



Ka Wā Malo'o ma Pu'uwa'awa'a

*He pō'ino loa ka wā malo'o no nā meaola 'ōiwi
he nui ma Pu'uwa'awa'a*

He Aha ia Mea he Wā Malo'o?

'O ka wā malo'o, 'o ia nō ka wā e emi iho ai ka ua ma lalo o ka 'awelika mau ma kekahi 'āina kiko'i no ka manawa lō'ihi. Inā nele ka 'āina i ka ua 'ole, e emi ana ka lepo ma'ū a me ka wai honua, a me ke kahe 'ana o ke kahawai, a e pilikia ana ka 'āina i ka lawa 'ole o ka wai. A inā 'u'uku loa ka ua, e nui a'e ana ka wela o ia 'āina ma luna o ka 'awelika mau, a e emi ana nā ao o ka lani. He mau pule, mahina, a i 'ole makahiki paha ka lō'ihi o ia mea he wā malo'o, a aia ka 'ino o ka wā malo'o i ka lō'ihi o ka wā e emi nui ai ka ua. 'O'i aku ka 'ino o ka malo'o i ka wela o ka lā, no ka mea omoomo ka wela o ka lā i nā hunawai o ka lepo a lilo akula i ka lewa o ka lani. Loli ke 'ano o ke kaia-puni i ka wā malo'o, a 'o ka hopena 'o ia nō ka pau ahi, ka make 'ana o nā kumulā'au, a me ka laha 'ana o nā meaola



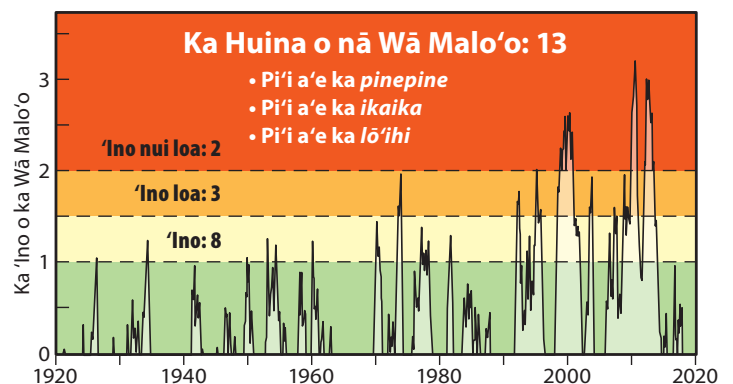
Ki'i 1: Penei ka loli o nā kaiaola 'ōiwi ma Pu'uwa'awa'a (ma ka hema o ke ki'i) i ka wā malo'o (ma ka 'ākau o ke ki'i): pi'i a'e ka heluna o ke ahi lalapa, ulu a'e ka meakanu a me ka mau'u malihini, nui a'e ka hana a nā mū a me nā māmela malihini, a 'o ka nalowale loa o ke kaianoho o nā meaola 'ōiwi ka hopena. 'O nā māmela mai'ao malihini, e like me ke kao 'ōhuka (ma ka 'ākau lalo o ke ki'i), 'oi aku ka 'ai 'ana i nā lā'au 'ōiwi i ka wā malo'o. Emi iho ka ulu 'ana o nā kumulā'au 'ōiwi i nā hana a kēia mau holoholona, e like me ka hehi 'ana, ka māihi 'ana i ka 'ililā'au, a me ka 'ai 'ana.

malihini. Ma Hawai'i, he hanana ko'iko'i ka wā malo'o i ka 'ōnaehana aniau, a hiki i ka wā malo'o ke ho'ololi nui i ke kaiaola (Ki'i 1).

Ka Wā Malo'o ma Pu'uwa'awa'a

He 13 mau wā malo'o ma Pu'uwa'awa'a mai ka makahiki 1920 a hiki i kēia manawa, a ua hala nā wā malo'o 'ino loa 'elua ma hope o ka makahiki 2003. 'O ka wā malo'o lō'ihi nui loa, he 106 mahina ka lō'ihi (mai ka malama 'o Ianuali 2006 a hiki i ka malama 'o Nowemapa 2014), a 'o kēia ka wā malo'o 'ino nui loa o nā wā malo'o i palapala 'ia. 'Oiai he mea ma'amau a kūlohelohe ho'i ka wā malo'o ma ka honua nei, ke nānā kākou i nā wā malo'o i loko o ke kenekulia i hala iholā, 'ike kākou ua pi'i a'e ka nui, ka lō'ihi, a me ka 'ino o ka wā malo'o (Ki'i 2).

Ua pili ka nui o nā wā malo'o i kou wahi e noho ai. Pālūa ka nui o nā wā malo'o ma nā wahi ha'aha'a o ka 'āina (ma lalo o 900 kapua'i ke ki'eki'e) ma Pu'uwa'awa'a. Eia kekahi la'ana: Ma ka Pu'uhoonua no nā Manu Ululā'au



Ki'i 2: He mo'olelo o ka wā malo'o ma Pu'uwa'awa'a i loko o nā makahiki 1920–2020, i loa'a ma o ka huli hope o nā mahina 12 o ka Standardized Precipitation Index (SPI-12). Hō'ike kēia pākuihi i nā wā malo'o ma luna o ka 'awelika mau. Inā pi'i a'e ka 'ino o ka malo'o a hiki i ke kūlana 1, he wā malo'o 'ino ia; inā hiki ka malo'o i ke kūlana 1.5, he wā malo'o 'ino loa ia; a inā ma luna o ke kūlana 2, he wā malo'o 'ino nui loa ia (hō'ike 'ia ma nā laina kahamoe). He 2 wā malo'o 'ino nui loa, he 3 wā malo'o 'ino loa, a he 8 wā malo'o 'ino i kau ma luna o Pu'uwa'awa'a i loko o nā makahiki 1920–2020.

