



The Rain Follows The Forest

A Plan to Replenish Hawaii's Source of Water

November 18, 2011 – NARS Commission

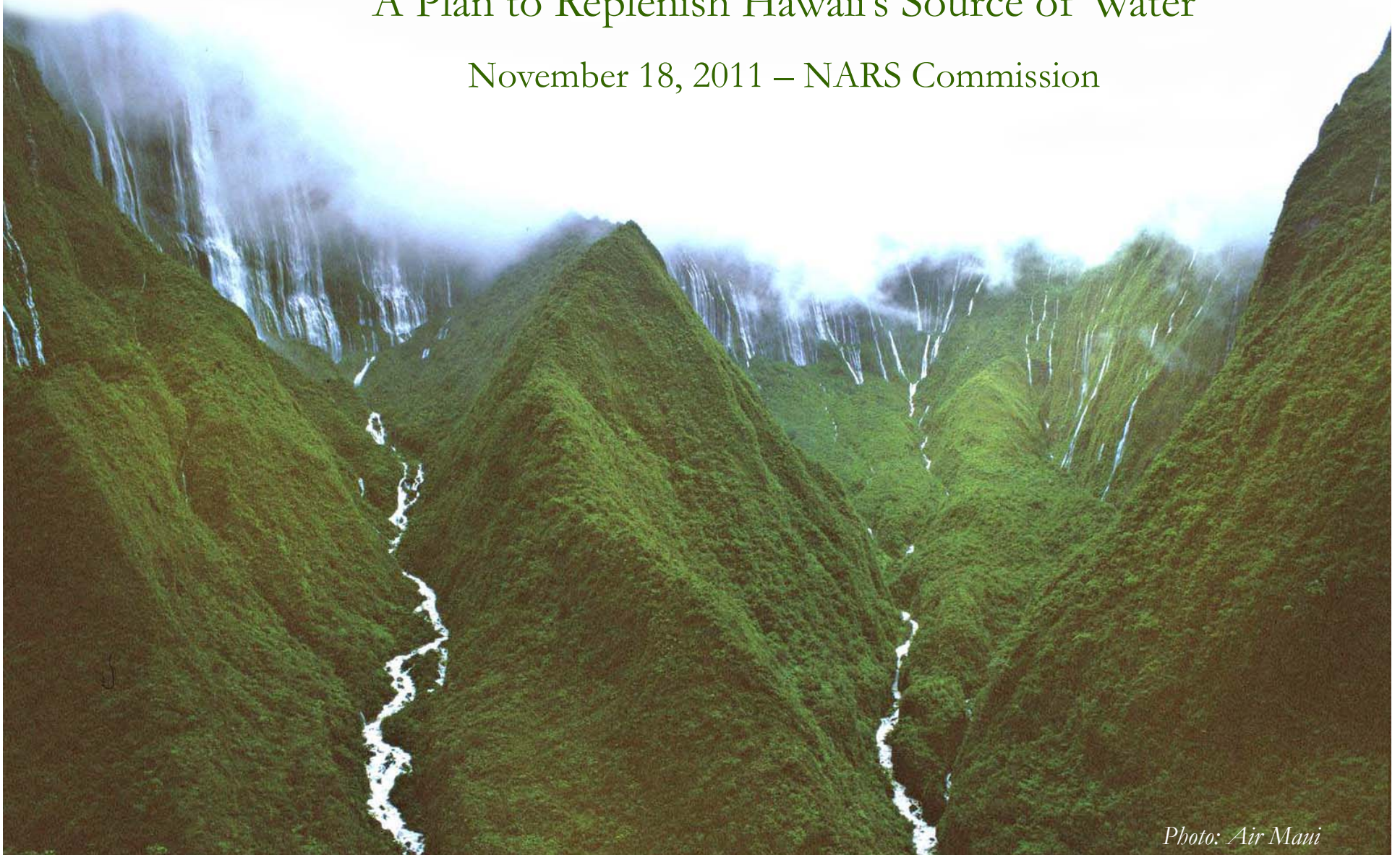


Photo: Air Mani



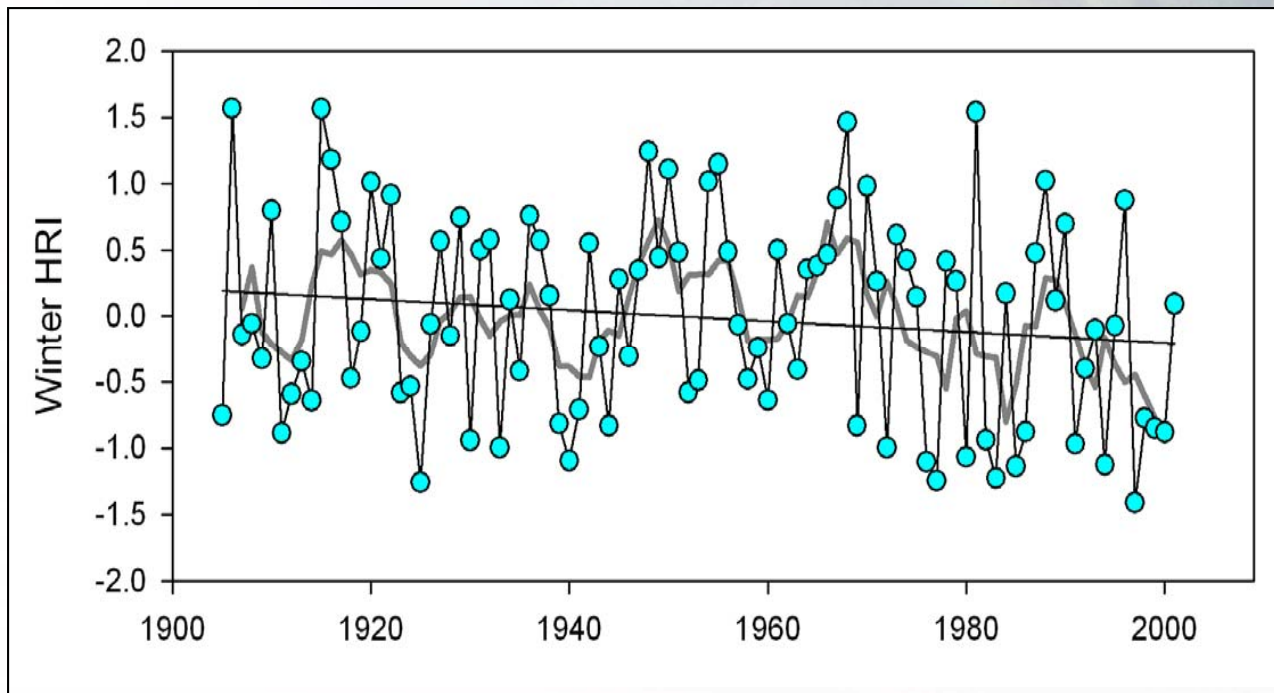
The Rain Follows the Forest

- Hawaii's water supply is at risk
- Benefits of forest watershed protection
- Action plan
- Funding and public support



