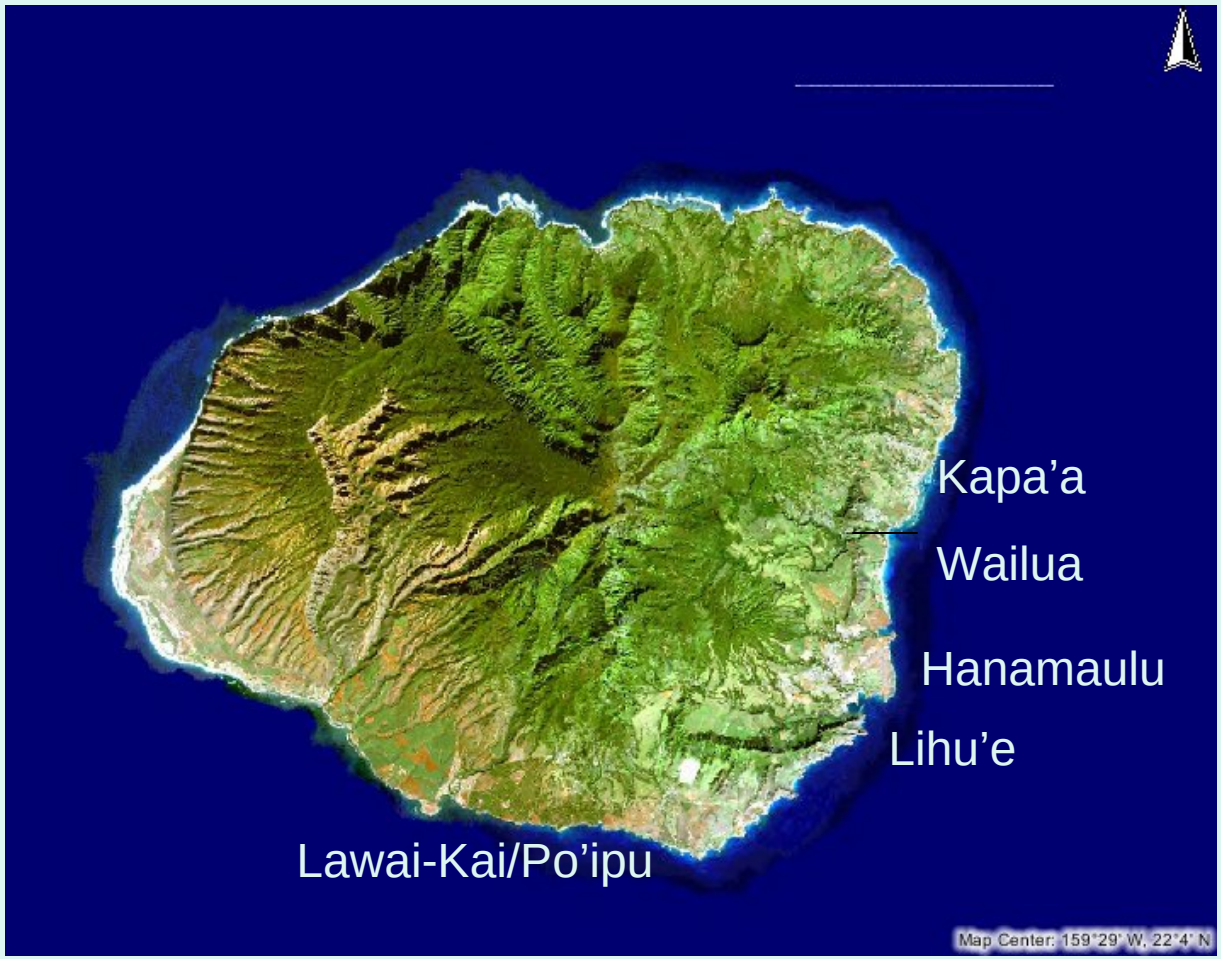
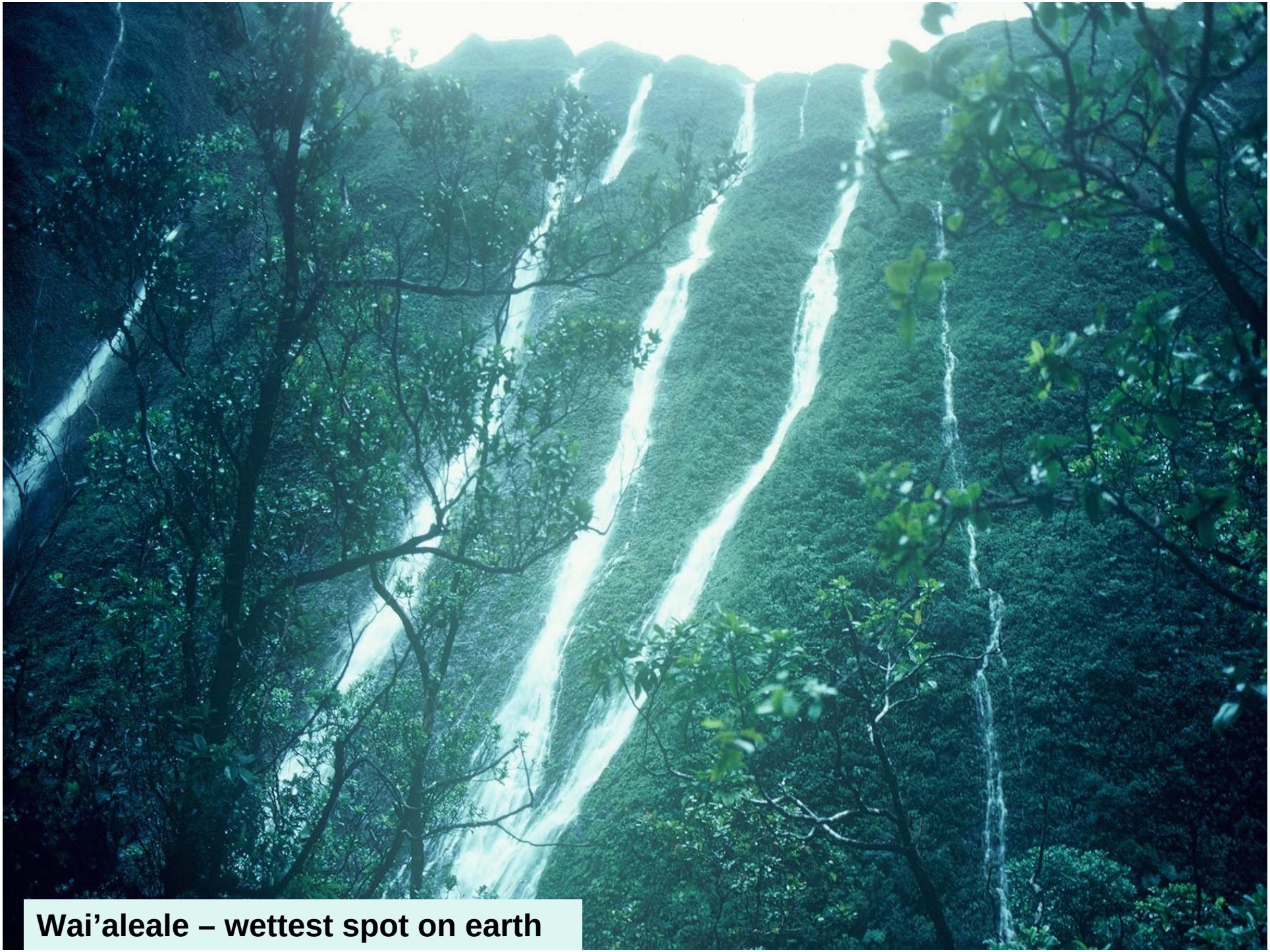
Watershed Development and Stream Ecosystem Degradation on Kauai, Hawaiian Islands

