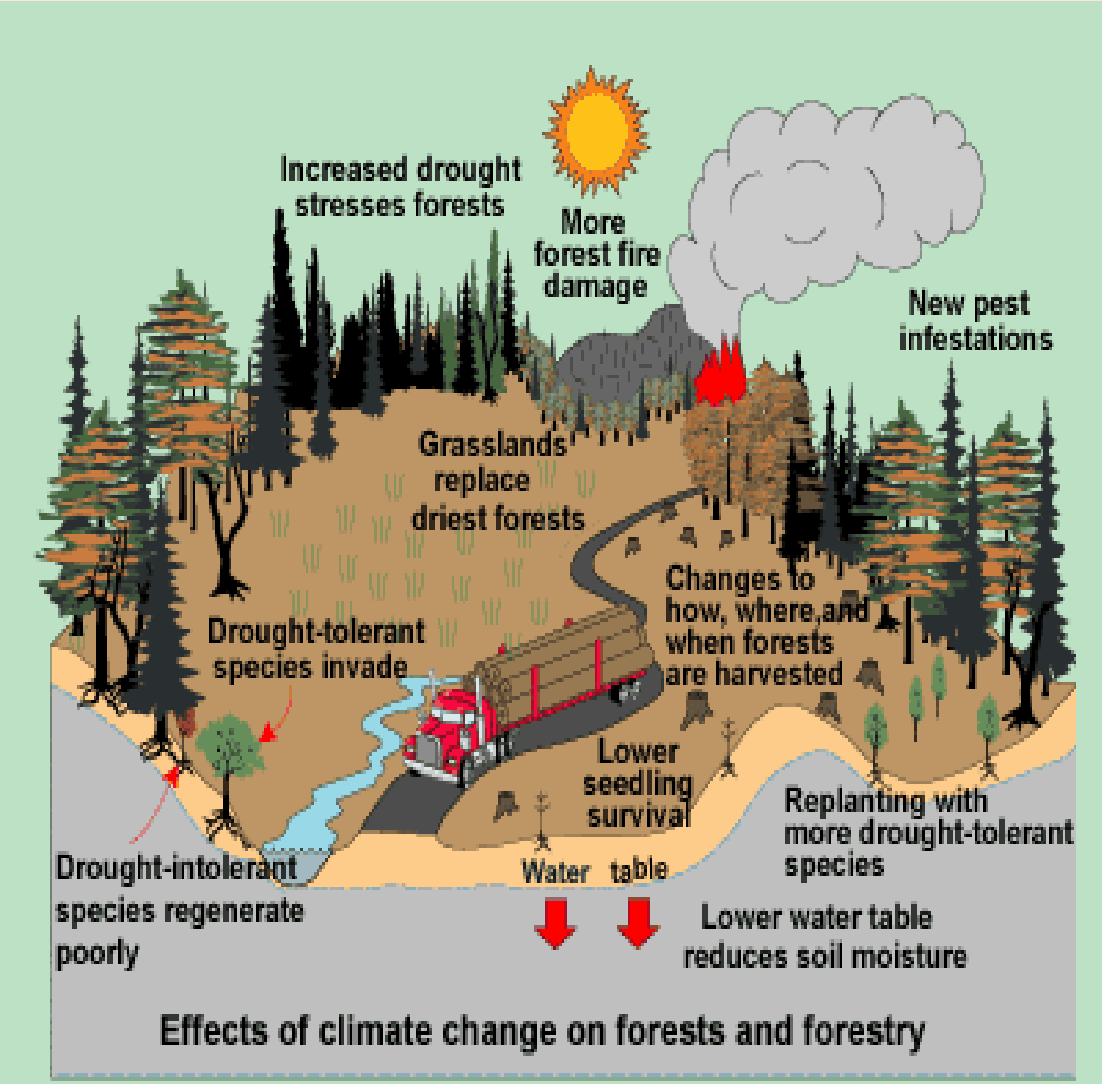
Majority of the foresters agree on the point that climate change is occurring

But

There is a lack of consensus in the forestry community about the specific impacts of climate change on forests.

Impact of climate change on forests

- Forest Fires
- Drought
- Insects
- Diseases
- Biodiversity
- Recreation and tourism