Hawaii's Water Supply is at Risk

Evidence of Long-term Decline in Rainfall

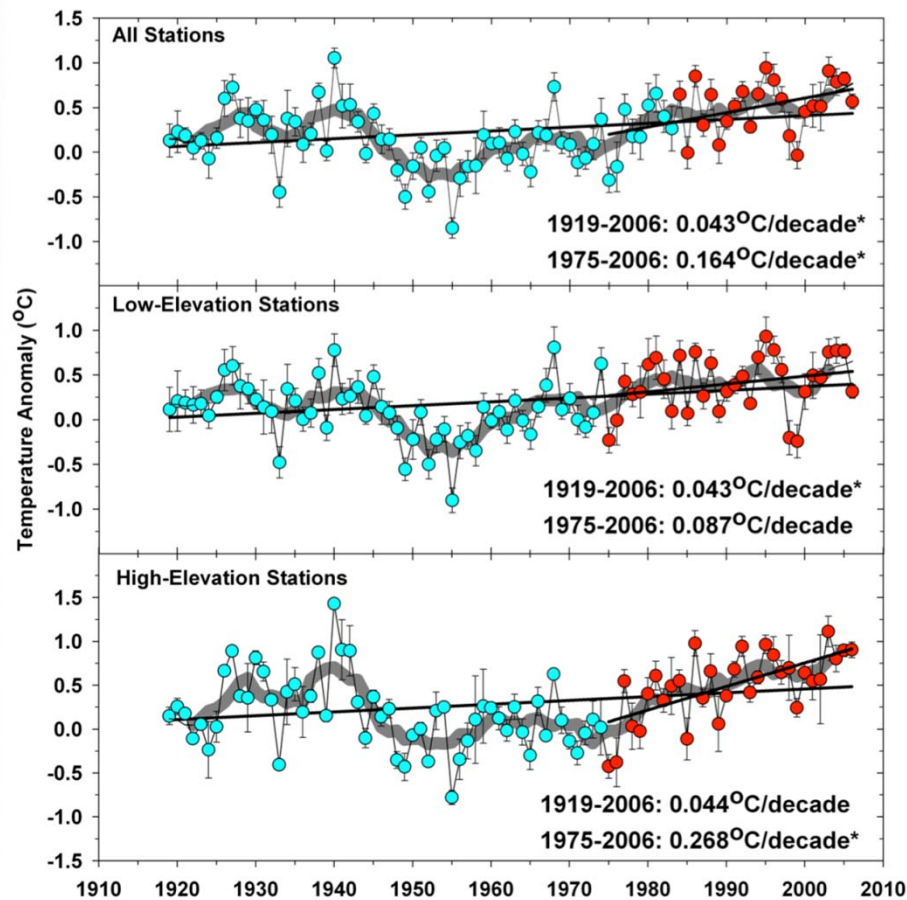


Chu, P.-S., and Chen, H. 2005. Interannual and interdecadal rainfall variations in the Hawaiian Islands. *Journal of Climate* 18: 4796-4813.



Hawaii's Water Supply is at Risk

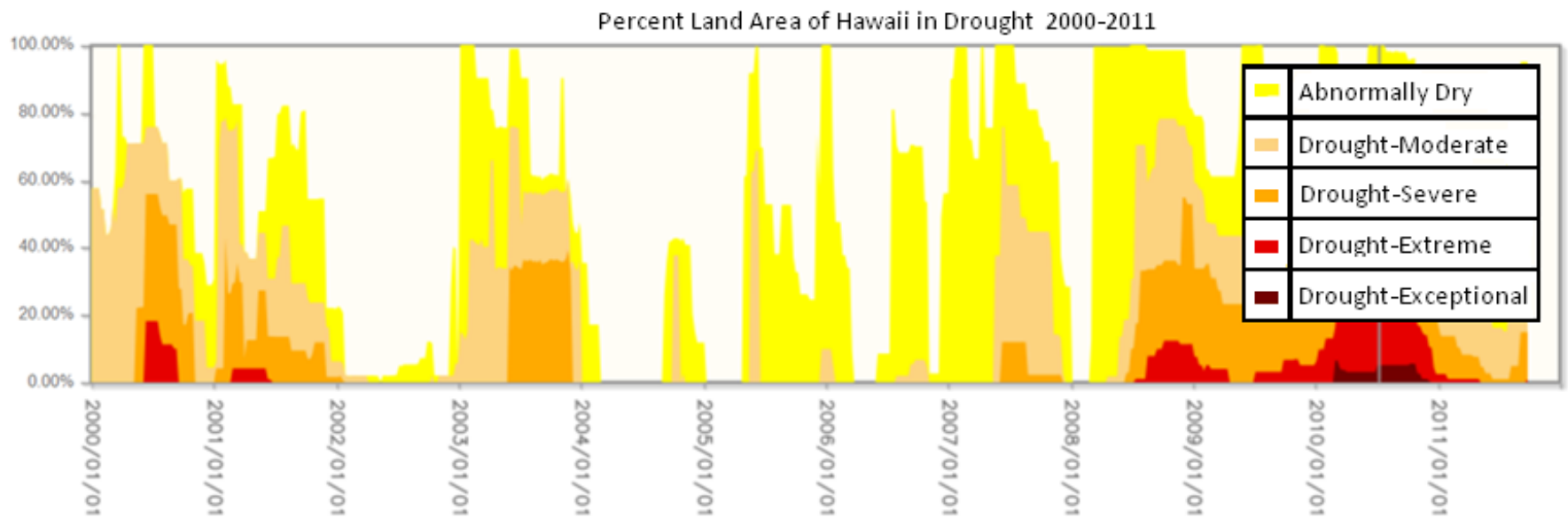
Hawaii Temperature



Giambelluca, T.W., Diaz, H.F., and Luke, M.S.A. 2008. Secular temperature changes in Hawai'i. *Geophysical Research Letters* 35, L12702, doi:10.1029/2008GL034377.



