

Yuma Agriculture Water Conference 2016.

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The three limiting factors of terrestrial ecosystems

1. Plant-Available Nutrients
2. Water (too much as well as too little)
3. Sunlight





Trends in AZ Ag Commodity Exports: cash receipts

2013

1.Processed Vegetables, \$240m

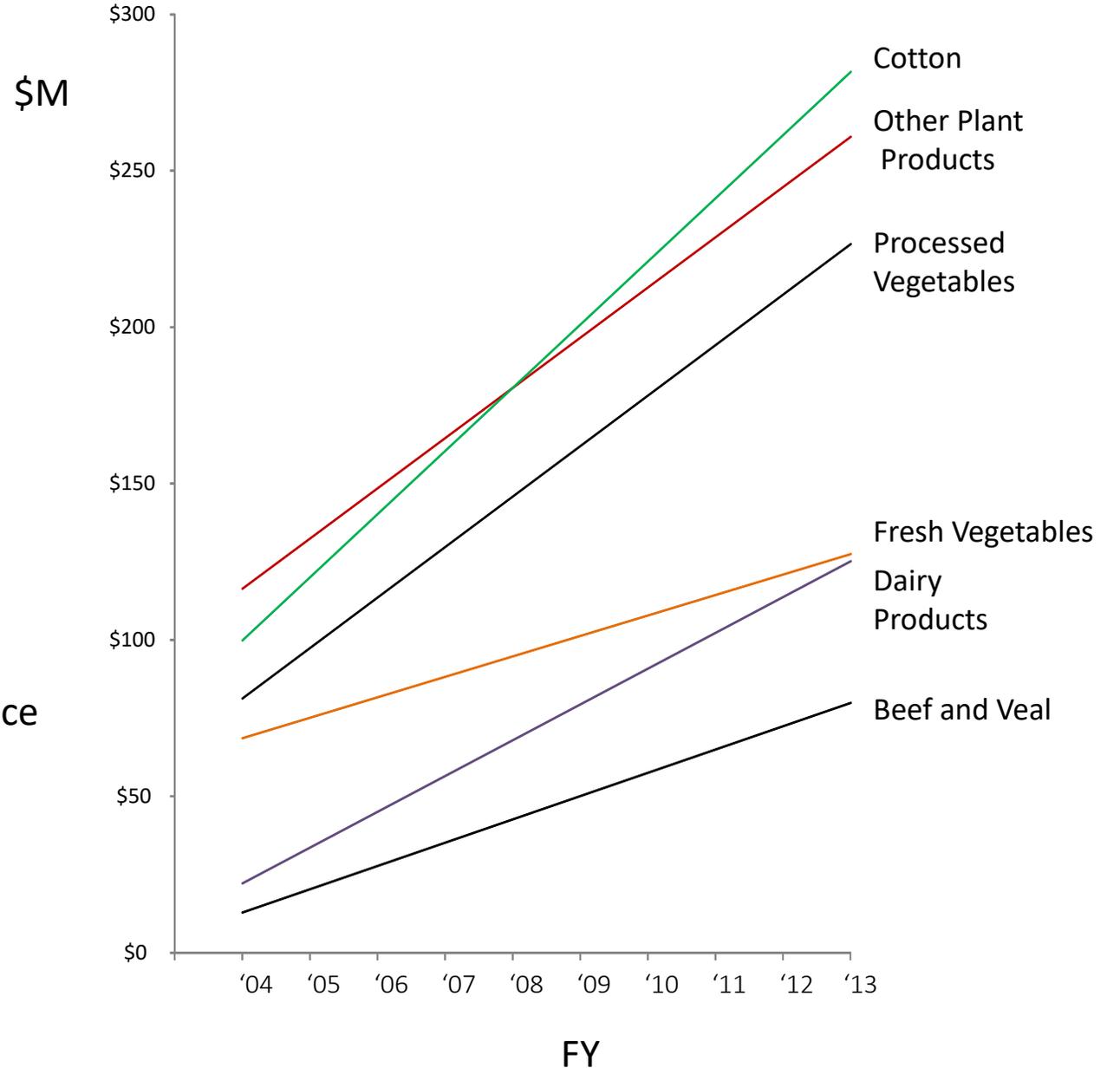
2. Cotton, \$219m

3.Dairy products, \$146m

4.Fresh Vegetables, \$134m

5.Beef and veal, \$81m

U.S. Department of Agriculture Foreign Agricultural Service



THE TWO TYPES OF CHALLENGES

TECHNICAL

- *Definition*: clear, predictable, repeated and so easily identified from past experience
- *Solutions*: clear; predictable; repeated, common; can be bought often “off the shelf”; quick.
- *Leaders of work*: Those with positional authority, experts using existing models/strategic plans (may be bought as consultants)

ADAPTIVE

- *Definition*: no past experience, requires experimentation and deriving new knowledge.
- *Solutions*: cannot easily be bought especially as an “off the shelf” product; not immediately clear and/or obvious; long.
- *Leaders of work*: Those whom the problem affects; may or may not have positional authority; may become “experts” but no existing models or strategic plans (consultants often useless only used as a tool)

Markets

The world's increasing middle class

2009: 1.8B out of 6.8B = **26%**

2020: 3.2B out of 7.5B = **43%**

2030: 4.9B out of 8.2B = **60%**

OECD DEVELOPMENT CENTRE: THE EMERGING MIDDLE CLASS
IN DEVELOPING COUNTRIES. Homi Kharas. January 2010. Working Paper No. 285

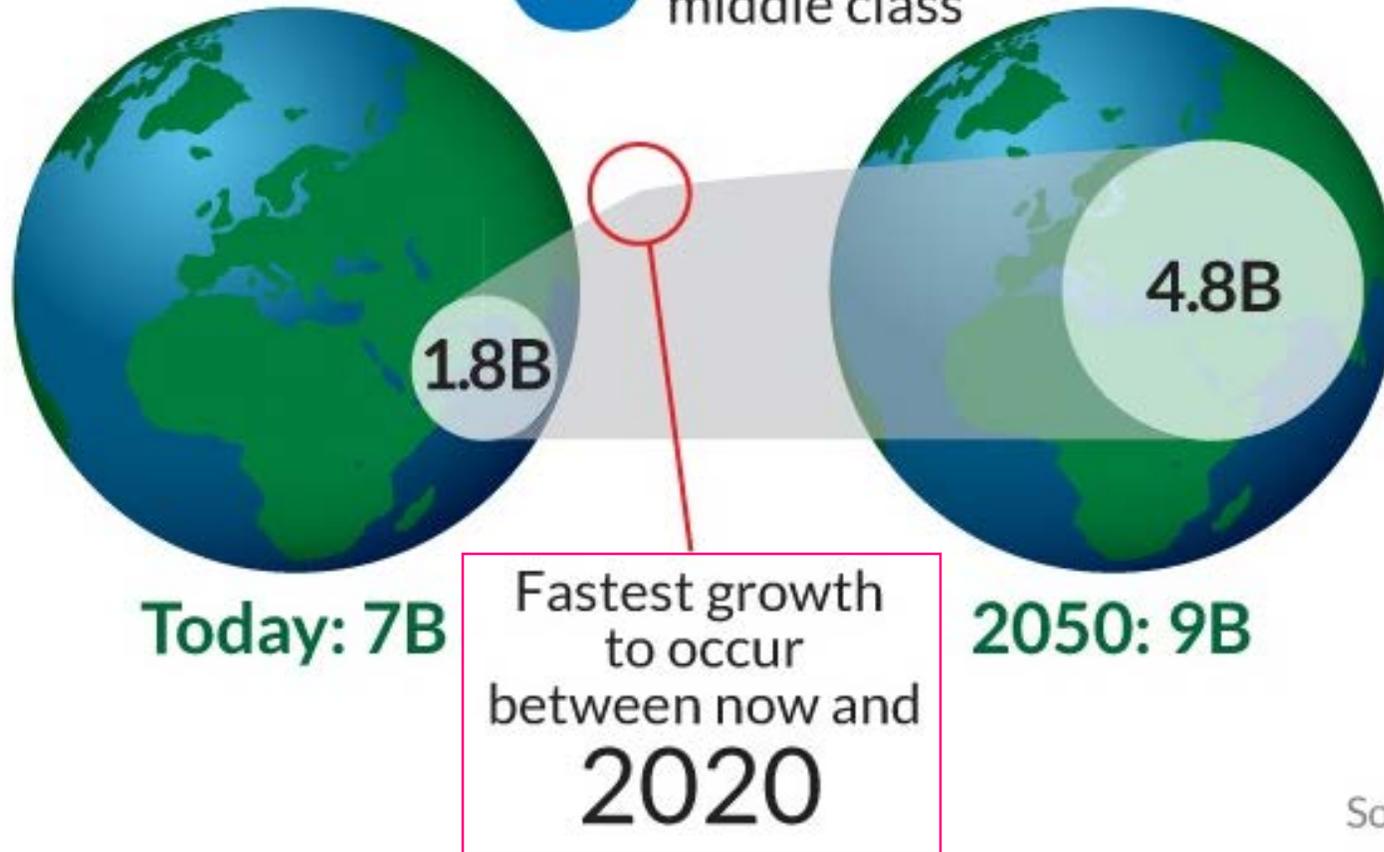


College of Agriculture and Life Sciences – Office of the Vice President and
Dean.

The University of Arizona, Tucson, Arizona

GROWING MIDDLE CLASS

3 BILLION
join the
middle class



Source: FAO, OECD^{1,2}

Specialty crops account for one-third of all US crop value

- Grown on only 1% of total cropland
 - 76% land is irrigated, compared to 6% for all crops
 - high investment, high value
- 98% farms are family businesses or partnerships
 - 94% farms under 1,000 acres

Per Capita Consumption (Lbs.)

	1980	1990	2000	2013	% Change
All fresh fruit	88.4	92.0	101.2	110.5	25.0%
All fresh vegetables	113.0	147.1	174.5	169.8	50.3%

Source:

Tom Stenzel

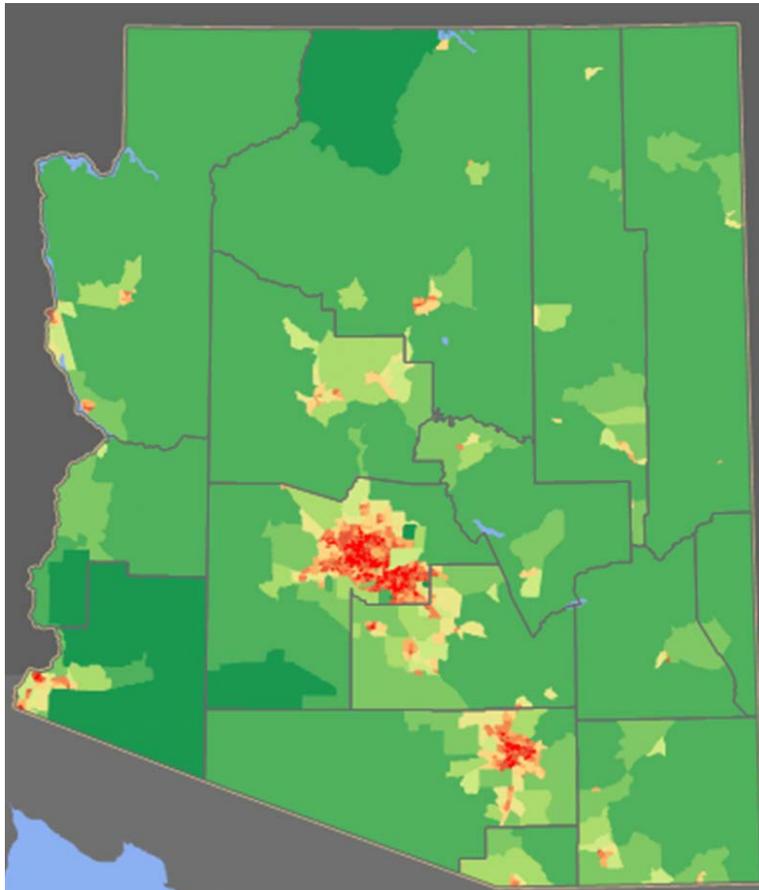
President & CEO

United Fresh Produce Association

Exporting water?