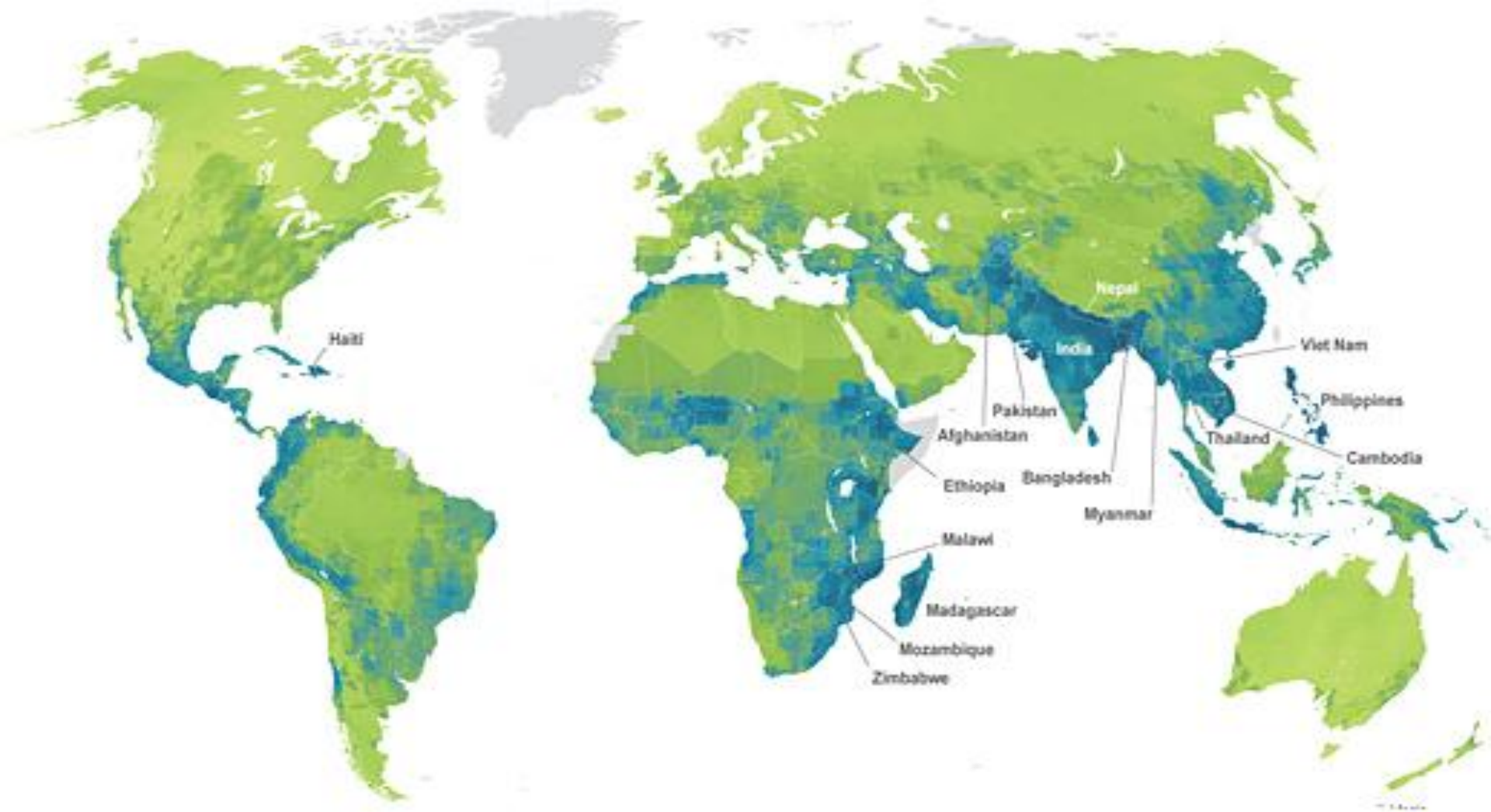
Climate Change

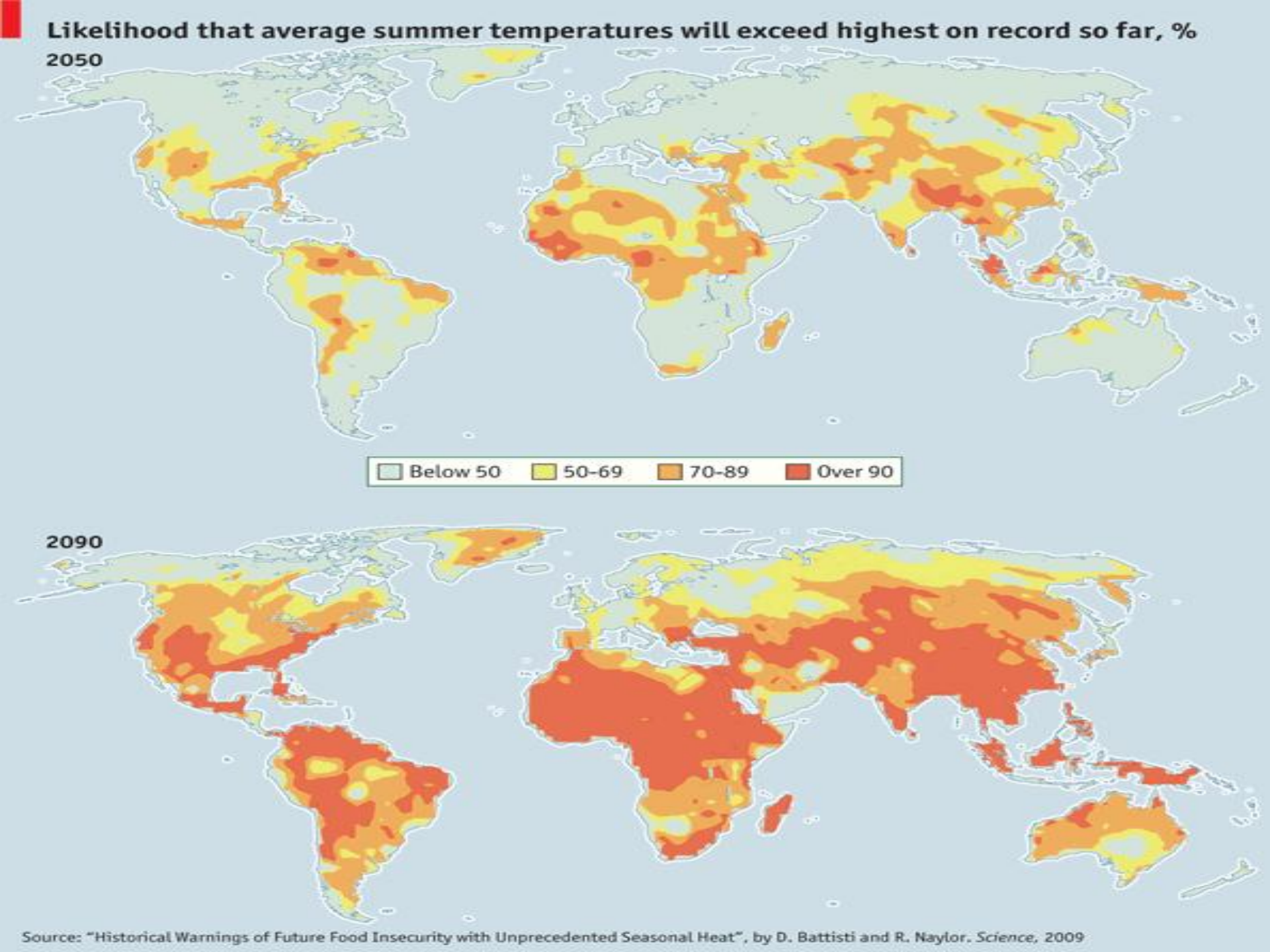
Becoming carbon neutral is only the beginning. The climate problem will not be solved by one company reducing its emissions to zero, and it won't be solved by one government acting alone. The climate problem will not be solved without mass participation by the general public in countries around the globe. (*Rupert Murdoch*)

Not only is it real, it's here, and its effects are giving rise to a frighteningly new global phenomenon: the man-made natural disaster. (*Barack Obama*)

Climate change controversy:

We don’t need to worry about climate change - it won’t effect us.

