Tools to Protect Watersheds on Small Islands

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Watershed Strategies for Islands

- Rainfall as a Resource/Runoff as a Waste
- Rapid, small watershed planning
- Educate & engage public
- Create locally-based watershed organizations

Intense Land Use Change in Coastal Areas

1994

1999

The 8 Tools of Watershed Protection

8. Watershed Stewardship

1. Watershed Planning

2. Land Conservation

7. Non-Stormwater Discharges

3. Aquatic Buffers

6. Stormwater Management

5. Erosion & Sediment Control

4. Better Site Design

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Adapting the Eight Tools of Watershed Protection

- Carefully adapt “mainland” solutions
- Minimize impervious cover
- Apply the 8 tools together at the small watershed scale
- Use simple techniques, done well.

Watershed Planning

- A'hupua'a planning: from the mountain to the sea
- Create overlay zones that designate growth areas and resource protection areas

Basic Methods to Prepare Watershed Protection Plans

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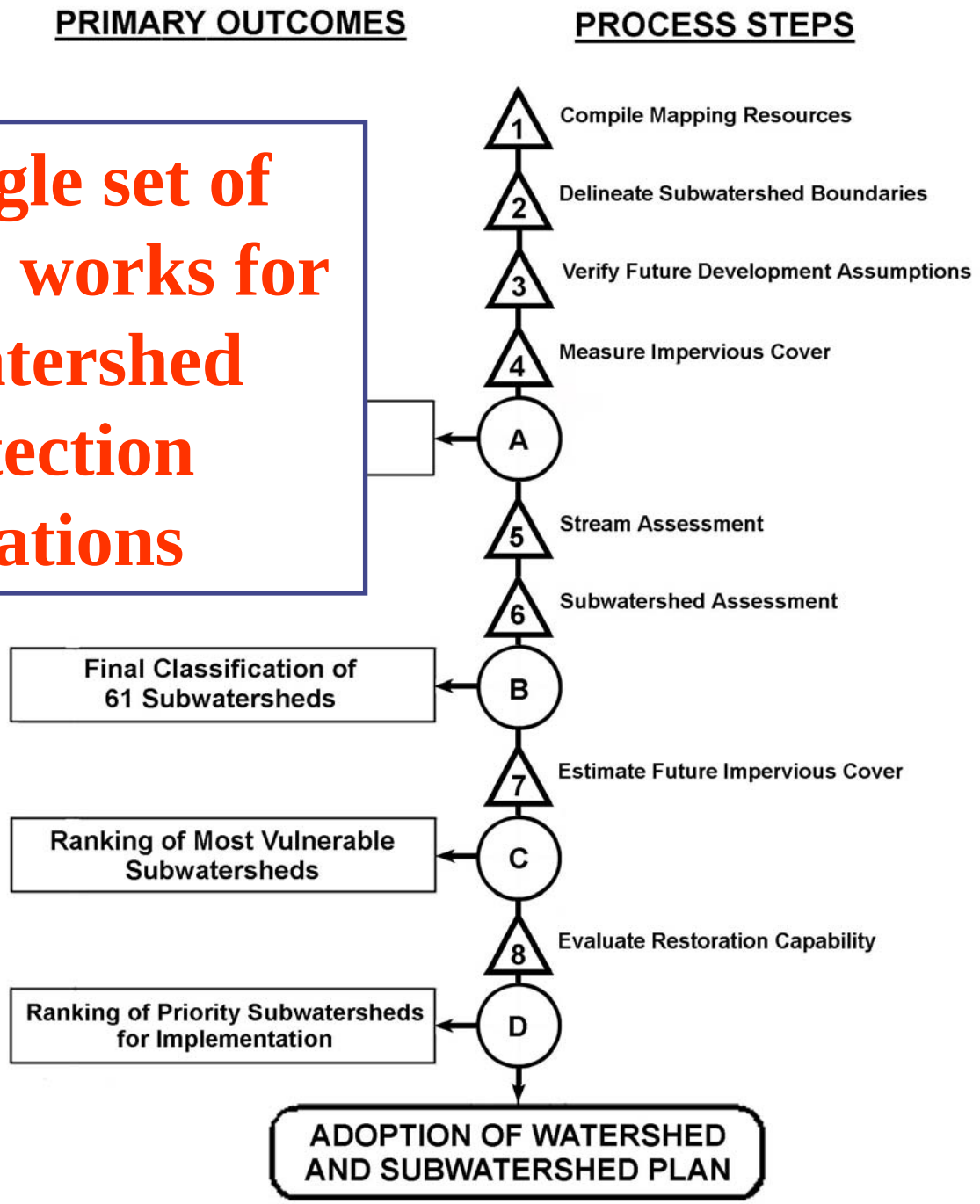
No single set of methods works for all watershed protection situations



Seven Steps of Local Watershed Planning

1. Assess needs and set goals ←
2. Identify vulnerable subwatersheds ←
3. Evaluate watershed conditions ←
4. Adapt protection tools ←
5. Apply early action projects
6. Adopt and implement plan
7. Develop long-term capacity

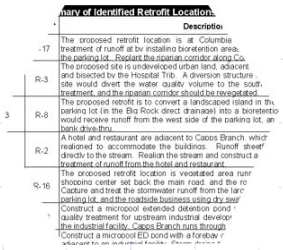

Whoa, I'm seeing shapes…
Desktop Analysis
Stakeholder Mgmt.
Management Outcomes
Field Assessments

Each Step Includes its Own Unique Methods for:

