Adaptation Action Plan For Springs Ecosystems

from

Learning to Live with the Heat: Adapting to a Changing Climate in the Sky Island Region

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SKY ISLAND ALLIANCE
Protecting our Mountain Islands and Desert Seas

EcoAdapt™
Meeting the challenges of climate change

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Adaptation Action Plan for Springs Ecosystems Working Group

The Underlying goal for the Springs Ecosystems Working Group and Adaptation Action Plan is to **maintain and improve spring integrity.**

The primary mechanisms for achieving this goal were identified to be:

- Aquatic species management/restoration
- Terrestrial species management/restoration
- Selected grazing
- Sustainable use/flow management (Quantity)
- Invasive species control
- Transborder management of springs
- Connectivity
- Fire management
- Prioritization of springs based on climate vulnerability and resilience (underway by Springs Stewardship Institute)

Observed, Measured, Predicted Changes of Concern

Climate impacts of concern to springs in the Sky Island region include increasing temperature (and related changes in evaporation and evapotranspiration) and altered precipitation patterns (more drought and more flooding) that may reduce spring flow. Maintaining and improving springs and spring habitat is key to support their function in a changing climate.

Vulnerabilities

- Increasing temperature and decreasing water that makes the environment more favorable for invasives
- Higher ion concentrations (including metals)
- Exacerbating increased demands on multiple demands on the water/competition
- Breaking food webs and interactions that may impact the species
- Increased severity of droughts and variability
- Decreased recharge rate
- Increased isolation and decreased size of habitat
- Increased pathogen threats
- Restoration for non-future conditions
- Altered disturbance regime
- Multiple use and increase demand for water
- Diminished water availability and spring volume
- Upstream habitat changes and fire (erosion, sedimentation, altered microhabitat)
- Biocontrols become unpredictable
- Cross border differences in management responses to climate change and related effects
- Mapped springs become more vulnerable as demand increases

Adaptation Goal: *Maintain and improve (where possible) spring integrity to support hydrology and biodiversity in a changing climate*

Adaptation Strategy: *Create climate smart spring restoration methodologies.*

Actions: Develop a springs restoration manual focused on process and conduct a symposium/training on its use. It should cover the following issues:

- Why restore?
- Changes in flow, determining how much and why
- Restoration options
- Planning documents for sites
- Step downs from regional to basin to specific springs
- Planning resources needed (flow data, geohydrologic modeling, etc.)

Leads: Sky Island Alliance and Springs Stewardship Institute

Partners:

- Land management agencies
- Arizona Water Protection Fund
- Arizona Department of Water Resources
- Bat Conservation International
- The Nature Conservancy
- Borderlands Habitat Restoration Initiative
- Tribes
- Livestock Groups
- National Resources Defense Council
- Hunting Groups
- Arizona Game and Fish Department
- Counties
- Partners from Mexico?

Schedule for Activities

Medium-term

- Finish first version of methodologies by mid 2015

Long-term

- Translate to Spanish to implement holistically in Sky Island Region.
- Test use of the manual through case studies

Monitoring Plan:

Upon completion of restoration methodologies guidebook monitor use of the guidebook through website hits, downloads and a survey.

Adaptation Strategy: *Develop management and regulatory mechanisms to protect springs' source water.*

Actions:

- Create spring buffer area for wells (no wells within a defined distance, based on spring type) (AZ Land and Water Trust, other land acquisition/conservation easement)

- Address growing demand through laws/regulations/guidance to maintain minimum spring flow
- Identify regulatory tools for creating groundwater protection zones (easements?, contracts on individual property?)
- Identify and designate groundwater protection zone (Tribes and agencies)
- Add springs ecological aspects to the US Forest Service handbook and other management guidance (Groundwater Dependent Ecosystem Guidance, Forest Plan Revision)
- Consider requirement of test pumping for projects off federal land to test drawdown
- Conduct active recharge activities following mapping of key recharge areas

Partners:

- Pima County
- Arizona Land and Water Trust
- Tribes
- Land Management Agencies (particularly USFS)
- Arizona Game and Fish Department
- NGOs?
- Kartchner Caverns?

Adaptation Strategy: *Protect spring/wetland habitat in management plans in addition to source flow.*

Actions:

- Develop special management designations (e.g. Research Natural Area) on public lands to protect spring habitat as part of Resource Management Plans
- Add springs ecological aspects to the US Forest Service handbook and other management guidance (Groundwater Dependent Ecosystem Guidance, Forest Plan Revision)
- Allotment planning/management
- Identify Wilderness Protection Designations (as they include water protected) (Sierra Club, Sky Island Alliance)
- Designations for reference springs

Leads: Sky Island Alliance, Coronado National Forest

Partners:

- Bat Conservation International,
- Arizona Game and Fish Department
- Springs Stewardship Institute
- Ruby

Schedule of Activities:

Short-term

Develop special management areas and prescriptions for springs on Coronado National Forest lands as part of their plan revision (2013-2014)

Adaptation Goal: *Maintain sustainable use and flows at springs.*

Adaptation Strategy: *Upland habitat restoration to increase recharge and decrease erosion – include fire considerations.*

Actions:

- Assess upland grazing management for spring benefit/detriment
- Evaluate fire management for potential spring benefit/detriment
- Adapt prescribed fire planning to consider springs locations
- Update Resource Advisor Handbook to include spring information - add priority springs to the retardant avoidance areas for aquatic ecosystems and to prevent fire lines from being built through them
- Look at dendrocronology for changes in spring flow
- Choose habitat restoration work in process and integrate springs considerations/monitoring
    - Conduct springs assessments this summer ahead of planned restoration treatments in the Pinaleño Mountains both inside and outside of planned treatment areas
- Conduct near upland habitat restoration to maintain microclimate and reduce evapotranspiration.