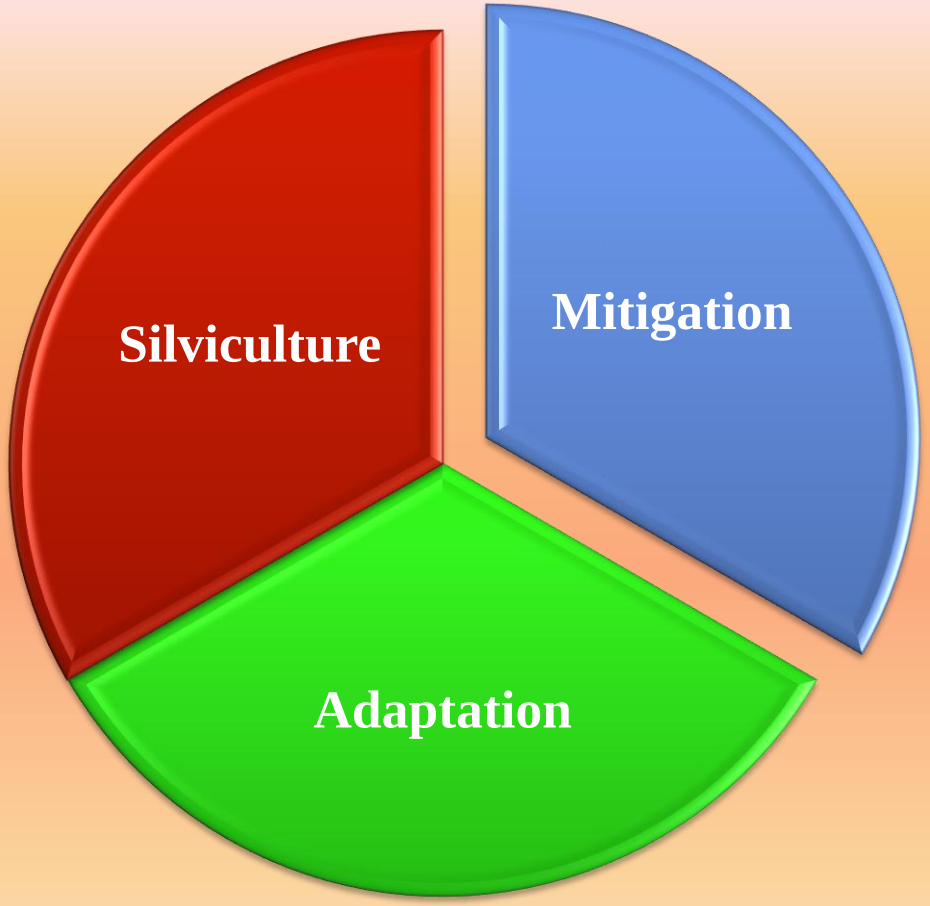




Source: "Historical Warnings of Future Food Insecurity with Unprecedented Seasonal Heat", by D. Battisti and R. Naylor. *Science*, 2009

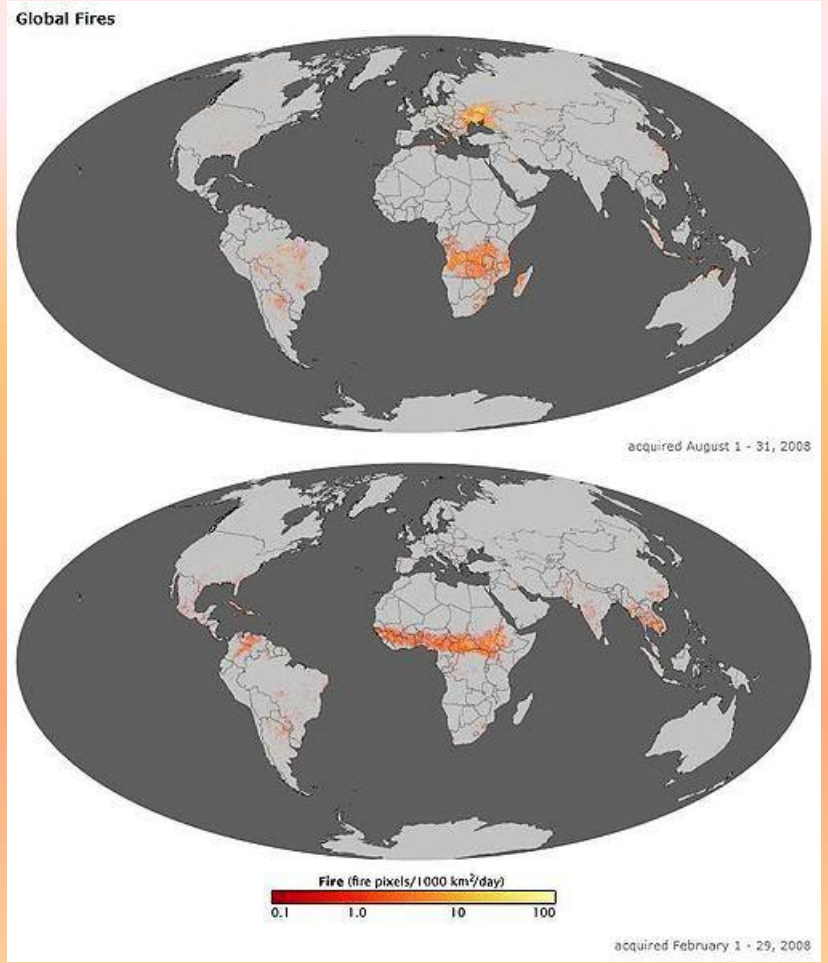
Climate change Controversies:

- Climate change Mitigation-REDD project and Carbon credit
- Climate change adaptation.
- Climate change promotes more forest fires.



Global Fires

Global fires during the year 2008 for the months of August (top image) and February (bottom image), as detected on NASA's Terra satellite.

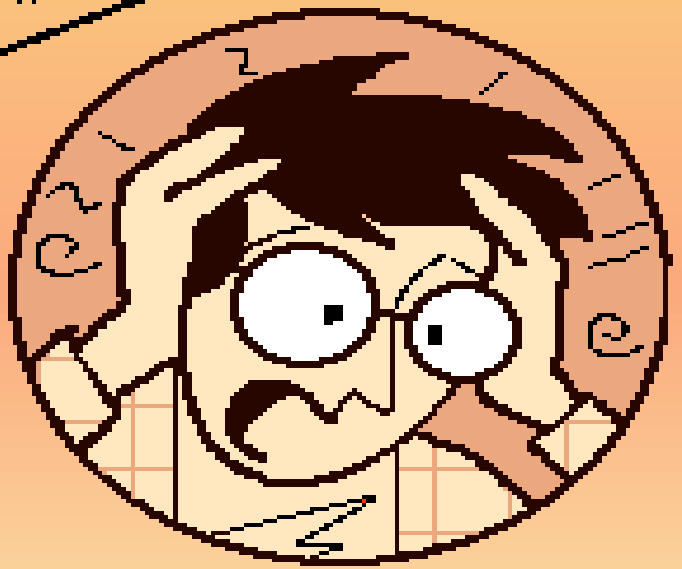


(http://en.wikipedia.org/wiki/Wildfire)

Forest Fire Controversies:

- Fires as management tool - we need fire or we don’t need?
- Forest fires add carbon in atmosphere during burning
- Fires are part of the ecosystem especially Mediterranean Basin.