- Water as an economic resource
- Water as a geopolitical tool (like oil)
- Direct and indirect water (like carbon)

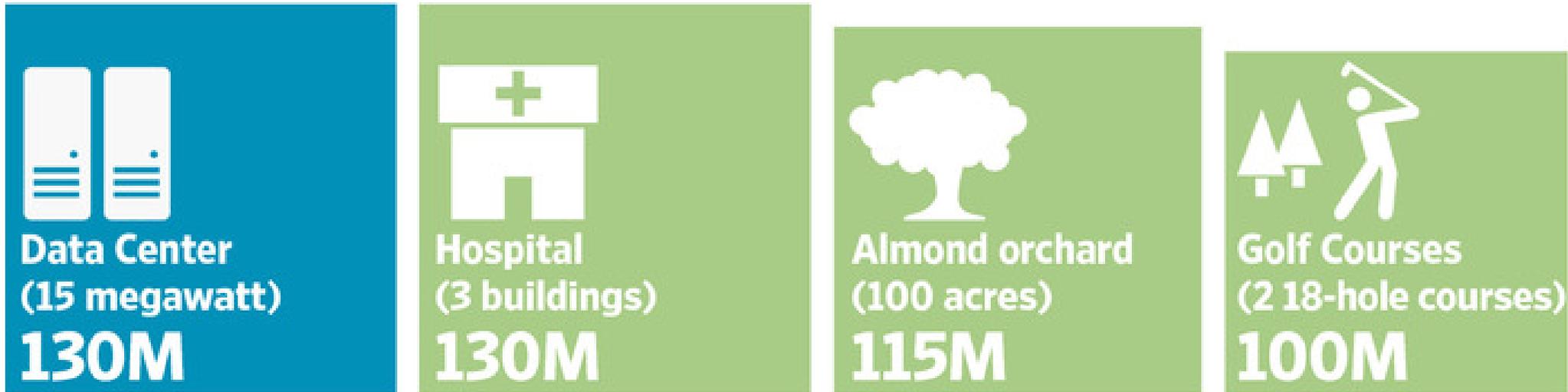
- 2007: Intel & TI used 11B gallons of water to produce silicon chips
- A single 300-millimeter wafer requires ~2,000gal. of water
- 11/14 of the worlds largest semiconductor factories are located in the water-stressed Asia-Pacific region



Waterlogged

A midsize data center uses roughly as much water as about 100 acres of almond trees or three average hospitals, and more than two 18-hole golf courses.

Approximate annual water usage, in gallons*



*Use varies depending on climate and other factors

Sources: California Department of Water Resources (orchards); James Hamilton (data centers); U.S. Department of Energy (hospitals); Golf Course Superintendents Association of America (golf courses)

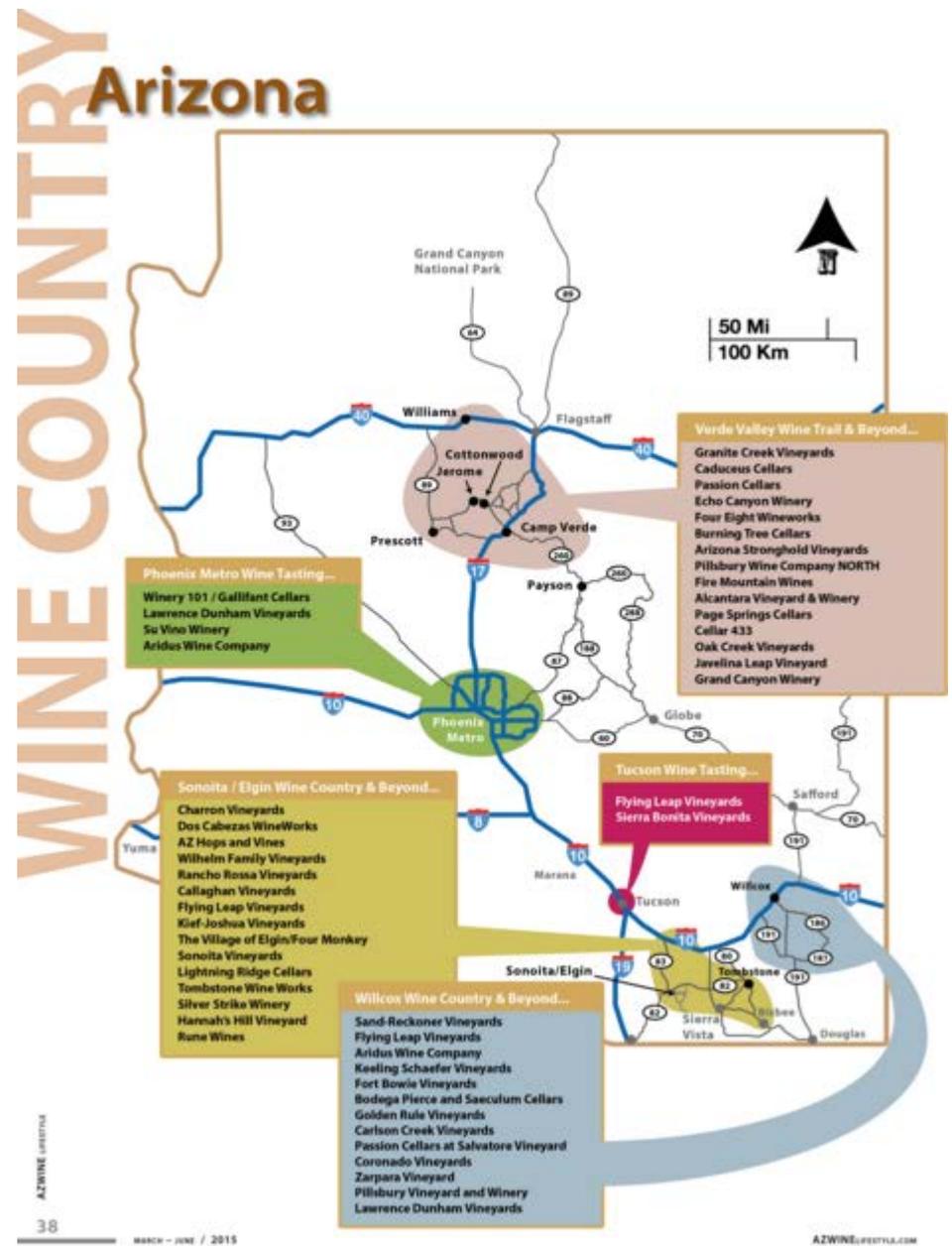
THE WALL STREET JOURNAL.

Interdependence



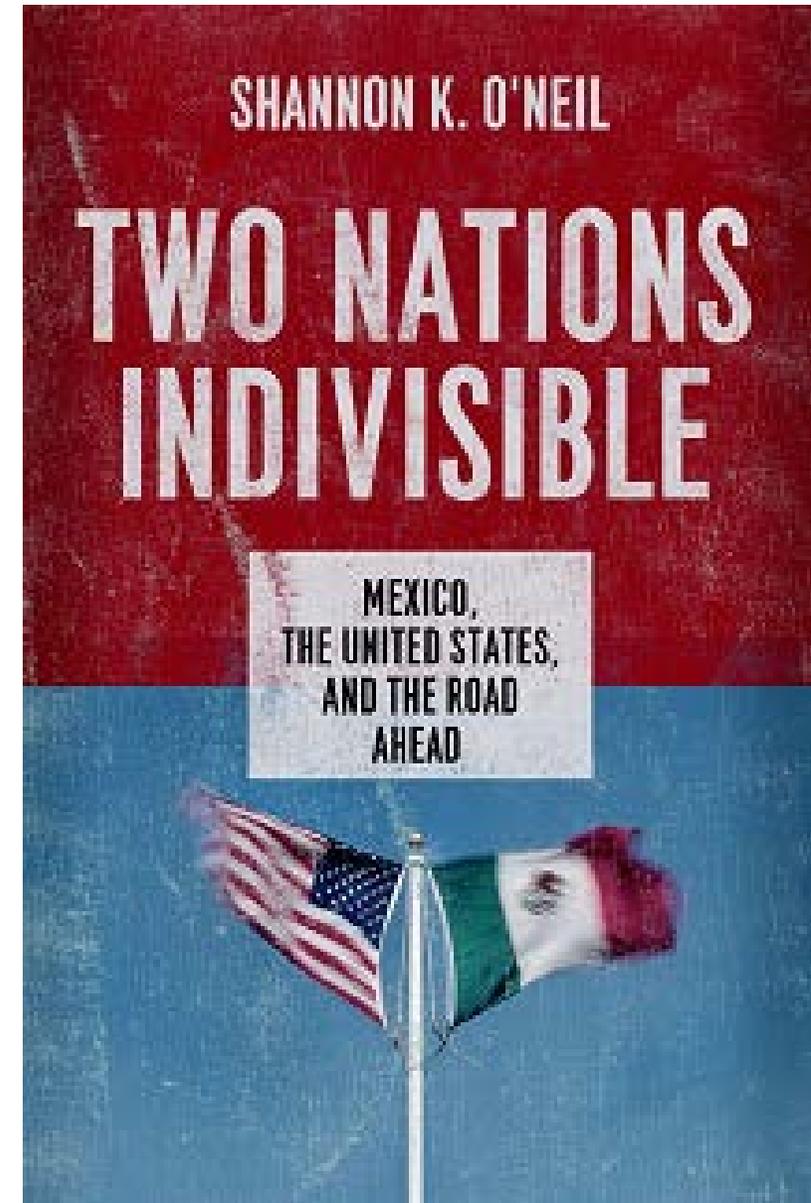


<https://www.arizonawine.org/images/stateMap.gif>



<http://azwinelifestyle.com/wp-content/uploads/2015/04/AZWINEm2015AZSTATEmap1.jpg>

- NAFTA 21 years old: quadrupled US-MEX trade
- US MEX border is the most economically dynamic region of both countries.
- “Made in Mexico” products are, on average, 40% made in the US (“Made in Canada”: 25%).
- AZ-MEX trade has not kept pace with other boarder states.
- Fresh produce hardest hit: historically 1/2 of trade and today 1/3 of trade.
- 21st Century Economic trend: Rise of global middle class, rise of global supply chain, rise of internet trade.

