

A Source of Information for Water Related Issues Across Arizona



SWES People and Programs

Extension Faculty that Focus Primarily on Water Related Issues

- Kathy Jacobs, Executive Director
 - Arizona Water Institute, Professor & Specialist

- Michael Crimmins PhD
 - Assistant Specialist & Professor, Climate Science

- Paul Brown PhD
 - Extension Specialist &, Research Specialist, AZMET

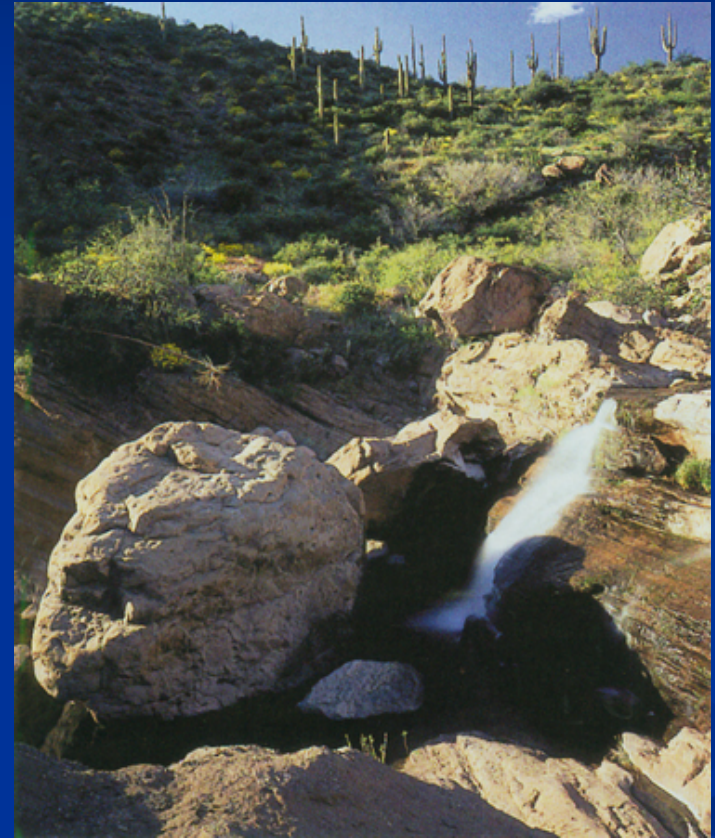
- James Walworth PhD
 - Extension Specialist & Professor

- Charles Sanchez PhD
 - Resident Director YAC, Professor & Research Scientist

- Kevin Fitzsimmons PhD
 - Extension Specialist & Professor

- Janick Artiola PhD
 - Associate Professor & Extension, Research Scientist

- Channah Rock PhD
 - Assistant Specialist & Professor, Water Quality



A landscape photograph of a dry, grassy field with mountains in the background under a clear blue sky. The foreground is dominated by a large clump of tall, thin, light-colored grasses. The middle ground shows a field of shorter, dry grasses and scattered shrubs. In the background, there are several rounded, brownish mountains under a clear blue sky.

Michael Crimmins
Assistant Specialist &
Assistant Professor, Climate
Science

Arizona Drought Impact Reporting System

- The Arizona Drought Impact Reporting System is being designed and built with the guidance of Local Drought Impact Groups (LDIGs)
- The main goal of the DIRS is to ensure relevant impact information collection to meet the need of citizens and counties across the state.
- It is also hoped that the information collected can be used to assess changes in drought status across Arizona and aid in local drought planning and response.

