

A large, gnarled tree with a wide, spreading canopy stands in the center of a misty, hazy landscape. The ground is covered in dry, brownish vegetation, and the background shows rolling hills under a pale, overcast sky. The overall mood is serene and somewhat somber.

Sustainable Landscapes

What's Ecology Got To Do With it?

Linda J. Novy & Associates
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Applying Sustainable & Ecological Principles in Your Landscape...

What's in it for You?

- Requires less maintenance, water, and other inputs (less dollars!)
- Costs less to plant and maintain
- Creates beauty and elegance
- Provides nutrient rich and abundant food, flower and other crops
- Improved quality of life

What is a Sustainable Landscape?

One that Incorporates Bay Friendly Principles:

1. Builds healthy soil
2. Reduces waste in the garden
3. Conserves water
4. Creates wildlife habitat
5. Protects local watersheds and the bay
6. Contributes to a health community
7. Saves energy

What is a Sustainable Landscape (cont.)?

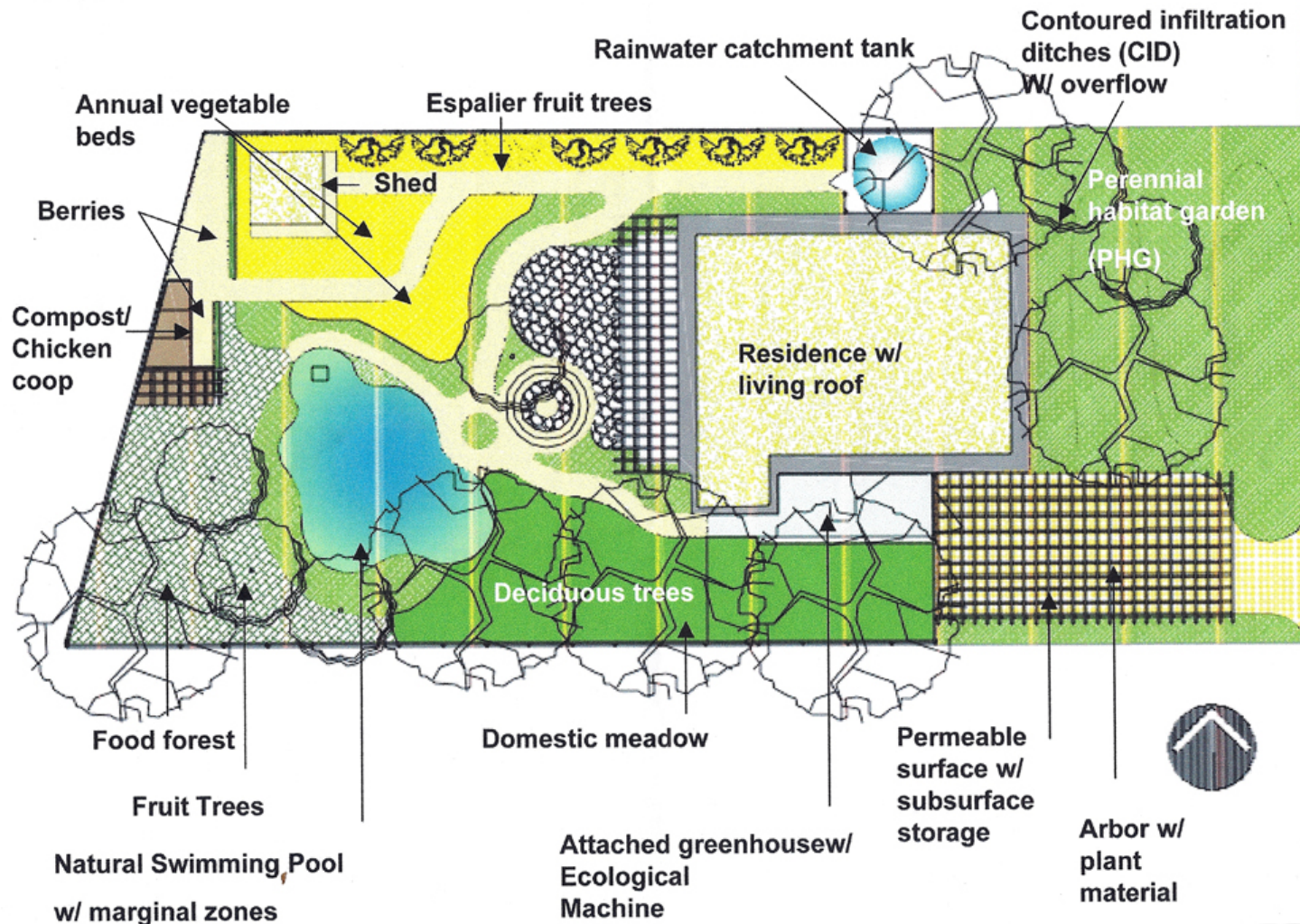
- Provides ecological benefits and ecosystem services including:
 - Increased nutrient cycling
 - Reduction and elimination of invasive species
 - Increased water uptake in soil and plants
 - Increased soil retention
 - Increased carbon storage
 - Increased biological diversity and pollinator services
- Reduces management intervention and high levels of “inputs”