Desktop Analysis

Field Assessment

Stakeholder Involvement

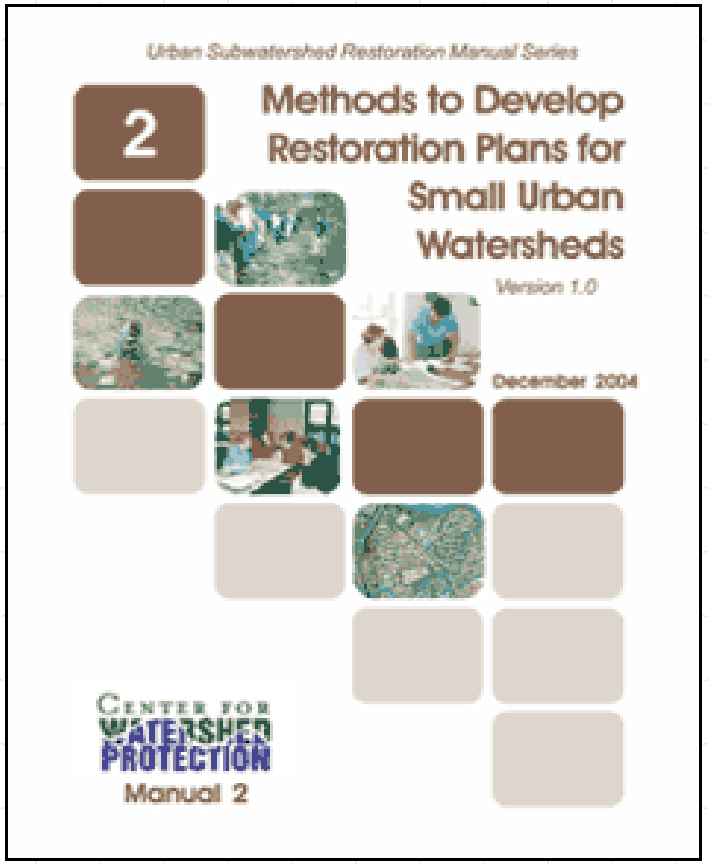


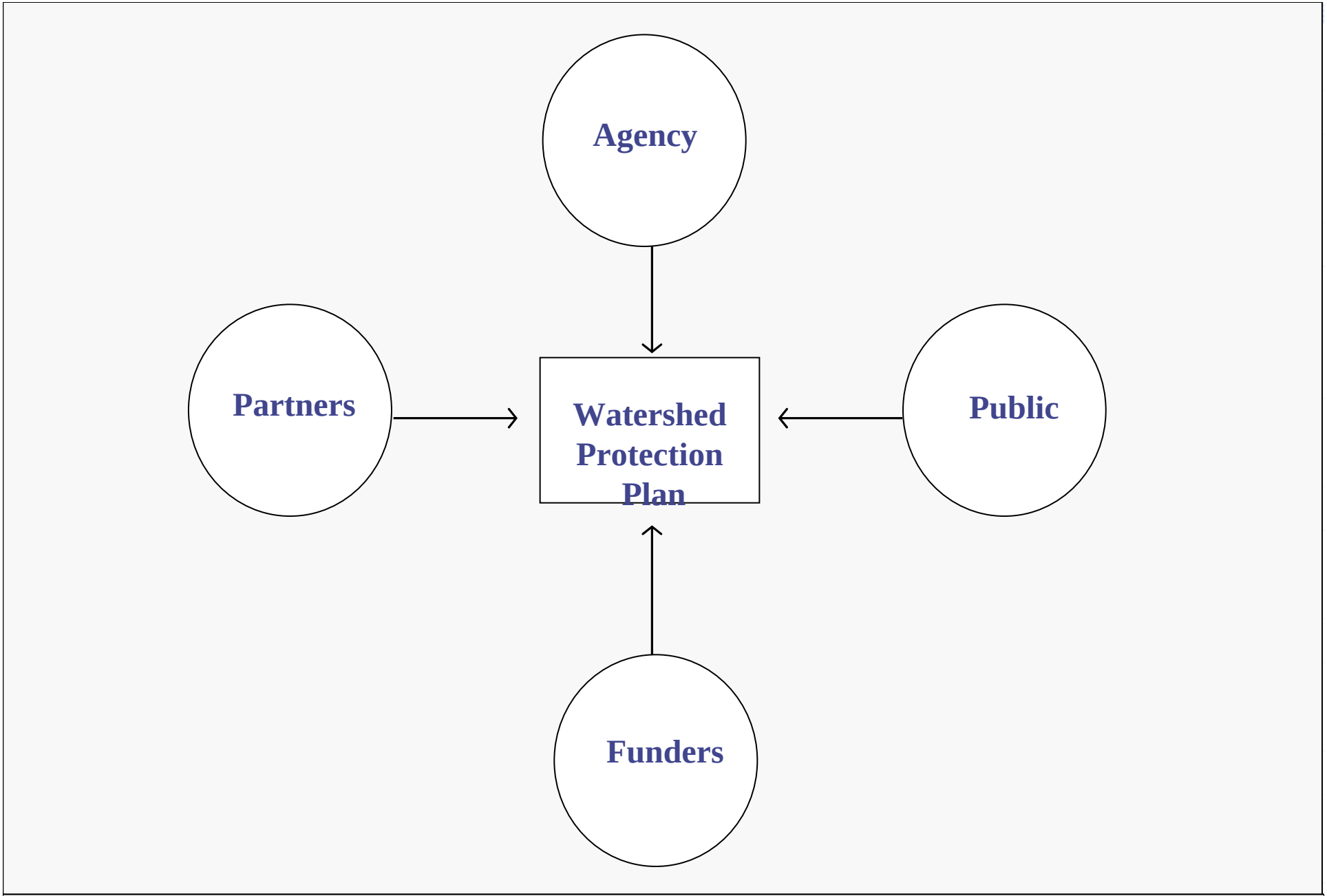
Management Decisions

Manual 2. Methods to Develop Restoration Plans for Small Urban Watersheds

Step-by-step guidance to develop, adopt and implement restoration plans

Features 32 different desktop field, stakeholder, and management methods





Stakeholder Groups Involved in Protection Plans

Goals, Objectives and Indicators

Goals: broad statement of purpose about what protection will accomplish expressed in a slogan and understood by the public

Objectives: Precise statements of specific actions needed to achieve goals (who, what, how, where, when, how much) that give instructions to managers

Indicators: numerical and measurable indicators of watershed health linked to goals and tracked over time by scientists.