AZ-DIRS: Impact Reporting Entities

- Agricultural Operations
- Livestock Production and Rangelands
- Economic, Cultural, Recreation
- Aquatic Species/Riparian Areas
- Terrestrial Wildlife
- Plant Communities/Ecosystem Function
- Hydrology/Water Resources

Arizona DIRS: Drought Impacts Reporting System

DIRS alpha release

[Home](#) | [My DIRS](#) | [Logout](#)

The Arizona drought impact reporting system is being designed and built with the guidance of Local Drought Impact Groups (LDIGs) to ensure that it collects relevant impact information and meets the needs of citizens in counties across the state. It is also hoped that the information used herein can be harmonized with the National Drought Mitigation Center's "Drought Impact Reporter". The impact information collected through the system will be used in conjunction with hydroclimatological data by the Governor's Drought Task Force to assess changes in drought status across Arizona on a monthly basis. AZ-DIRS will also have tools to summarize and report on local impacts by county to aid in local drought planning and response.

This survey reflects observations of drought impacts from March, 2008

WATER RESOURCES AND HYDROLOGY


Surface Water Impacts

Impact	Impact	Impact Observed?	Comments	Images
A1	Unusually low water levels in reservoirs, lakes, and ponds	<input checked="" type="checkbox"/>		

Monthly to Seasonal Climate Bulletins and Briefings

Issued: September 27, 2006


Southwest Climate Outlook



Source: Barbara Morehouse, UA Institute for the Study of the Environment


Photo Description: Lake Powell is one of Arizona's largest reservoirs and is critical to the state's water supply. It is currently at less than 50 percent of capacity. The bathtub ring was taken last month and shows Lake Powell's "bathtub ring," the lighter colored rock and dark red rock is the high water mark. It was water on the western side of the reservoir between Navajo General Natural Bridge National Monument.

Would you like to have your favorite photograph featured on the Southwest Climate Outlook? For consideration send a photo representing your favorite west climate and a detailed caption to: knelson7@email.arizona.edu



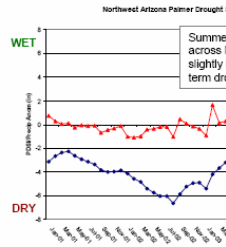
The information in this packet is available on the web: <http://www.southwestclimateoutlook.com>

Northwest Arizona Climate Summary Early Fall 2006



September 24, 2006 – Exceptionally dry conditions experienced across northwest Arizona during the winter of 2005-2006 have given way to near-normal precipitation through the spring and summer of 2006. Precipitation amounts associated with the summer monsoon have been spotty, but generally near normal across central and northern Mohave County. Kingman received 1.58 inches of precipitation during July, which is over a half-inch above the long-term July average of 1.04 inches. Precipitation amounts for July around the Kingman area measured by the Mohave County Flood Control weather station network were from over 8 inches in the Hualapai Mountains to less than 0.15 inches near Yucca, Arizona. Precipitation amounts for the period of May through July were also below normal across southern Mohave County. The office reported only 0.10 inches of rainfall for July which is also been warm across NW AZ for the period of May through July. The period of May through July was 1.5 F above average through the 2006 late spring-summer.

Forecasts for the upcoming fall season (October-November) indicate that the southwest U.S. will see an increased chance for above and average precipitation amounts. A trend toward above normal temperature forecast. The equal and opposite forecast signal on which to base either an adjustment to the fact that fall weather patterns over the southwest U.S. are surface temperatures over the Pacific Ocean. Widespread precipitation is expected to moderate event through the fall. The average winter precipitation for Arizona. Winter time temperature patterns related to the El Niño-Southern Oscillation climate forecasts through the fall to monitor this current situation.




Dry conditions through the fall and winter of 2005-06 could be short-term drought conditions. Near to above average precipitation values to rebound, indicating slight short-term improvement.