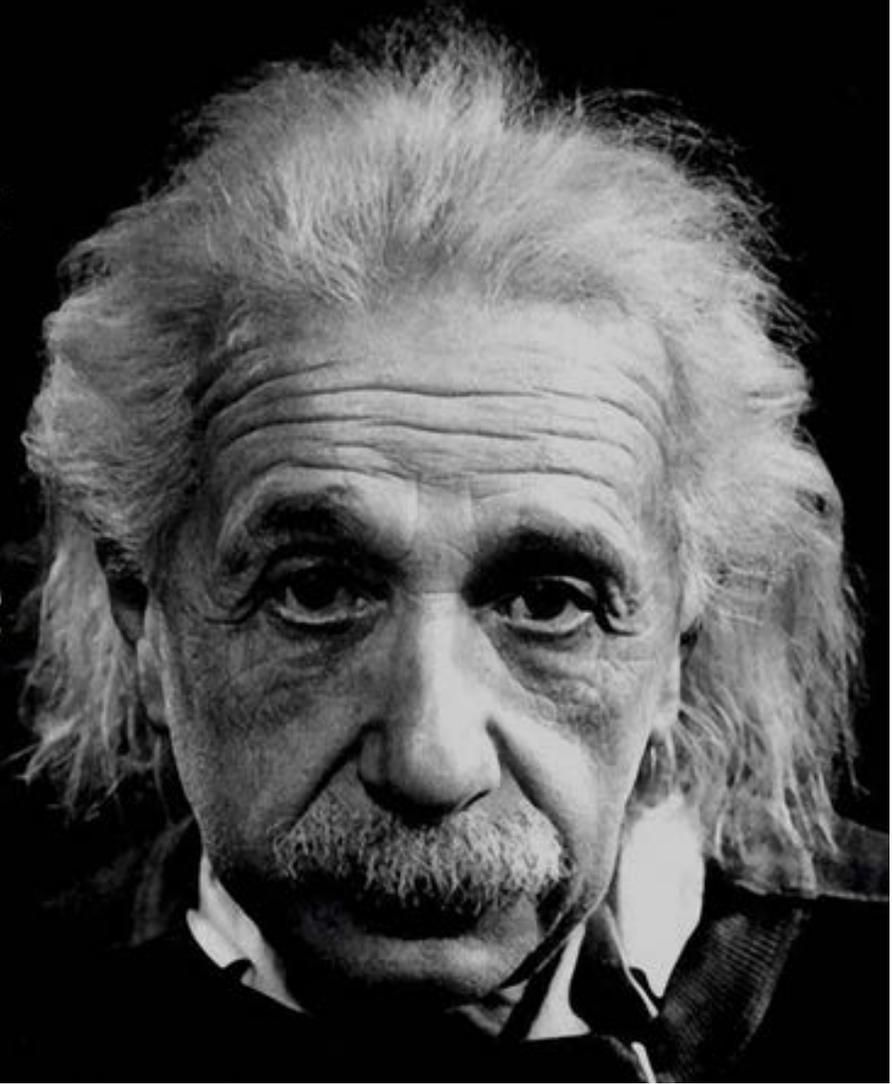


...most people think that the future of the world will be defined by globalization, but the truth is that technology matters more.

Peter Thiel (Paypal founder; Facebook angel investor)

"Two things are
infinite. The universe
and human stupidity.

...and i'm not so sure
about the universe."



Knowledge Economy growth depends on information quantity, quality, and accessibility.

- Greater reliance on intellectual capabilities than on physical inputs or natural resources.
- Products and services based on knowledge-intensive activities further contributing to an accelerated pace of technical and scientific advance.
- More and more rapid creative disruption (incessant product and process innovation with new production units replacing outdated ones).
- New industry emergence.
- Wage and high-quality job inequality.

Figure 2. Trends in U.S. Bioscience and Private Sector Employment, 2001–2012

Source: Battelle analysis of BLS, QCEW data; enhanced from IMPLAN.

Indexed: 2001 = 100

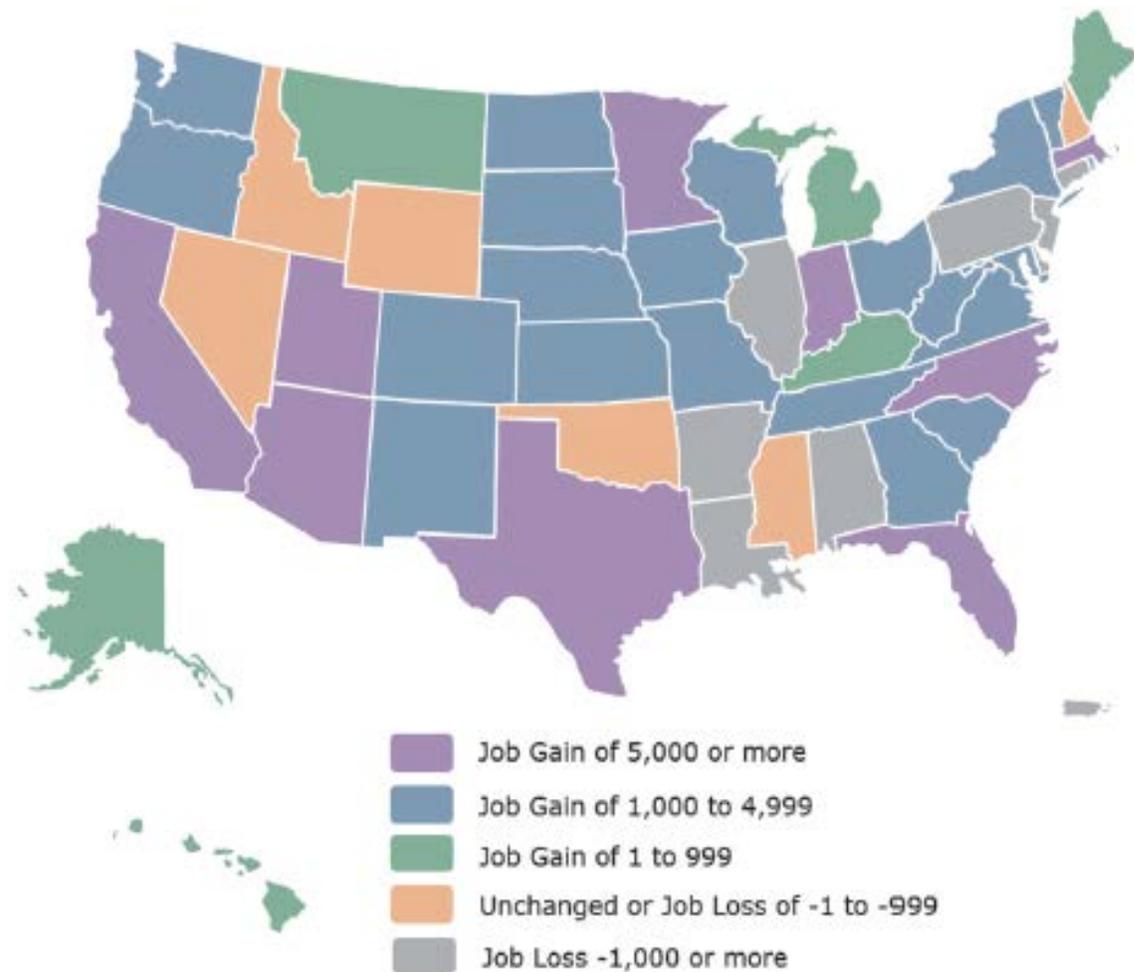
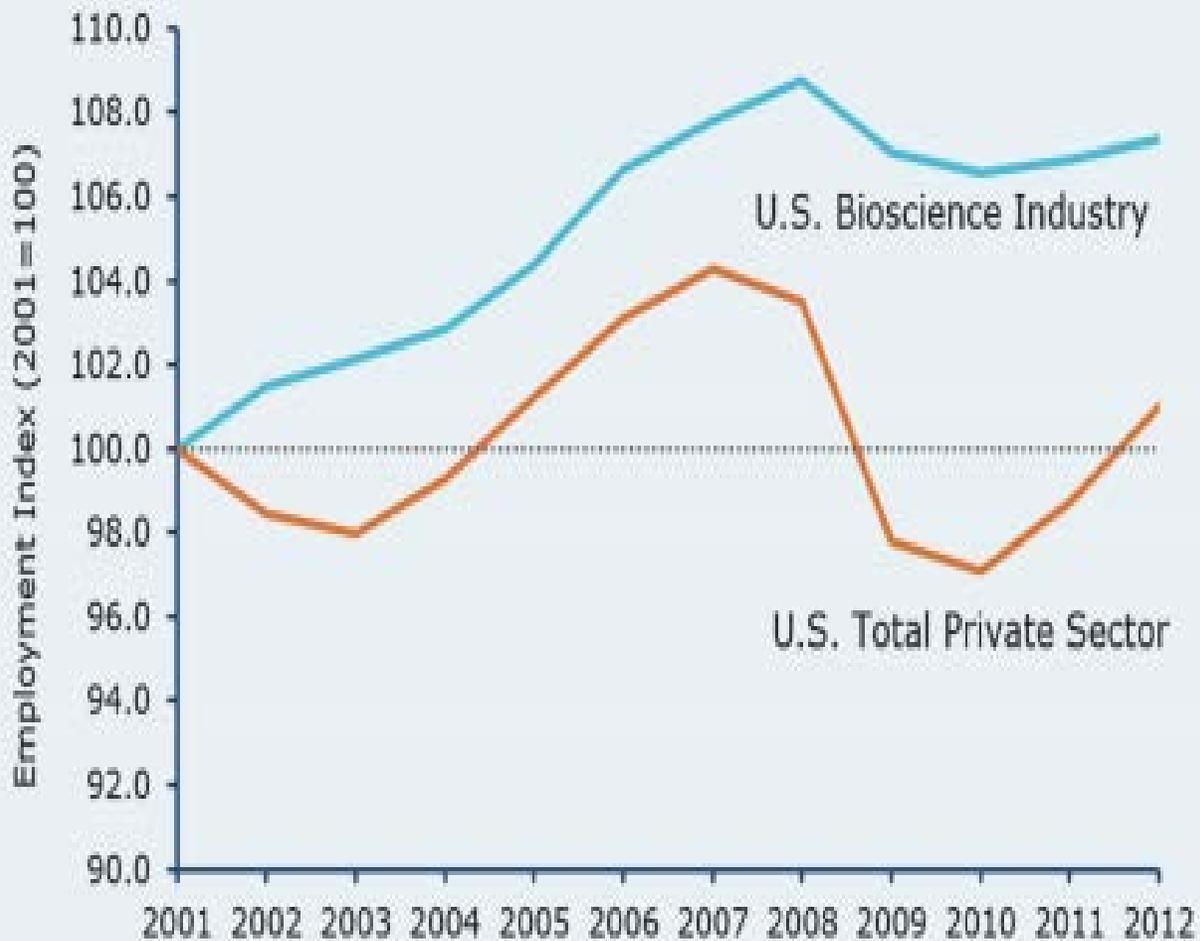


Figure A. Change in Bioscience Employment by State, 2001–2012

Source: Battelle analysis of Bureau of Economic Analysis gross output data.