Hawaii's Water Supply is at Risk

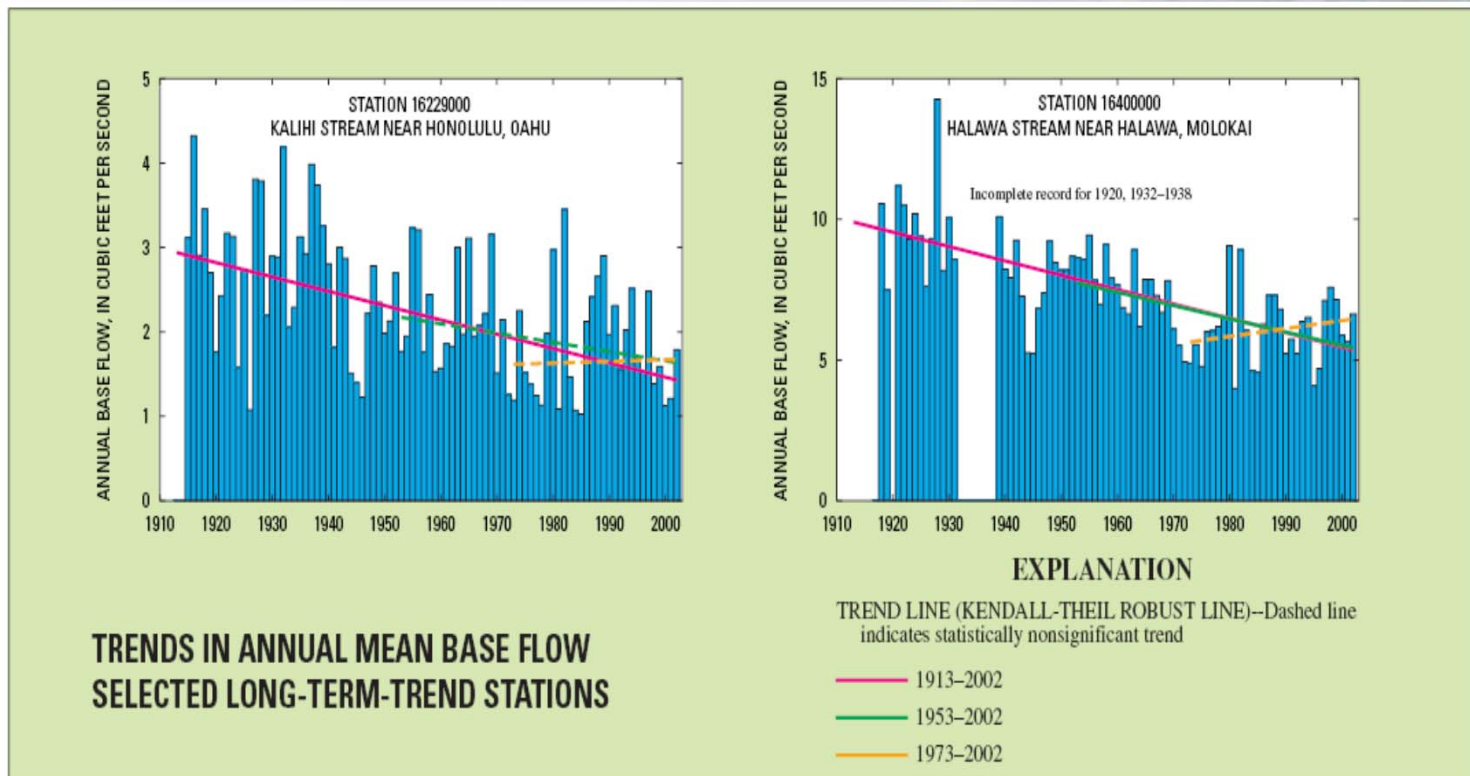


U.S. Drought Monitor



Hawaii's Water Supply is at Risk

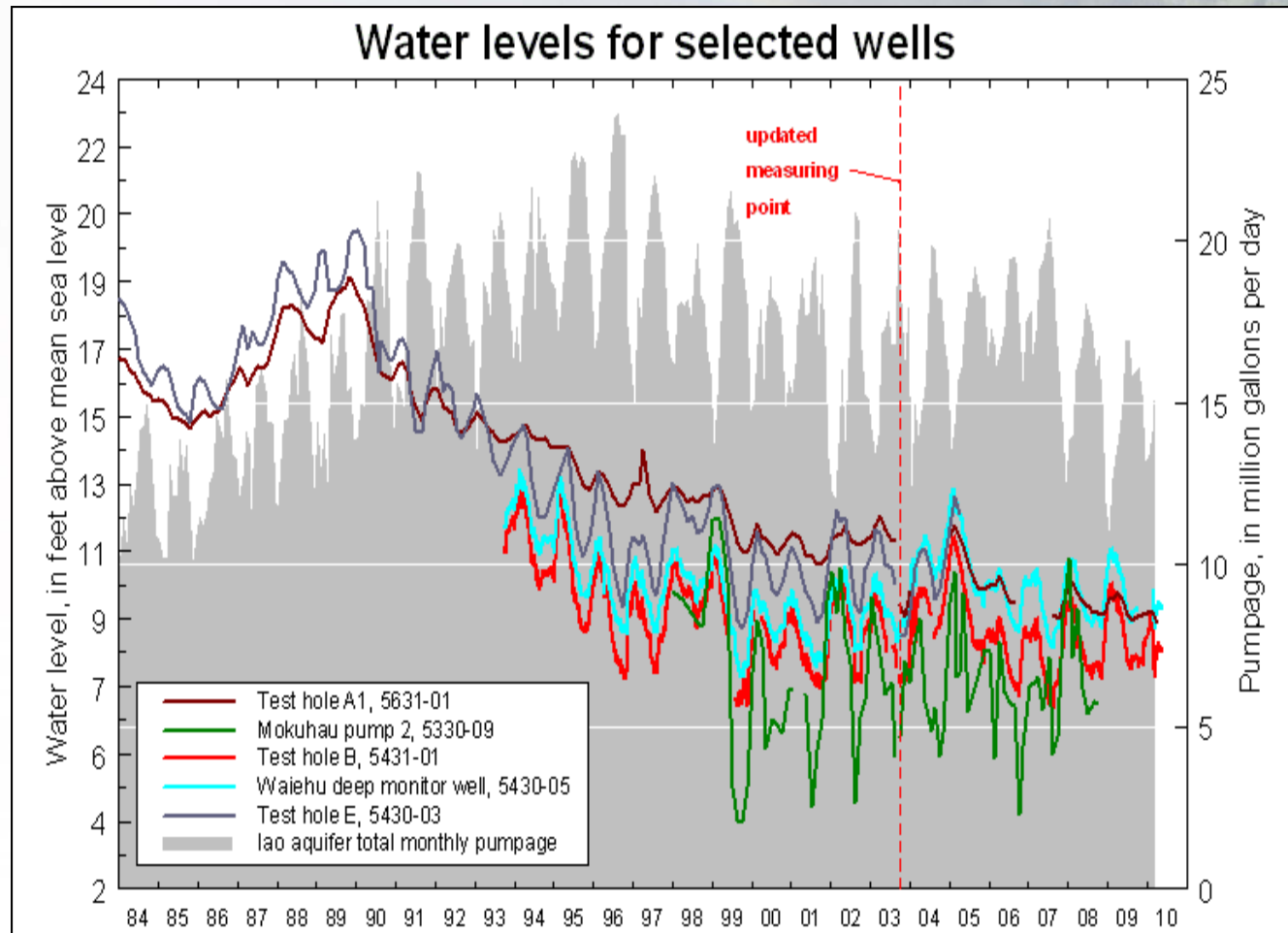
Stream Base Flow in Decline



Oki, D.S., 2004, Trends in Streamflow Characteristics in Hawaii, 1913-2003: U.S. Geological Survey Fact Sheet 2004-3104, 4 p.