THE UNIVERSITY OF ARIZONA



Camera and Voice



Attendee List (1)

My Status

Michael Crimmins

Chat

the jet stream?
NWS Phoenix: Could you revisit the overall wintertime precip pattern for La Nina conditions for the upper Colorado basin?
NWS Phoenix: I apologize. I was referring to percent of normal tendencies
John Fleck: yes


To: Everyone

Fall 2007 Climate Outlook

November 14, 2007

Mike Crimmins

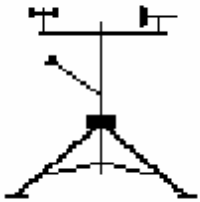
Gregg Garfin





Paul Brown
Specialist, Research
Specialist

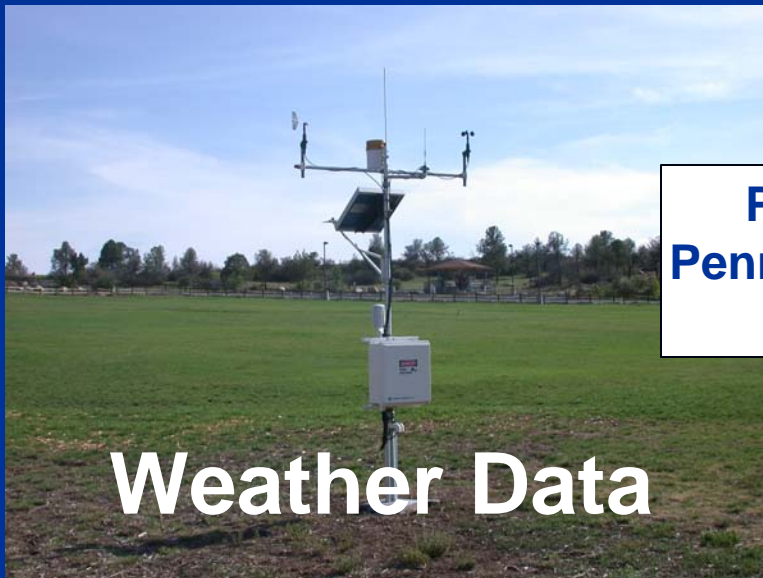
Arizona Cooperative Extension



AZMET



THE ARIZONA METEOROLOGICAL NETWORK



Weather Data

**Penman or
Penman Monteith
Equation**



**Evaporative
Demand**

Extension and faculty personnel within the AZMET program convert reference Evapotranspiration (ET) into estimates of crop and turf water use and provide various reports to clientele.

Crop/Turf Water Use Reports

Available: Email, Internet, Newspaper

Phoenix Area
Lawn Watering Value
NOV 13, 2001

0.23"

is needed on your ryegrass if you watered 3 days ago, unless it has rained.

Phoenix Area Turf Water Use Report

Nov. 14, 2002

Turf: Ryegrass

-----Water Use In Inches For Previous-----

LOCATION	Day		3 Days		7 Days	
	AC	HQ	AC	HQ	AC	HQ
Phoenix Greenway	0.08	0.09	0.22	0.24	0.58	0.64
Phoenix Encanto	0.08	0.09	0.23	0.26	0.59	0.66
Desert Ridge	0.08	0.09	0.24	0.26	0.60	0.66
Litchfield Pk.	0.09	0.10	0.25	0.28	0.63	0.69
Waddell	0.09	0.10	0.24	0.26	0.59	0.65
Buckeye	0.09	0.10	0.25	0.27	0.63	0.69
Queen Creek	0.08	0.09	0.23	0.25	0.64	0.70
Area Average	0.08	0.09	0.24	0.26	0.61	0.67

AC: Acceptable Quality Turf
HQ: High Quality Turf

LAWN WATERING GUIDES

TURF WATER USE REPORTS

Location	Alfalfa		Pecan		Pistachio	
	Last Week	This Week	Last Week	This Week	Last Week	This Week
Bonita	2.3"	2.4"	0.7"	0.7"	0.6"	0.8"
Bowie	2.3"	2.4"	0.7"	0.8"	0.6"	0.8"
Kansas Set.	2.2"	2.4"	0.6"	0.7"	0.6"	0.8"

Research Interests

- Deficit Irrigation
- Irrigation Uniformity
- Impact of Salinity on Golf Courses
- Weighing Lysimeters (Yuma)



Initial Focus: Water Use of Vegetable Crops

A photograph of a baseball field with a chain-link fence and mountains in the background. The field is green with brown dirt paths. In the background, there are mountains, some trees, and a building. The sky is blue with some clouds.

