



Tribal Case Study: Drought Planning

Pala Band of Mission Indians [California]
Drought Planning Efforts

Pala History – established 1875

Water Source

Aquifer / groundwater = sole water source

Mediterranean climate / semi-arid region

Tribal Population

Pop. ~ 1,300 people

Land base: 16,000 acres

San Diego County, CA

Pala Reservation, 1905



Pala Background Info...

Findings - California's 4th Climate Change Assessment

Increased average temperatures

Increased wildfire risk

Longer dry periods

Highly variable winters, with more
intense precipitation & fewer wet
days...**will lead to more frequent &
severe drought periods**

Previous Water Shortages / Droughts:

- 1924, 1931, 1976-1977, 1987-1992, 2007-2009, 2012-2016

Pala's Limited Drinking Water Source

Pala Aquifer – tribe's only
drinking water source

Pala = NOT connected to
outside water sources

More groups using the
same (water) resource

Climate change impacts
will reduce water sources

Increasing tribal capacity means putting more resources into properly quantifying water sources and upcoming climate change risks, as well as developing plans to mitigate those risks.

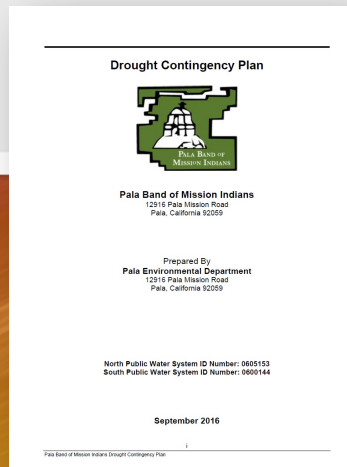


Overview of Pala's Planning Efforts

Initial Planning Efforts

FIRST STEPS

ID & quantify your water resources
How much water do you use/need
Where do you use it?



1

Drought Contingency Plan (2016)

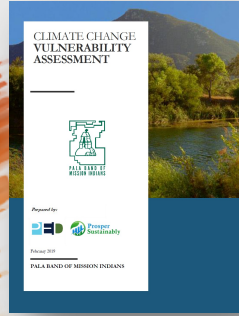
Boilerplate template used (not very specific)
No community input into plan (lacking)

2

Pala's Water Availability Assessment

ID how much groundwater is available to Pala
Surface-GW interaction model computes GW flow and storage.

Initial Planning Efforts



3

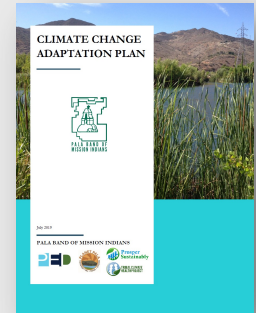
Climate Change Vulnerability Assessment

- ID's the Pala's most significant climate change vulnerabilities, and then ranks those risks/vulnerabilities.
- FINDINGS: Main Vulnerability = DROUGHT (sub-categories: elevated temperatures & wildfire)

4

Climate Change Adaptation Plan

- Develops adaptation strategies to reduce risk /mitigate climate change impacts identified in the Vulnerability Assessment.



Vulnerability
Assessment

Adaptation Plan

DROUGHT

HIGH RISK EXPOSURE



Key Climate Exposure Facts

Drought is defined as a prolonged period of abnormally low rainfall resulting in water deficits and low soil moisture. It is one of the most pervasive climate-induced weather exposures for tribes and can increase the risk of wildfire (see Wildfire) and flooding (see Storms and Flooding). Recent droughts have reached record intensity in some regions of the US such as the Southwest.¹⁴⁷ Climate projections suggest the Southwest may transition to a more arid climate on a permanent basis over the next century and beyond.¹⁴⁸

Although the 2017 rain season was somewhat wet in Southern CA, San Diego County is currently in a severe drought, which is projected to persist.¹⁴⁹ Pala's 2016 Hazard Mitigation Plan indicates that drought conditions were reported in 10 of the last 16 years and are likely in the future.¹⁵⁰ Several survey respondents observed that there has been less rainfall than historically fell in Pala.¹⁵¹ Prolonged low average annual rainfall rates are expected to exacerbate water shortages on the Reservation resulting from growing water demand in the region and a complex history of water diversion by new settlers and legal battles over water rights. Pala staff report that the San Luis Rey River and Pala Creek no longer have regular flow.¹⁵² For purposes of this report, drought exposure resulting from climate change is considered a high risk.

