Summary Workshop 2: "Water Resources Management in Agriculture and Ecosystems to Improve Climate-Extreme Resilience in Mexico and the USA"

Fall 2023 Workshop at Casa de la Universidad de California

Josue Medellin-Azuara, Joshua Viers, Thomas Harmon, Marc Beutel, John Abatzoglou,
Co-Principal Investigators, UC Merced

Objectives

In this two-day workshop the project team aimed to reconvene project partners to: 1) reflect on the insights that emerged from the inaugural project workshop in November 2022; 2) present progress on the various case studies around the four research thrusts, 3) obtain feedback from workshop participants on refining research questions to inform policy recommendations.

1. Resilient Communities

Participants: John Williams (moderator), Marina Mautner (SEI), Jeanette Cobian (UC Merced), Laura Ponce (Ecosur). For presentations access here (provided approval)

Progress: most participants of this group met in this event for the first time so the discussion was focused on new research ideas.

Specific issues and needs:

- Lack of effective fire alert and prevention
- Ways to establish a better understanding and communication with communities from their experience and history
- Needs assessment to face and interact with fire: solidarity, risks, action, prevention
- Resilient communities review:
    - Culture, honesty, hope, joint efforts
    - Climate resiliency: droughts, floods, fires. Socio-environmental responsability
    - Local community definition of "resiliency" and action associated to it.
    - Including social experts
    - Learning from community historical or ancestral adaptations
    - Technology-based adaptations for Mexico and California.

Research/Policy Thrusts identified and Potential products:

i. Access to technological tools to prevent and mitigate fire events and effects.
ii. Development of mechanisms to facilitate support to communities ("jump the hardle")
iii. Two pages survey for needs assessment in communities (group)
iv. Cartography interpretation in Meseta Comitec Tojolabal (Chiapas) (group)
v. Seeking funds for meetings among community committees in charge of Fire Cultural Management (Sep 2024, Laura-Jeanette)
vi. PRONACOSE: Open mic interview in December: inform about local necessity to adapt local needs to increase resiliency to droughts (Sam-Dante)
vii. Field day in Copalita river's Basin (Norma-Sam)
viii. Outreach through radio/TV spots by local broadcast media in native tribe's languages (Mexico) and Spanish (California) (Laura-Jeanette-Samuel-Norma).
ix. Training on Fire Behavior to Fire Fighter Brigades in protected natural areas of Chiapas and California (Laura-Jeanette)
x. Woking on two scientific articles for publication and at least one for UNESCO chairs (Laura, Norma, Jeanette, Sam, Dante)
xi. Working on academic articles:
- Frontiers in Climate: outreach products description
- International Journal of Wildland Fire: Cultural use of Fire, multidisciplinary approach.

2. Climate Data Science

Participants: John Abatzoglou (moderator), Carlos Patino (UDLAP), Rene Lobato (IMTA), Sam Sandoval (UC Davis). For presentations access here (provided approval)

Progress: two on-going case studies were discussed.
Specific issues and needs:

- Variability in precipitation and evapotranspiration in SW US and NW Mexico suggest research opportunities: Intra and interannual hydroclimate variability changes over the past decades:
    - Aspects of surface water budget have detectable changes in variability
    - Changes consistent with anthropogenic climate change?
    - Can the changes be explained by internal climate variability?

- Climate Observations,Forecasts, Impacts

- Unmet needs and partnering on funding:
    - What pressing pressing hydroclimate information and risk information is needed but not widely available in Mexico?
    - What funding opportunities exist to partner in expanding the Climate Toolbox into Mexico and incorporating specific needs?
- Understanding of climate extremes and trends (i.e. pp is declining and temperatures rising)
- Drought forecasters can be improved by studying drought indicators: PP, temperature, soil moisture, vegetation, ET
- Including tools in hydroclimatic models: most reliable models for water resources management.
- Access to geographic and water data (quality and quantity)
- Increase resiliency for water supplies and communities
- Colorado River – Water Quantity, Quality and Economic Analysis
    - Water salinity and its effects on soil salinity
    - Research opportunities in Colorado river estuary
    - Impacts of population growth in Colorado river basin (Phoenix, Utah, etc.).
- Rio Grande – Rio Bravo: Resilient Flow Regimes

Research/Policy Thrusts identified and Potential products:

i. Binational Seminar or Workshop on "Climate Toolbox": Tech tool that describes past, present and future. Objectives: discussion about pros and cons of the tool, and opportunities to implementing it in Mexico (data collection).

ii. Proposal: Expansion of University supported climate services through Alianza:
    a. Growing need to increase access and usability of climate information to improve climate readiness today, tomorrow, and decades into the future
    b. Corporate world rapidly filling this gap, but often lacks knowledge on climate/hydro and is interested in profits over democratization of information
    c. Can we leverage infrastructure and lessons with the Climate Toolbox by partnering with knowledge experts in Mexico to offer services into Mexico??

iii. Catedra UNESCO: joint collaboration for publishing journal articles (Journal "Entorno", Bulletin, Blogs).