Step 2: Identify Vulnerable Subwatersheds

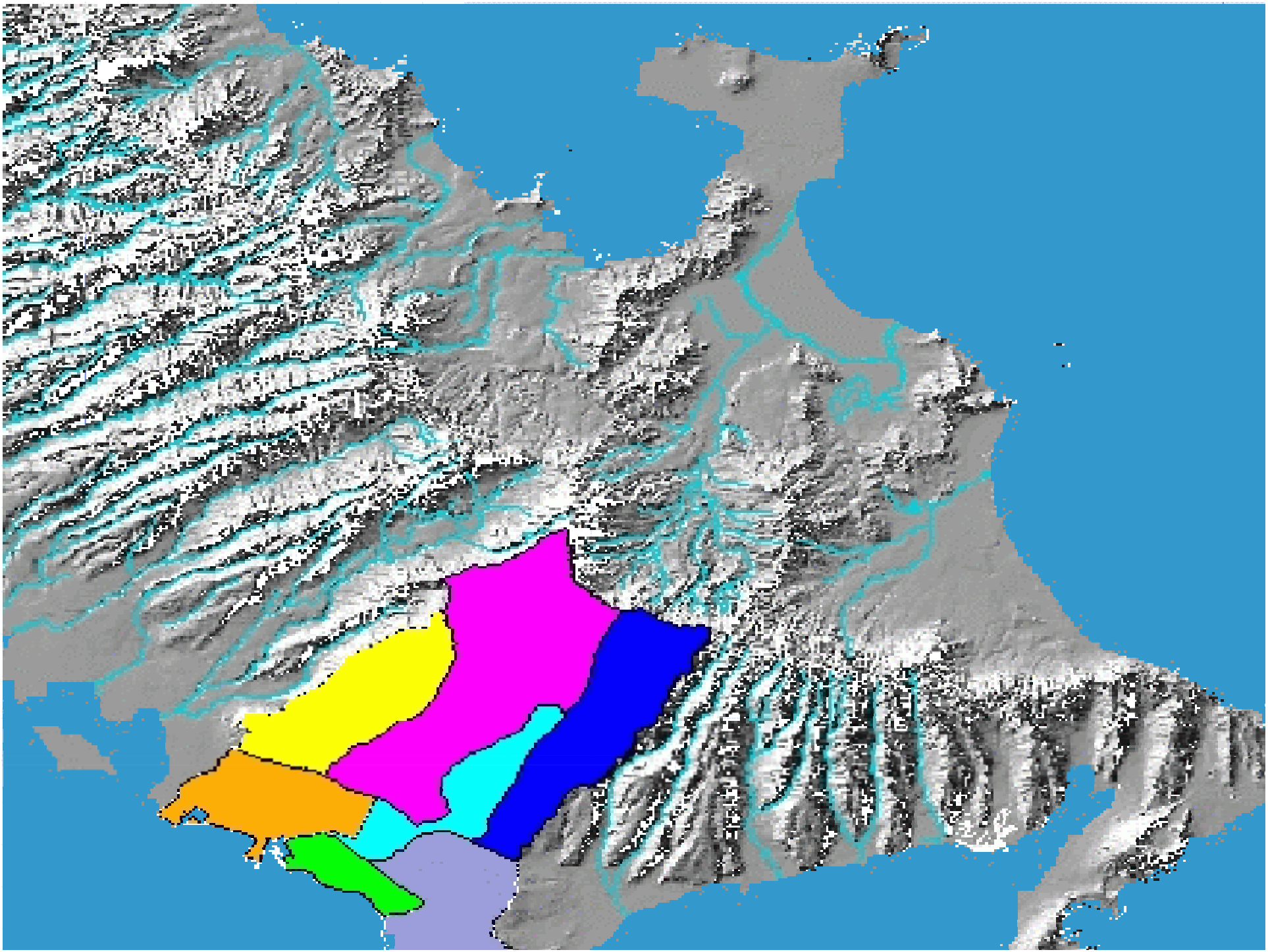
D: Watershed Land Cover Analysis

F: Watershed Resource Inventory

S: Stakeholder Meetings

M: Watershed Vulnerability Analysis

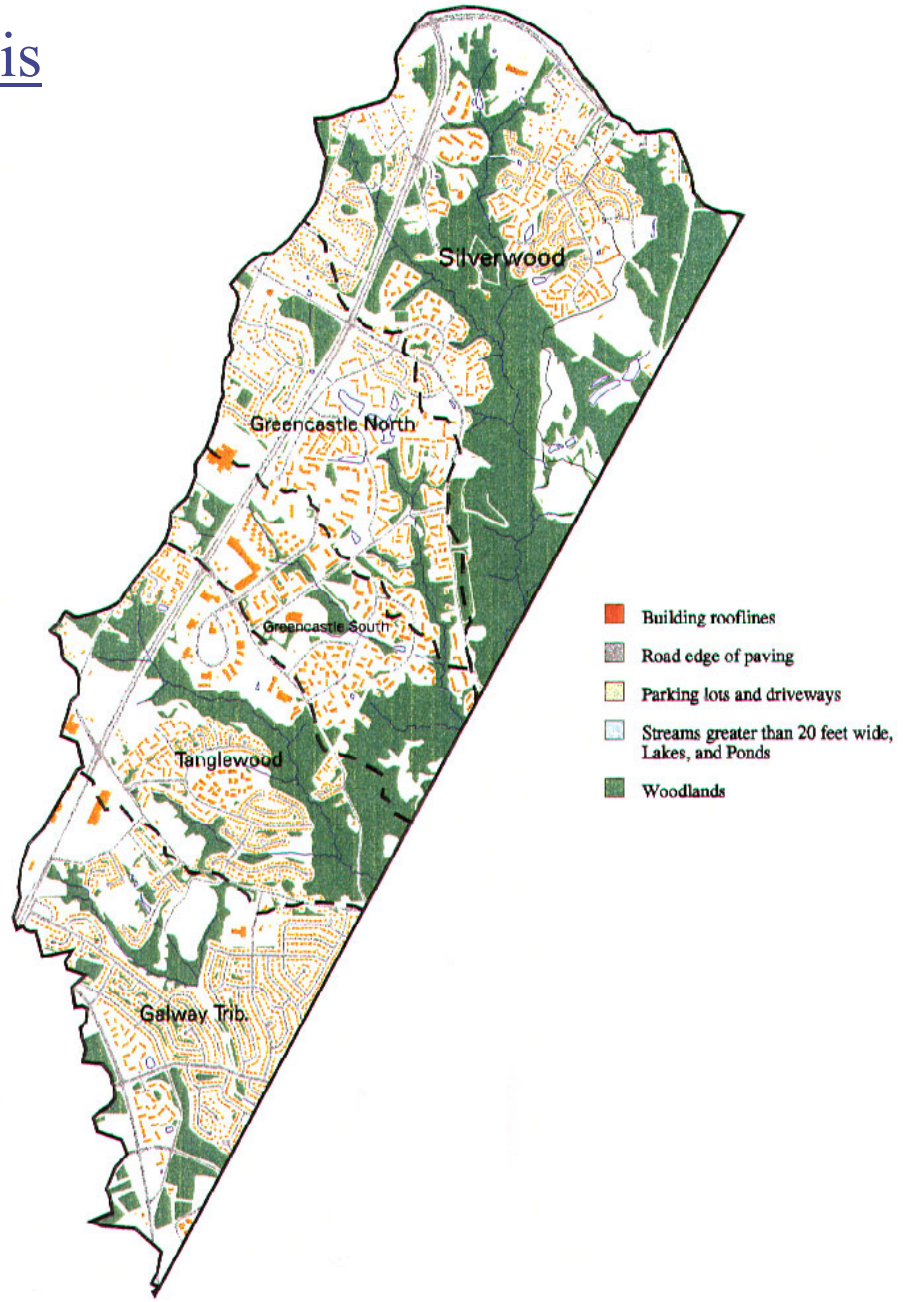
Purpose: narrow management focus to most critical resources and vulnerable subwatersheds