James Walworth
Specialist and Professor

Current Drought Stress Programs/Research

- Turf varieties were subjected to drought stress cycles to evaluate ET demand and ability to withstand drought.
 - Sea Isle 1 seashore paspalum
 - Tifway bermudagrass
 - A138 Inland saltgrass



Program Goals

- What we don't know
 - The minimum amount of water to maintain acceptable turf performance for golf course use
 - How much can we 'cheat' and still have adequate growth and turf quality?
 - What degree of deficit irrigation (less than optimum ET demand) can be applied to various cultivars of bermudagrass and seashore paspalum on Arizona golf courses?

Charles Sanchez
Resident Director YAC,
Professor & Research
Scientist



Arizona Agricultural Experiment Station

Yuma Agricultural Center



Programs of YAC

- **Water Quantity**

Irrigation studies in cooperation with USDA Arid lands Research Center and the USBR.

- **Water Quality**

Contaminants in Colorado River, waste streams discharged into River, and surface waters diverted from river for urban and agriculture use.



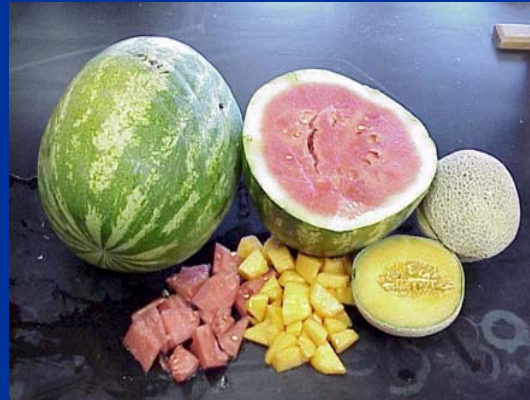
Irrigation

- Weighing lysimeters for ET determination
- Modeling surface irrigation systems to develop management criteria
- Flow measurement for improved management
- Surface Irrigation automation



Contaminants in Surface Waters

- Microbial quality of irrigation water and impact on food safety
- Abiotic contaminants (perchlorate, heavy metals, pharmaceuticals) in surface water and potential food chain transfer



Kevin Fitzsimmons
Professor and Specialist



Aquaculture

Aquaculture is the fastest growing sector of agriculture in the US and globally. It is especially important in arid regions where water is limited and every drop must be used efficiently. U of A has an international reputation as a leader in arid lands aquaculture.



- Multiple use of water for production of aquatic plants and animals and irrigation of field crops.
- Tilapia farming
- Shrimp farming
- Aquaculture in schools

Invasive Aquatic Plants and Wetland Restoration

Protection and restoration of riparian zones in the desert is critical for native species and human residents.

- Aquatic Nuisance Species
- Riparian study, restoration & protection
- Constructed wetlands
- Integrated pest management of aquatic weeds



Watersheds, Phycology, and Water Quality

The study of algae and their role in aquatic systems in the desert has proven to be important to understand native fisheries, the movement of water in irrigation systems and to improving the quality of drinking water.

- Algae impacts on drinking water
- Control of taste and odor problems in municipal water supplies
- Watershed impacts on aquatic biology and water quality

CAP Canal @ Mesa WTP Intake 10/9/96



Use of Saline Wastewater for Halophytes

Salt tolerant plants are used for a variety of purposes and are native to the desert Southwest

- forage crops & ornamental plants
- Restoration & bioremediation
- wildlife habitat & human consumption