Growth in Nominal Gross Output for Major Bioscience Subsectors

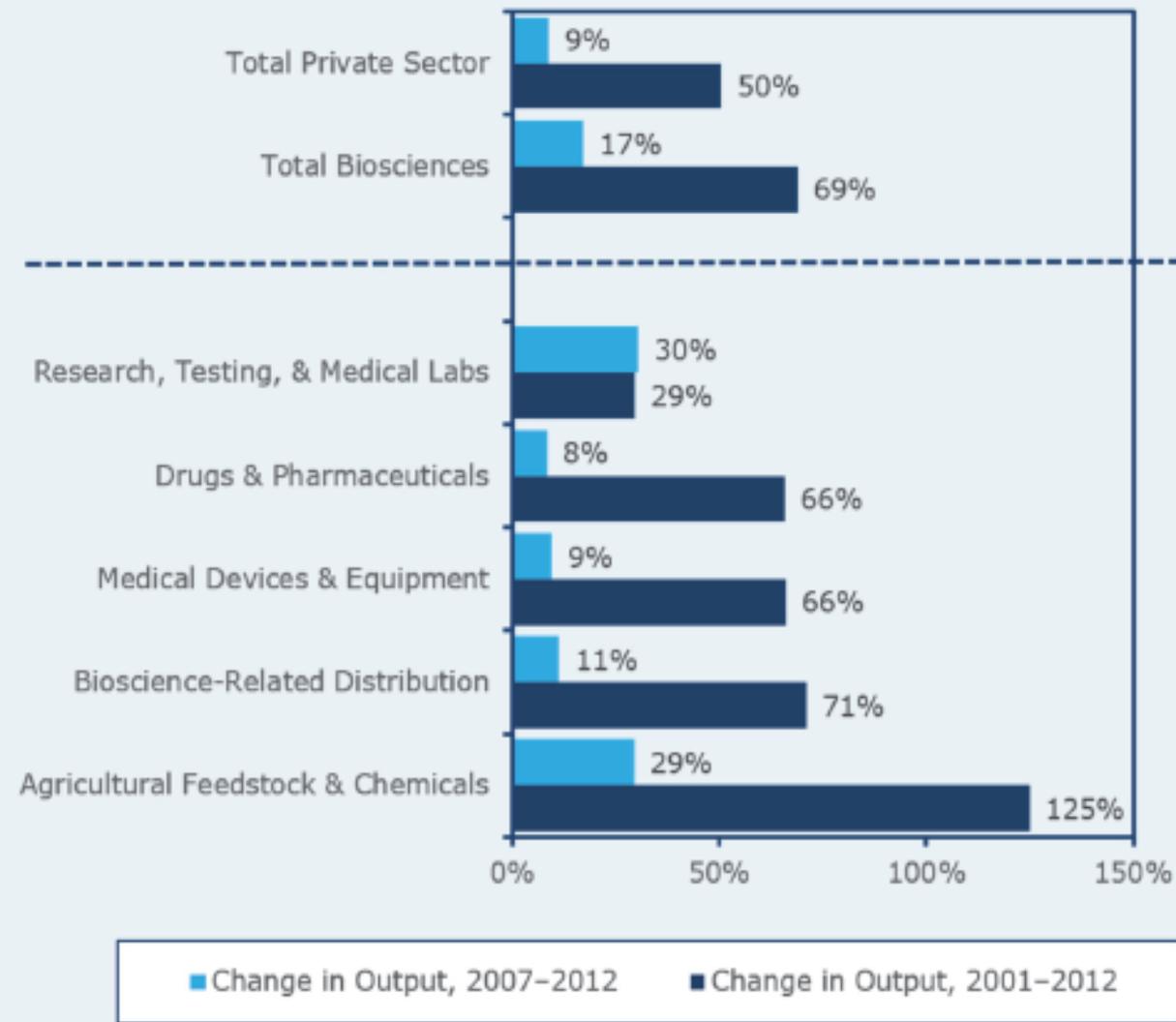
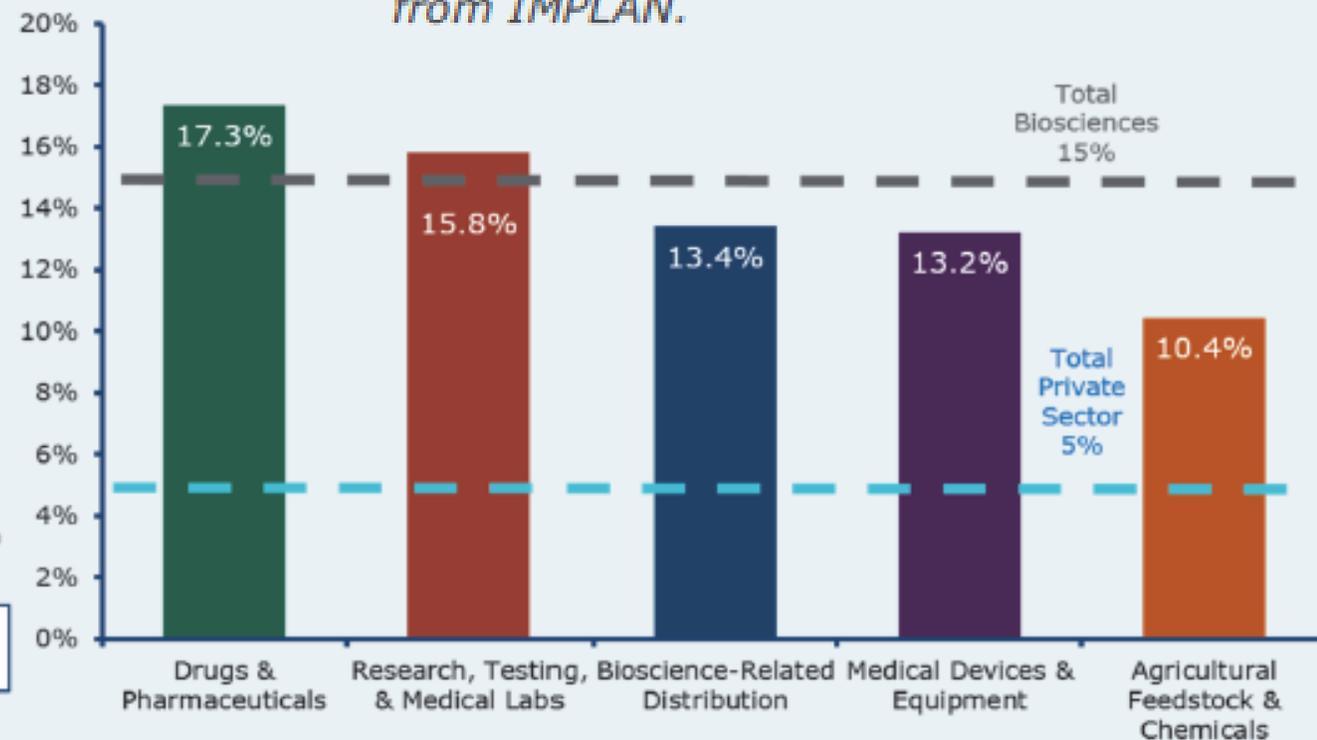


Figure 5. Change in Real Average Annual Wages in the Biosciences, 2001-2012

Source: Battelle analysis of BLS, QCEW data; enhanced from IMPLAN.



Source: Battelle analysis of Bureau of Economic Analysis gross output data.



WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

Aquaculture

The Aquaculture Pathology Laboratory (APL) is an OIE (Office International des Epizooties or World Animal Health) Reference Laboratory and a USDA APHIS Approved Laboratory for testing of live shrimp and other products intended for export. The services provided by the APL include disease diagnostics, surveillance and reference lab services from the main diagnostic lab, quarantine and disease challenge services at the West Campus Aquaculture facility and technical services and training to governments, companies and aquaculture cooperatives located in the United States, Latin America, Africa, the Middle East, Oceania and in east and southeast Asia.

The APL also carries out a variety of applied research projects for USA-based and foreign companies. This includes quarantine and disease challenge studies to evaluate genetic gains in disease resistance to several OIE-listed shrimp virus diseases provided primarily to commercial shrimp breeding companies located in Hawaii and Florida. Research activities are aimed at developing new tests for shrimp disease diagnosis and for evaluating specific antibacterial and antiviral compounds.



Examining a collection of diseased shrimp from a culture pond in the Me Kong Delta area of Vietnam. Photo Credit: Cao Thanh Trung



Infectious hypodermal and haematopoietic necrosis

→ Prof. Donald V. Lightner
Aquaculture Pathology Laboratory
Department of Veterinary Science and Microbiology
University of Arizona
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Tucson, AZ 85721
UNITED STATES OF AMERICA
Tel: +1-520 621 84 14 Fax: +1-520 621 48 99
Email: dvlight@u.arizona.edu

Infectious myonecrosis

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Spherical baculovirus (Penaeus monodon-type baculovirus)

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White spot disease

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Taura syndrome

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Tetrahedral baculovirus (Baculovirus penaei)

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CERTIFIED

NO Detectable PCBs
NO Detectable Mercury

Tested by an accredited independent laboratory



<http://www.bizjournals.com/phoenix/blog/business/2015/11/study-arizona-a-top-destination-for-businesses.html>

Study: Arizona a top destination for businesses relocating from California

Nov 5, 2015, 10:30pm MST | UPDATED: Nov 6, 2015, 7:22am MST



Eric Jay Toll

Reporter- *Phoenix Business Journal*

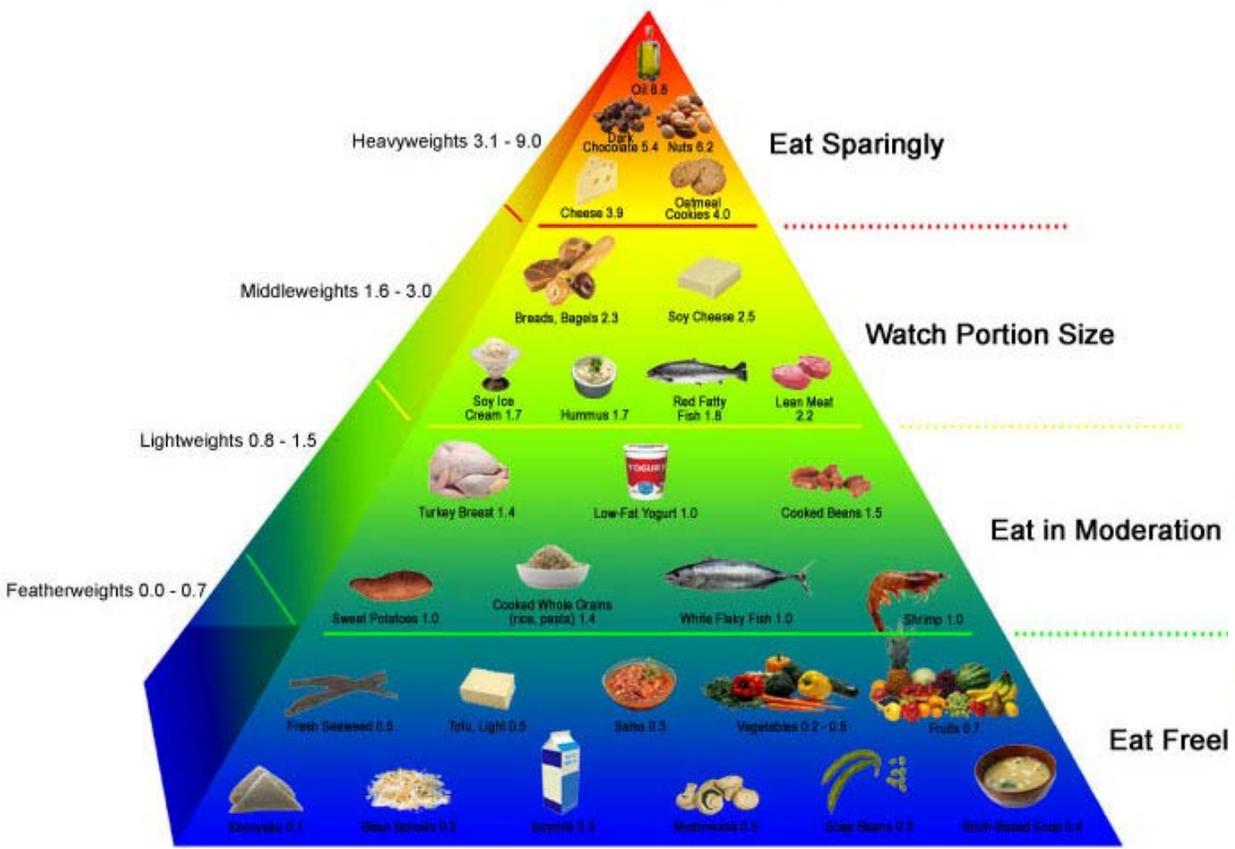
Email | Twitter

Arizona is the third-best market for California disinvestment, according to a seven-year Spectrum Location Solutions study of companies leaving the state.