o uka (5300 kapua'i ke ki'eki'e), kahi pulu nui loa ma Pu'uwa'awa'a (27 'iniha o ka ua i ka makahiki), he 12 wā malo'o i 'ike 'ia. Akā, ma kahi ha'aha'a o ke kai kū'ono 'o Kīholo (28 kapua'i ke ki'eki'e), kahi malo'o nui loa ma Pu'uwa'awa'a (11 'iniha o ka ua i ka makahiki), he 18 wā malo'o i palapala 'ia i loko o nā makahiki 1920–2020.

Nā Hana Ho'omalū

I ka wā malo'o, aia i nā luna mālama 'āina ke kuleana o ka ho'omalū 'ana i nā kumuwaiwai. No laila, he mea ko'iko'i ko lākou mākaukau ma nā pono hana a me ka 'ike lawa no ka ho'olālā 'ana i nā hana ho'omalū kūpono. He mau hana ho'omalū kēia e hiki ai ke lawelawe 'ia ma mua a ma hope o ka wā malo'o, i mea e ho'emi iho ai i nā hopena 'ino (Kī'i 3). 'O ka mālama 'āina ka ha'iloa'a no ka ho'emi 'ana i nā hopena 'ino no nā kumuwaiwai kūlohelohe a mo'omeheu.

Nā Hana e Pono ai ka 'Āina

Ma Mua o ka Wā Malo'o

E ho'emi i ka laha 'ana o nā meaola malihini; e mālama i nā pale ahi; e ho'oulu hou i nā meakanu 'ōiwi; e ho'okahua i nā 'āpana 'āina nānā no nā meaola 'ōiwi kāka'ikahi; hō'ili'ili a mālama i nā 'ano'ano no ka wā ma hope o ka wā malo'o, e ho'olaha aku i kēia 'ike i ka lehulehu.

I ka Wā Malo'o

E pāpā 'ia ke komo 'ana i nā wahi no ka pale ahi; e ho'olako i ka 'ai a me ka wai i nā meaola 'ane make loa; e ho'onui i ka nānā 'ana i nā pā; e ho'oponopono i nā hana ho'oulu hou (mai kanu i nā mea kanu hou); e ho'emi i ka laha nui 'ana o nā meaola malihini a me nā holoholona mai'ao.

Ma Hope o ka Wā Malo'o

Inā ua 'ā ke ahi, e ho'oulu hou i nā meaola 'ōiwi e 'ā koke 'ole i ke ahi; e kanu hou i nā meaola kāka'ikahi; e ana i ka loli o ka nāhelehele i loko o ka manawa lō'ihi, a e ho'olālā i nā hana kūpono e hana ai.

Kī'i 3: Nā hana ho'omalū i hiki ke lawelawe 'ia ma mua a ma hope o ka wā malo'o¹.

He Mea Nui Kēia i ke Aha?

Nā Hopena Like 'Ole ma ka 'Āina

Aia nā meaola 'ane make loa he nui ma nā wahi o Pu'uwa'awa'a e pō'ino nui loa i ka wā malo'o.

Emi ka heluna o nā meaola i ka wā malo'o 'ino, a i kekahi manawa, 'o ka wā malo'o ke kumu o ka make loa o ia mau meaola. I ka wā malo'o, e pi'i ana ka hiki ke pō'ino ka 'āina i ke ahi, a no kēia mea, e pāpā 'ia ke komo 'ana o ka lehulehu i kekahi o nā wahi o Pu'uwa'awa'a, i mea e emi ai ka hō'ā 'ana i ke ahi. 'O kekahi hopena 'ē a'e o ke ahi lalapa, 'o ia ka nui 'ana o ka 'a'aiawā 'ana o ka 'āina ma nā wahi i puhi 'ia e ke ahi. He hana nui a ko'iko'i ka waele 'ana i nā meakanu i 'ā koke i ke ahi, e like me ka mau'u *fountain*, i mea e ho'emi ai i ka pō'ino o ke ahi. 'O kekahi hana e ulu hou ai nā ululā'au, 'o ia nō ke kanu 'ana i nā kumulā'au 'ōiwi i ma'a i ka wā malo'o (Kī'i 4). Ma o nā hana ho'omalū kūpono, e emi ana ka laha 'ana o nā meaola malihini, a me ke kupu pinepine a me ka nui o nā pō'ino e like me ke ahi lalapa i ka wā malo'o.



Kī'i 4: Ka mau'u *kikuyu* make i ka wā malo'o, a me nā kumulā'au Māmane make i ka wā malo'o, ka haipilikia, ka nahele, a pēlā aku. Pa'i 'ia kēia kī'i i ka mahina 'o 'Okakopa 2010, ma ka 'ao'ao komohana hema o Pu'uwa'awa'a (3583 kapua'i ke ki'eki'e) ma hope o 21 mahina o ka malo'o.

Kī'i na Elliott Parsons



¹ Drought history is calculated as the inverse of the 12-month, Standardized Precipitation Index (SPI-12).

² Frazier et al. (2019) <https://www.fs.usda.gov/treeearch/pubs/59164>

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