



Ke Aniau ma Pu'uwa'awa'a i Kēia Mua Aku

E nui ana ka wela a malo'o ma Pu'uwa'awa'a i ka hopena o ke kenekulia

Ka Wānana 'Ana i ke Aniau

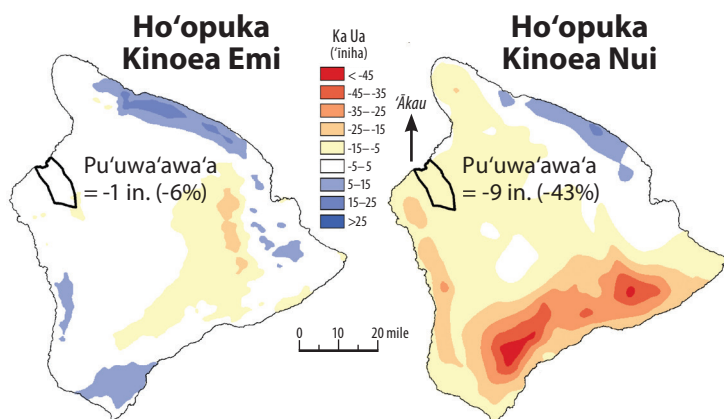
Hō'ike nā **kumu ho'ohālike aniau** (*climate models*) i ka nui o ka wela a me ka ua no ka hapanui o ka 'ili honua ma kēia mua aku. Ho'ohana kēia mau kumu ho'ohālike i nā ha'ihelu makemakika no ka wehewehe a wānana 'ana i ka pilina o ka ikehu me ka moana a me ka lewa lani ma ka honua holo'oko'a. 'O ka **ho'ēmi pālākiō aniau** (*climate downscaling*), 'o ia nō ka ho'ololi a unuhi 'ana i nā wānana aniau no nā wahi ākea o ka honua, i wānana aniau kūpono no nā 'āina kūloko kiko'i. Ua ho'ohana 'ia nā ki'ina hana ho'ēmi pālākiō like 'ole no ka wānana aniau 'ana i ka ua a me ka wela ma Hawai'i. He 'elua kūlana o ke kinoea ho'omohana honua e hiki ai ke ho'ololi i ka wānana 'ana i ka hopena o ka honua nei: ke kūlana 1) E holomua nā po'e apau i ka ho'ēmi 'ana iho i ka ho'opuka kinoea ho'omohana honua (Kūlana "Ho'opuka Kinoea Emi"); a me ke kūlana 2) E mau ana ka hana me ka no'ono'o 'ole i ka ho'ēmi 'ana iho i ka ho'opuka kinoea ho'omohana honua (Kūlana "Ho'opuka Kinoea Nui").

Aia ka pono 'o ka ho'omaopopo o ka lehulehu i ka hopena o ka loli 'ana o ke aniau no kēia mau kūlana 'elua 'oko'a. Pēlā e holomua ai nā hana ho'omalua, 'o ia ho'i, ka

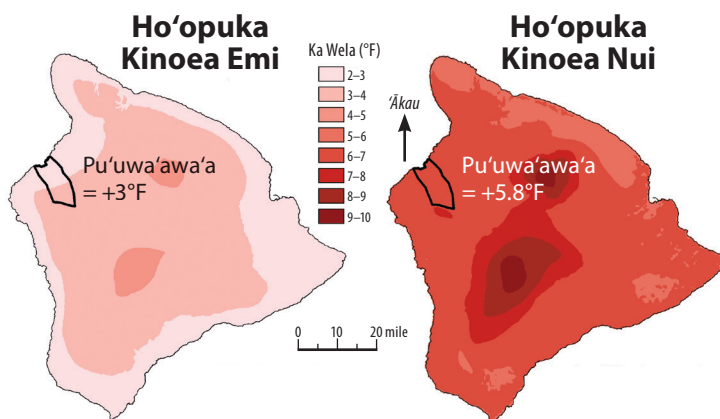
mālama 'ana i nā meaola, nā kaiaola, nā ahupua'a, a me nā kaiāulu. He mea nui ka 'ike i ke aniau no ka no'ono'o a ho'olālā 'ana i nā papahana like 'ole, e like me ka ho'one'e a lawe hou 'ana i nā meaola, ka mālama 'ana i ka 'āina, ka ho'oulu hou 'ana i nā ululā'au, a me ka ho'omākaukau 'ana i nā hana ho'omalua kaiāulu.

Ka Ho'ohuli Aniau ma Pu'uwa'awa'a

Hō'ike 'ia ka wānana i ka nui o ka ua ma kēia mua aku no nā kūlana ho'opuka kinoea emi a nui ma ka mokupuni 'o Hawai'i ma ke Ki'i 1. No ke kūlana ho'opuka kinoea emi, e emi iho ka ua i loko o ho'okahi makahiki he 6% (1 'īniha) i ka hopena o ke kenekulia. Ma nā wahi ki'eki'e e pilikia nui ai ka 'āina i ka ua 'ole. No ke kūlana ho'opuka kinoea nui, e emi iho ka ua o ho'okahi makahiki he 43% (9 'īniha). Inā pēlā, e malo'o ana nā wahi like 'ole ma ka mokupuni holo'oko'a, akā e 'ino loa ka malo'o ma nā wahi ha'aha'a o ka 'āina (ma lalo o 300 kapua'i). No ke ana wela (Ki'i 2), e pi'i 'āwiwi ana ka wela o ka lā no nā kūlana 'elua. No ke kūlana ho'opuka kinoea emi, i ka hopena o ke kenekulia, e pi'i a'e ka 'awelika o ka wela a i ka 3°F ma luna o ka wela o kēia mau lā. No ke kūlana ho'opuka kinoea nui, e pi'i



Ki'i 1: Ka wānana 'ana i ka ua ma ka mokupuni 'o Hawai'i i ka makahiki 2100, no ke kūlana ho'opuka kinoea emi¹ (ma ka hema) a nui² (ma ka 'ākau).