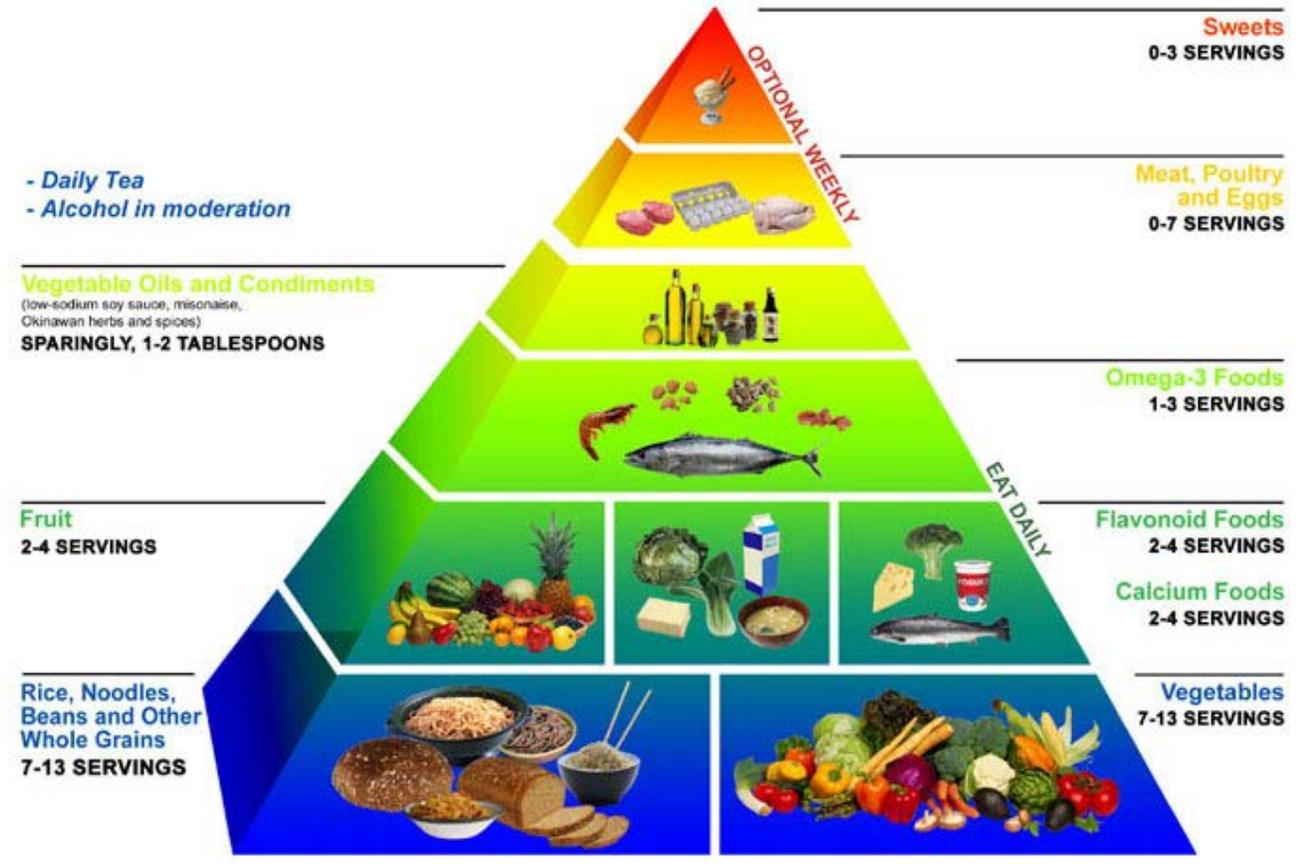
Texas, Nevada and Arizona are in the top three slots, following by Colorado, Washington, Oregon and North Carolina.

The report also said that a number of foreign nations gained from California losses, with the most jobs going to Mexico, India and China.

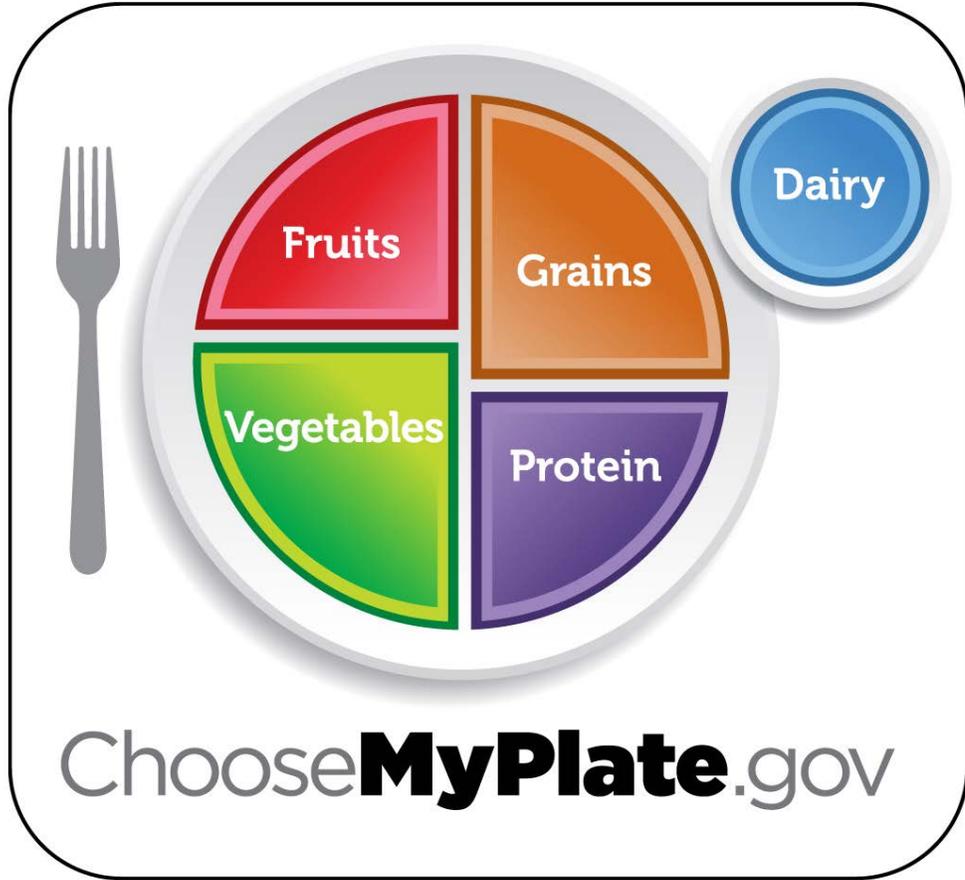
WIIFM?



Okinawan



Mediterranean



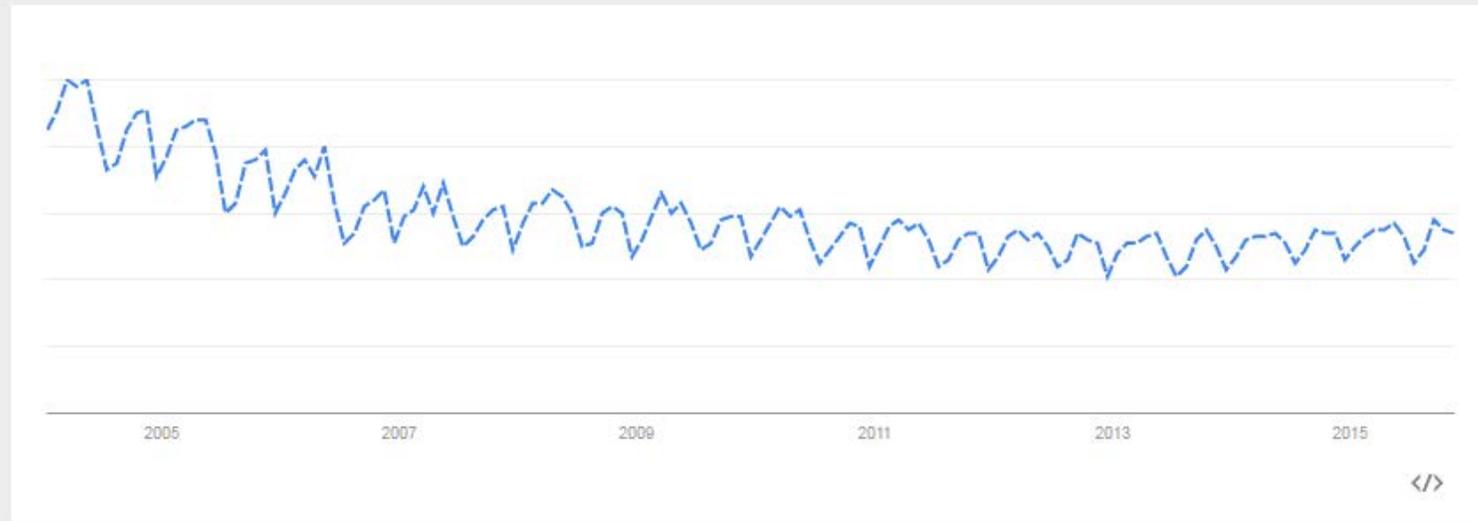
Scientific Report of the 2015 Dietary Guidelines Advisory Committee

Advisory Report to the Secretary of Health and Human Services
and the Secretary of Agriculture

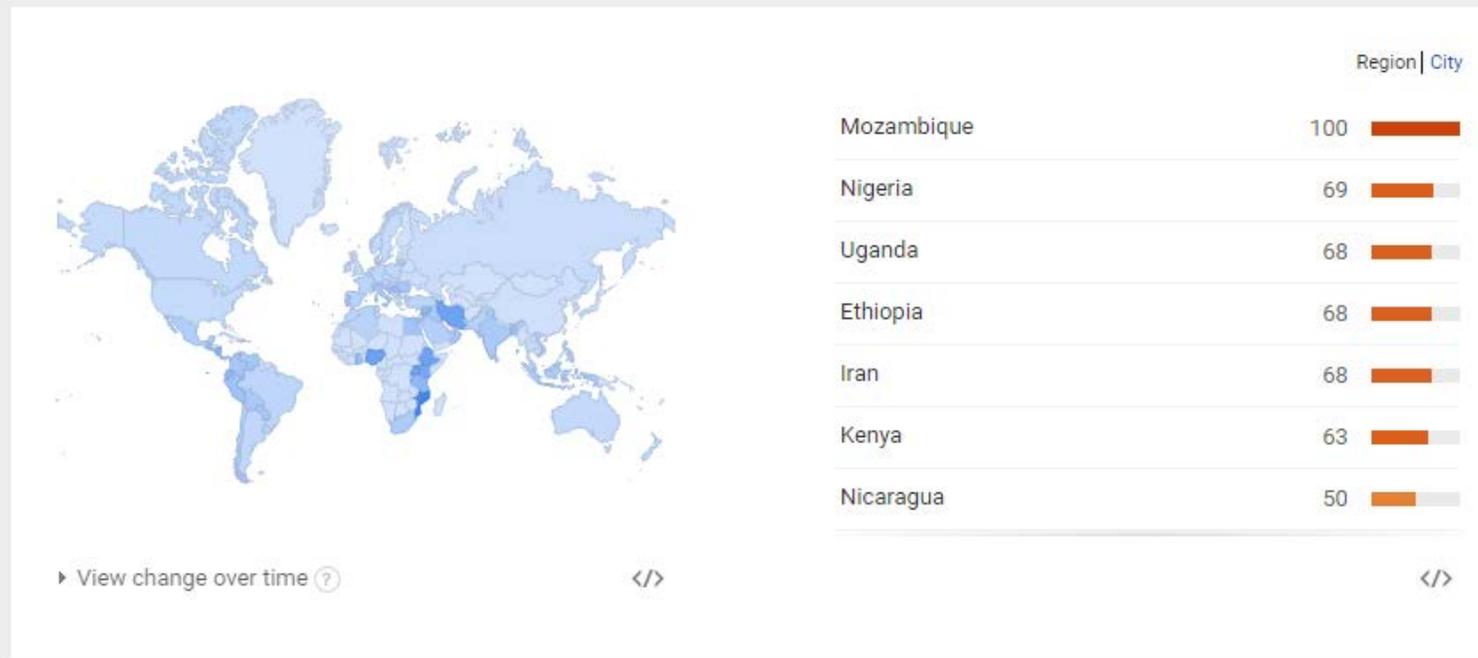
Agriculture

Interest over time ?

News headlines ? Forecast ?