Watershed Land Cover Analysis

Translate Current Land Use and Future Zoning into Land Cover Units that can be used to compare conditions between subwaterheds:

- Impervious Cover
- Forest Cover
- Exposed Soil (Roads)



Focus on Watershed Vulnerability Analysis

- Classifies subwaterheds (for regs)
- Identifies ones most vulnerable to development
- Forecasts future degradation
- Highlights the best subwatersheds and resources
- Targets which subwatersheds should be focus of early action projects


Restore


Prevent


Protect


Treat

Watershed Vulnerability Analysis

1. Delineate watersheds
2. Translate current land use into land cover IC-FC-SC-GC
3. Project future zoning into land cover
4. Derive subwatershed cover metrics
5. Initial subwatershed classification (ICM)
6. Derive supplemental subwatershed metrics
7. Develop weighting and scoring system
8. Final subwatershed vulnerability list

Subwatershed Metrics

- Impervious Cover
- Forest Cover
- Wetland Cover
- Exposed Soil (less than 15% FC)
- Miles of dirt roads
- Downstream Reef Vulnerability
- Sediment Load

What might be some other metrics to use in Molokai watersheds?

- What are good ones that can be easily derived from existing data sources?
- Please provide contact info on your sources
- Do they exist in GIS?
- Is the mapping data recent?

Step 3: Evaluate Watershed Conditions

D: Design the Watershed Assessment

F: Conduct Rapid Field Assessments

S: Landowner Interviews

M: Watershed Baseline Report

Purpose: acquire real watershed data to base sound planning decisions

Step 4: Adapt Watershed Protection Tools

D: Adapt Watershed Tools

F: Apply to Real World Sites

S: Convene Roundtables to Gain Consensus

M: Draft Watershed Regulations

Purpose: test and refine the development regulations needed to protect the watershed

The 8 Tools of Watershed Protection

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There is a Method to Develop Watershed Regs

- Assess gaps in local protection capacity
- Understand future development patterns and plan review burden
- Adapt model ordinance to fill gaps
- Assess fiscal and staff impact to locality
- Investigate political pathway to adoption (and key barriers)
- Make persuasive case and choose best route to gain acceptance (e.g., roundtable)

Step 5: Apply Early Action Projects

D: Rank Early Action Projects

F: Evaluate Projects in Field

S: Work with Landowners/Cons-techs

M: Draft Watershed Plan w/ Early Action Projects *

Purpose: Show early on-the-ground results to partners and funders

Examples of Early Action Projects

Riparian reforestation…conservation easements…stream fencing…instream habitat restoration….land trusts….stream cleanups…fish barrier removal…septic system inspections…demonstration stormwater BMPs…watershed education…farm BMPs

Early action projects are low cost, easy to design, and can be installed in a year or less

Step 6: Adopt and Implement the Plan

D: Devise Implementation Strategy

S: Create Watershed Partnerships

M: Adopt Final Plan

Purpose: Navigate the plan through local agencies, Elected officials and partners to make it happen

Step 7: Develop Long Term Capacity

D: Watershed Coordination and Funding

F: Indicator Monitoring

S: Ongoing Management Structure

M: Revisit and Update the Plan

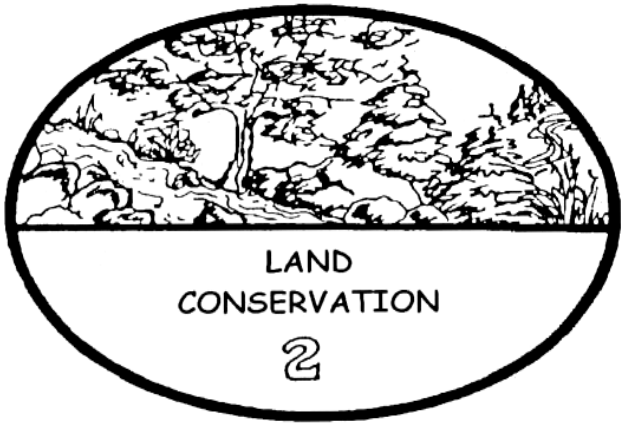
Purpose: set yourself up to be a force for implementation in the long run

Watershed Coordination and Funding

- Maintain stakeholder interest
- Coordinate partners
- Education/outreach
- Project funding
- Track development
- Conservation Assistance
- Report Trends

The Collective Watershed Brain

Let's talk about ways to finance watershed restoration through local, state and federal sources.