Partners:

- Sky Island Alliance – springs surveys/assessments
- Coronado National Forest – resource advisor and manager
- Abe Springer, Northern Arizona University
- Springs Stewardship Institute
- Malpai Borderlands Group
    - Share best practices – USFS attends annual meetings

Schedule for Activities:

Short-term

- Conduct springs assessments in 2013 before restoration treatments occur (2013-2104)
- Restore microclimate at select springs (Sky Island Alliance 2013-2014)

Long-term

- Monitor springs to detect impacts – could take a decade

Adaptation Goal: *Decrease conflict at springs and mitigate for increased demand for water from multiple uses.*

Adaptation Strategy: *Improve infrastructure at spring sites to conserve water and provide habitat.*

Actions:

- Create managing agency requirements and plans for infrastructure maintenance to ensure water is not being squandered
- Engage volunteers to inventory and report where infrastructure is in need of help
- Identifying and implementing evaporation reducing devices for cattle tanks
- Remove drainage tiles and leaking pipes
- Repair/restore infrastructure to conserve water and share water with the environment

- Develop briefing paper with the value of springs ecosystems and managing them for multiple use
- Website that shares techniques

Leads: Sky Island Alliance (surveys and resources for repair/restoration), US Forest Service (regulatory agency)

Partners:
- Regional ranchers (permittees)
- Other Land Management Agencies
- Arizona Game and Fish Department (sensitive wildlife species issues)
- Pima County
- Bat Conservation International

Adaptation Strategy: ***R****enovation of dirt tanks, catchments, etc. that are alternative water sources that can take pressure off springs*

Action: Identify alternative water sources for agriculture that can take pressure off of springs:
- Identify springs the renovation or improvement of these resources could help
- Secure proper permitting and NEPA compliance (e.g. 404 issues)
- Outreach to appropriate partners for technical support and to educate

Partners:
- University of Arizona Range Extension
  - Resources are limited right now, but they are amenable to other people putting on a program and will outreach to the audience
- Society of Range Management (they have an annual meeting)
- Malpai Borderlands Group
- Regional Ranchers
- Las Cienegas National Conservation Area
- Bat Conservation International
- Sky Island Alliance or other NGO (help put materials together)
- Volunteers to do surveys and hand work

Monitoring Plan:
- Dirt tank index
- Develop bird-watching/citizen science at tanks
- Assess and monitor nearby springs to discern effects

Adaptation Strategy: *Reduce conflicts between multiple uses at springs and increased demand.*

Actions: Engage ranchers on sustainable spring use through:
- Webinar, talks, pamphlets and other information on springs and how healthy springs will benefit ranchers. Distribute through Ag Extension.
- Develop guidelines for sustainable use (agencies and others) that include: fencing, solar wells, and alternative water resources -catchments

Partners:

- University of Arizona Ag Extension
- Natural Resource Conservation Districts
- Arizona Cattleman's Association
- Western Governors Association
- Sky Island Alliance
- Citizen stewardship-driven watershed partnerships (e.g. Cienega Watershed Partnership)

Monitoring: Bird groups—identify associated springs and assess quality)

- Catchments (renovating dirt tank, ephemeral wetlands, cattle ramps, pressure off springs)
- Rainwater collection

Additional Strategies and Activities for Consideration:

- Reduce/Reallocate use of water
- Restore hydrology (removal of non-native tree species, re-water springs, resolve basin recharge issues)
- Continue monitoring and eradication of invasives (better education on what is an invasive through Sky Island Alliance Plant ID/Aquatic workshop including invasives and anticipated range shifts). Include occasional reevaluation of target species)
    - Closure of areas that are deemed too "sensitive"
    - Signage at trailheads
    - Protect pool forming springs (no extraction, no invasive dumping)
- Create transborder forum through the Desert Landscape Conservation Cooperative – include springs (Partners: Sonoran Join Venture, Sky Island Alliance)
- Translate springs assessment/database materials into Spanish. Many of these strategies can be implemented similarly on lands in Mexico
- Create CAKE module on climate change and springs
- Transboundary Aquifer Assessment Program (TAP) – has some data on water resources
- Prioritize/Guidance for connectivity and climate change (DLCC)

Additional Science and Research Needs Identified:

- Optimize inventories for effective level of expertise (how expert do we need to be?)
- Inventory water rights
- How do we build and network the needed expertise for spring research and management?
- Finer scale geologic layers to better understand spring dynamics (isotopic, geochemistry)
- Learn more about migratory birds and springs
- Better understand threats to springs (including mines)
- How far into landscape do springs influence, how do they relate to the landscape (isotopic study)
- Flow splitting
    - Technology
    - How much water can you take before you affect system (minimum viable flow)?
- Post-fire monitoring of springs and upland habitat
- Long-term historical responses to previous climate change
- Create inventory and management plans

Working Group Members

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Gus Glaser, Center for Biological Diversity
Barbara Warren, Physicians for Social Responsibility
Howard Frederick, interest in springs for 45 years after becoming owner of Ruby Mines, board member, Sky Island Alliance
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