What is Ecology?

- 1873, coined by Ger. zoologist Ernst Haeckel (1834-1919) as *Ökologie*, from Gk. *oikos* "house, dwelling place, habitation" + *logia* "study of."
- The study of the relationships between living organisms and their environments
- Ecosystem: All of the organisms in an area and all of the abiotic (non-living) materials and energy with which they interact

Integrated Sustainable Landscape

ISL RESIDENCE



Sustainable Landscape: RETURN ON YOUR INVESTMENT (ROI)

As inspired by Brad Lancaster, Rainwater Harvesting Expert

Degenerative Investment: requires high “inputs” to sustain; consumes more resources than it generates; creates fewer ecological benefits; degenerative and diminished quality over shorter time frame.

Examples: Lawns, annual flower beds sourced from industrial flower growers, landscapes requiring high water applications.



Sustainable Landscape: RETURN ON YOUR INVESTMENT (ROI)

Generative Investment: requires some on-going “inputs” to sustain; produces more resources than it consumes; creates multiple ecological benefits; generates a moderate increase in quality over longer time frame.

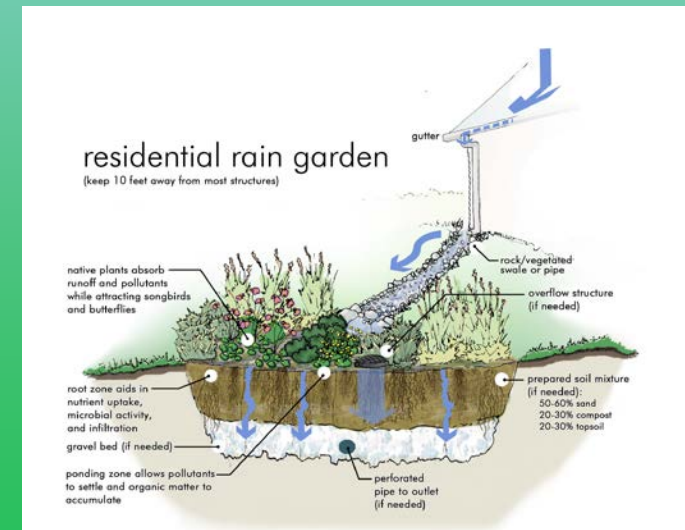
Examples: landscape that has multiple uses, such as creating wildlife habitat, food, recreation, medicinal uses, structures and grading that create more on-site water recapture.