Hawaii's Water Supply is at Risk





Benefits of Forest Watershed Protection

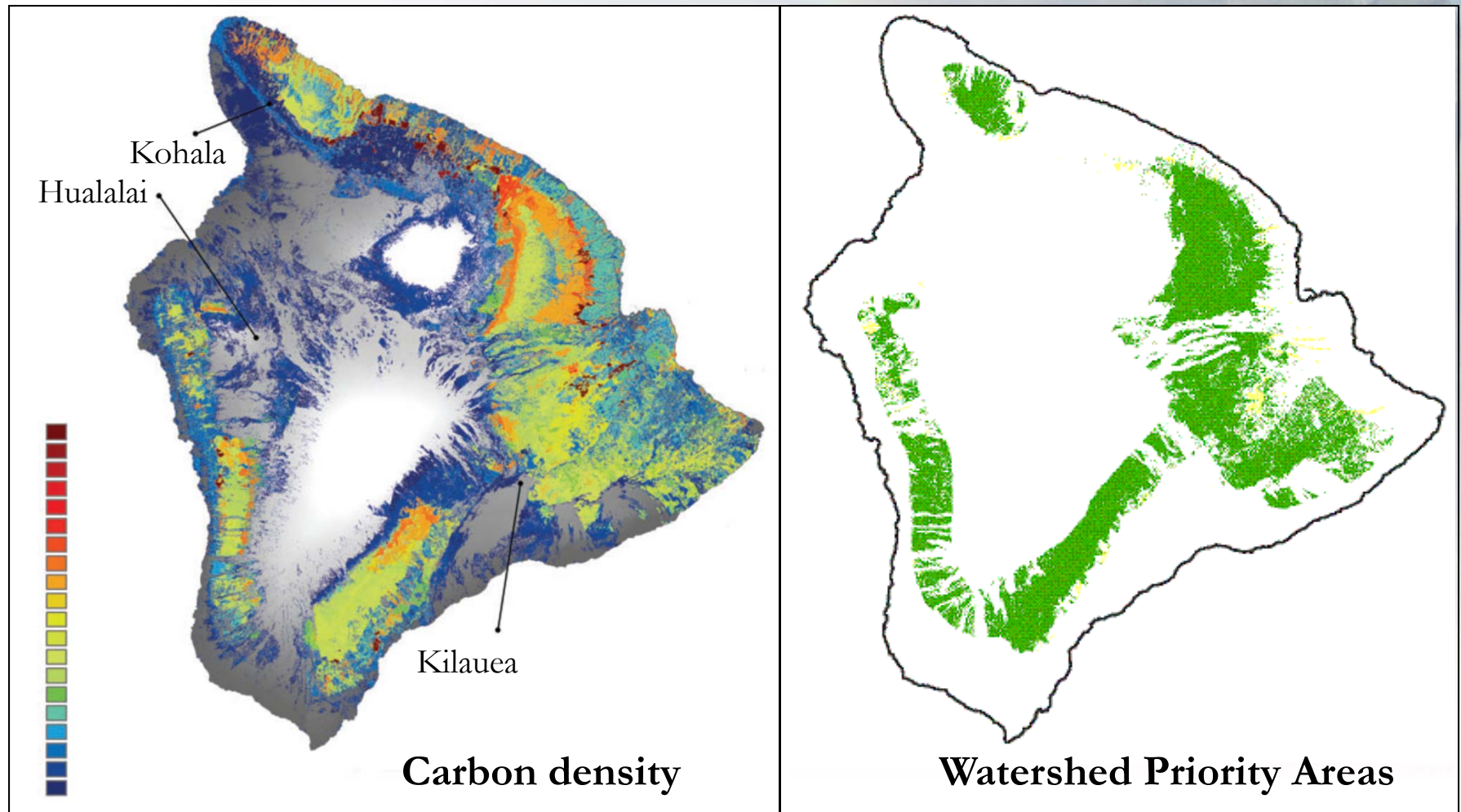


Forests capture rain and cloudwater

- Forests can increase water capture by up to 30%
 - 1% loss of recharge in the Ko`olau Mtns costs \$42 million
 - Invasive plants reduce estimated groundwater recharge in East Hawaii by 85 million gallons/day
 - Desalination plant planned for `Ewa will cost \$40 million to construct and \$5 million annually to produce 5 million gallons/day