I CAN'T STOP THINKING!!



Objectives:

- To review the fire ecology in United States
- To contact the forest departments and researchers to get fire and weather data and to know their views about fire and climate change relationship.
- To test if there is a correlation between forest fires and climate change.

Hypothesis

- Global climate change increase temperature and hence increases the chances of number of fire events

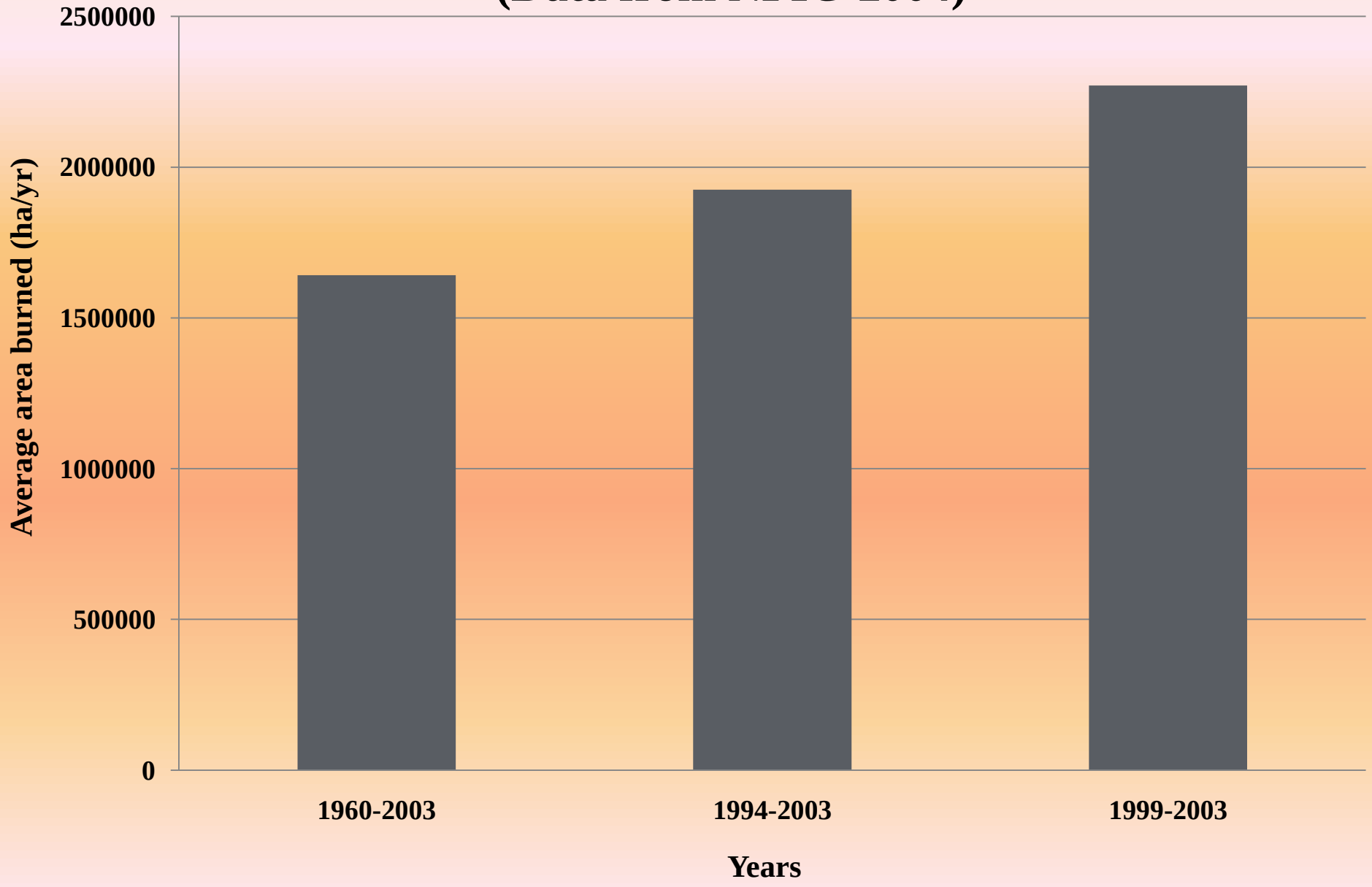
Satellite image of "2002 African fires" - part of a presentation on NASA's world wind program

Review of Fire Ecology in US

- The measure necessary for the successful practice of forestry is protection from fire (Graves 1910, Pyne 1982)
- The conviction was burned into me is that fire prevention is number 1 job of American foresters (Greeley 1951).