Sustainable Landscape: RETURN ON YOUR INVESTMENT (ROI)

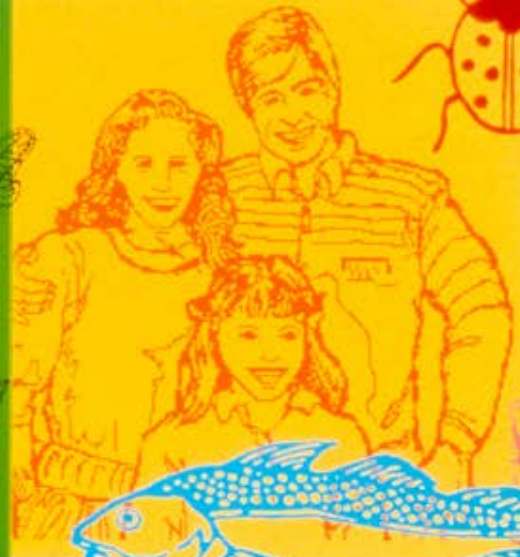
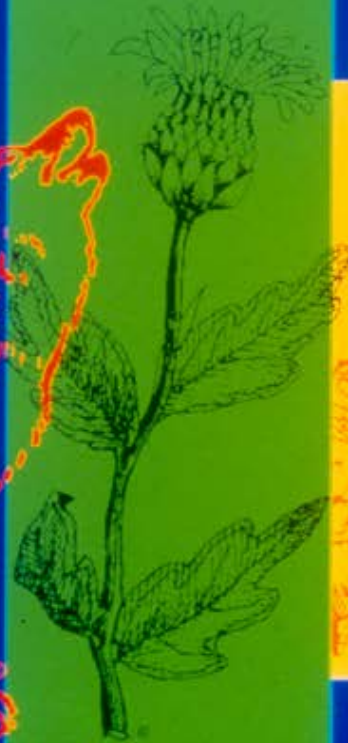
Regenerative investment: Requires fewer to no on-going “inputs” to remain functional; produces cascade of ecological benefits – produces more resources than it consumes; self-repairing and regenerating over long time frame.

Examples: landscape that functions like an authentic ecosystem that is self-regenerating; vegetative rainwater harvesting structures and soil quality that are self-sustaining.





BIOCENTRIC EQUALITY



BIOREGIONAL RELATIONSHIPS: ENDANGERED SPECIES

**Mission
Blue
Butterfly**



**Tiburon
Mariposa
Lily**



**Salt Marsh
Harvest
Mouse**



**White
Clapper
Rail**



Bay Area Checkerspot Butterfly



Threatened species (brink of endangerment)

Host Plants:

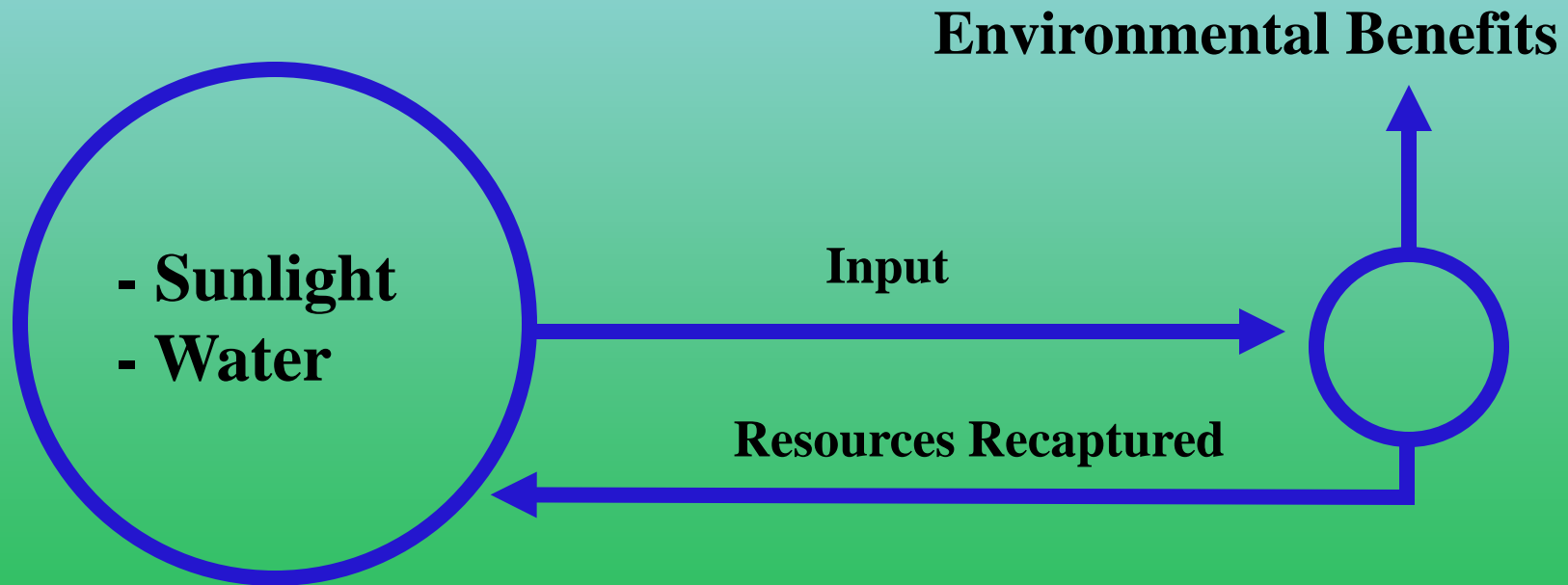
- Sticky Monkeyflower
- California Bee Plant
- English Plantain
- Indian Warrior

