

Indigenous Responses to Climate Change

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Native worldview

- Religion and ritual were intertwined with the production cycles of nature.
- Human interaction enhanced the carrying capacity of the ecosystem
 - Plantings/harvest techniques
 - Fire
 - Wetland Engineering

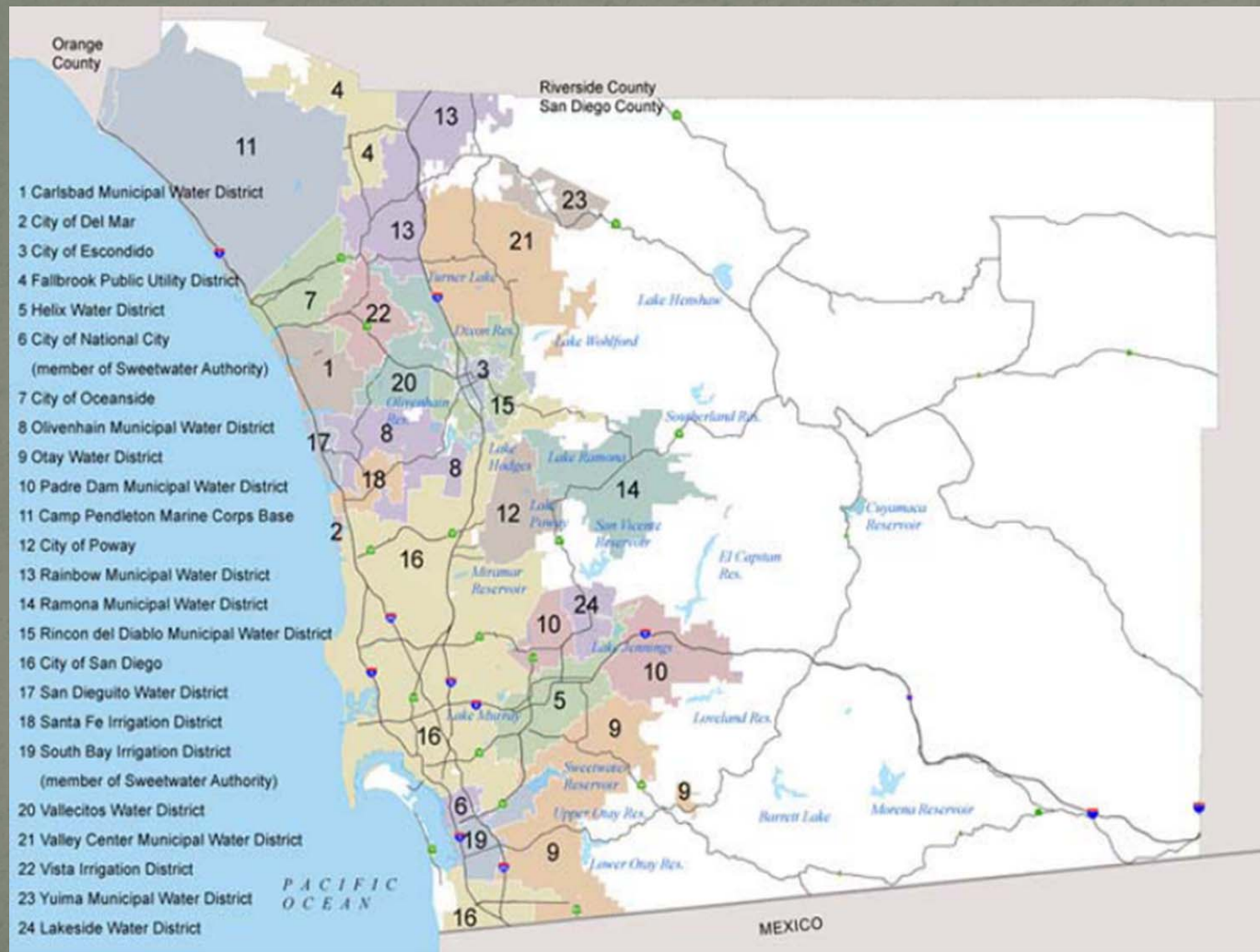
Loss of traditional water resources

- Reservoirs – up to 8 acre-ft per acre loss to evaporation
- Loss of stream covers – increase water temperature
- Introduction of exotics
- Draining of wetlands
- Increase speed of drainage – reduced storage in decomposed granite.