Land Conservation

- **Critical habitats**

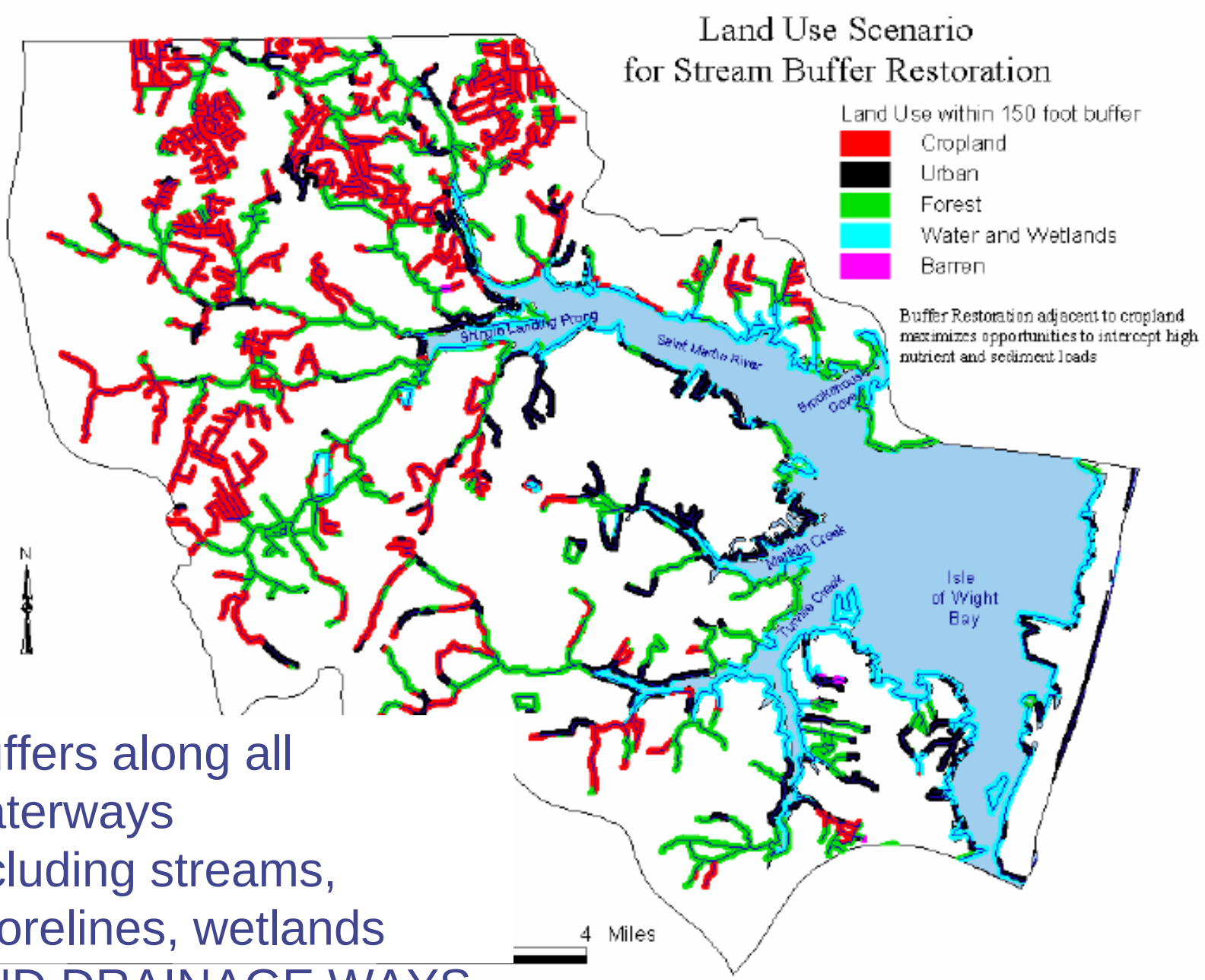
Tidal, freshwater wetlands
Maritime forest, Coves
Shorelines,