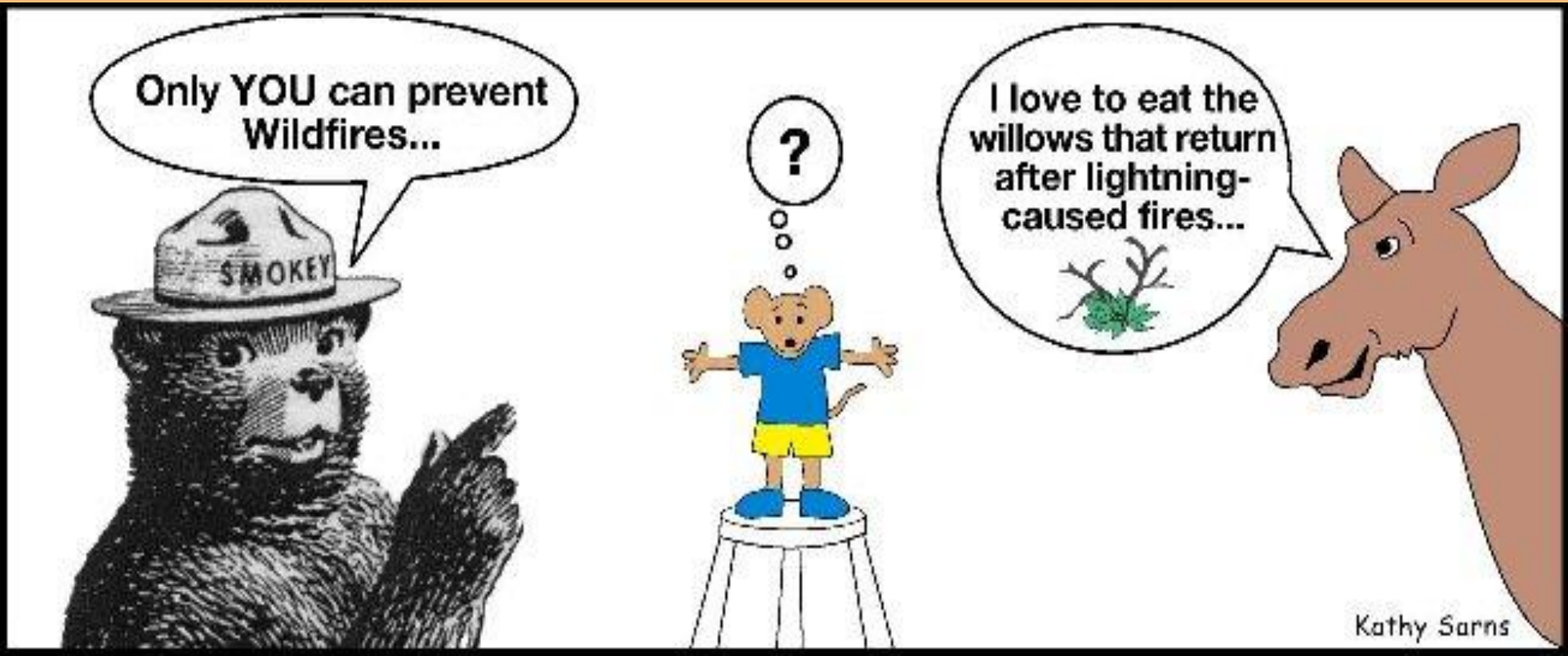
Wildfires average between 1960-2003

(Data from NFIC-2004)



Review of Fire Ecology in US

The Leopold report identified fire suppression as a "Policy that was adversely affecting wildlife habitats" (Leopold et al. 1963)

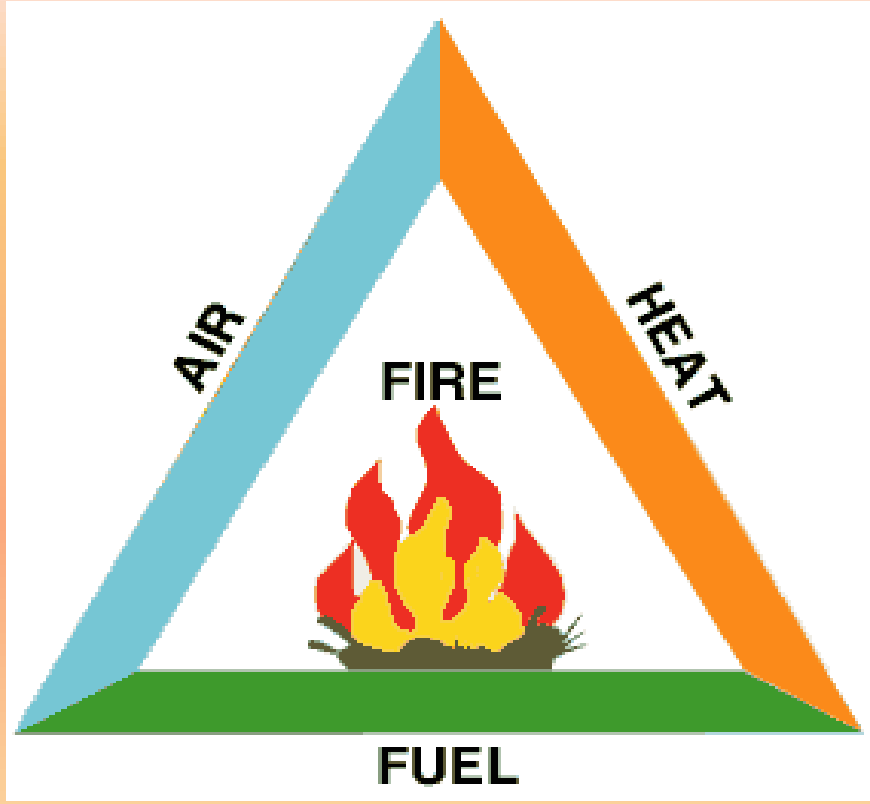


Prescribed fires

"We are determined to save the best of the past as we change a basic concept from fire is bad to fire is good and bad"(Henry Debruin- USFS-1974)

Fire Behavior

- Fire behavior is not just fuel but heat and air as well.
- Fuel is very important fire behavior component but it is directly affected by the management policy.



Fuel management challenges

- **Pacific Northwest:**

36,000,000 ha area need fuel treatment

Treatment goal for one year 52000 ha

At this rate it would take 69 years to treat all area.

- **California :**

62,000,000 ha area need fuel treatment

85 years to treat all area

Methodology

- National Interagency Fire Center
- Data source : http://www.nifc.gov/fire_info/ytd_state.htm
- Collective data of public and private land
- Temperature data : http://www.wrcc.dri.edu /spi/divplot1map.html
- **Parameters :**
- Number of Fire events in each state (2002-2010)
- Area burned (2002-2010)
- Temperature (2002-2010)

Methodology

- **Correlations :**
- COREL: Correlation
- F/W = Number of fires and temperature
- F/AB=Number of fires and area burned
- AB/W=Area burned and temperature

Correlation index

States	F/W	COREL	F/AB	COREL	AB/W	COREL
VA	0.7642027	L	0.7193802	L	0.02182	S
OR	0.2588828	S	0.6329006	L	-0.03414	N
CA	-0.269109	S	-0.0675181	N	-0.55779	L
WA	0.0248655	N	0.08426	N	0.30724	M
NY	0.8076632	L	0.3317637	S	-0.09439	N
NJ	0.9065848	L	0.6325337	L	0.03592	N
PA	0.1836883	S	0.787417	L	-0.08064	N

