Mescalero Apache Tribe:
Innovative approaches to climate change adaptation

There is no disagreement that the climate in the Sacramento Mountains has been getting warmer and dryer in recent years. Indeed, the temperature and drought regimes of late have been described as extreme by state meteorologists. The winter season, the period of time between the first freeze and the last freeze, has grown shorter, while Indian Summers, the time between the beginning of fall and the first freeze has grown longer. The overall temperature during the spring and summer is higher, and the duration of both seasons (winter and Indian Summer) is longer. Other measureable observations include changes in annual rainfall patterns. For instance, the monsoon season is arriving later in the year, and the average duration and frequency of rain during the monsoon season has decreased. Local meteorological records reveal that 2011 ranked 2nd lowest in annual precipitation since the start of meteorological record keeping in the region. Similarly, 2012 ranked 6th lowest for annual precipitation. Not surprisingly, the past two years combined constitute the worst 2-year drought period in recorded history.

Photo: Corn stalks in the community garden

In addition to fluctuations in the local climate, residents have observed ecosystem wide changes around Mescalero Apache tribal lands. One particular area of concern is the increased frequency and intensity of wildfires in the area due to exceptionally dry forest conditions. Bark beetles too, are impacting forest ecosystem health. According to local environmental professionals, the bark beetles have become increasingly lethal in the already drought-compromised forests. The tree kill from bark beetle infestation has in turn created more fuel for wildfires, which perpetuates the cycle of forest degradation.

Mike Montoya of the Mescalero Apache Tribe serves as Director of the MAT Fisheries Department, executive director of the Southwest Tribal Fisheries Commission, and project leader for the Sovereign Nations Service Corps (SNSC), a Mescalero-based AmeriCorps program. During his many years of experience working on natural resource management, Montoya has observed climate-driven changes to the landscape. For instance, he explains that "the alpine life zone island ecosystem surrounding Sierra Blanca seems to be shrinking and moving higher [in elevation] up the mountain." In response to the regional precipitation and temperature changes, Montoya insists that, "these observed trends have occurred over a decade or more and are not isolated, stochastic events."

Mike and his dynamic team of hatchery staff and AmeriCorps[1] volunteers have been busy creating innovative solutions to complex, climate-driven challenges. Mike states that while the

[1] Several of the climate change adaptation projects have been undertaken by the Sovereign Nations Service Corps (SNSC), an AmeriCorps project based out of the Mescalero Tribal Fish Hatchery (MTFH). The MTFH, meanwhile, is currently operated under a Memorandum of Agreement between the Southwest Tribal Fisheries Commission (SWTFC) and the Mescalero Apache Tribe (MAT).

Mescalero Apache Tribe does not currently have a specific climate change program or policy relating to climate change adaptation, the tribe has undertaken several environmental initiatives to help bolster tribal resilience to climate change impacts.

Landscape Conservation
Project Implementation and Progress

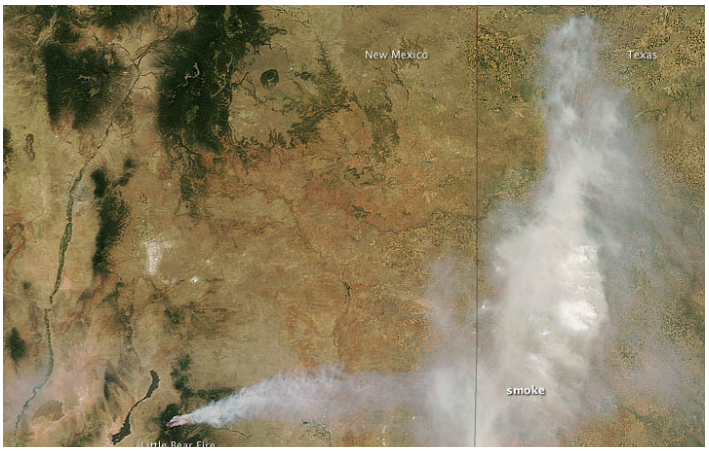
Removal of Exotic Species

In partnership with the Division of Resource Management and Protection (DRMP), Mike's team has been working to remove exotic trees, primarily Chinese Elm, from tribal lands. The exotics removal project supports watershed restoration and provides firewood to community members. In an effort to reduce both organic waste production and the need for cutting healthy forest for firewood, hatchery staff buck and split the exotic trees that have been removed. After drying for 6 months, staff members distribute the firewood to elders in the community.