Hydrologic reserves

Subtropical forest
pasture

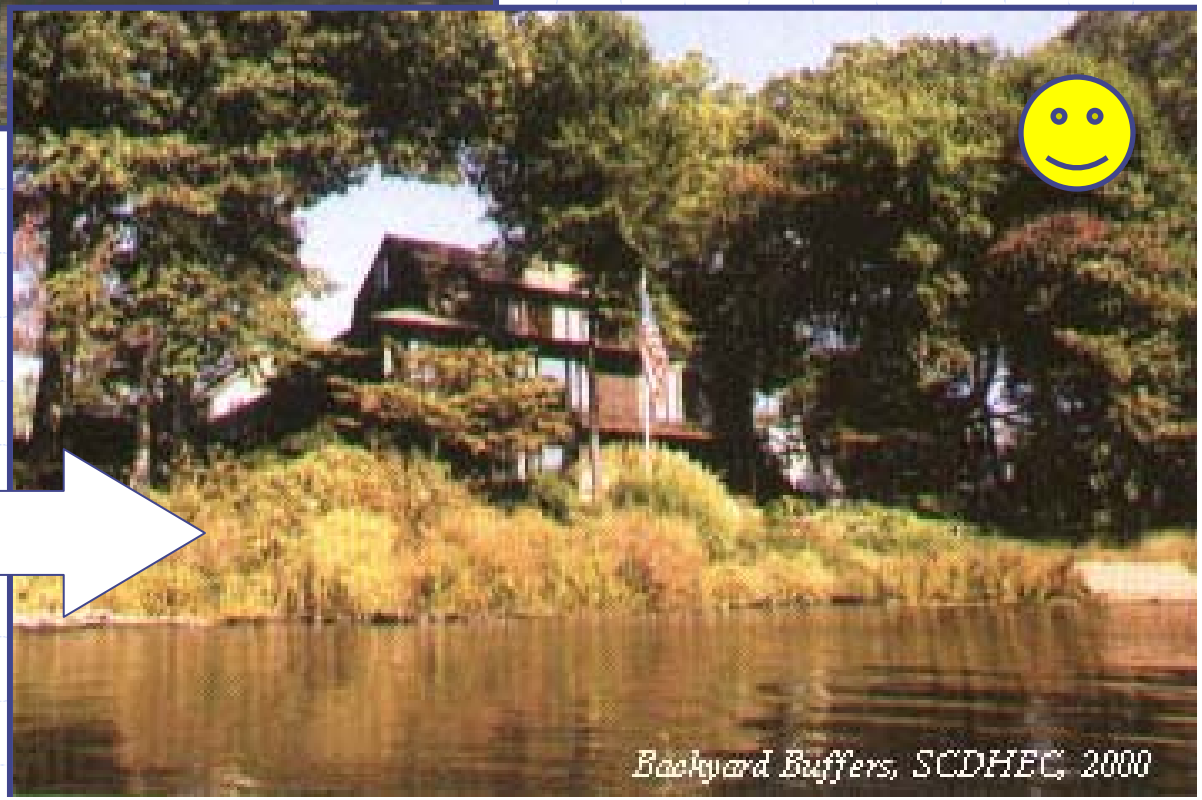
- **Cultural areas**

SC Wildlife Magazine

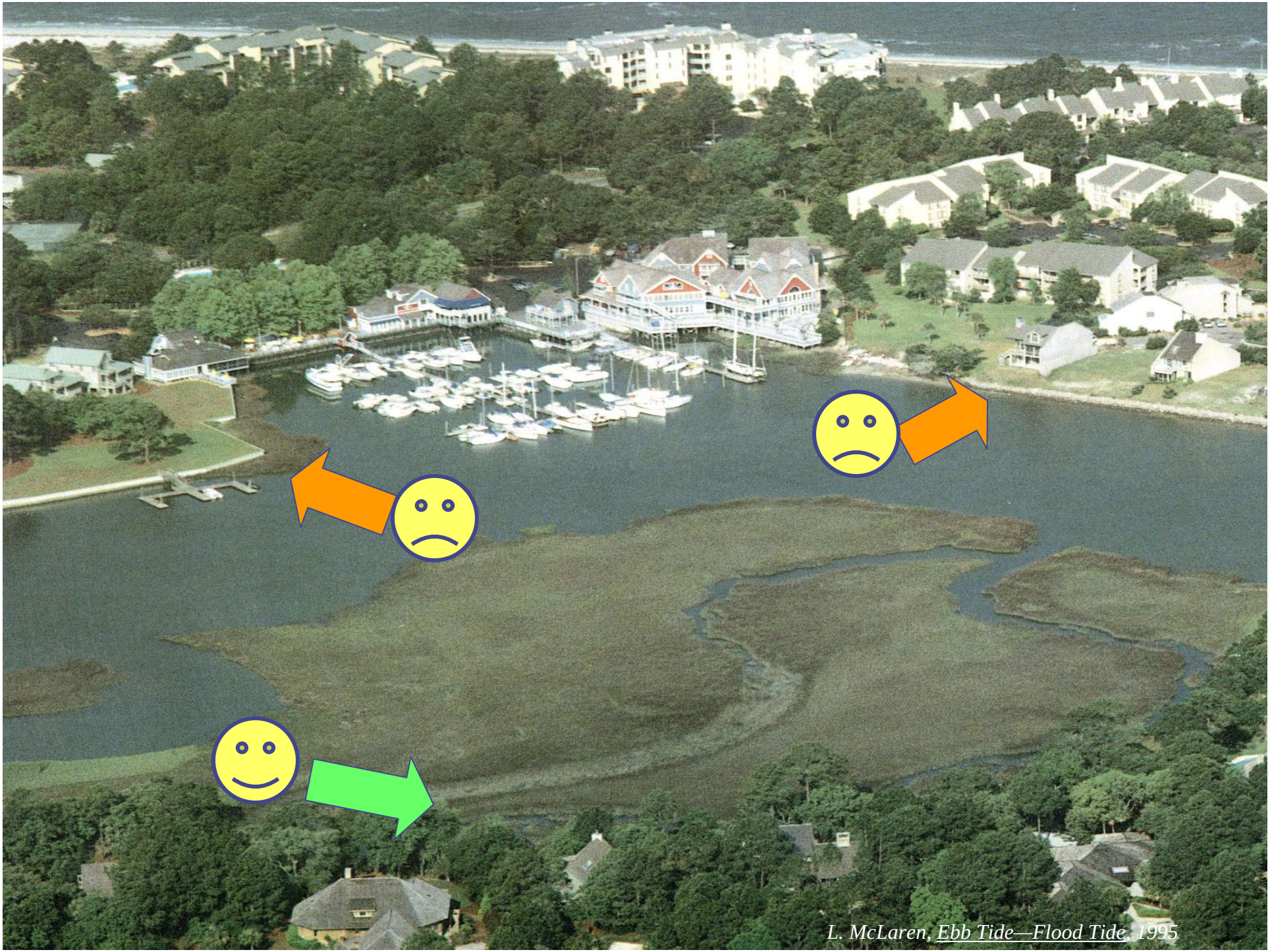


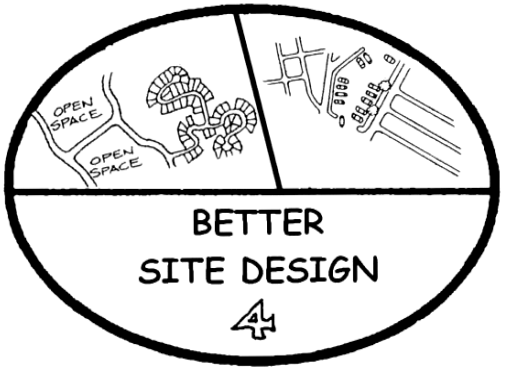
Buffers along all waterways including streams, shorelines, wetlands AND DRAINAGE WAYS

No buffer; direct runoff of lawn products



Naturally vegetated shoreline buffer; minimal impact from runoff


L. McLaren, Ebb Tide—Flood Tide, 1995



Better Site Design

- **Three Basic Principles of Site Design for Islands**

- **Disconnect Impervious Cover**
- **Road Design**
- **Preserve Native Cover (Fingerprinting)**

Evaluating Neighborhood Potential for Rooftop Disconnection

Direct Connection

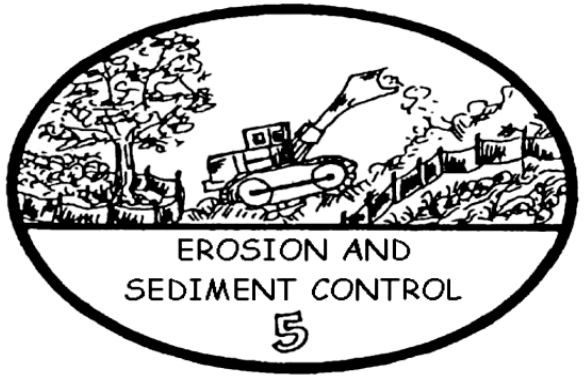
Connected; Flowing to Impervious Surface