Sustainable development where are you?

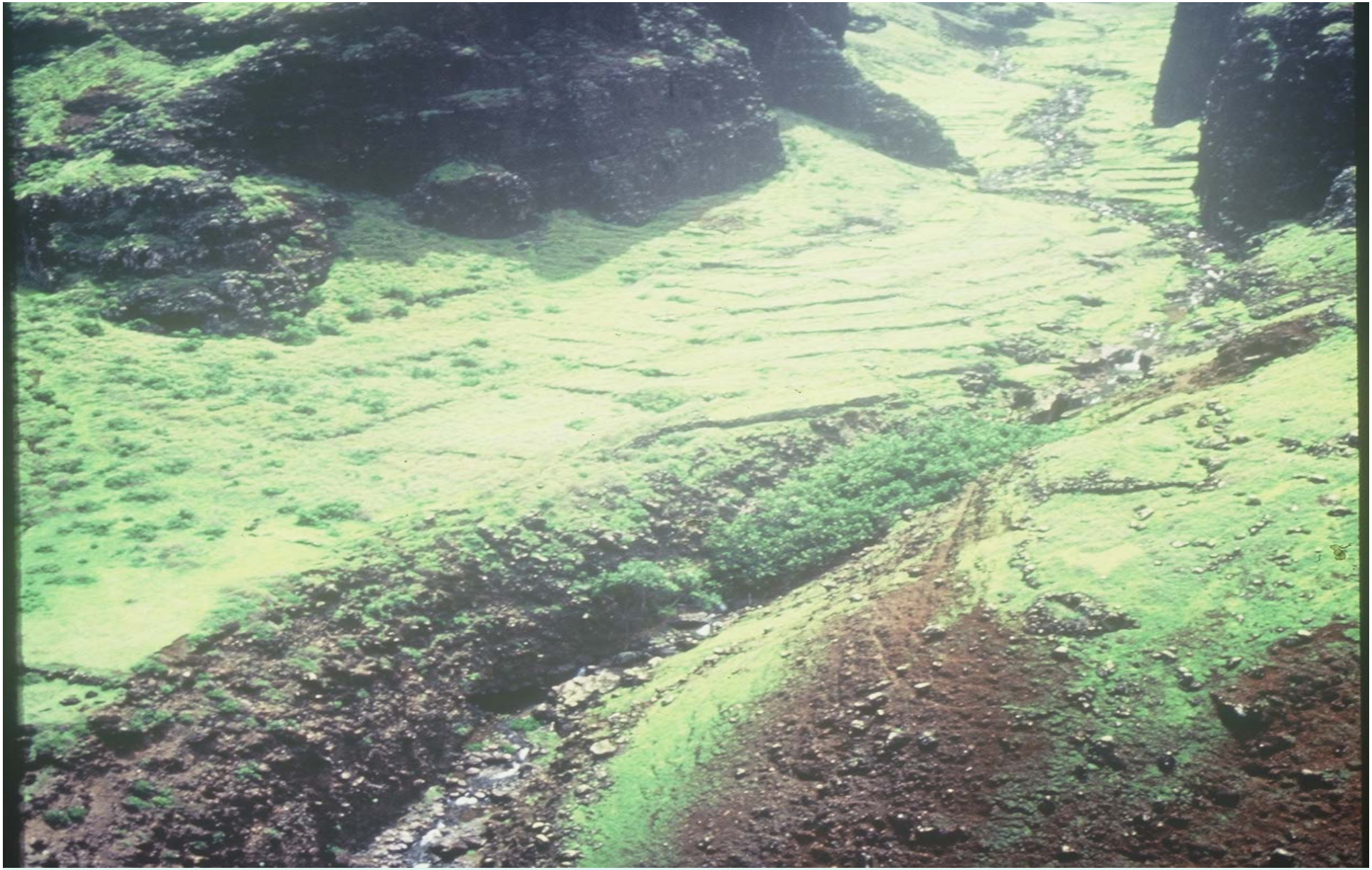
Kaua’i: the island of abundant streams and unsustainable urban development