Photo: SNSC volunteers sort firewood from the exotic species removal project

Fuels Treatment Project

On Mescalero Tribal forest lands, managers evaluate and thin forest stands, then utilize the biomass from thinning projects. The tribe works continually to adapt the prescribed treatments to the prevailing weather and climatic conditions. Tribal managers also work in conjunction with the US Forest Service, with whom they share common boundaries and watershed oversight.



NASA Space Observatory MODIS image of the 2012 Little Bear Fire in New Mexico

Over the past decade, the tribe has succeeded in reducing wildfire fuels through the implementation of effective prescribed thinning treatments. Already the fuels reduction treatments have proven beneficial for the tribe. For instance, during the Little Bear Fire – one of the largest wildfires in New Mexico's history – Governor Martinez complimented the tribe on their forest management techniques. It seems that the reduction over time in dead and downed fuel on tribal lands served as excellent protection from catastrophic wildfire.

This ongoing project is funded by the US Forest Service.

Energy Efficiency and Renewable Energy Project Implementation and Progress

Energy Efficient Woodstoves

In 2009, the Mescalero Apache Housing Authority was awarded a $120,900 grant from the US Department of Energy to replace old wood burning heaters and stoves with new energy efficient woodstoves. The program, which reduces greenhouse gas emissions and increases in-home heating efficiency, is geared primarily toward the elderly and low-income families.

Solar Energy Experiment

More recently, the tribe received a $10,000 Tribal Climate Change grant from the Bureau of Indian Affairs for an experimental solar energy installation. Already the grant monies have enabled project managers to begin construction of a photo voltaic (PV) grid-tied, 125-volt system to pump water from a storage pond to the community garden and farm. In addition, project staff members have successfully constructed a 12-volt, off-grid system which powers lights in and around the tribal hatchery.

As for the experimental component of this solar project, the PV installation will tie into the electric provider's network, so that in addition to producing power to meet local demands, the tribe will be able to sell back 208-230 volts of electricity to their current energy supplier. This installation will reduce the tribe's overall electrical costs while supplying the energy required to pump water for the community garden, local residences, and the hatchery. Prior to expanding the solar energy program, managers will have to conduct a cost benefit analysis, in which they will consider savings accrued, large-scale applicability, and future energy demands.

Wind Energy Project

The tribe has recently voiced interest in pursuing a wind turbine installation, which could serve as both an educational tool and an added source of renewable, clean energy.

Fisheries Management and Water Quality Project Implementation and Progress

Influences of a Changing Climate on the Persistence of Rio Grande Cutthroat Trout

The Mescalero Tribe is a member of the Rio Grande Cutthroat[2] Conservation Team, which is made up of representatives from federal and state fisheries management agencies as well as tribal and non-profit organizations. The conservation team meets annually to discuss progress made to protect and expand habitat for Rio Grande Cutthroat Trout (RGCT) as well as reintroduction efforts. The Mescalero Tribal Fish Hatchery has contributed to the Conservation Team in a variety of ways over the years. For instance, recently the Mescalero hatchery retained several suspected RGCT populations while DNA analysis was conducted to genetically confirm the population's species composition.

