EGU General Assembly 2022
HS6 – Remote sensing and data assimilation
HS6.6: Remotely-sensed evapotranspiration
live chat on Thursday, 26 May 2022
Conveners: Pamela Nagler & Hamideh Nouri (14 presentations)

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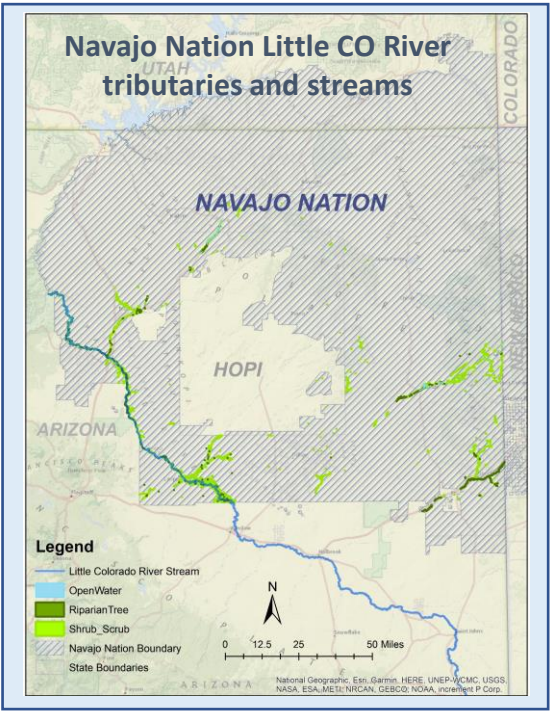

EGU22-1380 Consumptive Water Use for the Riparian Areas of the Little Colorado River within Navajo Nation

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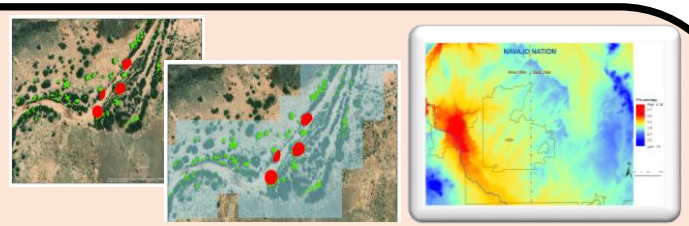
These data are preliminary and are subject to revision. Do not cite.

Goal: to estimate riparian actual ET & Consumptive Water Use with Landsat OLI and Daymet Gridded ETo from 2014-2020

Methods



ET_o (Blaney-Criddle): $P* (0.457*T_{mean}+ 8.128)$ **(Eqn 2)**

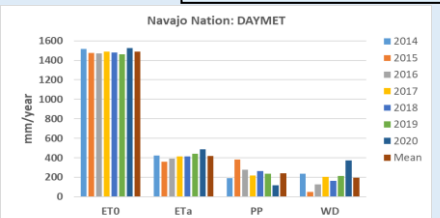
where ET_o is the reference evapotranspiration [mm/day]
T_{mean} is the mean daily temperature [°C] given as $T_{mean} = (T_{max} + T_{min}) / 2$
P is the mean daily percentage of annual daytime hours (FAO, 1986)

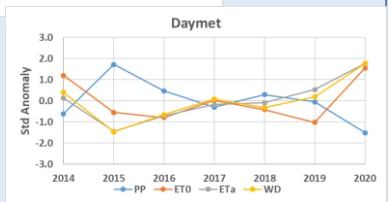
$ET_{a\ (Landsat)}$: $ET_{o\ (daily)}*1.65(1-e^{-2.25EVI}) -0.169$ **(Eqn 1)**

After these input variables (T_{mean}, T_{max}, T_{min}, and P) were determined at both resolutions (1 km and 4 km), we calculated the daily average ETo using Blaney-Criddle following Eqn 1. ETo from Blaney-Criddle was then averaged over 16-days using the 8-days before- and after- the Landsat overpass date to provide for a direct computation of ETa following Eqn 2.

Results

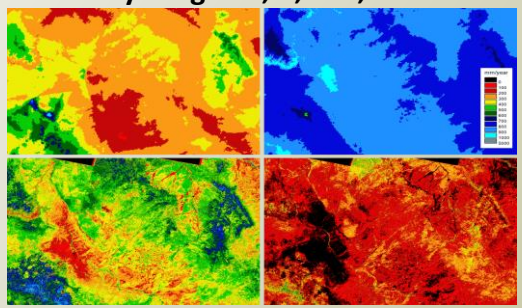
Spatio-temporal Change in water metrics over 7 yrs





Summary water balance (mm/year) (top) and standardized anomalies (bottom) estimated using Daymet and Landsat with the water metrics shown as bars for each of the seven individual years (2014-2020), and their long-term average, for potential ET (ETo), actual ET (ETa), precipitation (PP), and ETa-PP (water deficit, WD) and results for total riparian vegetation.

Daymet (1 km gridded)
7-yr Avg ETo, P, ETa, CU



WD = 7.01 IN/YR OR 0.58 FT & ETO = 4.1 FT
ETA = 16.5 IN/YR; 1.38 FT/YR; 421 MM/YR
CU = 36,983 AF

These CU findings for select riparian areas along the Little Colorado River range between 31,648 - 36,983 AF and refine earlier predictions by Nagler (2020) that ranged from 25,387 AF to 46,397 AF using literature estimates from similar ecosystems.

Conclusions

Our research provides better estimates of ETa and CU that will be valuable to the Navajo Nation in the adjudication of water rights, as well as to assist decision-making by natural resource managers tasked with managing habitat and water resources along these riparian corridors.

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