Wai’aleale – wettest spot on earth

Awaawapuhi Stream, Na Pali Coast State Park- high IBI



Nualolo ‘Aina Stream, Na Pali Coast State Park- high IBI and extensive taro terracing; ancient example of “sustainable development”/stream protection

Sustainable Development:

- Protects ecosystem integrity
- Promotes economic efficiency
- Ensures social/cultural equity

Oah’u: positive correlation between degree of urban development and stream degradation

Shanghai- urban development and water quality degradation

Halehaka Road (45 feet wide) in Puako subdivision. The subdivison, Puakea Golf Course Home Depot, Chiefess Kamakahele School, and two developing subdivisions discharge st into Puali Stream

The opposite of “green roofs”: from rooftop to storm drain to stream channel

Urban stormwater runoff Puako subdivision and associated pollutants: Puali Stream

Urban stormwater discharge into Puali Stream and associated stream bank erosion

Lawehana Stream, tributary of the Hanamaulu River: incised stream channel due to increased hydraulic action from urban stormwater discharges

Chemical spill into Kalapaki Stream: Lihue Industrial “Park”

Warning Polluted Water: Kalapaki Beach, Marriott Hotel, Kauai


PUHI
INDUSTRIAL PARK
PREMIUM

Puali Stream channelization and riparian degradation within Puhi Industrial “Park”

Makaaeae Stream, tributary of Puali River, riparian degradation landscape company on Grove Farm land discharges into Nawiliwili Bay

Papalinahoa Stream riparian clearing for Puakea golf course and Ulu Ko subdivision; since urbanization this stream is no longer a perennial stream

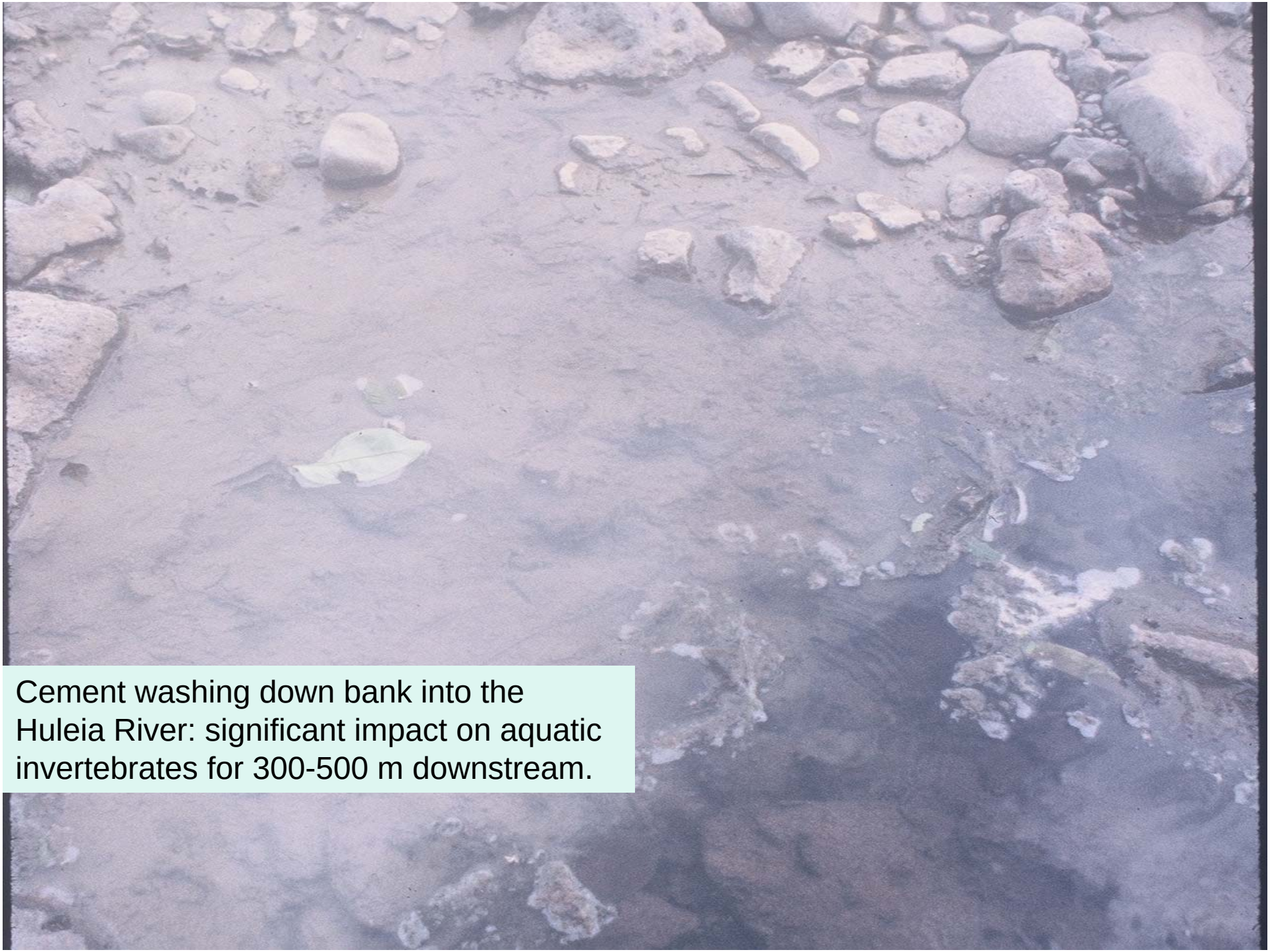
Ku’ia Stream, tributary of the Huleia River, diversion (1957) takes 100% of flow out of the watershed; blocks migration of amphidromous species