Benefits of Forest Watershed Protection

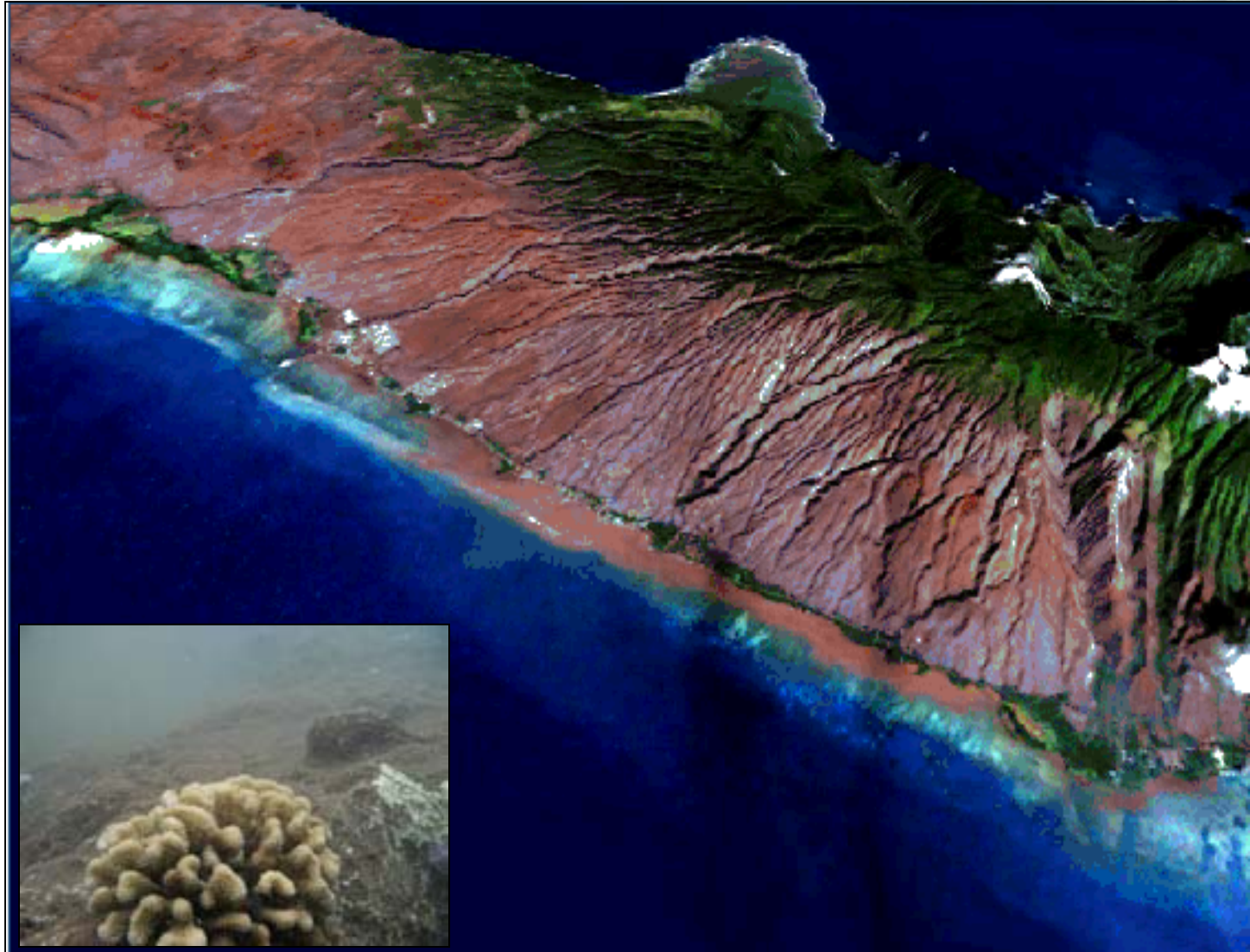


Asner, G. P., R. F. Hughes, J. Mascaro, A. L. Uowolo, D. E. Knapp, J. Jacobson, T. Kennedy-Bowdoin, and J. K. Clark. 2011. High-resolution carbon mapping on the million-hectare island of Hawai'i. *Frontiers in Ecology and the Environment* 9:434-439



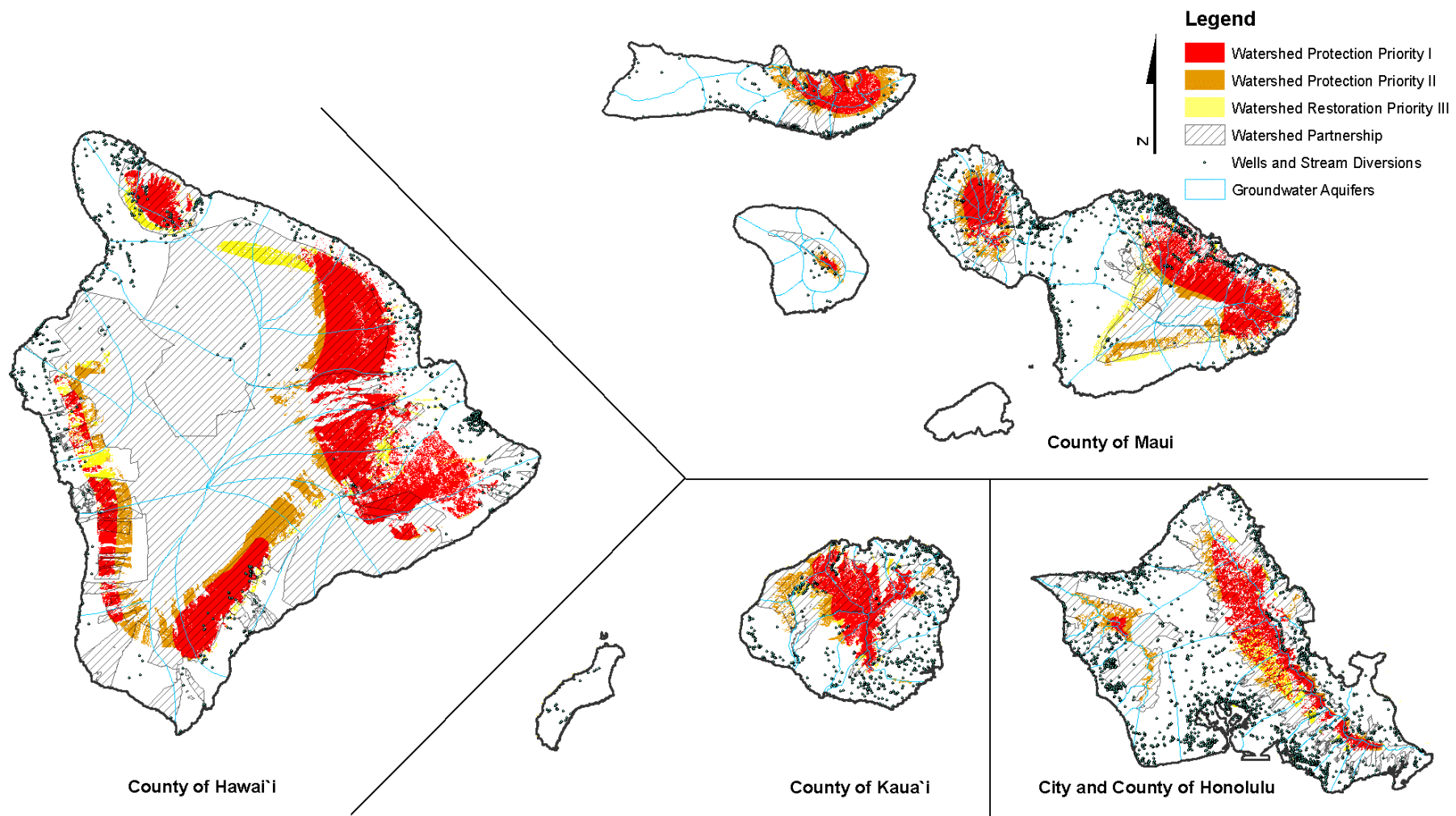


Benefits of Forest Watershed Protection





Priority Watershed Areas

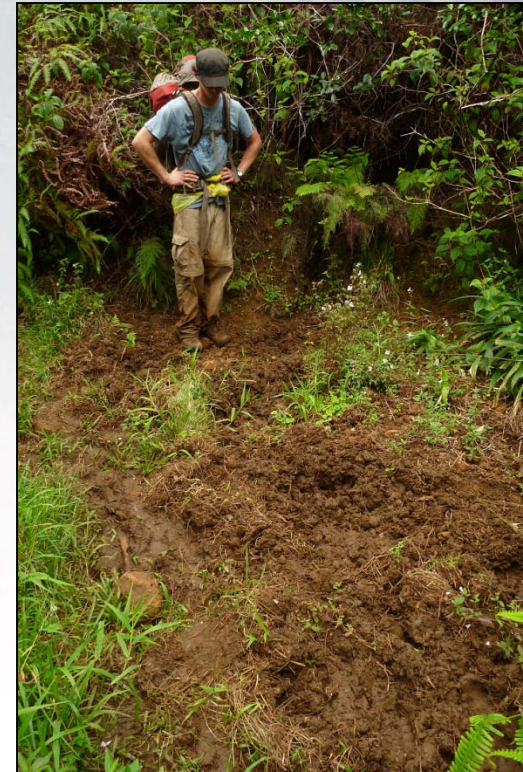


See Appendix II for methodology.
Map created November 2011. DLNR (808) 587-4170.



