

# TROPICAL WATER QUALITY INDICATOR WORKSHOP



UNIVERSITY  
OF HAWAI'I

March 1–2, 2001  
Waikiki Beach Marriott Resort: Koa Room  
Honolulu, Hawai'i

Sponsored by  
Water Resources Research Center, University of Hawai'i  
U.S. Environmental Protection Agency  
Hawai'i Department of Health



WATER RESOURCES  
RESEARCH CENTER  
University  
of Hawai'i

## MARCH 1, 2001

7:30–8:15 AM	Sign in (No registration fee)
	❖ MORNING SESSION MODERATOR: <i>Roger Fujioka</i> (University of Hawai'i) ❖
8:15–8:25 AM	Opening remarks <i>Bruce Anderson</i> , Director (Department of Health, Hawai'i)
8:25–8:30 AM	Guidelines for workshop: <i>Roger Fujioka</i> (University of Hawai'i)
8:30–8:50 AM	Review: Selection of fecal indicators and establishment of current recreational water quality standards based on measurable risk <i>Alfred Dufour</i> (U.S. Environmental Protection Agency)
8:50–9:00 AM	Discussion
9:00–9:20 AM	Review: Environmental sources and persistence of fecal indicator bacteria in Hawai'i and Guam <i>Roger Fujioka</i> (University of Hawai'i)
9:20–9:30 AM	Discussion
9:30–9:50 AM	Review: Evaluation of water quality monitoring data by Hawai'i Department of Health <i>Eugene Akazawa</i> (Department of Health, Hawai'i)
9:50–10:00 AM	Discussion
10:00–10:30 AM	COFFEE BREAK
10:30–10:50 AM	Review: Environmental sources and persistence of fecal indicator bacteria in Puerto Rico and the U.S. Virgin Islands <i>Gary Toranzos</i> (University of Puerto Rico)
10:50–11:00 AM	Discussion
11:00–11:20 AM	Review: Environmental sources and persistence of fecal indicator bacteria in south Florida <i>Helena Solo-Gabriele</i> (University of Miami)
11:20–11:30 AM	Discussion
11:30–11:50 AM	Evaluation of an epidemiological/water quality study in Hawai'i <i>David Morens</i> (National Institutes of Health)
11:50–12:00 Noon	Discussion
12:00–1:00 PM	LUNCH
	Evaluation of an epidemiological/water quality study in Trinidad, West Indies <i>Christine Bullock</i> (Institute of Marine Affairs, Trinidad)
	❖ AFTERNOON SESSION MODERATOR: <i>Charles Gerba</i> (University of Arizona) ❖
1:00–2:00 PM	Open discussion of presented and additional data

2:00–2:30 PM	Discussion and vote on the following question: Are there sufficient experimental and monitoring data to conclude that the <b>assumption</b> used in interpreting water quality standards (there are no significant environmental sources of fecal coliforms, <i>E. coli</i> and enterococci) is not applicable in tropical areas (Hawai‘i, Guam, Puerto Rico, south Florida) where these bacteria can be recovered in high concentrations from ambient environments (water, soil, plants)?
2:30–3:00 PM	Discussion and vote on the following question: Are there sufficient experimental and monitoring data to conclude that the EPA <b>criteria</b> ( <i>E. coli</i> , enterococci) used to assess the quality of environmental waters are not reliable in tropical locales (Hawai‘i, Guam, Puerto Rico and south Florida) because the selected fecal bacteria persist in these ambient environments and represent non-fecal contamination?
3:00–3:30 PM	COFFEE BREAK
3:30–4:30 PM	Discussion and vote on the following question: Are there sufficient experimental and monitoring data to conclude that the EPA-recommended <b>recreational water quality standards</b> are not suitable to assess the hygienic quality of environmental waters in Hawai‘i, Guam, Puerto Rico and south Florida?
4:30–5:00 PM	Recommendations of experiments to conduct for the purpose of better addressing the questions and issues raised during this session

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**MARCH 2, 2001**

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	❖ MORNING SESSION MODERATOR: <i>Roger Fujioka</i> (University of Hawai‘i) ❖
8:15–8:30 AM	Call to order, guidance and announcements
8:30–9:00 AM	Review: (1) Evidence for multiplication of fecal indicator bacteria in the environment; (2) Selection of more reliable criteria and standards for recreational waters in Hawai‘i <i>Roger Fujioka</i> (University of Hawai‘i)
9:00–9:15 AM	Discussion
9:15–9:45 AM	Review: (1) Evidence for multiplication of fecal indicator bacteria in the environment; (2) Selection of more reliable criteria and standards for recreational waters in Puerto Rico <i>Gary Toranzos</i> (University of Puerto Rico)
9:45–10:00 AM	Discussion
10:00–10:30 AM	COFFEE BREAK
10:30–11:00 AM	Review: (1) Evidence for multiplication of fecal indicator bacteria in the environment; (2) Selection of more reliable criteria and standards for recreational waters in south Florida <i>Helena Solo-Gabriele</i> (University of Miami)
11:00–11:15 AM	Discussion
11:15–11:45 AM	Relevance of microbial ecology in interpreting water quality standards <i>Gary Toranzos</i> (University of Puerto Rico)
11:45–12:00 Noon	Discussion
12:00–1:00 PM	LUNCH Group discussion/ <i>Joan Rose</i> (University of South Florida)
	❖ AFTERNOON SESSION MODERATOR: <i>James Tiedje</i> (Michigan State University) ❖
1:00–2:00 PM	Open discussion of presented and additional data