Disconnected; Flowing to Pervious Surface

Disconnected; Flowing to Rain Barrel

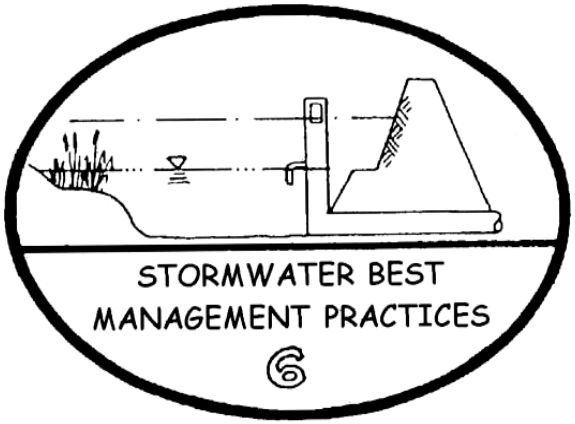
Disconnected; Flowing to Rain Garden

Erosion and Sediment Control

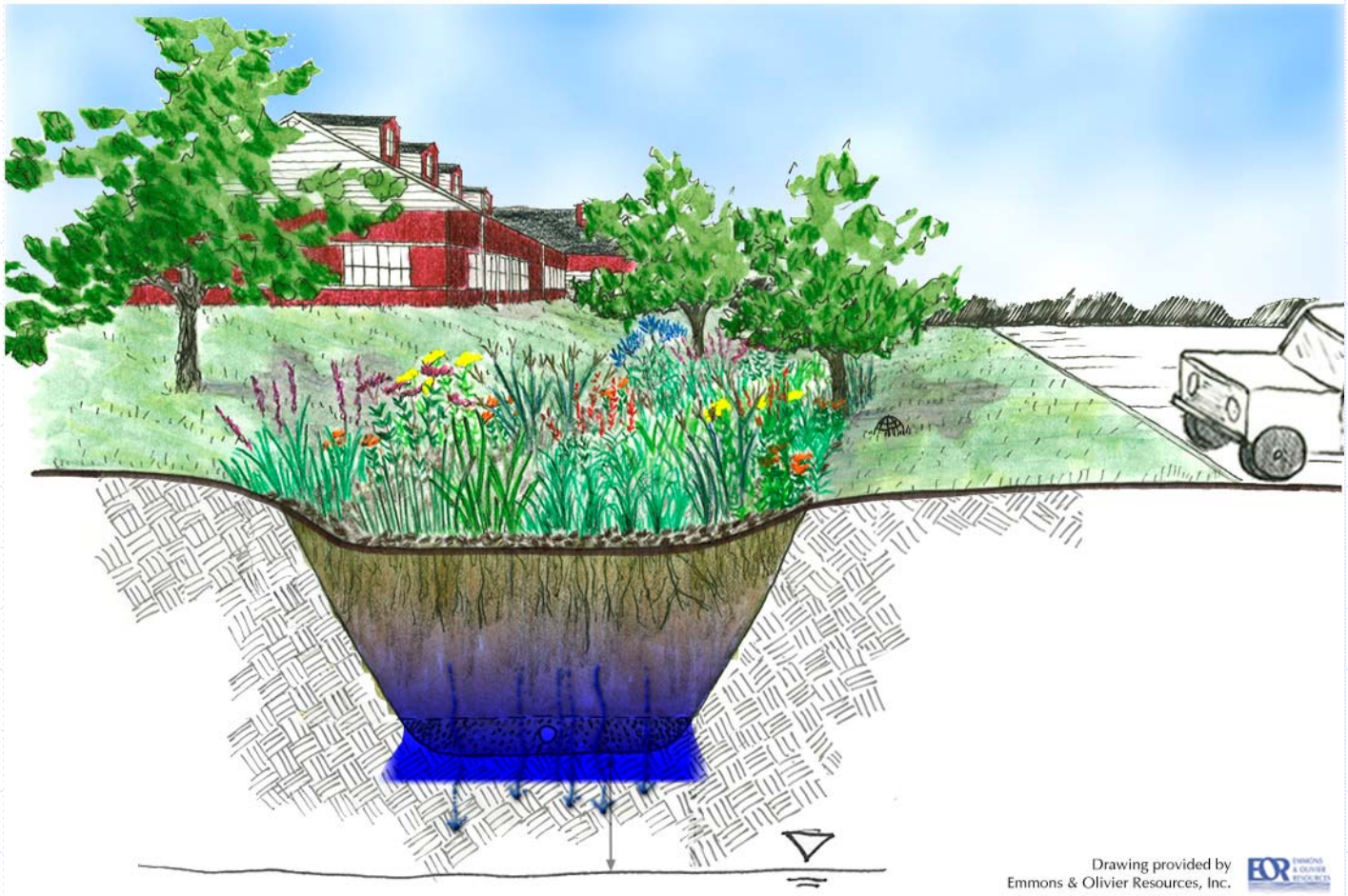


- Clearing restrictions
- Forest conservation
- Site fingerprinting
- Construction sequencing
- Rapid seeding w/ native spp.
- Sediment basins w/ lo-tech PMA dosers
- Silt fences

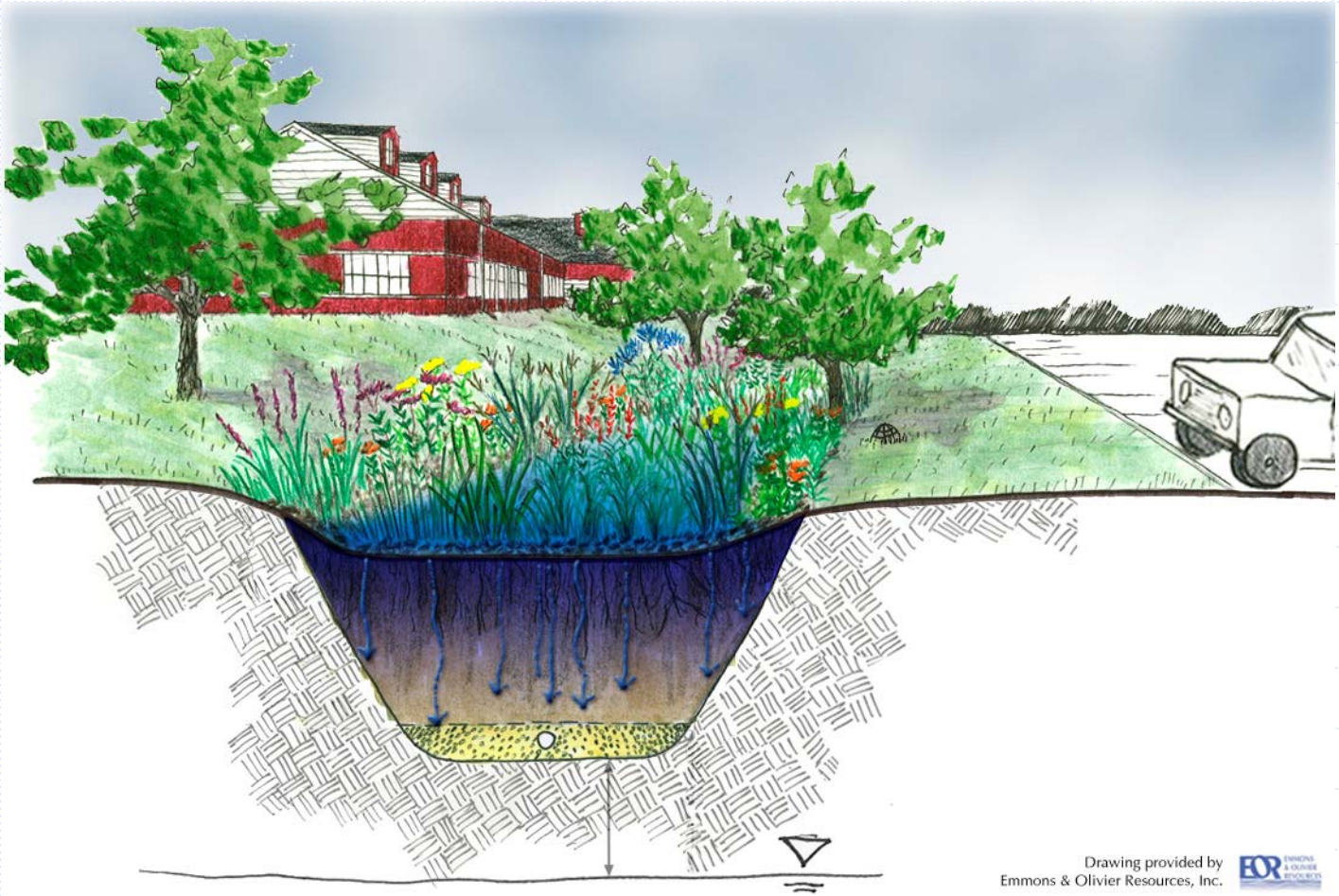
Stormwater Discharges



- Promote stormwater wetlands
- Maximum N & bacteria removal
- Maximum on-site filtration with pretreatment
- Avoid infiltration in areas with high water table
- Provide long residence time for coliform to die off
- Use “dry swale” for conveyance
- Stormwater-friendly shoreline development