Range:

- Western United States
- Common in the hills of Marin where food plants grow

“Closed Loop System”

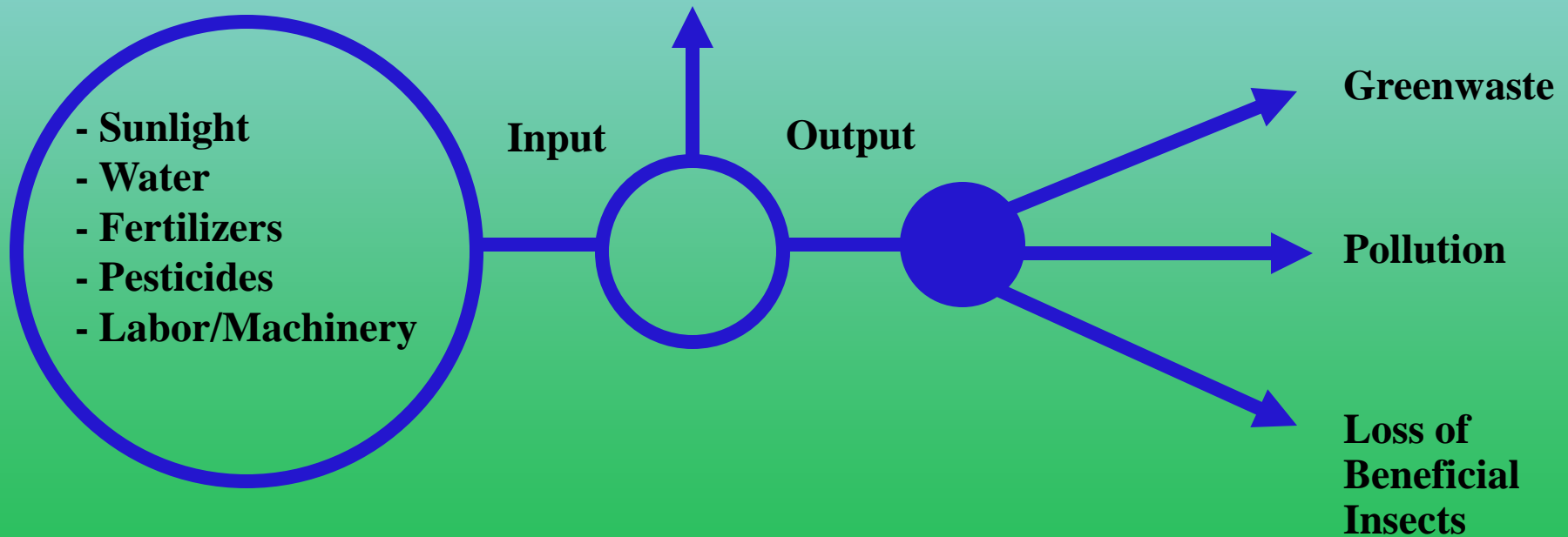
Sustainable Use of Resources
in Nature





Linear System

Unsustainable Use of Resources

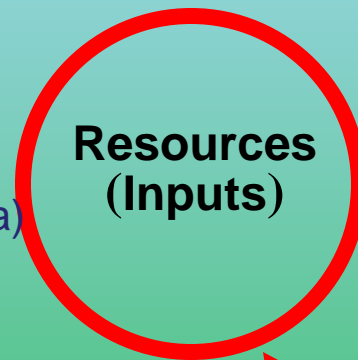


Sustainable Use of Resources

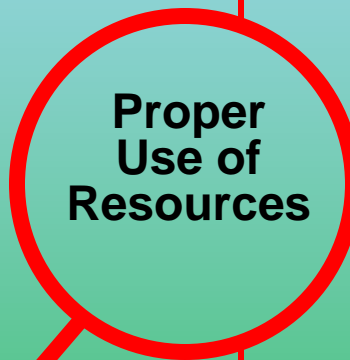


Environmental Benefits: Air Quality - Recreation and Social - Wildlife Enhancement - Biodiversity - Temperature Regulation - Reduction of Pollution - Self-Regulating Ecosystems

- Solar Energy
- Water
- Soil Nutrients
- Organisms (plants, insects, soil biota)
- Power-Labor and Fossil Fuel



Resources (Inputs)



Proper Use of Resources

- Water Management
- Organic matter
- Compost and Site Generated Mulch
- Integrated Pest Management
- Plant Selection
- Soil Management
- Nitrogen-Fixing Plants

Minimal Negative Output


- Water
- Organic matter
- Nutrients
- Natural Controls (e.g. beneficial insects)



Resources Conserved and Recycled

Tracking Inputs, Outputs and Recaptured Resources

Example: Multi-residential property

| LINDA J. NOVY & ASSOCIATES <i>Sustainable Landscape Management</i> | |  |
|---|--|---|
| Inputs | | Outputs & Ecosystems Services |