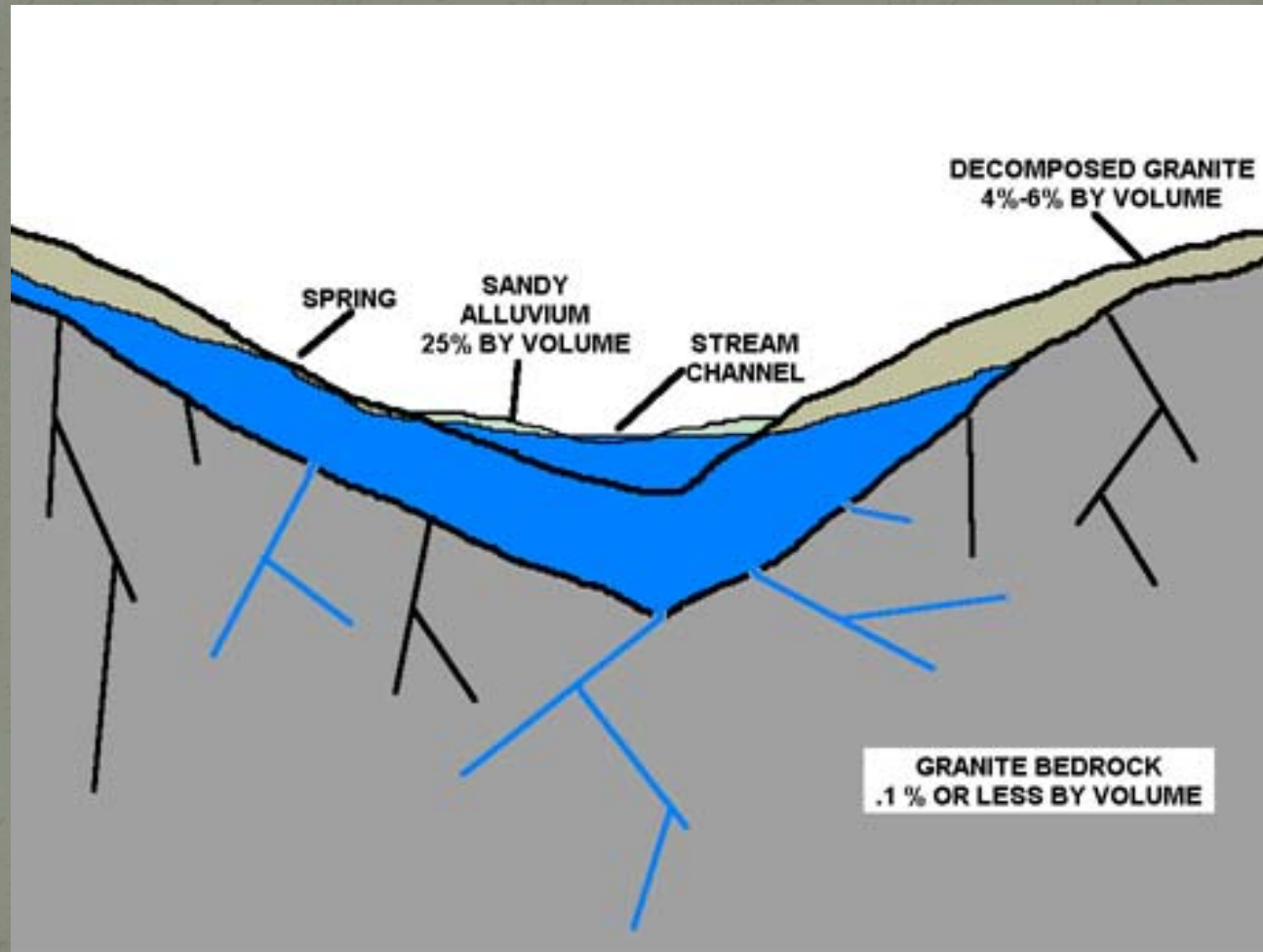
Modern Views of Water

- Water Quantity
- Water Quality
- Surface Water
- Ground Water
- Endangered Species