Ki'i 2: Ka wānana 'ana i ka wela o ka lā ma ka mokupuni 'o Hawai'i i ka makahiki 2100, no ke kūlana ho'opuka kinoea emi¹ (ma ka hema) a nui² (ma ka 'ākau).

ana ka 'awelika o ka wela a i ka 5.8°F. No nā kūlana 'elua, like ka 'āwīwī o ka pī'i 'ana o ka wela mai uka a hiki i kai (6,000 kapua'i ke ki'eki'ena), akā e neoneo nui ka 'āina i ka wela o ka lā ma nā wahi ki'eki'e.

He Mea Nui Kēia i ke Aha?

Nā Hopena Like 'Ole ma ka 'Āina

Ma muli o ka loli 'ana o ka wela a me ka ua, e loli ana nā meakanu a me nā holoholona e noho ana ma Pu'uwa'awa'a. Ke pāhola nui ka wela a malo'o, he mau hopena like 'ole e 'ike 'ia ana, e like me ka loli o nā wahi e noho ai nā meaola 'ōiwi a malihini, ka pī'i 'ana o ka hiki ke pō'ino ka 'āina i ke ahi, ka laha 'ana o nā ma'i, a me ka pī'i 'ana o ka hiki ke pō'ino nā meaola 'ōiwi 'ane make loa. 'O ka mea 'āpiki, 'a'ole ka ho'ohuli aniau he hopena ma kēia mua aku wale nō, akā he mau hopena a hō'ailona o ka ho'ohuli aniau i 'ike 'ia i kēia wā e kū nei.

'O ka mea ho'oweliweli nui loa i nā manu Hawai'i o ka ululā'au, 'o ia nō ka ma'i malaria manu i ho'olaha 'ia e ka makika. I ka wā kahiko, 'a'ohe ma'i o nā ululā'au ma muli o ke anu ma nā wahi ki'eki'e. Akā, i ka pī'i 'ana o ka wela, laha nui ka makika i uka me ke emi 'ana o nā wahi kūpono no nā manu, a no kēia mea, emi iho ka heluna nui o nā manu. Wahi a ka wānana aniau o nā kumu ho'ohālike, e nalowale ana ke kaianoho o nā manu Hawai'i mūkiki he 90% a 'oi aku i ka makahiki 2080³. Ma Pu'uwa'awa'a, noho ka manu 'I'iwi (Ki'i 3) ma ka ululā'au ma uka aku o kahi e noho ai nā makika. Inā 'a'ole i nānā 'ia kēia pilikia, e pō'ino ana nā meaola 'ōiwi Hawai'i he nui, e like me ka manu 'I'iwi, i ka make 'ana i ka ma'i malaria manu i kēia kenekulia.

He mea ko'iko'i ka ho'omaopopo 'ana i ka loli 'ana o ke aniau no ka ho'olālā 'ana i nā hana ho'omalū like 'ole. Ke hana nei nā luna 'āina i nā mea e ho'oulu hou ai i nā kaiaola 'ōiwi, penei: ka pale 'ana aku i nā meaola malihini, ka hana pū 'ana me ka po'e noi'i no ka ho'ēmi 'ana i ka laha nui 'ana o nā makika, ka mālama 'ana i nā 'ano'ano, a me ka ho'oulu hou 'ana i nā meakanu 'ōiwi ma nā kaiaola. He pono nō ho'i ka laulima o nā hana ho'omalū, a me ka no'ono'o 'ana i ka 'ike e ola ai ka 'āina. Ma o kēia mau hana, e ola mau nā ululā'au, nā meakanu, a me nā holoholona, no ka pono o ka 'āina a me ka pōmaika'i o nā hanauna o kēia mua aku.



Ki'i 3: Ka manu 'I'iwi ma Pu'uwa'awa'a. I kēia manawa, noho nā manu 'I'iwi ma ke kuahiwi ma uka o ~4,000 kapua'i, kahi e loa'a 'ole nā makika (*Culex quinquefasciatus*, ke kumu nui o ka ma'i malaria manu a pu'upu'u manu). I ka pī'i 'ana o ka wela, e laha ana paha nā makika i uka, me ka laha 'ana ho'i o kēia mau ma'i make.⁴

Na: Zach Pezzillo, DLNR-DOFAW

¹ Dynamical downscaling; Zhang et al. (2016) <https://doi-org.eres.library.manoa.hawaii.edu/10.1175/JCLI-D-16-0038.1>

² Statistical downscaling; Elison Timm et al. (2015) <https://doi-org.eres.library.manoa.hawaii.edu/10.1002/2014JD022059>

³ Fortini et al. (2017) <https://doi.org/10.1371/journal.pone.0140389>

⁴ Judge et al. (2017) <https://irma.nps.gov/DataStore/Reference/Profile/2239426>

Na ka Pacific Islands Climate Adaptation Science Center
i kākō'o i kēia papahana