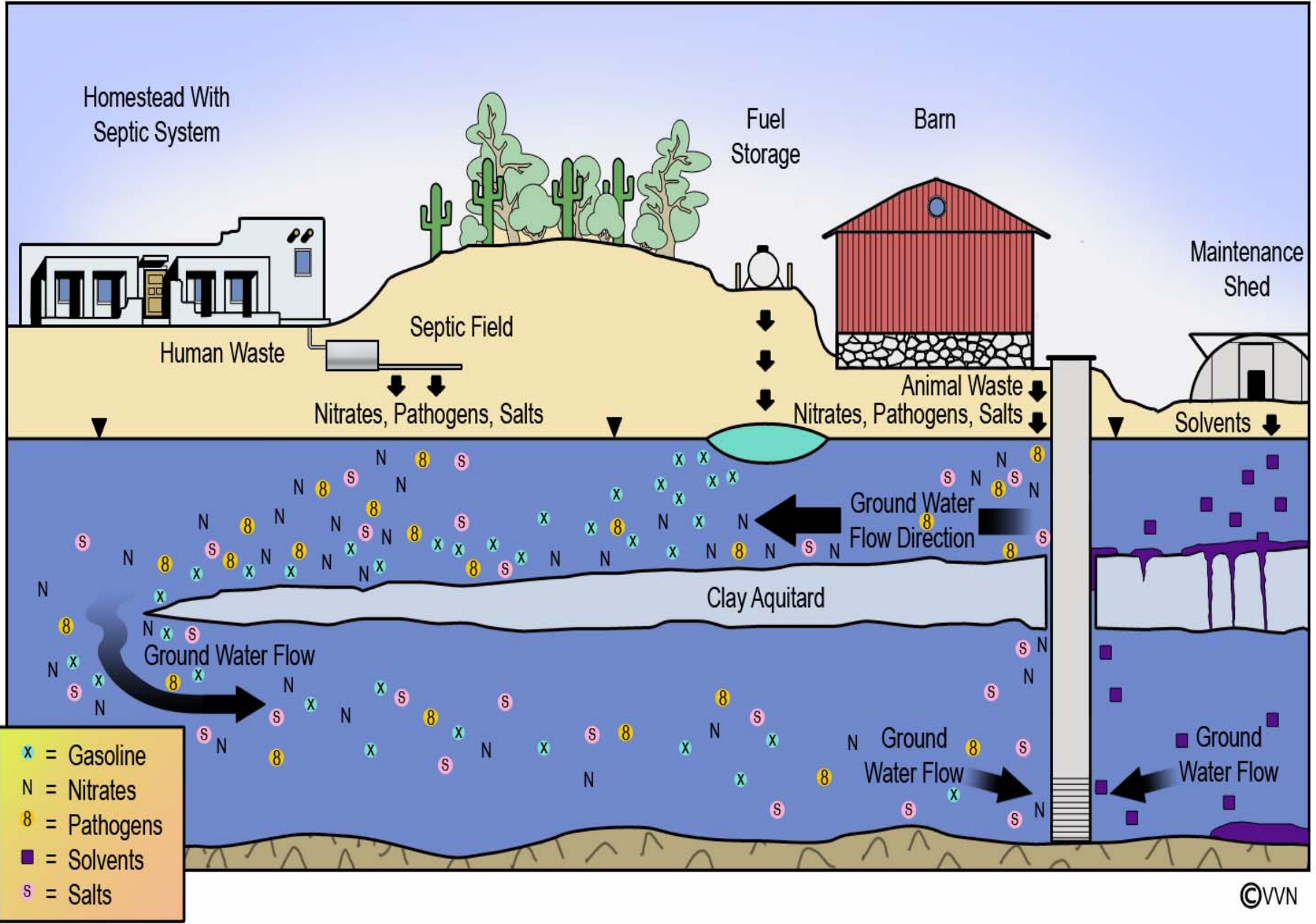
Janick Artiola
Assoc. Professor, Assoc. Research
Scientist and Water Quality Specialist