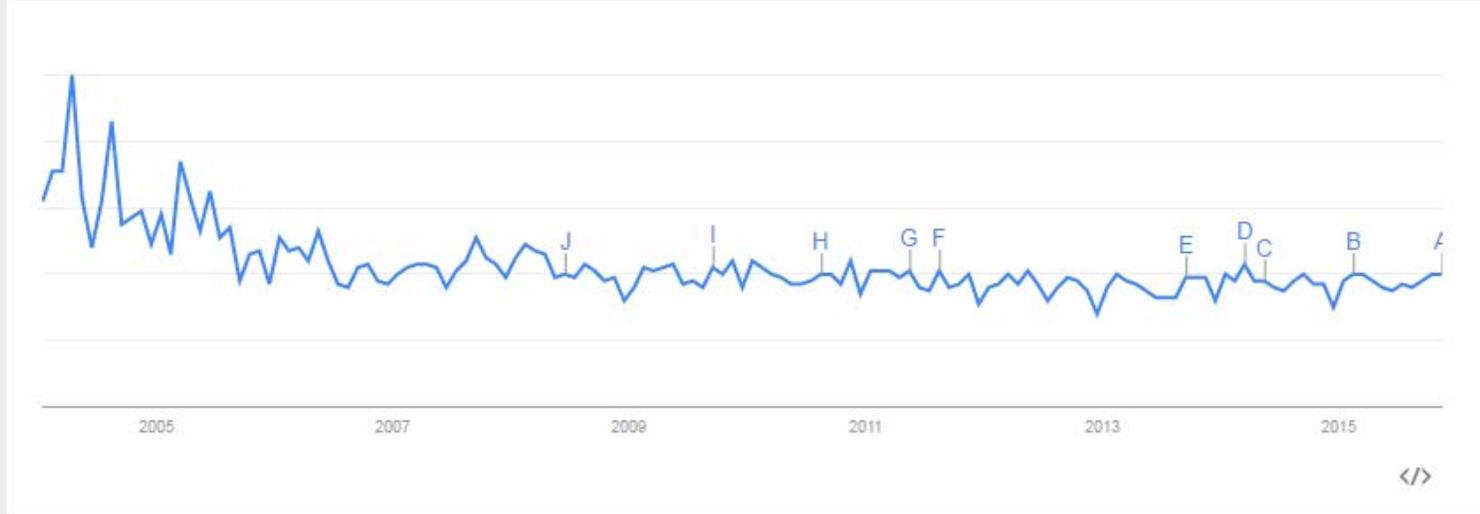
Regional interest ?



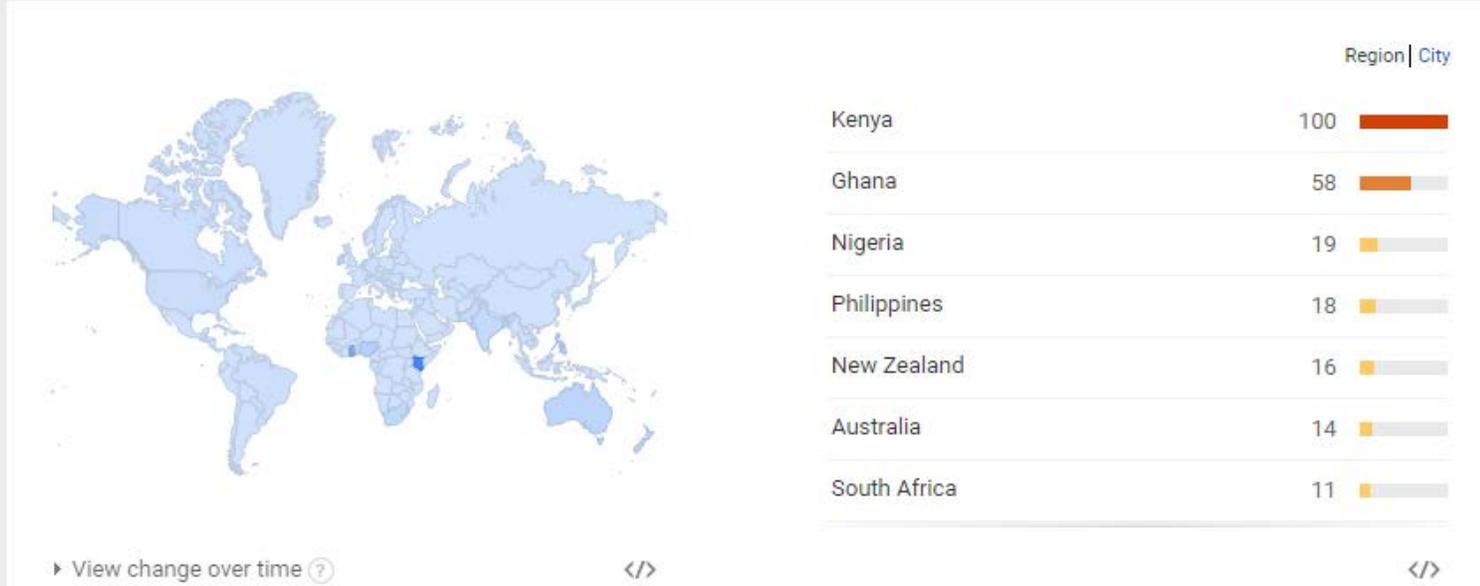
Agribusiness

Interest over time ?

News headlines Forecast ?



Regional interest ?



▶ View change over time ?

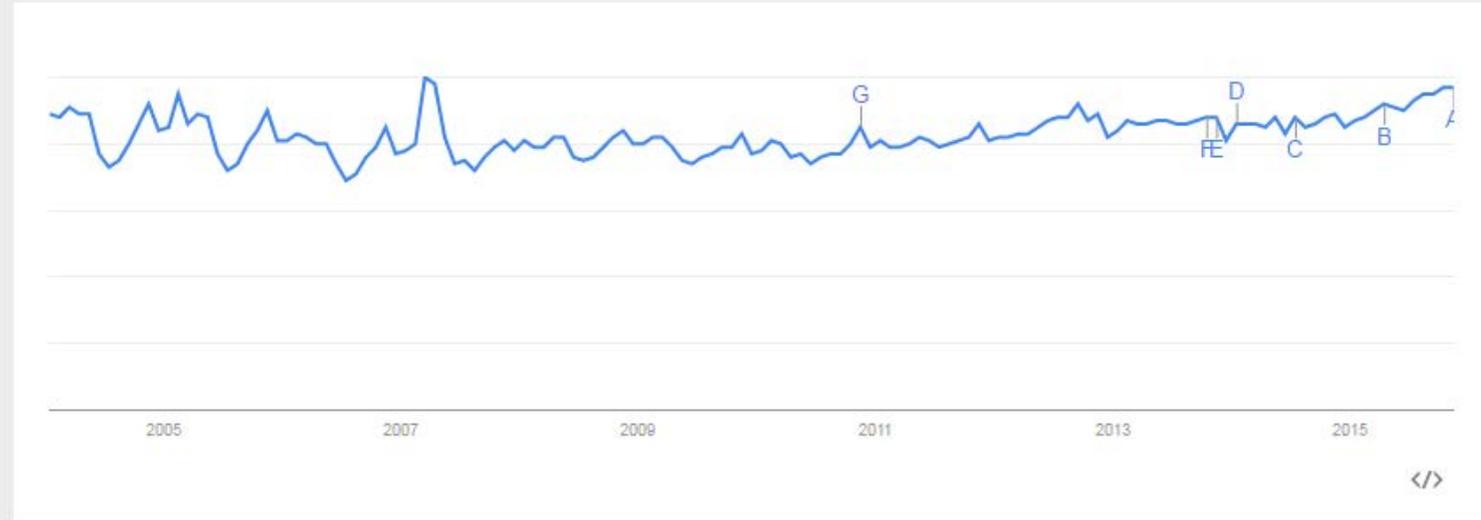
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Food

Interest over time ?

News headlines Forecast ?



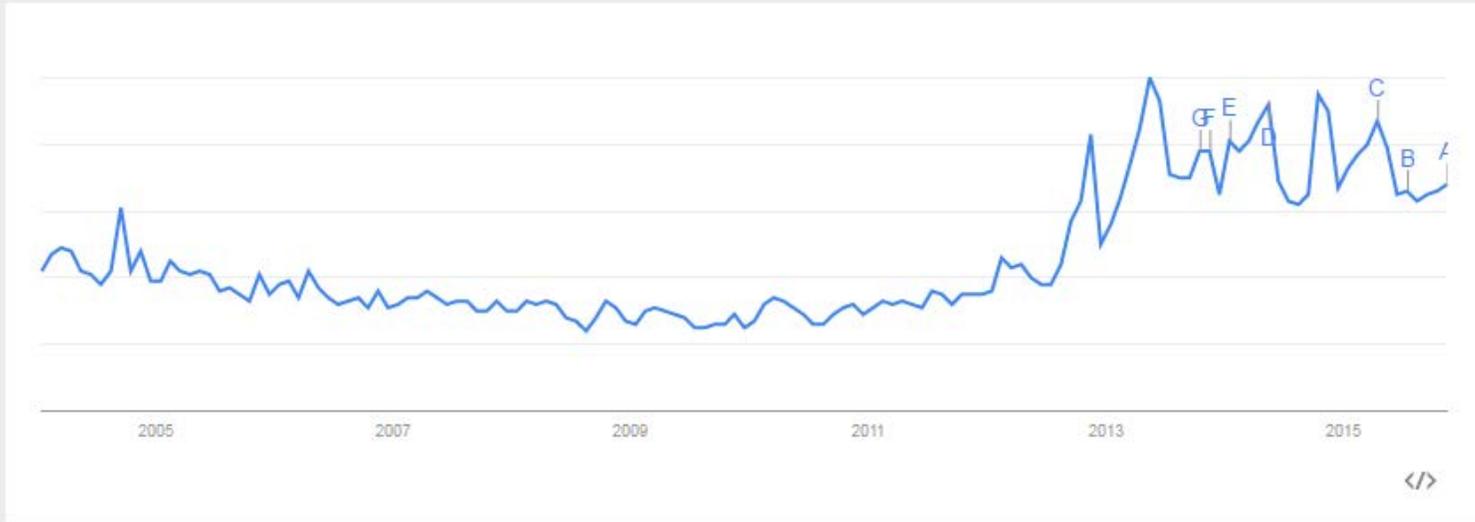
Regional interest ?



GMO

Interest over time [?](#)

News headlines Forecast [?](#)



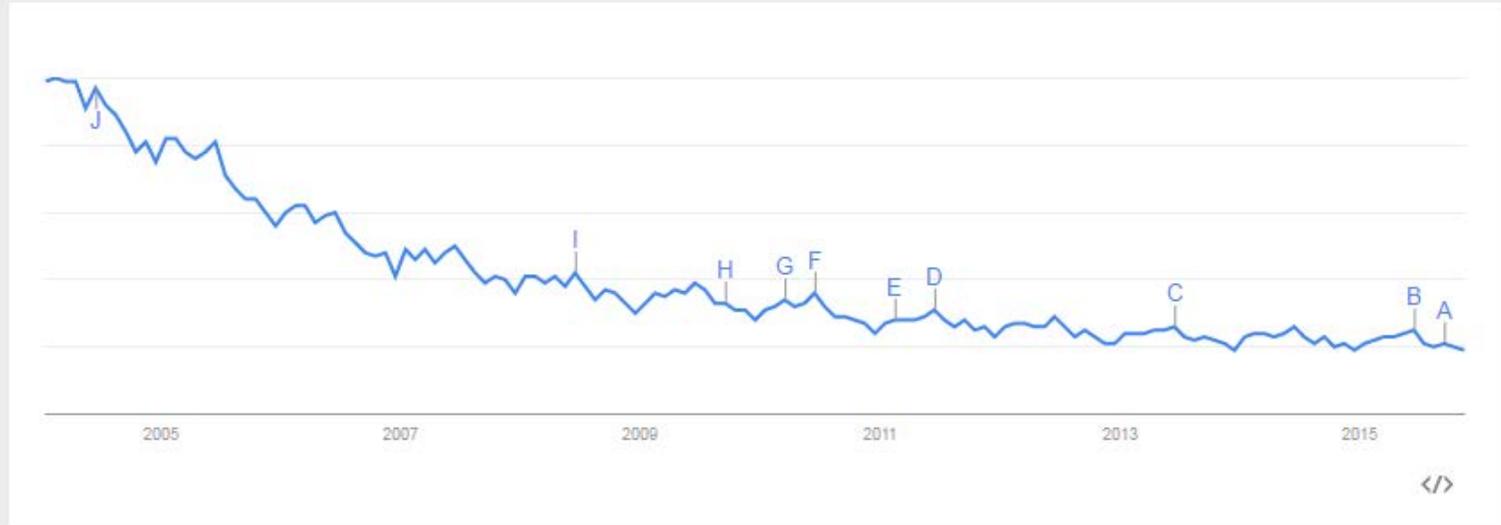
Regional interest [?](#)



Biotechnology

Interest over time ?