- Agriculture/cattle
- Individual usage

San Diego County Water Districts



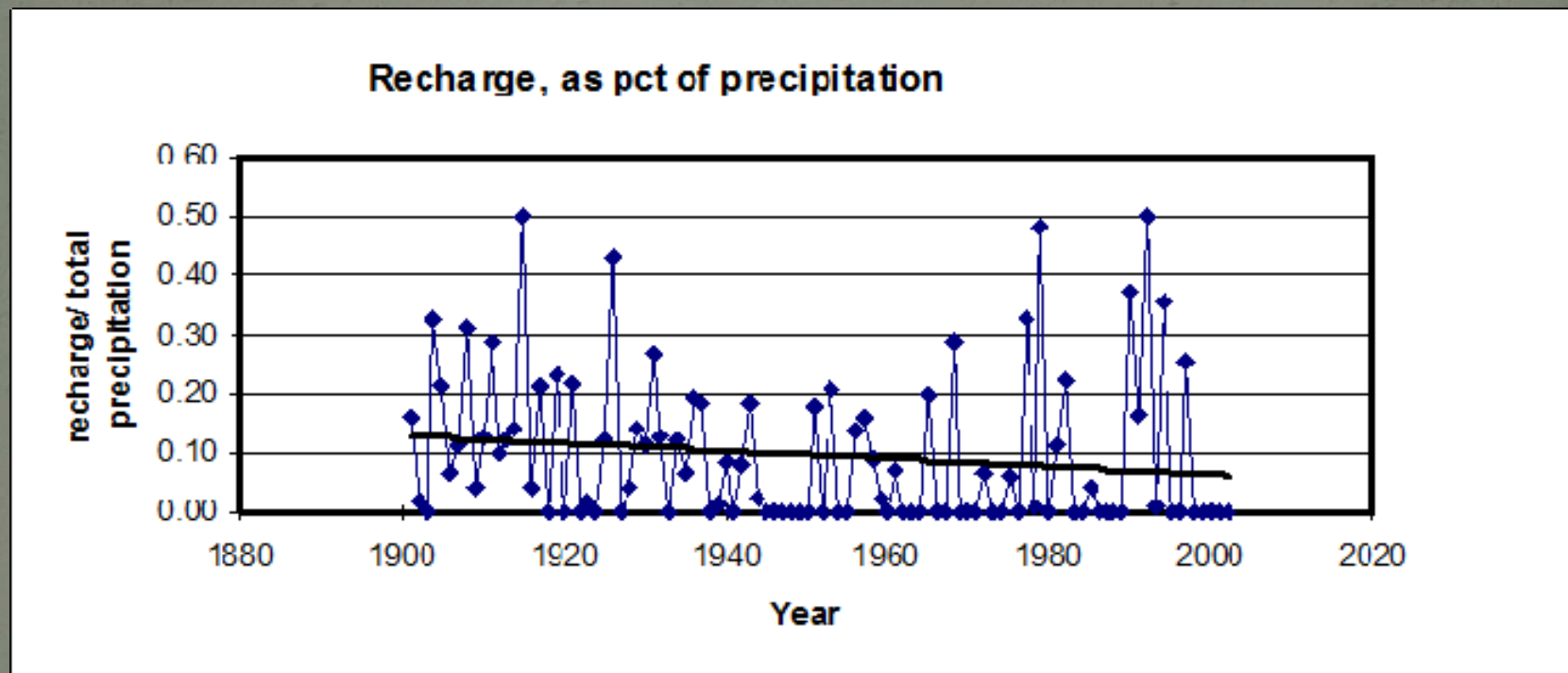
San Diego County's Quantification Modeling