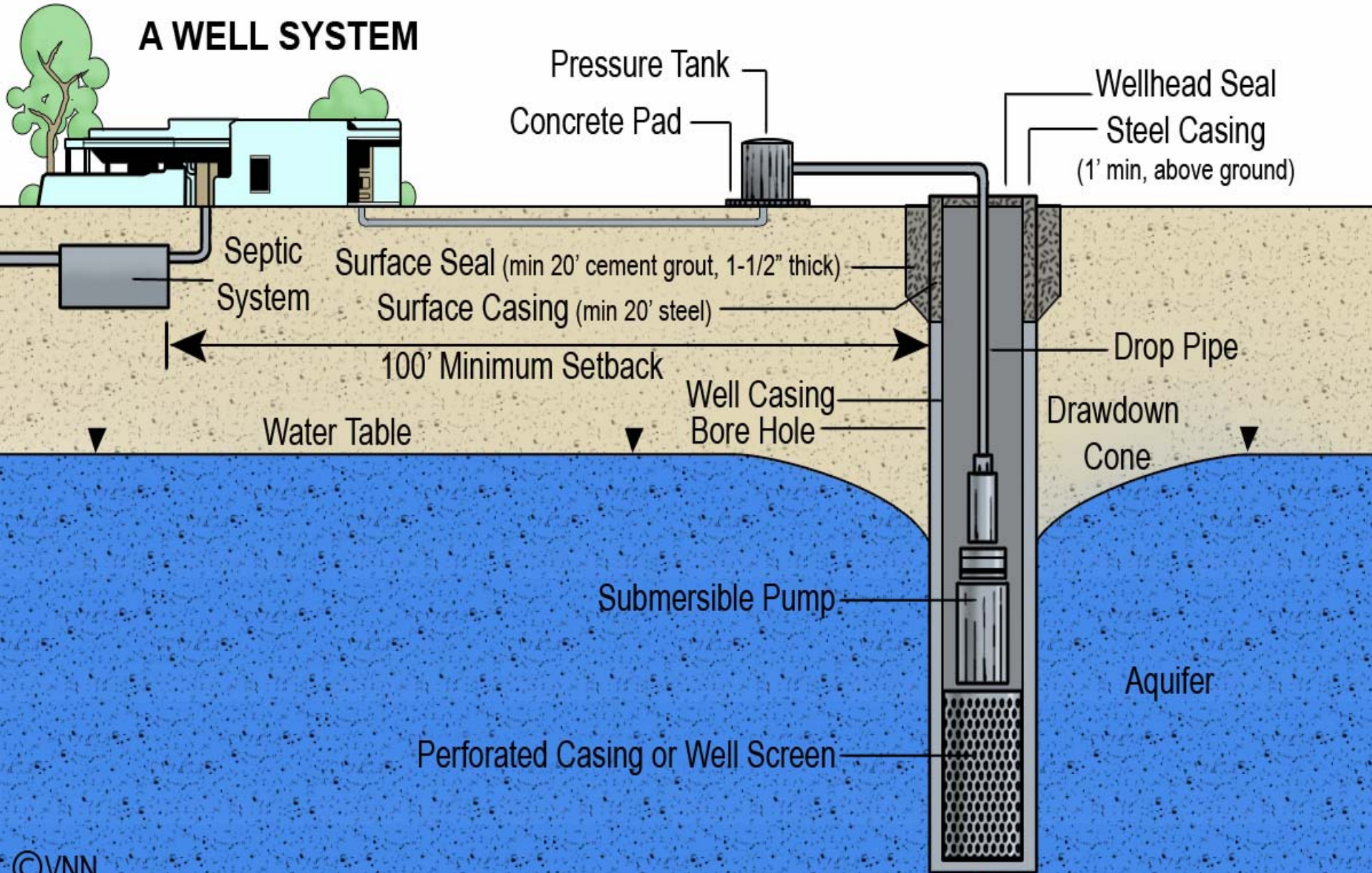
Education/Extension Activities

- Co-director of UA Superfund Basic Research Program Science Translation Core
 - Two Sci Transfer bulletins (co author, English+Spanish versions)
- Extension Specialist
 - Booklet on water treatment for home users (co-author/co-translator, English+Spanish versions)
 - Biosolids in AZ.. Bulletin AZ1426
 - Home Energy tips.. Bulletin: in review
 - AZ Well Owners Guide.. Booklet: in review