News headlines Forecast ?



Regional interest ?



[View change over time](#) ?

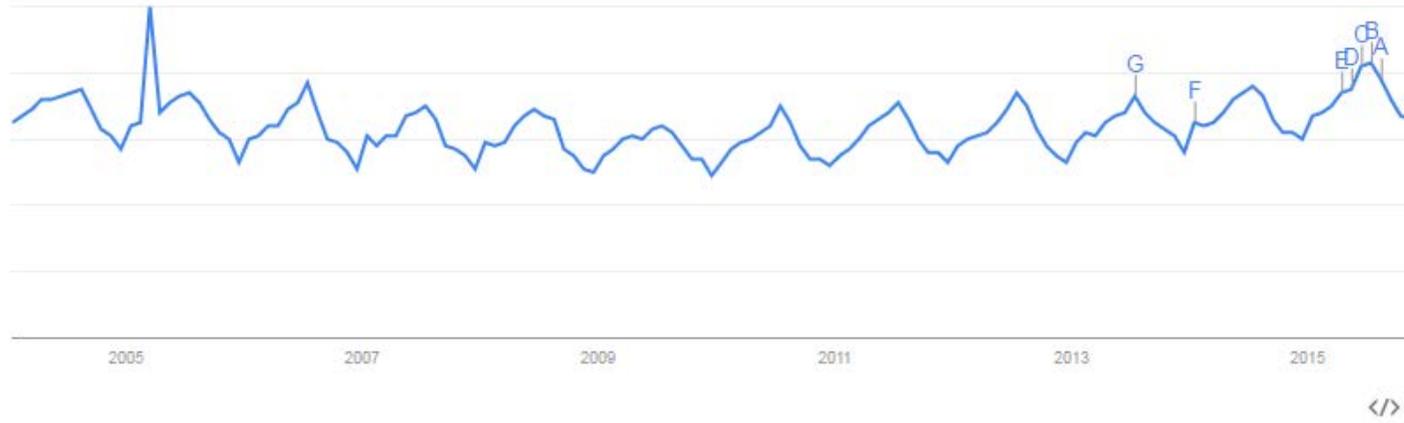
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Water

Interest over time ?

News headlines Forecast ?



Regional interest ?



Region	City
United States	100
Australia	99
South Africa	92
Singapore	84
New Zealand	82
Canada	79
Kenya	75

▶ View change over time ?

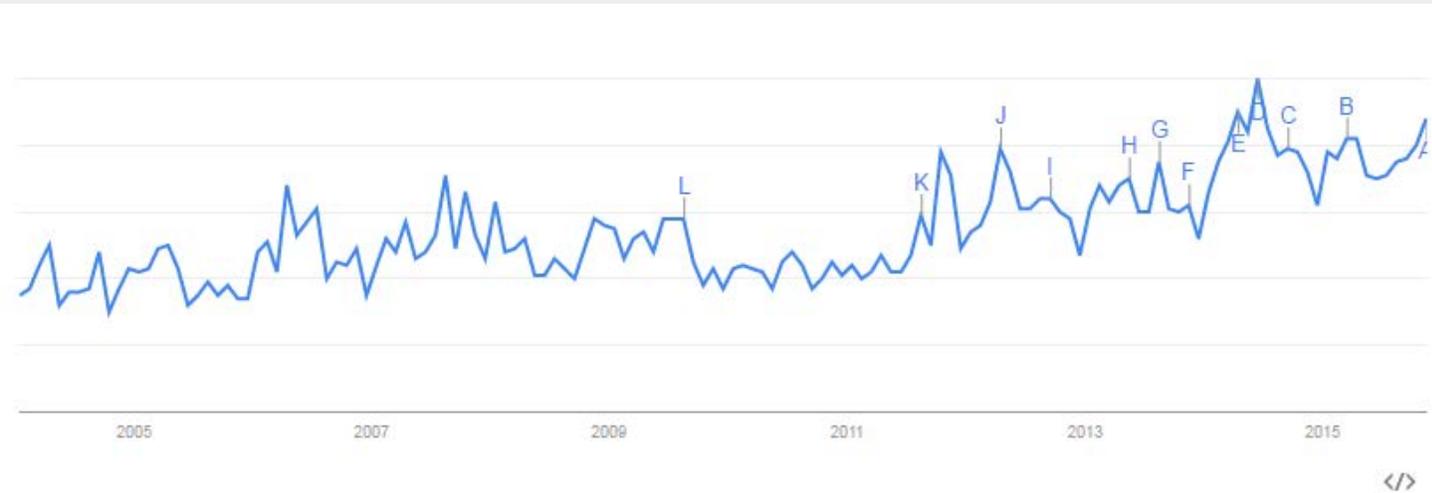
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Student Debt

Interest over time ?

News headlines Forecast ?



Regional interest ?



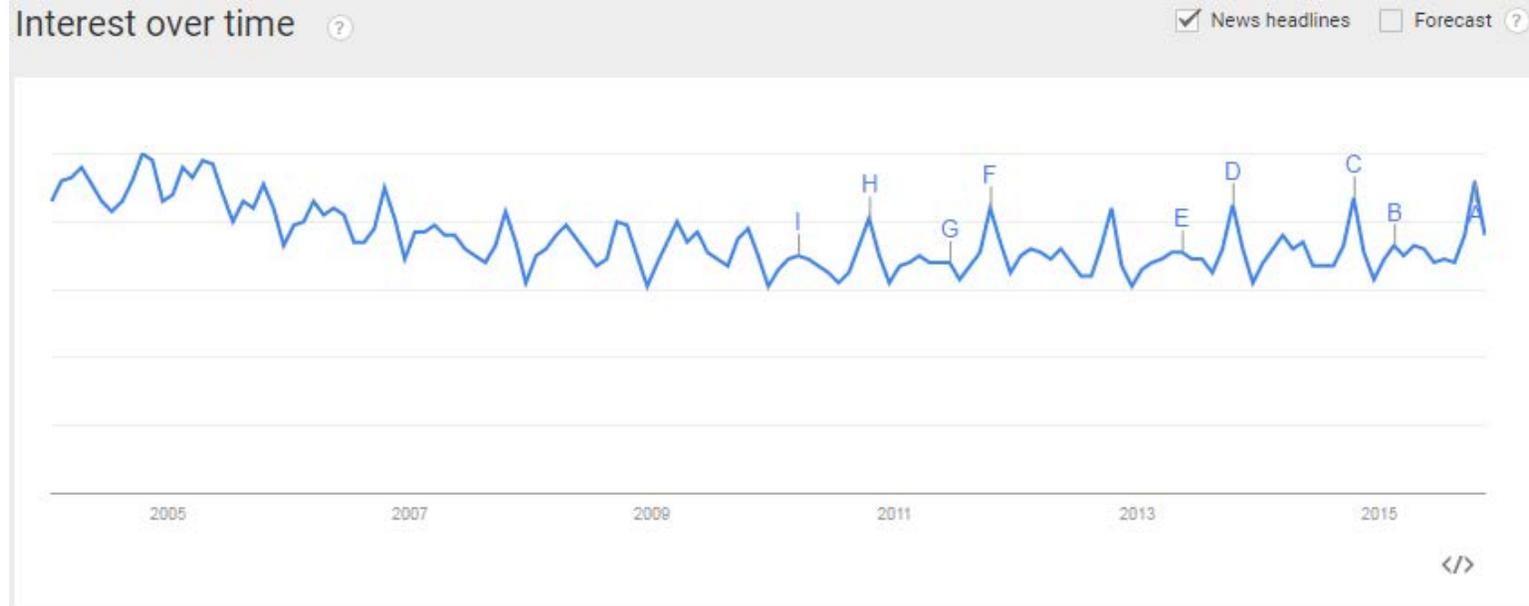
Region	City
United States	100 
Canada	46 
United Kingdom	23 
Australia	12 

▶ View change over time ?

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Cancer



Regional interest ?



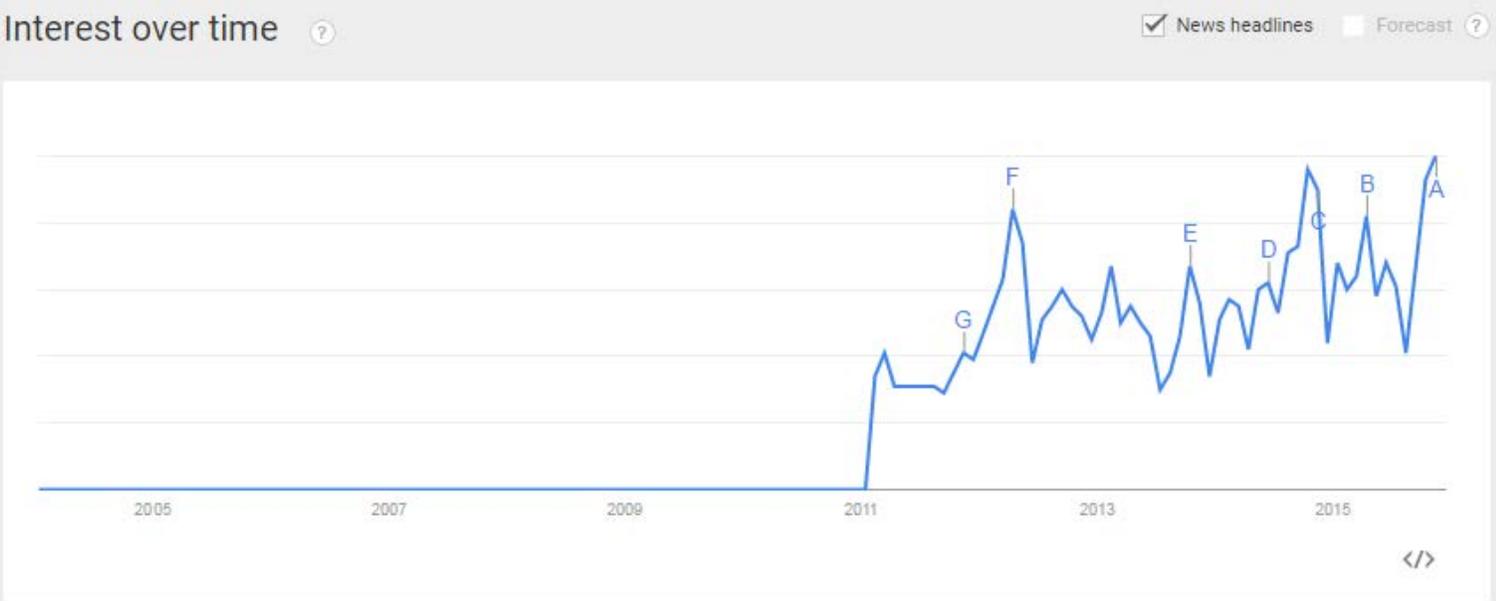
	Region City	
United States	100	<div style="width: 100%;"></div>
Canada	99	<div style="width: 99%;"></div>
Australia	95	<div style="width: 95%;"></div>
Puerto Rico	93	<div style="width: 93%;"></div>
United Kingdom	83	<div style="width: 83%;"></div>
Ireland	76	<div style="width: 76%;"></div>
New Zealand	74	<div style="width: 74%;"></div>

▶ View change over time ?