2:00–2:30 PM	Discussion and vote on the following question: Are there sufficient experimental and monitoring data to conclude that fecal indicator bacteria (fecal coliforms, <i>E. coli</i> , enterococci) can multiply in tropical environments and that bacteria from these sources are indicative of lower health risk than those from fecal sources?
2:30–3:00 PM	COFFEE BREAK
3:00–3:30 PM	Open discussion of presented and additional data
3:30–4:00 PM	Discussion and vote on the following question: Are there sufficient experimental and monitoring data to conclude that the proposed alternative criteria and recreational water quality standards for Hawai‘i and Puerto Rico are more useful than current EPA criteria and standards?
4:00–5:00 PM	Recommendations of experiments to conduct for the purpose of better addressing the questions and issues raised during this session

## TROPICAL WATER QUALITY INDICATOR WORKSHOP PARTICIPANTS

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<p><b>Mr. Eugene Akazawa</b> Department of Health, Hawai‘i</p> <p><b>Dr. Nicholas J. Ashbolt</b> The University of New South Wales</p> <p><b>Dr. Muruleedhara Byappanahalli</b> University of Hawai‘i</p> <p><b>Ms. Christine Bullock</b> Institute of Marine Affairs Trinidad, West Indies</p> <p><b>Ms. Carmen Denton</b> Guam Waterworks Authority</p> <p><b>Dr. Alfred P. Dufour</b> U.S. Environmental Protection Agency Cincinnati</p> <p><b>Dr. Roger S. Fujioka</b> University of Hawai‘i</p> <p><b>Dr. Charles P. Gerba</b> University of Arizona</p> <p><b>Dr. Terry C. Hazen</b> Lawrence Berkeley National Lab California</p>	<p><b>Mr. Rick Hoffmann</b> U.S. Environmental Protection Agency Washington, D.C.</p> <p><b>Dr. Gillian Lewis</b> University of Auckland, New Zealand</p> <p><b>Dr. David M. Morens</b> National Institutes of Health, Maryland</p> <p><b>Dr. Joan B. Rose</b> University of South Florida</p> <p><b>Dr. Michael Sadowsky</b> University of Minnesota</p> <p><b>Dr. Steve Schaub</b> U.S. Environmental Protection Agency Headquarters, Washington, D.C.</p> <p><b>Dr. Helena Solo-Gabriele</b> University of Miami</p> <p><b>Dr. James M. Tiedje</b> Michigan State University</p> <p><b>Dr. Gary A. Toranzos</b> University of Puerto Rico</p>
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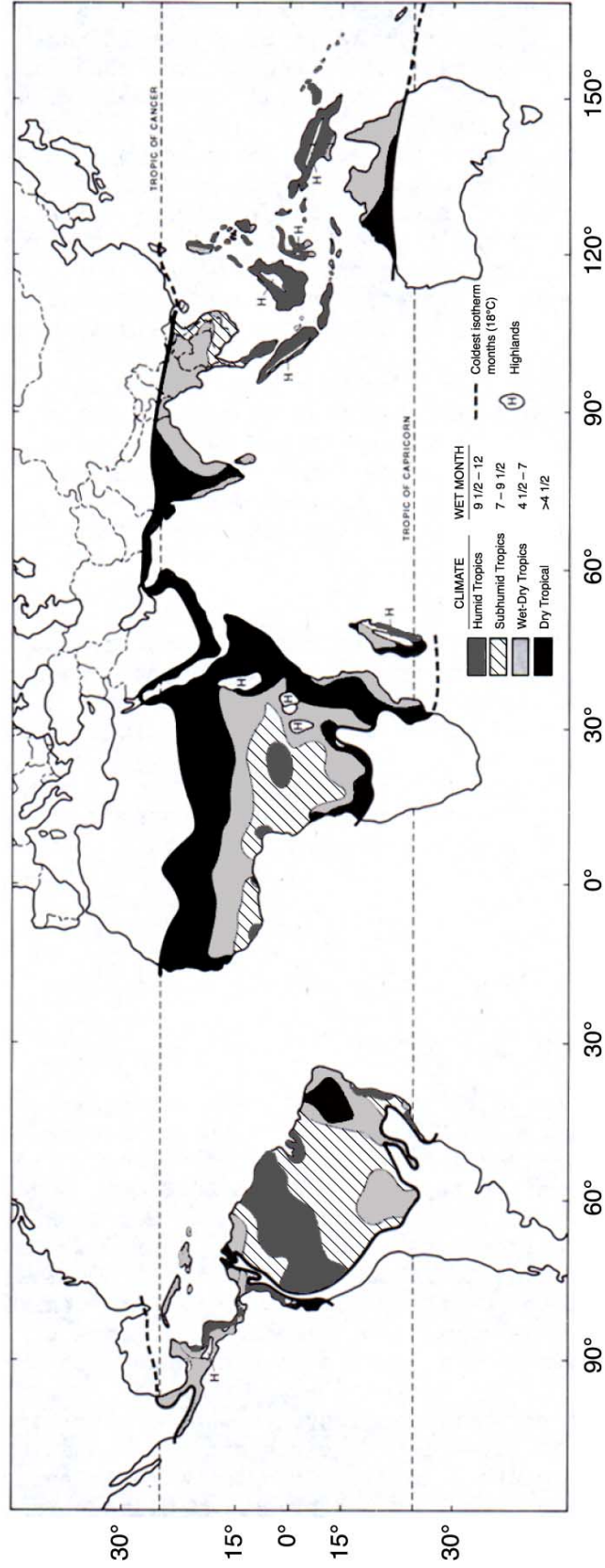
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APPENDIX F

World Map of Four Climatic Subregions in the Humid Tropics



Source: Chang and Lau (1993).