Basic Assumptions

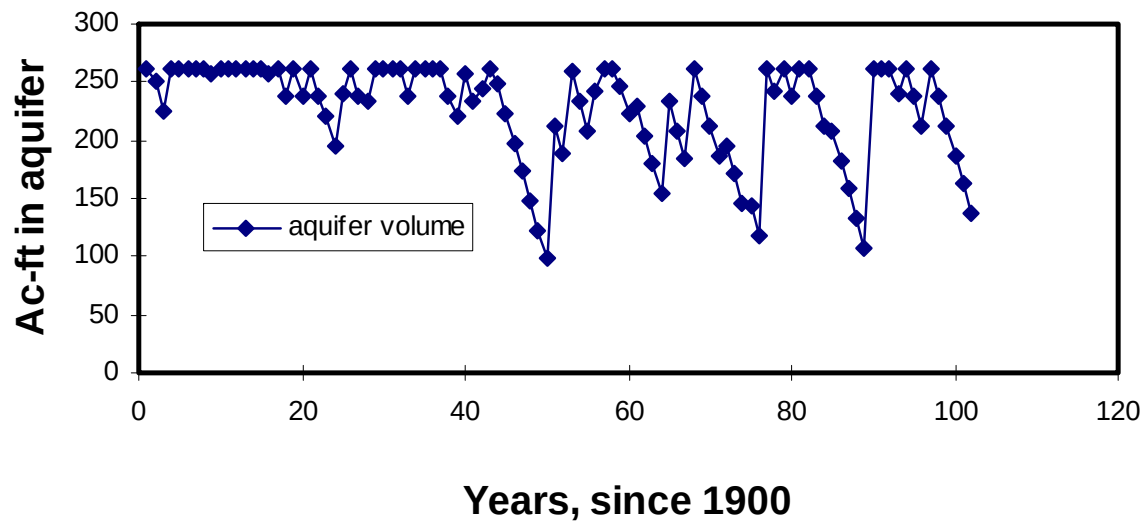
SM cap.		3.50	Inches		
runoff	0.3	30	%		
storage	0.050	5.00	percent eff porosity		
aq area	350.000		acres		
aq_depth	30.000		feet		
capacity	262.50		Ac-ft (50% allowed)		
ext. rate	25.00	15.50	Acft/yr or gpm (24 hr/day)		
min vol	97.65		driest condition occurred 1976		

Previous 100 years real data



Basin depletion estimate

**Long-term Water Balance,
Example Basin Drainage**
617 Acres, 40.29 gpm (24 hr/day)



Impacts to Indian Nations

- Model uses tribal lands in quantifying availability, does not include future tribal needs.
- Model does not address depletion impacts on biological resources. May trigger critical habitat designation that may affect tribal usage of resource.
- Model does not address water quality issues.
- Model assumes last 100 years as baseline.