Correlation	Negative	Positive
None	−0.09 to 0.0	0.0 to 0.09
Small	−0.3 to −0.1	0.1 to 0.3
Medium	−0.5 to −0.3	0.3 to 0.5
Large	−1.0 to −0.5	0.5 to 1.0

Results

- Total number of states studied: 26

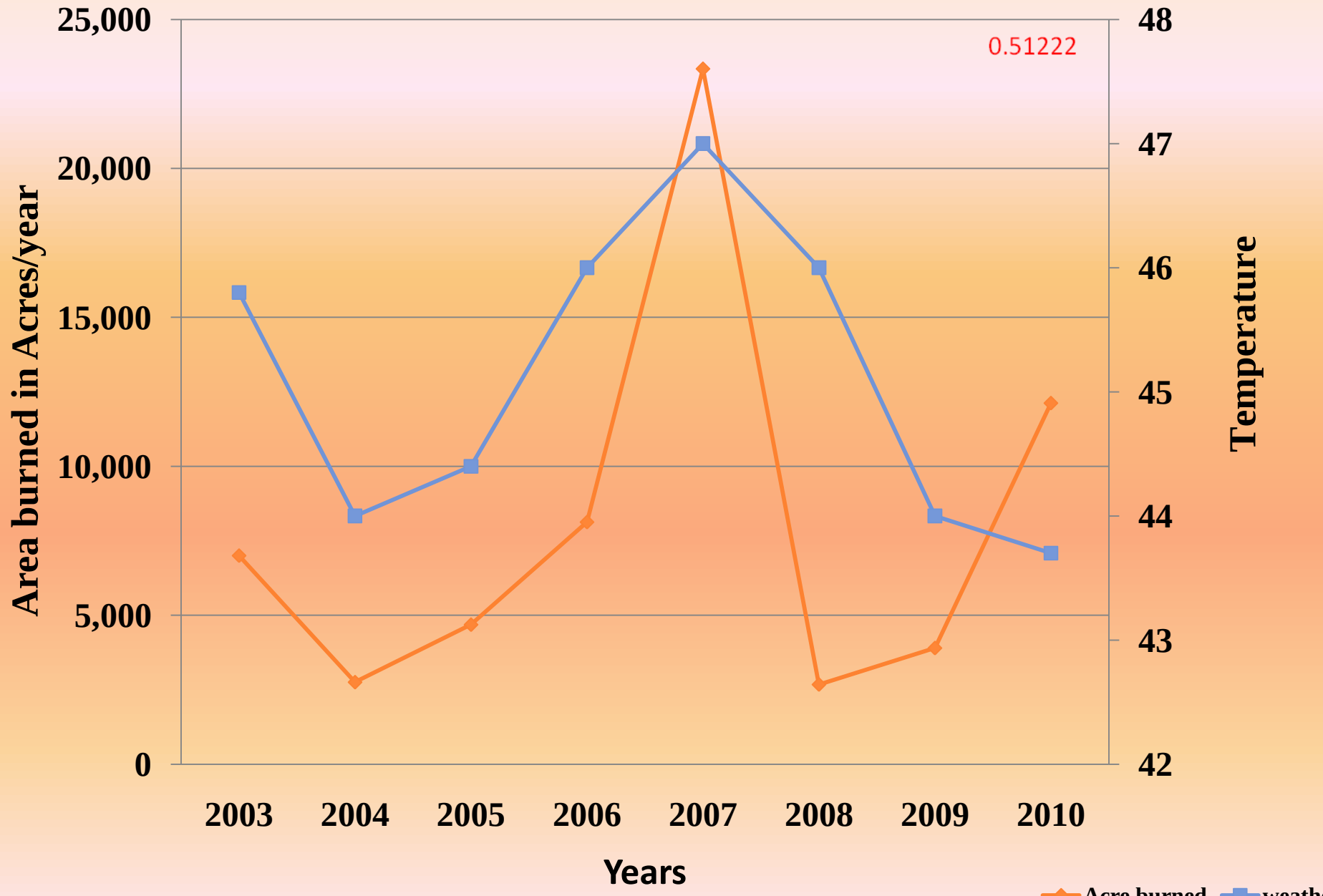
COREL	F/W	F/AB	AB/W
Large	**14**	**21**	**10**
Small	**07**	**04**	**08**
None	**05**	**02**	**08**

States	F/W	COREL	F/AB	COREL	AB/W	COREL
VA	0.7642027	L	0.7193802	L	0.02182	S
OR	0.2588828	S	0.6329006	L	-0.03414	N
CA	-0.269109	S	-0.0675181	N	-0.55779	L
WA	0.0248655	N	0.08426	N	0.30724	M
NY	0.8076632	L	0.3317637	S	-0.09439	N
NJ	0.9065848	L	0.6325337	L	0.03592	N
PA	0.1836883	S	0.787417	L	-0.08064	N
LA	0.6563347	L	0.8023299	L	-0.0749	N
AL	0.6943904	L	0.8961951	L	0.40102	M
AR	0.5685328	L	0.8541839	L	0.28639	S
AZ	0.2505936	S	0.7921311	L	-0.25008	S
CO	0.4326747	M	0.8312741	L	-0.02175	N
CT	0.191039	S	0.5805147	L	-0.02016	N
DE	0.8459248	L	0.5270943	L	0.12152	S
FL	0.5152295	L	0.8904592	L	0.13243	S
GA	0.9396526	L	0.6241717	L	0.39557	M
IA	-0.608394	L	0.5798933	L	-0.48618	M
IN	-0.2569	S	0.462308	M	-0.37739	M
ID	0.6325079	L	0.3292745	S	-0.21465	S
IL	-0.098844	N	0.468148	M	-0.4014	M
KS	0.0573223	N	0.2564839	S	0.14629	S
KT	0.4784912	M	0.9220488	L	-0.13144	S
MA	0.6398964	L	0.6758946	L	0.04598	N
MD	-0.08553	N	0.8244447	L	0.55485	L
ME	0.3223156	S	0.4606068	M	-0.08501	N
MI	-0.083436	N	0.3354549	S	0.51222	L
MN	0.4722007	M	0.6095993	L	0.65633	L