In addition, the Mescalero Apache Tribe contracted the Fisheries Department at New Mexico State University (NMSU), and the New Mexico Fish and Wildlife Conservation Office to

[2] The Rio Grande Cutthroat Trout (RGCT), a cold water trout species native to Colorado and New Mexico, is a candidate for listing under the endangered species act

undertake a study to determine the suitability of RGCT habitat in the Rio Ruidoso whose headwaters are located on the Mescalero Apache Reservation. Dr. Colleen Caldwell and NMSU graduate student Matt Zeigler are leading the effort to determine the potential influences of changing climate on the persistence of RGCT throughout its native range, including the Mescalero Apache Reservation.

This study was made possible with funding from the Fish and Wildlife Service's Tribal Wildlife Grant Program.

Water quality improvement and nutrient recycling at the Mescalero Tribal Fish Hatchery
In the past, water discharged from the Mescalero fish hatchery went directly into South Tularosa Creek. This practice led to unnatural nutrient loading into the creek and increased the potential for pathogen transmission from the hatchery into surface waters. In response to this environmental and ecological concern, the SNSC constructed a ½ acre settling and clarifier pond to capture hatchery discharge and retain settleable solids and nutrients before returning the water to the creek. This improves the water quality at the discharge point and downgradient. In addition, the nutrients that are settling in the pond can be used as fertilizer in the community garden located at the fish hatchery.

In preparation for another catastrophic flood event, as well as to conserve hatchery water, project leaders have crafted a multi-year long project to treat and reuse discharge water. Technicians will apply filtration, remove ammonia, add oxygen, and cycle the reclaimed water back into the hatchery. These conservation techniques are sure to benefit the hatchery, which is tasked with meeting the recreational fisheries demands of 17 tribes.

Funding for this project is provided through the BIA 638 Contract Southwest Tribal Fisheries Grant and BIA Hatchery Maintenance funding with some minor assistance through U.S. EPA.

Water use / conservation on the Mescalero Tribal Fish Hatchery
As with many tribes and municipalities in the desert Southwest, water scarcity is a serious challenge for the Mescalero Apache. If the integrity of the water used to operate the hatchery is compromised, the results could be devastating. Indeed, in 2008 a devastating fire and subsequent flood wreaked havoc on the hatchery when ash and silt came pouring through the water intake that supplied the hatchery tanks. At the time, surface water was piped directly into the hatchery. That singular event resulted in a 65% fish kill and according to Mike Montoya, "had it not been for the Youth Conservation Corps that literally jumped in to remove dead fish and keep the screens clean, we would have certainly lost all the fish and the facility as well."

Following the disaster, the team used funds from hatchery maintenance as well as the Federal Emergency Management Agency (FEMA) to construct a ¼ acre cement lined storage pond, and a 2,300' 6" pipeline to capture surface water from South Tularosa Creek and divert it to the pond. Overflow from the pond returns back to the stream but not before the water is again used to fill and support a small recreational pond. The water in the storage pond is used both for the hatchery and for local irrigation. Mike Montoya explains that "the plan in the event of another flood, would be to shut off the intakes where we normally get the water. This would prevent the silt and ash from coming in contact with the fish and would give us about 45 minutes worth of water cycling through the hatchery."

Spring Water Capture

As an additional preventive water quality measure, the Sovereign Nations Service Corps (SNSC) team has captured and diverted a nearby spring with a flow of 30 gallons/minute and redirected the water, via a 3,500', gravity-fed pipe, into the fish hatchery complex. There it is used to maintain and increase fish production before being released to downstream users.

Over the past four years, the team has rehabilitated most of the nearby springs to get the most "bang for [their] buck. Squeezing every drop of water [they] can into the hatchery, to produce the most fish [they] can with [their] limited resources." A second spring capture project, which produces approximately 15 gallons per minute from Villa Springs, provides water to the Native Fish tank house.

Photo: Members of the SNSC team work on spring remediation

Sustainability Initiatives
Project Implementation and Progress

Development of Community Gardens

The SNSC AmeriCorps team members based at the Mescalero hatchery worked to develop a community garden in the hatchery complex. The goals of the garden project are to (1) utilize the tribe's water resources responsibly, (2) reduce tribal dependence on store bought foods, (3) reduce the number of trips to off-reservation full service grocery stores, and (4) promote healthy, active lifestyles among community members through gardening.