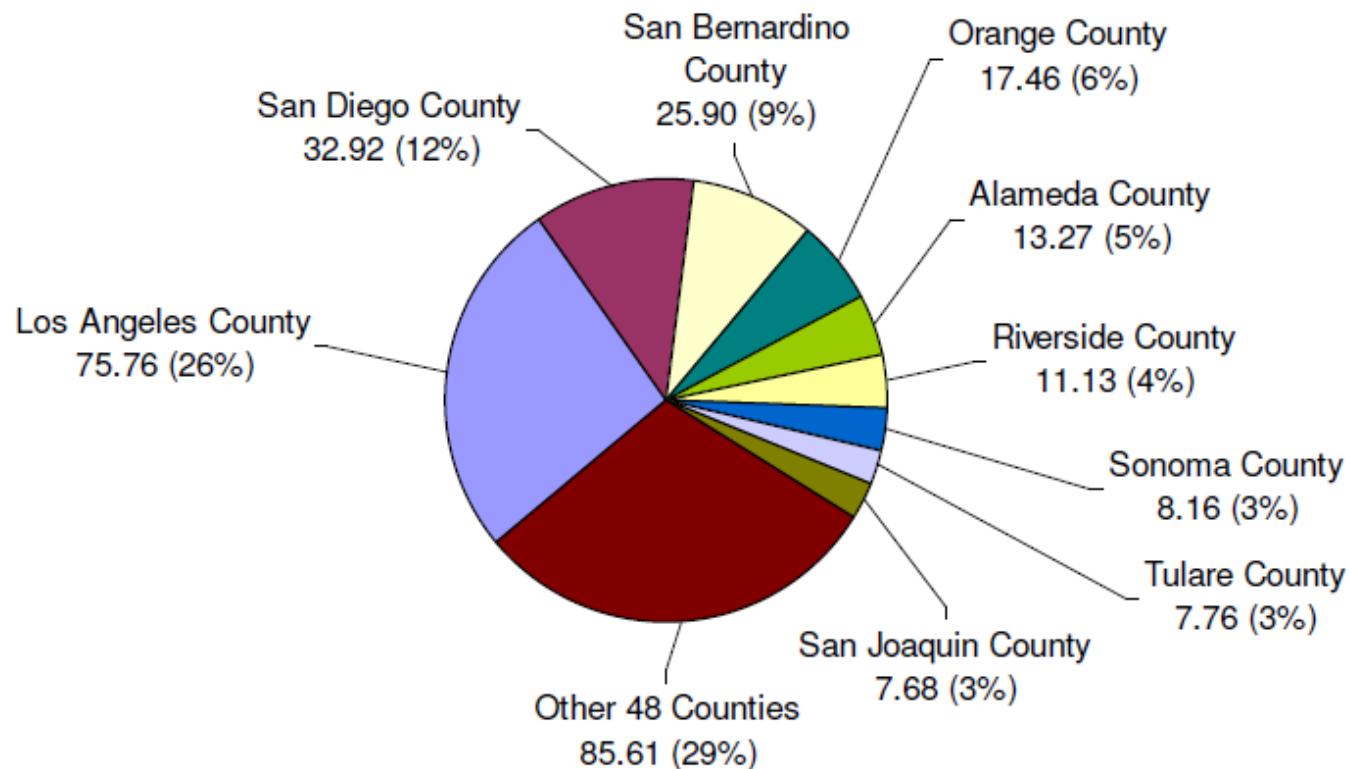
Water Quality

- Long term trends show increasing concentrations of natural contaminants
- Individual wells are only minimally tested.