A WELL SYSTEM



Research Interests/Publications

- Management of biosolids and water quality-related issues

- Water quality related to organic matter in irrigated semi-arid soils
 - 2006 Carroll, K.C., J.F. Artiola, M.L. Brusseau. Transport of molybdenum in a biosolid-amended alkaline soil. *Chemosphere*. 65:778-785.

 - 2008 O Shaughnessy, S.A., I. Song, J. F. Artiola, and C. Y. Choi. Nitrogen loss during solar drying of biosolids. *Environmental Technology*, Vol 29. 55-65.

 - 2008 Artiola, J.F. Soil Organic Carbon influenced by irrigation water quality in a semi-arid climate. *Comm. In Soil Science and Plant Analysis*. In review.



A microscopic view of numerous green, rod-shaped bacteria, likely cyanobacteria, arranged in various orientations against a dark blue background. The bacteria are elongated and have a slightly textured surface.

Channah Rock
Assistant Specialist and
Professor

Future Water Demand in Arizona

- Increasing human populations are changing the Arizona landscape drastically
- Increased Water Demand
 - Residential
 - Commercial
 - Agricultural
- Questions
 - Quality
 - Quantity



Surface Water Contamination



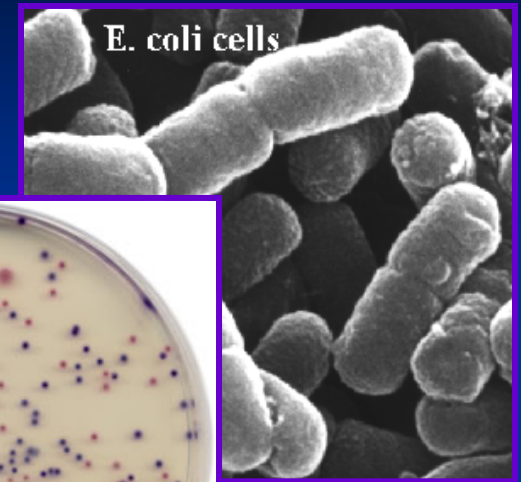
Wastewater

Recreation

Wildlife

Water Quality Programs and Research

- Emerging Contaminants
 - Pathogens
 - Endocrine Disrupting Compounds
 - Pharmaceuticals
 - Personal Care Products
- Microbial Monitoring and Source Tracking
 - TMDL (Total Maximum Daily Load)
 - Antibiotic Resistance
 - Molecular Profiling
- Biosolids
 - Microbial/Chemical Transport
- Reclaimed Water
 - Quality Concerns
 - Identify Benefits
 - Potential Uses
 - Factors that motivate people to use recycled water