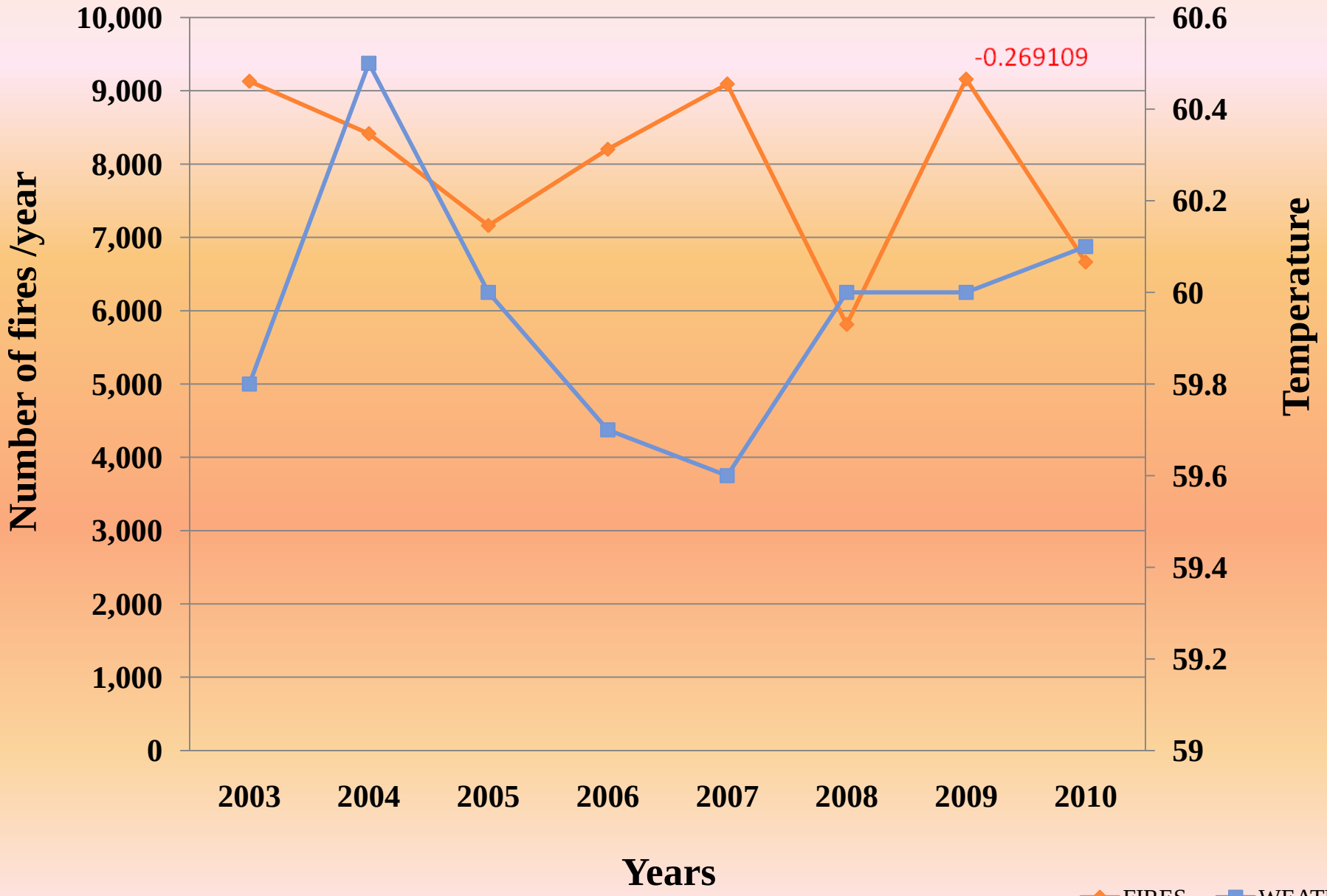
Fire and Temperature Correlation VA

Fires and Area burned Correlation LA

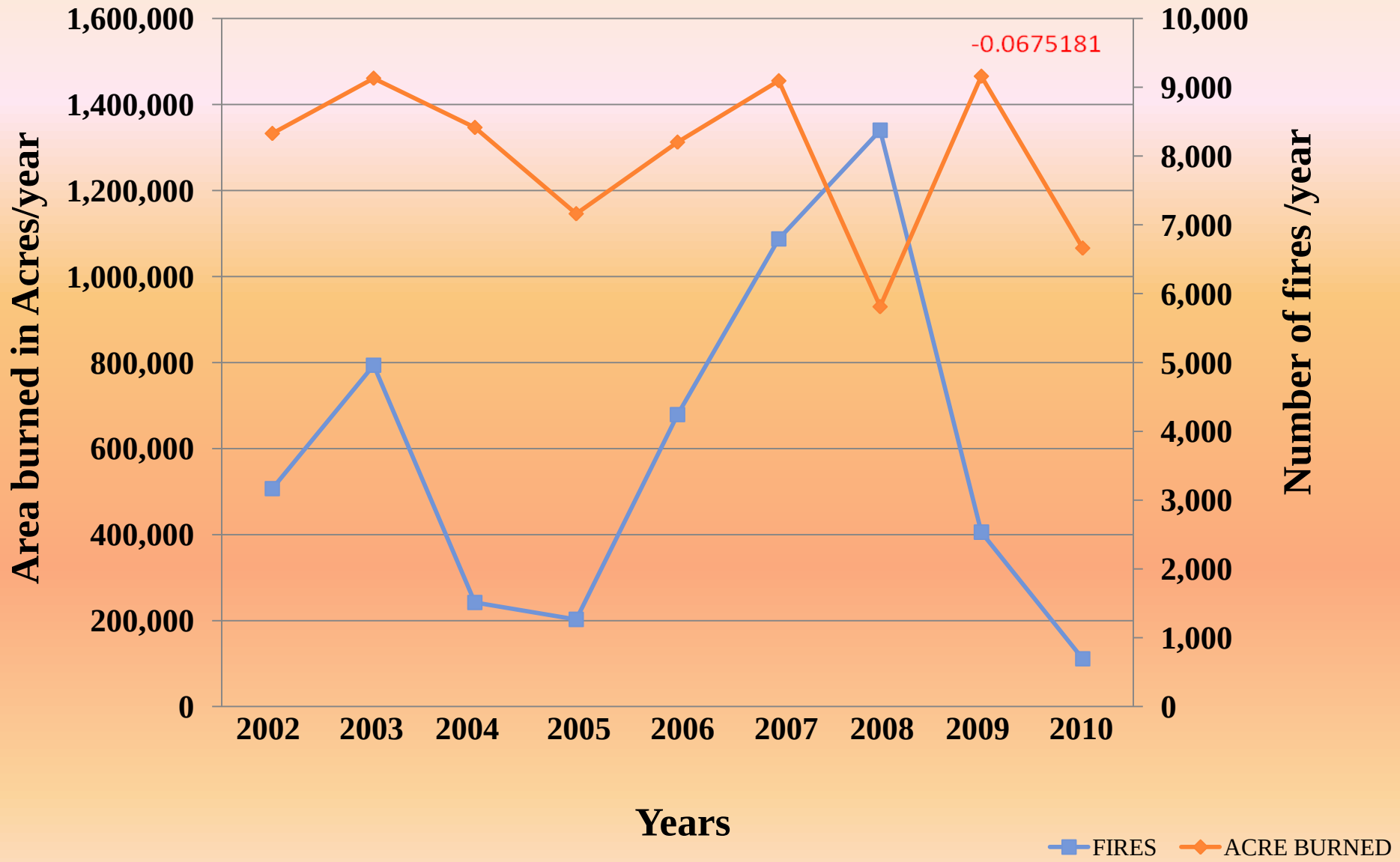
Area burned and temperature Correlation MI