GAMA- California Water Boards

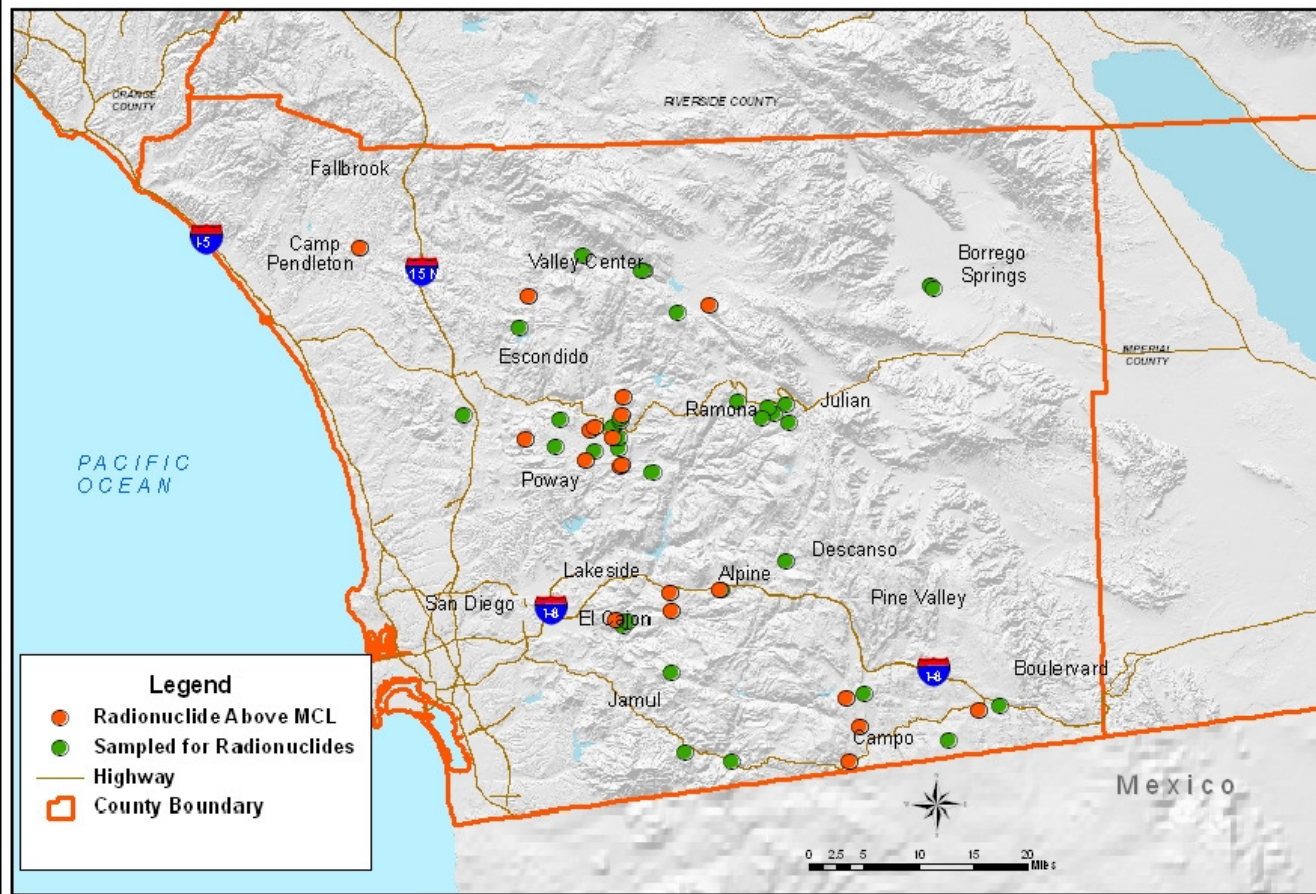
Groundwater Ambient Monitoring and Assessment

**Domestic Water Use, Total Self-Supplied Withdrawals
(Mgal/day)**



Radionucleide

Groundwater Ambient Monitoring and Assessment (GAMA) Domestic Well Project San Diego County Focus Area 2008-2009



Regulation of individual wells?

- Individual regulation fiercely opposed
- Confidentiality of well logs and sounder data.
- Testing for all regulated constituents
- Agricultural usage unregulated
- Cattle exemption

Reversing the trend



Rock Drop Structures



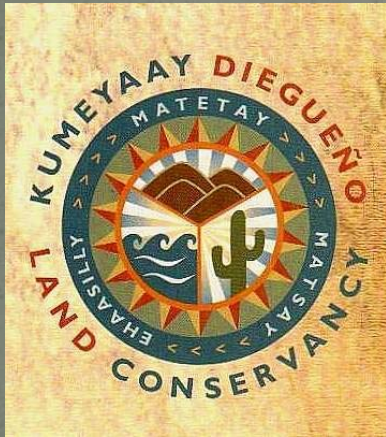
Recovered Riparian Area



Western Science vs Traditional Ecological Knowledge

- WS-Short term data from many sites
- TEK – long-term observation from a single site.
- Restoration or affirmative management
- Natural law – movement toward balance as part of the covenant with Mother Earth