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Bioeconomy



United Nations Water

- *Water scarcity affects almost half of the world's population*
- *By 2030, 47 percent of the population will be living in areas of high water stress.*
- *Humans are over-consuming water: ~3.5 Earths are needed for the global population if consuming at the rates of the average European or North American.*

pur·pose

/ˈpɜrpəs/

Noun

The reason for which something is done or created or for which something exists.



*A Case Study in Efficiency-
Agriculture and Water Use in the
Yuma, Arizona Area*

February, 2015

Yuma County Agriculture Water Coalition

Commodities & Decommoditization





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they are buying is
extra-long staple





300X

Markets

- “One marketing campaign away”
- Public short memory
- It’s all about moms—safety trumps all
- A crisis or business opportunity
- Politics

Marketing

Making people aware of what we do and making sure we are available to do it for as many of them as possible.

Every contact, communication and experience that people have with us.

Marketing is NOT about buzz and hype.

Answering the phone; sending an email; every time someone uses the organization; every time a company or customer visits; every time a journalist visits; every website; every “error”; every interaction is marketing.

Marketing isn't important so that we “win at business”; marketing is critical because our use of water makes a difference to people and is a critical component of the state's success.

WATER Marketing, Communications and Brand Management

- Is water a major focus of marketing, communications and brand management?
- Maintain image collections that capture marketable messages and makes them available via our digital asset management system
- Approved logos or “marques”, brand alignment
- Develop marketing plans around water
- Maintain “Yuma Water” promotional items for distribution; connect with tourism image (think: Israel greening the desert)
- Coordination with other stakeholder groups: is urban really the “enemy”?
- Yuma water brand management team for user experience and quality assurance
- Take advantage of comparison with the neighbors.

College of Agriculture and Life Sciences

- Engaged in theoretical to practical
- Can take risks
- Need to leave our agenda behind and have been given the privilege to continually learn
- Must expect only the best—must not be a place to hide out because industry has expectations on outputs and outcomes. It should be extremely hard to get and keep a job with us.
- 90% of today's scientific paradigm is wrong—we just don't know which 90%
- Educate a workforce for water management
- Help to make the case as a trusted source of data
- Long view: if CALS' hadn't been doing what it was doing—even when not especially popular—then we wouldn't have the local data.
- Local data is invaluable
- Cannot and should not carry a political load.
- Need to have UA CALS' faculty in the national spotlight

EDUCATION AND CIVIC HEALTH http://www.arizonafuture.org/assets/docs/vision_2025_arizona_comes_of_age.pdf

The level of education achieved by Arizonans is just as important to our civic health as it is to our economic prosperity and quality of life. Education drives 12 of 16 indicators tracked by the Civic Health Index based on U.S. Census data. The following five are representative.

Citizen Participation by Education in Arizona (2012)

	Overall		No HS Diploma		HS Diploma		Some College		BS Degree or Higher	
	AZ	U.S.	AZ	U.S.	AZ	U.S.	AZ	U.S.	AZ	U.S.
Vote	55.9%	61.8%	27.0%	38.0%	43.9%	52.6%	62.1%	64.2%	71.7%	77.1%
Volunteer	23.1%	26.1%	6.6%	9.0%	17.6%	16.7%	23.3%	27.7%	36.8%	39.8%
Attend Public Meetings	4.9%	9.3%	0.9%	2.8%	2.7%	5.2%	5.2%	9.4%	8.7%	15.3%
Work with Neighbors to Fix Something	6.0%	8.4%	0.9%	2.9%	8.4%	5.0%	6.9%	8.8%	7.4%	13.1%
Give to Charity—\$25 or More	53.4%	55.2%	21.2%	30.7%	41.4%	45.5%	61.6%	57.8%	72.3%	71.1%

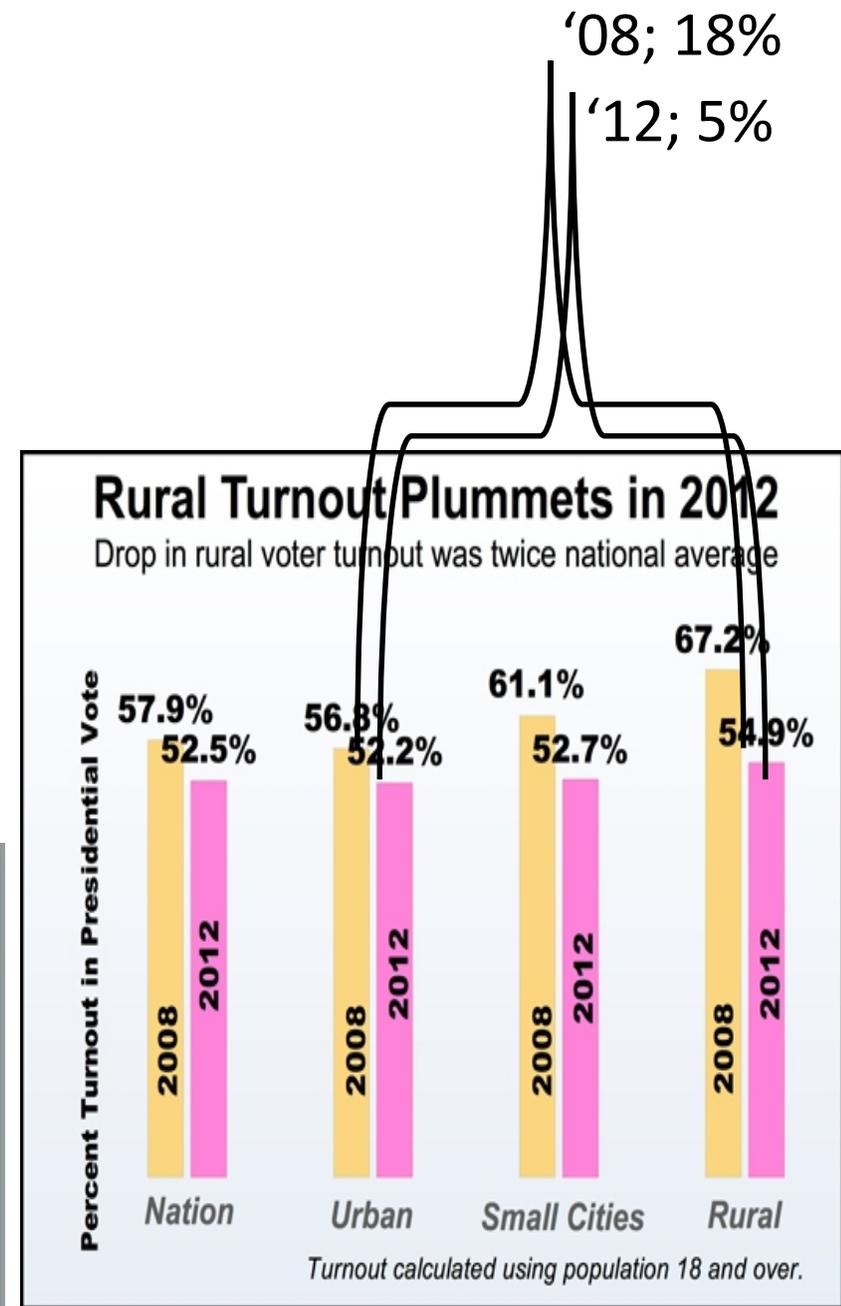
Source: Arizona Civic Health Index, 2013

THE CONSTITUTIONAL IMPERATIVE

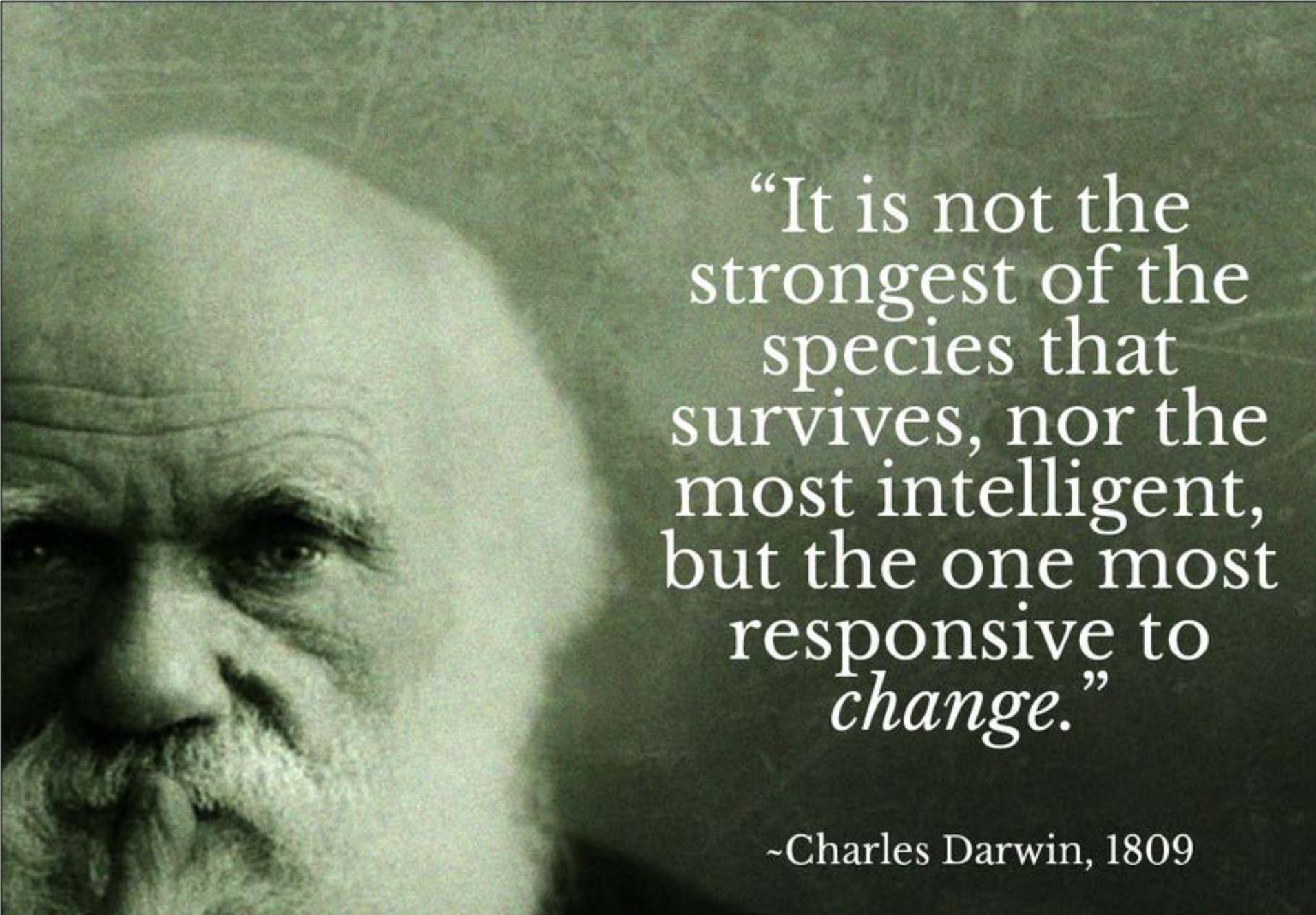
The foresight and commitment of Arizona's early lawmakers is remarkable. A small and largely rural population living on the edges of the frontier established an education system that spanned all levels—from the state's first elementary schools to three institutions of higher education. And it happened decades before statehood.

Project CENTRL
Center for Rural Leadership
<http://www.centrl.org/>

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<http://coloradopeakpolitics.com/2012/12/12/turnout-matters/>



“It is not the
strongest of the
species that
survives, nor the
most intelligent,
but the one most
responsive to
change.”

~Charles Darwin, 1809

Red Queen hypothesis



"For an evolutionary system, continuing development is needed just in order to maintain its fitness relative to the systems it is co-evolving with." (L. Van-Valen 1973)