Action Plan

- Remove all invasive hooved animals from priority I and II areas.





Action Plan

- Remove or contain damaging invasive weeds that threaten priority I and II areas



- Weed control in fenced areas
- Control and prevention of new invasive species that will spread to priority I and II areas
- Use and development of tested integrated pest management



Action Plan



- Monitor and control other forest threats including fires, predators, and plant diseases.
- Restore native species.
- Establish benchmarks and monitor success.
- Educate Hawaii's residents and visitors about the cultural, economic, and environmental importance of conserving native forests.
- Promote consistent and informed land use decision-making that protects watersheds.

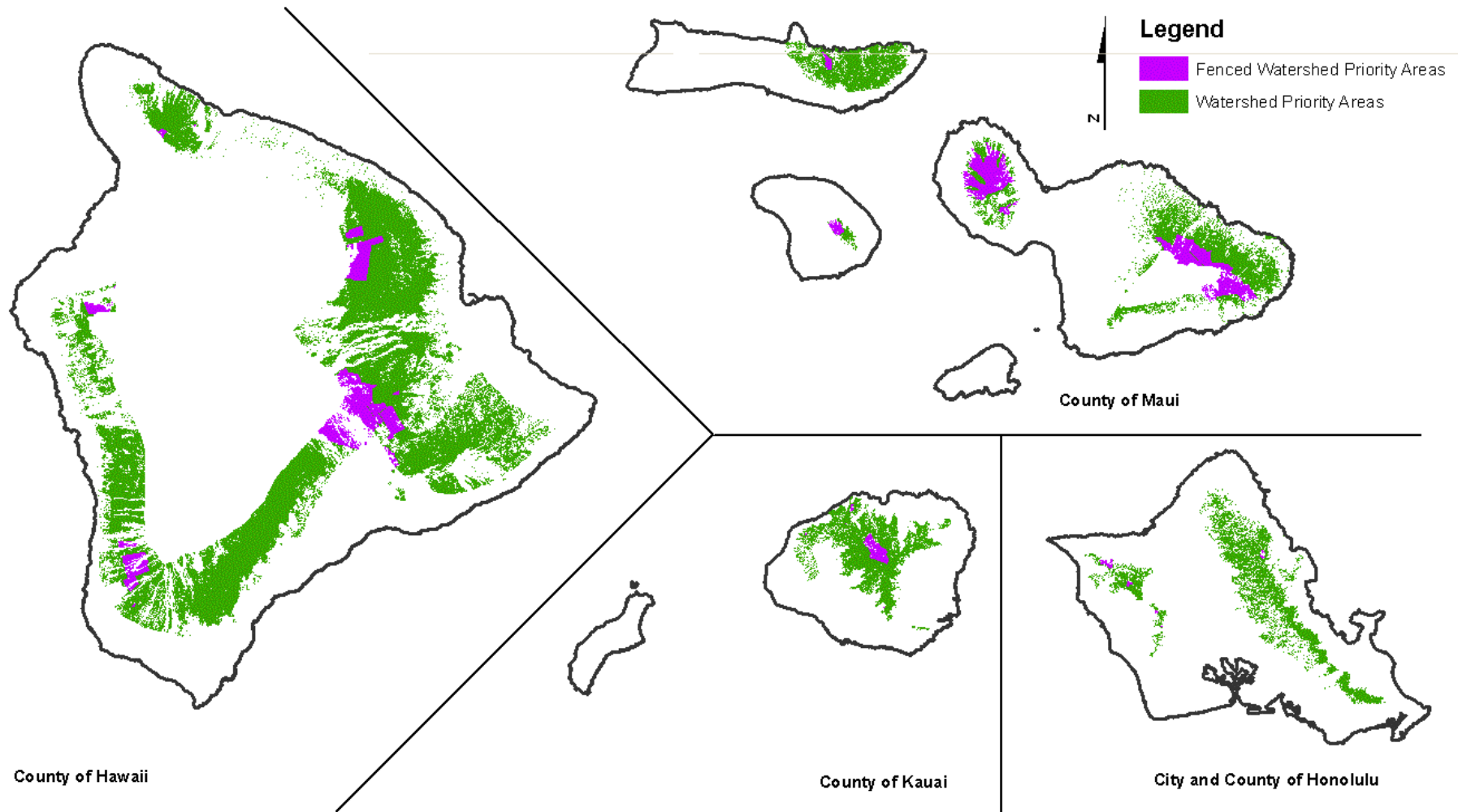


Action Plan

- DLNR's Goal
 - Double acreage protected in next 10 years
 - Requires investment of approximately \$11 million per year
 - Fund approximately 150 FTE natural resource careers
 - This level of effort, or more, needed in perpetuity to stabilize Hawaii's water source