In order to supplement the otherwise nutrient-poor soil, the team uses compost obtained through the local composting program, which has been in place for the past three years. Staff members explain that without the addition of compost, the soil, which is dry and low in organic material, would have to be supplemented using fossil fuel intensive synthetic fertilizers. Instead, the composting program helps to reduce organic waste disposal among local residents and adds nutrients and moisture to the gardening soil. The compost is supplemented with chicken, duck, and horse manure from local animals, as well as fish that died at the hatchery.

In addition to improving community health through the promotion of active living, the community garden team has donated all of the harvested produce to the Elders Center and community members, and they've undertaken an impressive outreach campaign. For instance, the working team developed an outreach pamphlet that highlights local community betterment initiatives, including the garden. They also crafted and presented a display for a local Tribal wellness living event. Over the holidays, the team took first place at the annual Christmas parade, where they provided healthy foods as Christmas treats for the children. They explain that their goals for the outreach events are to have youth and hatchery representation, to promote active lifestyle choices, and to gain public input on community betterment initiatives.

When asked to reflect upon the success of the garden, Mike Montoya aptly pointed out that “on a national and an international level, the dependency upon fossil fuels will continue even as fuel prices continue to rise, therefore the cost of producing, processing and delivering food to local retailers will continue to rise.” Indeed, the ability to source food locally is not only environmentally sustainable, it is also a critical step toward food security and independence.

Funding for this project was provided through a New Mexico Department of Health Community Transformation Grant.

Photo: An SNSC volunteer discusses healthy food options and the community garden with an attendee at the Community Health Fair

Sovereign Nations Service Corps Experimental Garden and Animal Farm

Growing a garden at high elevation, in this case 6,800', is challenging and often requires ingenuity. An added challenge is that the Mescalero Apache Tribe has not traditionally been an agrarian culture. Nonetheless, project leaders from the hatchery partnered with the Mescalero Division of Resource Management and Protection and the NMSU County Extension Office to create an innovative real-world classroom. In the spring of 2010, the group constructed a large greenhouse and a 50'x150' enclosed garden plot using federal excess materials from Holloman Air Force Base. The materials from federal excess (cinder blocks, 4x4’s, plastic tarps, and ½" pvc piping) and the gravel procured from tribal lands were all obtained for less that $150, making the project extremely affordable.

After completing construction of the garden and greenhouse, the group got to work planting various edible crops to evaluate the feasibility of growing particular crops in the harsh conditions typified on Mescalero Apache tribal lands. The edible crops including watermelon, cantaloupe, honeydews, cucumbers, green and yellow onions, lettuce, carrots, corn, squash, strawberries, tomatoes, sunflowers, beans, peas, pumpkins, turnips, and chilies, were only half of the experiment. The team is also utilizing the space to raise chickens, goats, and ducks both for local consumption and as an instructional tool for tribal youth and visitors.

Photo: Local children show off chicken eggs from the experimental garden

The crop experiments revolve around soil amendment and crop fertilization using manure and compost. An annual report for the experimental garden will be made available to the community for review. To date, some of the crops have done better others, but as a whole the greenhouse has helped to extend the growing season by approximately six weeks, which can translate into a substantial increase in food yield.

Recycling
The SNSC is currently accepting cardboard, plastics, white paper, and various metals for recycling, as well as exploring the potential to recycle other materials (i.e. tires and motor oil) which adversely impact the local environmental. They plan to obtain training to dispose of hazardous materials (i.e. combustibles and herbicides) so that they can support the community in responsible waste disposal activities. In addition, SNSC staff members have been able to retrieve scrap metal (i.e. brass, copper, ferrous) while cleaning up dumpsites, and abandoned or severely damaged vehicles. They hope to cover some of the programmatic expenses by selling materials, including scrap metal, to processors in El Paso, Texas. To that end, the team has begun accepting used pallets, and is now looking to get a compactor to make their trips to the processor profitable.