OTHER EXPOSURES TRIGGERED



Wildfire



Storms and flooding

SECONDARY EXPOSURES



Ground level ozone, dust particles/fungus, and allergens



Disease-carrying vectors



Water supply disruption

"I REMEMBER IT USED TO RAIN MORE.
CALIFORNIA'S DROUGHT IS REAL."

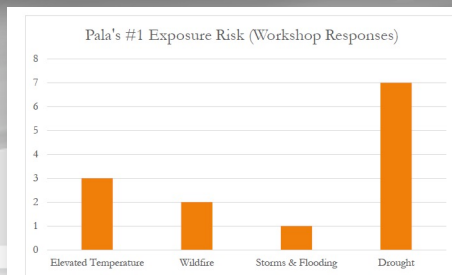
Pala Survey Respondent

Findings from: Pala's Climate Change Vulnerability Asmt.

Exposures Addressed	
Impacts Addressed	


Figure 7: Exposures and Impacts Addressed by Strategy

Primary Exposures	Secondary Exposures
Elevated Temperature	Water Insecurity
Storms & Flooding	Worsened Air Quality
Wildfire	Vector Changes
Drought	Food Insecurity
Impacts	
Health and Social Environment	



WORKSHOP RESPONSES ON PALA'S #1 EXPOSURE RISK



Install automated irrigation systems on agricultural lands that utilize soil moisture monitors that can track when crops need water. Agriculture operators are working with PED and Natural Resources Conservation Service (NRCS) using NRCS, EPA, and Bureau of Reclamation funds to complete this strategy by 2022.

Exposures Addressed	   
Impacts Addressed	 

Build infrastructure needed for aquifer storage and recovery. The Utilities Department will work with PED using a combination of grant and tribal funds to complete this strategy by 2025.

Exposures Addressed	   
Impacts Addressed	  




Identify or implement advanced monitoring/surveillance equipment and processes to allow for real time climate change and exposure detection and alerts (e.g. Aimow.gov, US Drought Monitor, water/food pathogens, ice changes, extreme heat, vector changes). PED is working with the IT and GIS Departments using a combination of grant and tribal funds to complete this strategy by 2022. Recent accomplishments include regular, on-site water and air quality monitoring. PED will pursue additional grant funds to expand and complete this strategy.

Exposures Addressed	       
Impacts Addressed	  






Model agricultural and irrigation water demand. PED is working with Agricultural Operators and using tribal funds to conduct this strategy on an ongoing basis. Recent accomplishments include an updated analysis on the tribe's practicably irrigable acreage.

Exposures Addressed	 
Impacts Addressed	  

Increase water storage capacity. PED is working with the Utilities Department using Bureau of Reclamation funds to expand and complete this strategy by 2022. Recent accomplishments include constructing new storage tanks in 2018 and drilling additional wells in 2017.

Exposures Addressed	   
Impacts Addressed	 

Create Source Water Protection and/or Drought Contingency Plans. PED worked with the Pala Utilities Department and used EPA and tribal funds to complete a Drought Contingency Plan in 2017.

Exposures Addressed	 
Impacts Addressed	  



Pala Reservation, Drying Peppers, 1920-1930's



Next Steps....

What came out of our plans & how are we using it?

Pala's Drought Contingency Plan & Other Drought Tools

Filling In Data Holes

GOAL

To more accurately measure both our water inputs (sources) AND how we are using our water here so that we can identify when/how to conduct water conservation efforts here.

Measures usage

1 Install Smart Water Meters

Allows real-time access to community water usage (by both Utilities AND homeowners), leak detection, and ranked usage within community

Measures inputs

2 Automate GW Measurements

Install water depth well sensors to continuously monitor GW levels

3 Precip./Stream Measurements

Upgrade rain and stream height gages throughout reservation, to more accurately measure water input & improve flood warning

Developing Drought Tracking Tools

4

Develop Drought Management Tool

This web-based GIS water resources decision support tool for the tribe to help identify when we are in drought, and provide mitigation actions. This will provide real-time data on current water levels, and water usage in the community.

Tool will be available for the tribe's Utilities Department, Environmental Department, and the Tribal Council. This allows the tribe to prepare for various drought scenarios.