Educational Resource



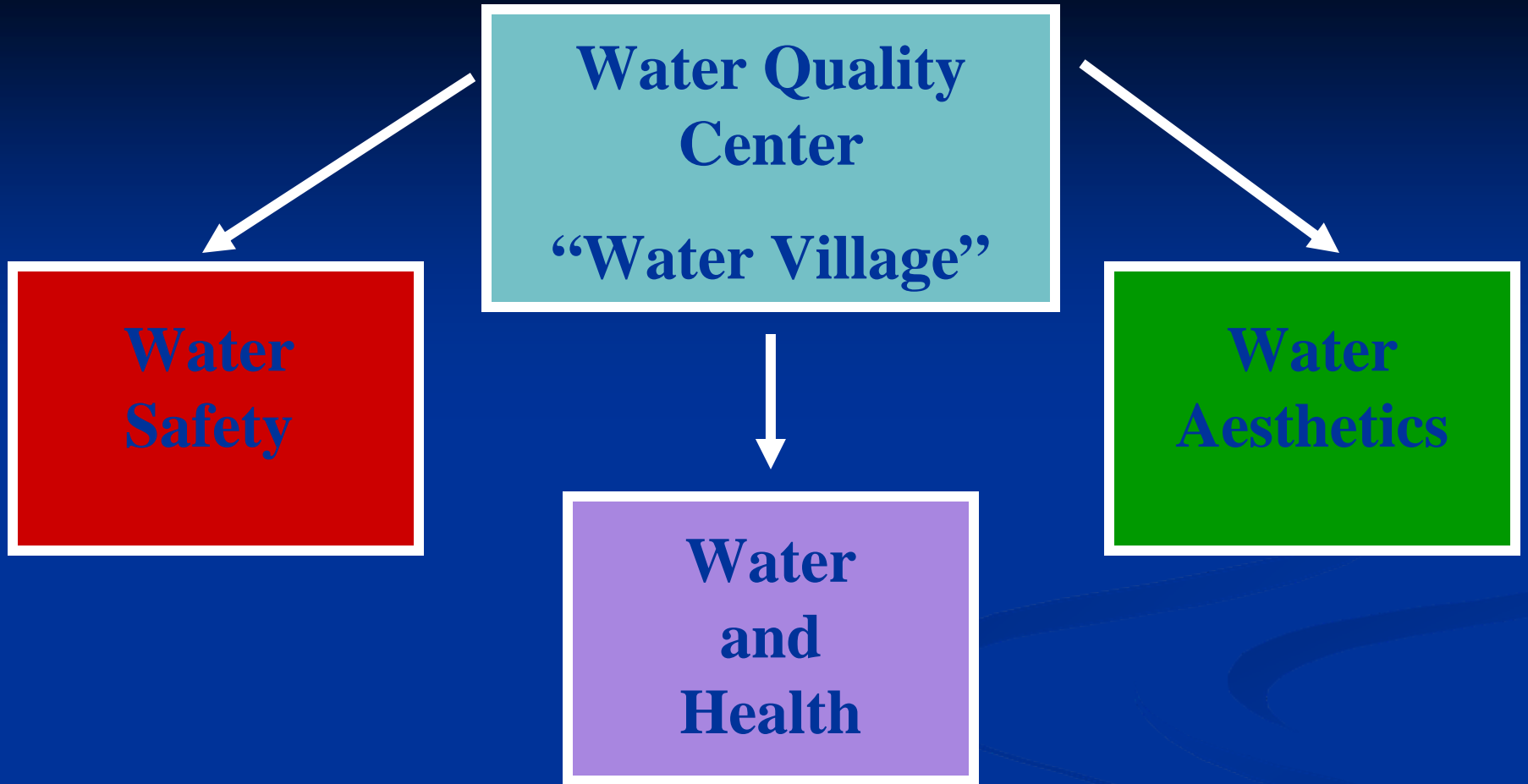
Research
Resource



Water Village

**I.L. Pepper
The University of Arizona**





Research Areas of the 'Water Village'

Water Safety

- Real-time monitoring for water intrusion of distribution lines.
- Development of new technologies
- Intermediate field scale testing at Water Village

Water and Health

- Influence of distribution systems on water quality
- Chemical and biological contaminants
 - opportunistic pathogens
 - endocrines
 - arsenic
 - perchlorate

Water Quality Center Laboratory



The University of Arizona National Science Foundation Water Quality Center

Director
Ian L. Pepper

**An Industry/University
Cooperative Research
Center (I/UCRC)**



Center Outreach

Current Research (U of A)

- **Nineteen (19) projects currently underway**

Research Focal Areas (U of A)

- **Water security**
- **Fate & remediation of commercial industrial contamination**
- **Agrochemical products and practices that influence water quality**
- **Municipal waste treatment and reuse**
- **Mining**
- **Potable water quality**