Repurposing
All of the vehicles in the Mescalero Tribal Fish Hatchery fleet have been obtained through Federal Excess property. The used vehicles are very affordable (the tribe pays only for repairs and transport of the vehicle) and they promote a healthy environment by eliminating the need to manufacture additional vehicles.

Moving towards Xeriscapes
On the Fish Hatchery complex and within the adjacent Kirgan Park, the SNSC is gradually replacing landscaped, non-native grass with ADA compliant sidewalks, interpretive trails, terraces, and native, drought-tolerant plants. The exotic, landscaped plants will be replaced with species of pine trees, yucca, sage, juniper, and Indian rice grass. This improvement will (1) reduce the maintenance expenses associated with traditional landscaped grass, (2) economic savings through reduced demand, and (3) enable the tribe to conserve a precious resource – water.

Challenges and Lessons Learned

Staff members repeatedly echoed the need for a long view when considering the complexity of natural resource management in a changing climate. As Mike Montoya explains, “it is yet unclear how climate change will effect our lives and the lives of our children,” though one thing is certain to him, “destructive events – wildfires, floods, and extended drought – are no longer rare and stochastic as I once believed…they are dramatic evidence of climate change. It is clear that a shift has occurred and continues to occur in the Sacramento Mountains. Healthy rain events that once brought life-giving moisture are now catastrophic floods that carry deadly ash and silt.” Montoya explains that we must first understand the impacts of climate change and use that knowledge to adapt. Says Montoya, “I am afraid that if we do not learn from our errors, and constantly strive to live as one, living in harmony with our environment, with the Earth Mother as our teacher and not our experiment, then we will become the victims of our own endeavors.”

Key Partners:
Corporation for National and Community Service – AmeriCorps
Bureau of Indian Affairs – Fish Hatchery Operations & Maintenance Program
Southwest Tribal Fisheries Commission – Bureau of Indian Affairs 638 Contract
Bureau of Indian Affairs – Tribal Climate Change Grant Program
US Fish and Wildlife Service – Tribal Wildlife Grant Program
New Mexico Department of Health – Community Transformation Grant
National Park Service – Rivers, Trails & Conservation Assistance Program
US Forest Service – wildfire fuel reduction partnership
Federal Emergency Management Agency (FEMA)

Photo: The Services Nations Conservation Corp team with livestock and produce from the community garden

About the Mescalero Apache Tribe

The Mescalero Apache reservation is located in southern New Mexico on 463,000 acres of ancestral land. The tribe is comprised of three sub-groups: the Mescalero, the Lipan, and the Chiricahua. In addition to being known for their extraordinary resourcefulness, the Mescalero Apache had a reputation for being fearsome warriors and highly skilled hunters.

Among the more famous warriors and chiefs of Mescalero descent are Geronimo (1829-1909), Mangas Coloradas (1797-1862), Vicotrio (~1825-1880), Victorio's sister Lozen (1840s-1886), and Cochise (dob unknown - 1874).

The Spaniards deemed the tribe Mescalero based on their consumption of the Mescal plant. Other staple foods for the Mescalero Apache include locally harvested wild plants (i.e. yucca), berries, fruits, seeds and nuts. Typically, hunters also harvested buffalo, antelope, and deer.

Resources and References

In of the Mountain Gods Resort and Casino, "About the Tribe"
http://innofthemountaingods.com/about-the-inn/about-the-tribe/

National Parks Service, Guadalupe Mountains National Park – History and Culture, Mescalero Apaches. http://www.nps.gov/gumo/historyculture/apaches.htm

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Photos in this profile are courtesy of the Mescalero Apache Tribe.

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The profile is available on the Tribes & Climate Change website: www4.nau.edu/tribalclimatechange/. The tribal climate change profiles featured on the website are intended as a pathway to increasing knowledge among tribal and non-tribal organizations about climate change mitigation and adaptation efforts.

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