Ku’ia Stream bed dry for about 500-1,000 m downstream

Waimea River diversion (1910?)

Wainiha River hydropower diversion weir (1907)—100% of flow about 90-95% of the time; no flow below weir for about 300 m downstream

Cement plant on the banks (50 m) of Huleia River



Cement washing down bank into the Huleia River: significant impact on aquatic invertebrates for 300-500 m downstream.

Measures needed to conserve and restore biological integrity of Hawaiian streams:

•Develop public and private partnerships to change the status quo; need a MOU between state and county to guide sustainable watershed development

•Paradigm shifts –

1) “sustainable developers” not developers vs. tree-huggers
2) spread out urban stormwater on the land and allow infiltration in detention basins and “water gardens”

•State/Counties should adopt laws/ordinances to establish community-based watershed councils to aid watershed resource planning and conservation

•State/Counties should adopt laws/ordinances to establish “grey water systems” that enhance infiltration, reduce STP operating costs, and reduce total use of potable water for gardens and lawns

•State (DLNR/COWRM/legislature) need to amend definition of “stream” or “stream channel” to include riparian zone inundated during the average floods; also need amendment relating to protection of “hydraulic conditions” (Washington State, Hydraulic Code)

Continued-

•State (DLNR; COWRM; OSP; CZMP, etc.) needs to adopt a "sustainable watershed development" policy and a "net gain" policy to guide the protection and restoration of stream biological integrity

•State (DLNR, LUC, OSP) needs to establish "Conservation District Zoning" for stream/river ecosystems to protect these sensitive ecosystems, including coral reef receiving waters

•Establish scientifically-based permanent instream flow standards to protect and restore biological integrity to Hawaiian streams, estuaries and wetlands

•Address cause and effect relationship between groundwater withdrawals and decreasing instream flows

•State needs to adopt "overlay planning" and establish commercial/industrial zoning setbacks from stream/riparian areas

•AG needs to address streams as a "Public Water Trust Resources" (Hawaii Supreme Court, August 2000, Waiahole decision and order)