Land Conservancies – Moving Beyond the Reservation



InterTribal Sinkyone
Wilderness Council



Maidu Summit
Consortium

Eyak Preservation
Council

Indian Country
Conservancy

Mutsun Land Trust

Indian Land Tenure
Foundation

Emuht Mohay – Love of the Land

- Humans have been an integral part of healthy ecosystems.
- Proper human interaction is necessary to maximize benefits to natural resources.
- Restoration is more than “freezing” a habitat damaged by years of grazing or agriculture.
- Selective harvesting or culling, done under approved standards can create a healthier ecosystem.
- Cultural resources are essential to understanding the proper restoration strategy.

Past Transitions

- Submerged sites
- Paleo culture
- Shellfish culture



Fire Mosaic

- Diversity
- Carrying capacity
- Transitional plants
- Scarification



Rock drop structures

- Enhance groundwater recharge
- Stabilize stream flow
- Create riparian habitats
- Supply food, medicines & building materials
- Resurrect craft industries

Benefits of Cultural Integration

- Traditional uses can give important information on the sustainable uses
 - Adaptations to climate change
 - Productivity of ecosystem
 - True climax vegetation – From Restoration to Sustainability
 - Village sites give important information of past riparian and wetland areas
 - Traditional harvest and planting may be essential

Partnerships/Coordination

- Kumeyaay Cultural Repatriation Committee
- Inter-Tribal Cultural Resource Protection Council
- Wildlife Conservation Board
- US Fish & Wildlife – Tribal Wildlife Grant Program
- Cuyamaca State Park
- Back Country Land Trust
- National Native Land Trust Alliance Steering Committee
- San Diego County Parks & Recreation
- California Department of Fish & Game
- US Bureau of Land Management
- San Diego Association of Governments



Kumeyaay Heritage and Habitat Conservation Project

Goal: To expand Kumeyaay cultural knowledge and natural resources management.

1. To preserve Kumeyaay heritage and wildlife habitat through education and land management.

2. To connect wildlife corridors to surrounding state and federally managed wildlife refuges.

3. To create partnerships between tribal and non-tribal land managers for species and habitat protection across the region.

Work Plan (Tasks)

Natural Resource Management

1. Perform Baseline Surveys of onsite biological and cultural resources
2. Establish Photo Points and Vegetation Sample Plots for annual monitoring

Learning Landscapes Education Program

1. Design curriculum
2. Select student participants
3. Facilitate field trips with tribal elders
4. Design educational panels
5. Evaluate future education program partnerships

Short-term Deliverables (End of Project Phase I – Years 1-2 of current grant application):

Natural Resource Management

1. Compile results of Baseline Surveys
2. Compile documentation of Photo Points and Vegetation Sample Plots
3. Prepare Area-Specific Adaptive Management Plans
4. Identify opportunities for future grant funding

Learning Landscapes Education Program

1. Student participants complete program
2. Post educational panels onsite
3. Program graduates participate in baseline surveys and monitoring
4. Coordinate a meeting with future educational program partners

Long-term Deliverables (Project Phase II – Future grant or partnership funding opportunities):

Natural Resource Management

1. Refine, adopt, and implement Area-Specific Adaptive Management Plans
2. Continue annual monitoring of Photo Points and Sample Plots
3. Design and implement water quality monitoring program for Lake Emma consistent with the terms of the Natural and Cultural Resources Management Plan

Learning Landscapes Education Program

1. Design and implement educational program with partnering tribal and non-tribal land managers

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