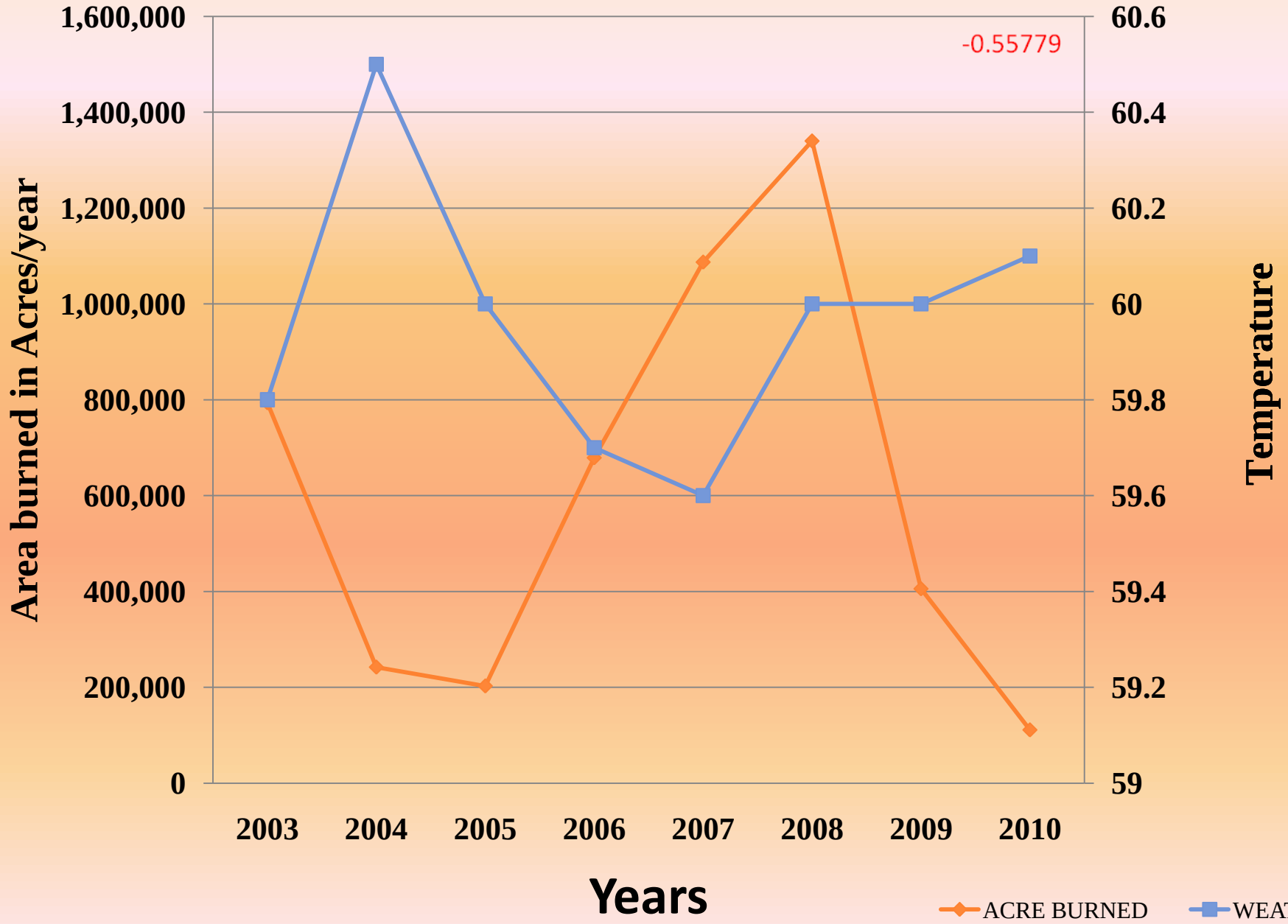
Fire and Temperature Correlation CA



Fires and Acre burned Correlation CA



Area burned and Temperature Correlation CA



Conclusion

Conclusion

- It seems that increase in temperature has good correlation with increase of number of fires events in most of states but we also need to study other factors like precipitation, drought and wind.
- In some states although the number of fires are small but a large area was burnt …. As these fires are much more severe. Drought and high temperature could be a factor to increase the risk of more fires.

Conclusion

- Mitigation and Adaptation go side by side while only working on adaptation is not just enough to solve the science.
- This is a pilot study to get the overview. Need more in depth study and elaborated research to come up with some solution.

Climate change is not just Global warming….

If you don't understand what the cause is, it's impossible to come up with a solution.

Acknowledgment

- Sara Wu (WFI)
- Chandalin Bennet (WFI)
- Rick Zenn (WFI)
- James Agee (SFER)
- Don McKenzie (UoW)
- Erica Smithwick (Penn State U)
- Aslam Khalil (PSU)
- David Peterson (UoW)
- Justin Podur (york uni CA)
- Carol Duffy (Wisc SU)
- Francis Putz (Ufl)
- Claudia Romero (Ufl)
- Edward Gilman(Ufl)
- Ernesto Alvarado (UoW)
- Mathew Germino (ISU)
- Oregon Department of Forestry
- Tillamook Forest department
- Virginia forest department

Thank you


I has a question...