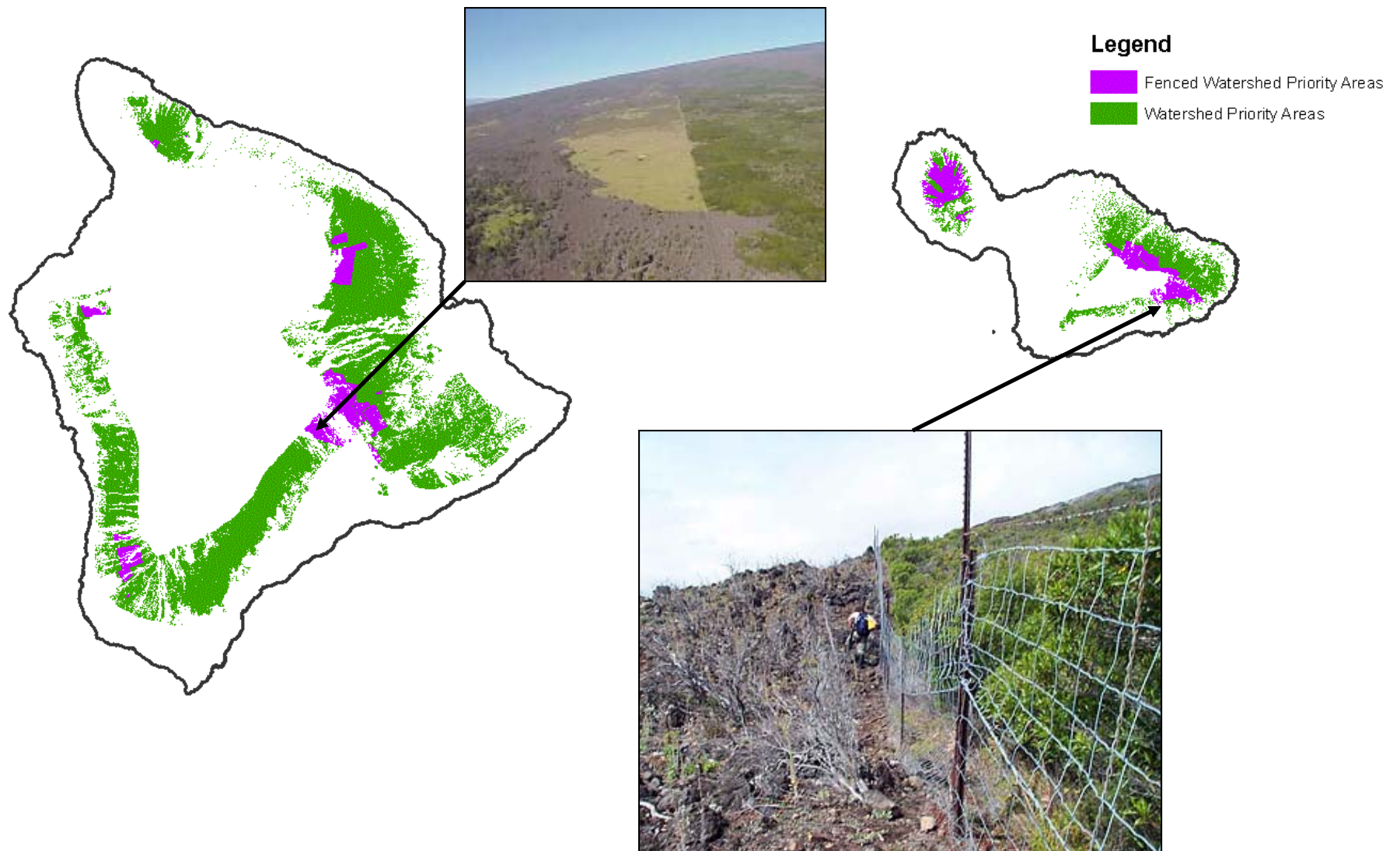
Watershed Priority Areas



Map created September 2011. DLNR (808) 587-4170.