Annual Rainfall Less Than 30 inches:
No under drain (use ET Pump) may need irrigation



Annual Rainfall 40 to 60 inches:
Underdrain and surface overflow

Annual Rainfall Greater than 60 inches:
Underdrain and surface overflow

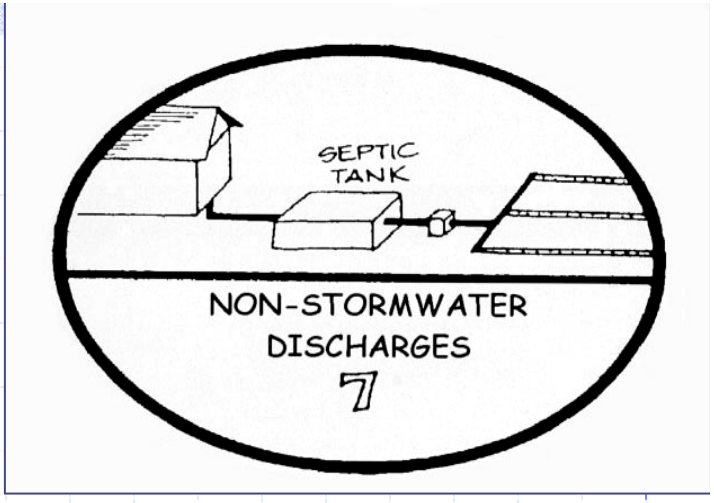
Design Guidelines for Island Bioretention Practices

- Two size stone filter to protect underdrain
- Coral or pumice in lieu of mulch for top
- Two cell design- first pretreats sediment
- Shallow filter depth (2 to 3 feet OK)
- Media: 50% sand, 30% leaf compost 20% parent soil
- Three design variations based on annual rainfall
- Need Good plant list for HI
- Avoid invasive species.


NO PETS


9. 15. 2004

Non-Stormwater Discharges



- Septics
  - Stricter standards
  - Required maintenance
  - Waterway setbacks
  - Homeowner education
- Marinas
  - "clean" marina program
  - marina certification

Failure Rates for Septic Systems

Failure rates: 5 to 30% nationally

Even functioning septic systems produce N loads

Island performance expected to be the same or worse due to risk factors

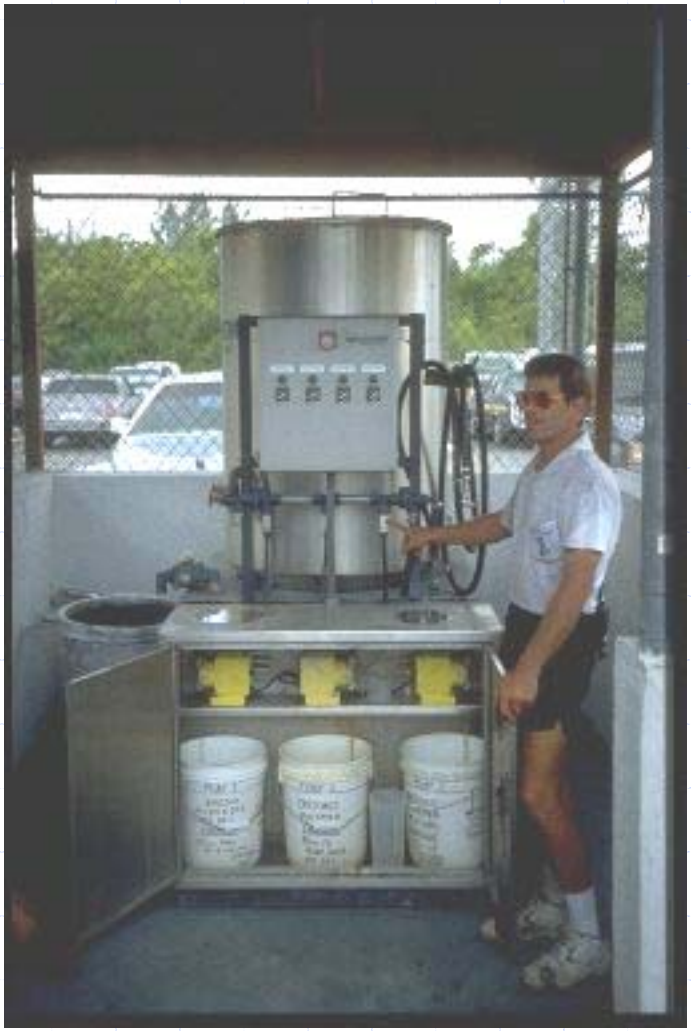
(See CWP 1999)

Septic System Failure Risk Factors

- Inadequate soils
- Poor design/location
- Testing or inspection
- Hydraulic overloading
- Tree growth in drainfield
- Failure to maintain

- Age > 20 yrs
- Situated on small lots
- Seasonal service
- Adjacent to shoreline or ditches
- Thin or excessively permeable soils
- Close to bed rock or water table

Marina Hotpsots



Photos from www.epa.gov/owow/nps/marinas/

Watershed Stewardship

WATERSHED
STEWARDSHIP PROGRAMS
8

- Watershed advocacy
- Boater education
- Buffer management
- Proper lawn/pet care
- Golf course management
- Septic System maintenance

Neighborhood Source Assessments as Tool to Target Education Efforts


Attention
Dog Guardians
Pick up after your
dogs. Thank you.
Attention Dogs
Grrrrr, bark, woof.
Good dog.
District of North Vancouver.
Bylaw 5981-11(i)

- Island watersheds are unique
- Tools must be adapted

Lets learn from each other and develop an island approach to watershed management