iv. Tech Tool to provide climate services focused on agricultural management to support farmers decision making.

v. Use different outreach spaces or means to inform: Blogs, videos, webpages, infographics, etc. on academic platforms and/or Alianza's

vi. Scientific papers and policy briefs (i.e. Frontiers on "Water Security"):
    a. Flood management and correlation analysis between floods and economical losses.
    b. Reliable multi-scale geographic and hydrological datasets to increase resilience to water scarcity

3. Groundwater Sustainability

Participants: Tom Harmon (moderator), Francisco Flores (DWR), Graciela Herrera (UNAM). For presentations access here (provided approval)

- **Progress:** MAR Playbook Case study (UCM-UNAM)
- **Specific issues and needs**:

  - MLRP implementation and possible tech tool for aquifer recharge: evaluate feasibility and chances of success
    - Identify MLRP suitability features
    - Identify data and create maps for features
    - Understand stakeholders priorities
    - Add cost-benefit analysis

  - Effects of MAR on water quality: uncertainty?
  - Empowering communities to monitor domestic well water
  - Aquifer overdraft in both, CA and Mexico: practices and strategies must be designed according to particular local conditions in order to be succesful

- **Research/Policy Thrusts identified and Potential products**:

i. Catedras Conahcyt (Dr Herrera)
ii. MAR Playbook: continuous work on a "Live" document that is fed by new experiences and knowledge. Next steps
iii. Papers and Policy briefs:
    - Methodologies and protocols
    - Include special issue in Frontiers "Water Security" (Tom Harmon)
iv. Academic exchange (Mario Hernandez and Graciela Herrera visiting UC Merced on Feb 2024)
v. Book with four Alianza's core groups as chapters
vi. Pilot project on artificial aquifer recharge in native communities (Manatiales, Mexico)

4. Integrated Water Management

Participants: Marc Beutel (moderator), Leopoldo Mendoza (UABC), Aldo ramirez (TM). For presentations access here (provided approval)

Progress: Case study (UCM-UABC) Article "Achieving Responsible Reclaimed Water Reuse for Vineyard Irrigation: Lessons from Napa Valley, California and Valle de Guadalupe, Baja California" final review for submission to Frontiers in Water

Specific issues and needs:

- Water issues in Guadalupe (Mendoza-Beutel-Hansen):
    - Water scarcity
    - Cities produce large amounts of wastewater
    - Water quality is variable due to lack of reliable treatments

- Lessons from Napa: same issues and wastewater treatment and use in agriculture but 40 years ago.
- Key questions to implement water reuse:
    - No information on emerging contaminants that could affect grape quality
    - Effect of reclaimed water on soil composition
    - Large volumes of water
    - Social, economic and legal aspects no addressed yet.
- Empowering communities to monitor domestic well water
- Aquifer overdraft in both, CA and Mexico: practices and strategies must be designed according to particular local conditions in order to be successful
- Infrastructure for water storage and distribution in Monterrey (A. Ramirez):
    - Assessment of climate threats and water supply vulnerability
    - Studying and evaluating plans and policies that have failed to meet results as expected
    - Needs to estimate operation cost, water rates, technical feasibility and optimization of methodologies to transport and store water
    - Aquifer monitoring in Monterrey: no recovery reported when they switc to surface water

- **Research/Policy Thrusts identified and Potential products**:

i. Water reuse in winegrapes: (Dr Mendoza)
    - Determination of quality of treated water according to Mexican legislation
    - Determination of 5 emerging contaminants of concern
    - Comparison of water quality standards (Tijuana and California)

- Establishment of a pilot scale irrigation scheme in Guadalupe
- Assess potential accumulation of contaminants in soils
- Assess legal, economic and social aspects in Guadalupe and compare to California's
- Policy brief: proposed strategies to secure viability and sustainability of the water reuse scheme.
- Oxygenation in Bravo valley: implement technique in water bodies as a sustainable mechanism to purify water

ii. Water infrastructure

- Optimizing operation and sources
- Conducting hydrogeological studies to enhance the understanding of groundwater flow systems
- Developing strategies for reducing surface and groundwater pollution
- Promoting decentralization of wastewater treatment and reuse
- Implementing demand management programs that effectively promote water conservation
- Promote the use of technology and innovative schemes in all subsectors
- Evaluating the possible redistribution of water resources with the agricultural sector and incorporating new water supply sources, the recovery, treatment, and conveyance of water from agricultural returns, and desalination.
- Developing an anthropogenic urban drought index
- Mission of above: delivering tools to decision makers and the population

Working plan for each research group

- Scheduling a group meeting with all interested Workshop participants in that particular research group led by the participants of each technical session.
- Group will meet to discuss a working plan, including timeline with activities and deliverables
- Among the outcomes of the meeting are:
  - List of products and deliverables to work on.
  - List of specific roles for group members
  - Timeline
  - Identify location(s) for each project (if applies)
  - Schedule biweekly meetings for follow up

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