Watershed Priority Areas





Methodology

Managed



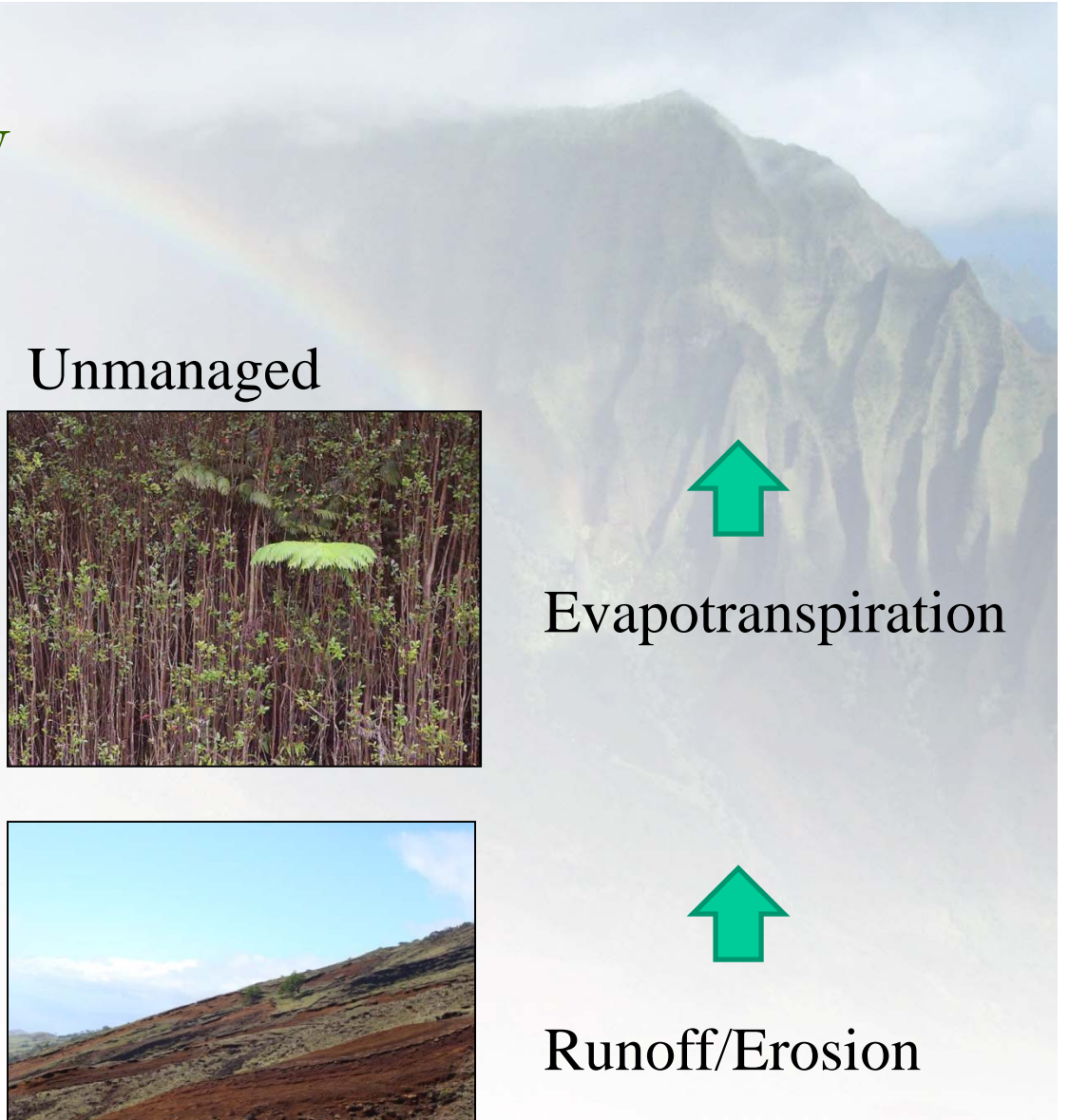
Unmanaged



Evapotranspiration



Runoff/Erosion





Methodology

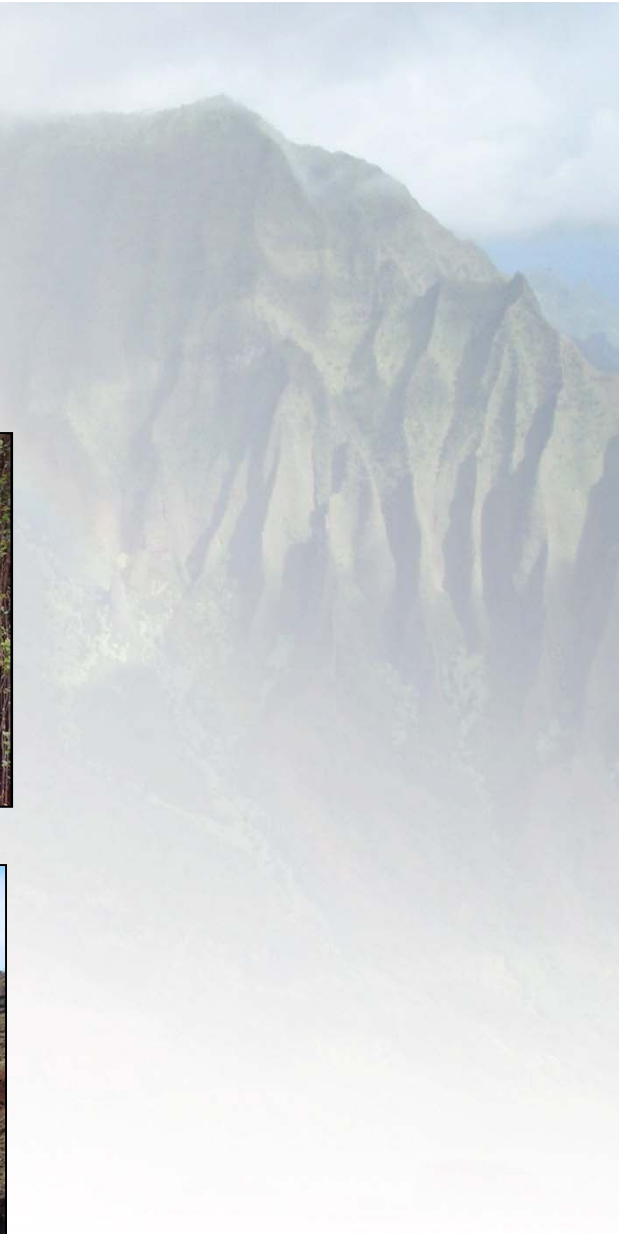
Managed



\$
↑
?

\$
↑
?

Unmanaged





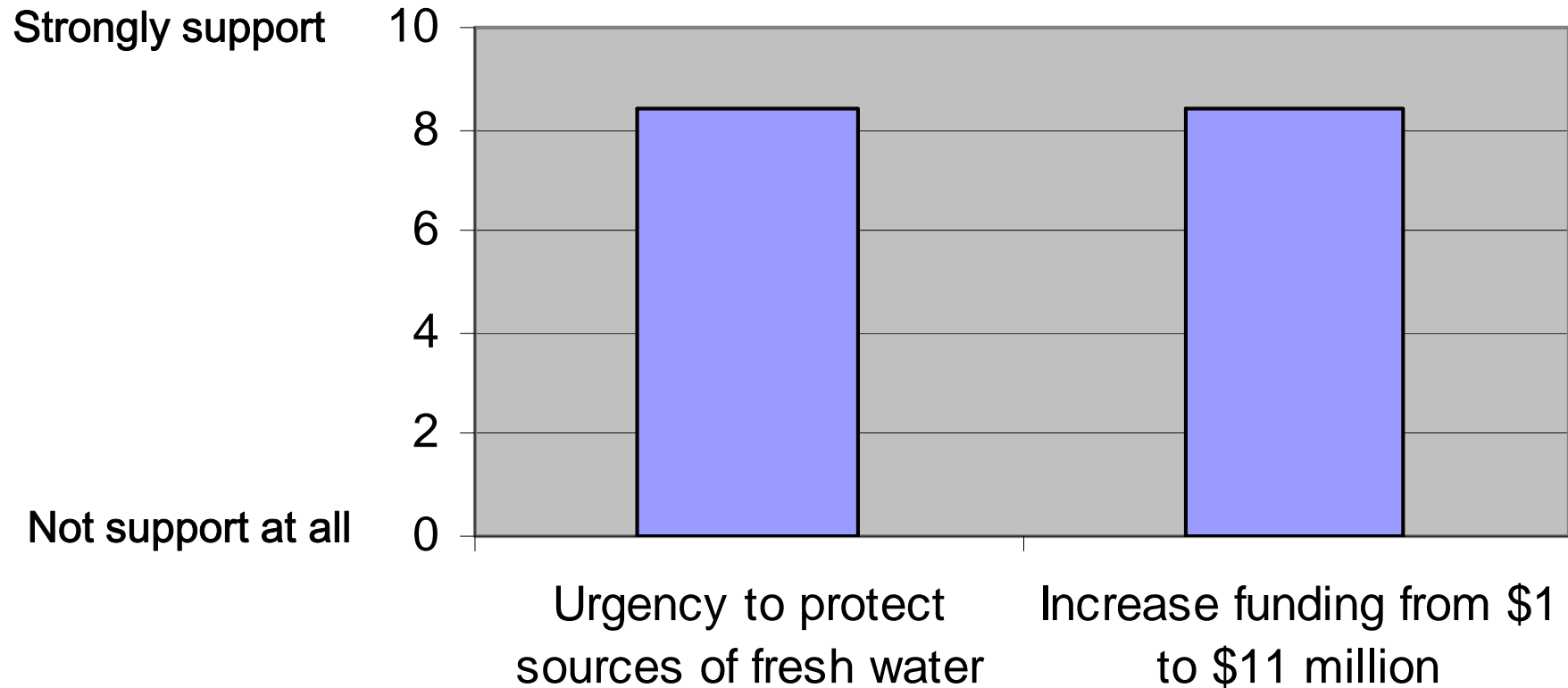
Funding

- Dedicated funding needed
- Watershed protection benefits multiple sectors so identify many funding sources
- Funding from uses that depend on or are mitigated by watershed protection
 - Visitor industries
 - Water
 - Climate change resiliency
 - Greenhouse gas emissions reduction



Polling

Public Support





Public Support

Watershed Contributions	Average	Theme
Capture rainfall and replenish fresh water supplies for our use	9.2/10	Water
Provide water for local agriculture	8.9/10	Water/Economy
Prevent erosion and runoff of sediment into our oceans	8.7/10	Oceans/Climate Change
Are of spiritual & cultural importance to native Hawaiian culture	8.1/10	Culture
Increase resistance to climate change by absorbing greenhouse gases	8.0/10	Climate Change
Support the visitor industry by providing the unique natural beauty that attracts tourists	7.9/10	Aesthetic/Economy



Public Support

Watershed Protection	Average	Theme
Hawaii's forests are important to Hawaii's fresh water supply	9.5/10	Water
Forests need protection because they are declining and home to native plants and wildlife found nowhere else on earth	9.0/10	Native Species
Invasive species must be kept to a minimum to protect the health of watershed forests	8.9/10	Invasive Species
Spending now to protect our forests saves taxpayer money in the long run	8.2/10	Economy



MAHALO

Hahai no ka ua i ka ulula`au

The rain always follows the forest

Hawaii.gov/dlnr