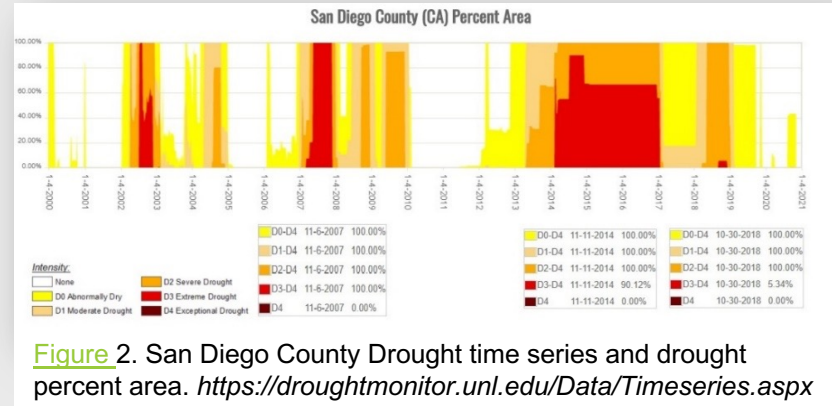
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Determine Ag Irrigation Needs

Determine proper irrigation needs at agricultural operations during a drought. Ties in with web-based GIS Tool.

Goal – to establish a task force (includes tribal departments & community, and other local stakeholders) and develop a new Drought Contingency Plan together.

Pala's Drought Contingency Plan – major update



PLAN MUST INCLUDE THE FOLLOWING 6 ELEMENTS:

- Drought Monitoring
- Vulnerability Assessment
- Mitigation Actions
- Response Actions
- Operational & Administrative Framework
- Plan Development & Update Process

Source: Bureau of Reclamation's 6 requirements of the Drought Response Program Framework & Directives and Standards

<https://www.usbr.gov/drought/docs/2019/FY19DroughtResponseProgramFramework.pdf>



Pala Reservation, old village & Pala Mission Church bell tower



Resources / Grant Funding

BIA = Bureau of Indian Affairs
(open to tribes in western states)

BIA Grant Funding

1

BIA Water Resources Programs

There are many BIA grants that we used to develop our Climate Change Vulnerability Assessment & Adaptation Plans

<https://www.bia.gov/bia/ots/tribal-climate-resilience-program>

2

BIA Climate Change Programs

BIA Tribal Climate Resilience (TCR) Program

- Can cover adaptation planning; capacity building; ocean and coastal management and planning
- Next due DEC 17, 2021
- Solicitation: <https://www.grants.gov/web/grants/view-opportunity.html?oppld=336222>

BOR = Bureau of Reclamation
(open to tribes in western states)

BOR Grant Funding

Water and Energy
Efficiency Grants

Water Marketing
Strategy Grants

Small-Scale Water
Efficiency Projects

Environmental Water
Resources Projects

Title XVI

Desalination

Basin Studies

Baseline Assessments

Reservoir Operation
Pilots

Applied Science
Grants

Cooperative
Watershed
Management Program

Drought Program

Water Conservation
Field Services
Program

3

WaterSMART Drought Programs

Many different drought-related grants/funding & technical assistance resources are available to tribes here.

<https://www.usbr.gov/watersmart/>

4

BOR grants we have used....

Drought Response Program - Resiliency Program

- Develop drought management/planning tool
- Install smart water meters, GW depth tools, stream gages

Applied Science Grant

- Develop agricultural irrigation management tools
- Hydrologic data acquisition

Drought Contingency Planning Grant

- Update our Drought Contingency Plan

Other Hazard- Related Grant Funding

5

FEMA's Hazard Mitigation Grant Program (HMGP)

Cal OES (Office of Emergency Services) – provides funds to implement mitigation activities for hazards, like drought. There's a new grant opportunity that can be used to develop Local Hazard Mitigation Plans.

2021 California Hazard Mitigation Grant Program

<https://www.caloes.ca.gov/RecoverySite/Documents/HMGP%20NOFO%20-%2010.27.2021.pdf>

6

Other grants we have used....

National Indian Health Board (NIHB) – Climate Ready Tribal Resources

- Adaptation Planning Grants
- https://www.nihb.org/public_health/climate_resources.php

Other Resources & Tools

1

NOAA/NIDIS Drought Group

National Integrated Drought Information System (NIDIS) Program. This group works on all manner of drought related monitoring, forecasting, planning, etc. They have so many great tools/resources/partnerships.

Sign up for their newsletter or monthly webinars!

<https://www.drought.gov/about>

2

Drought Contingency Plan templates

Templates available from:

- RCAC - www.rcac.org
- SWRCB (state water resources control board)
- Look up your local state & county DCP's, and ask what other local tribes have done.
- USBR's DCP Framework - <https://www.usbr.gov/drought/docs/2019/FY19DroughtResponseProgramFramework.pdf>

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Pala Reservation, during a wet year, 2010