| <p>1. Labor:</p> <ul style="list-style-type: none"> a. On site staff: 3 people full time (approximately 6,240 hours annually) b. IPM Tech: 45.5 hours (pesticides, iron) c. IPM Tech: 16 hours (Greenbelt fertilizer) c. Irrigation Tech: 1 person, 12 days per year for maintenance (96 hours) <p>Sub-total: 6,397.5 hours annually Excludes: irrigation repairs, supervision, additional site visits as needed (Information needed)</p> <p>2. Water use</p> <ul style="list-style-type: none"> a. Landscape: 15,412 ccf b. Water Features: 2,924 ccf <p>total: 18,332 (source Dendron)</p> <p>3. Energy for water delivery (not calculated)</p> <p>4. Integrated Pest Management</p> <p>Treatment materials:</p> <ul style="list-style-type: none"> a. Pre-emergent herbicide: 2 lbs, plus 2 oz. b. Post-emergent herbicide: 164 oz (split 30% Ls. and 70% hardscape) c. Turf herbicide: 16 oz d. Fungicide: 22 oz e. Other: Gopher management is sub-contracted (Information needed) f. Excludes: IPM treatment application by Arborwell (Information needed) <p>5. Fertilizers and Soil Amendments</p> <ul style="list-style-type: none"> a. Turf: 500# Spread and Forget 43-0-0 400# 14-14-14 b. Color beds: 50# Osmocote 14-14-14 | <ul style="list-style-type: none"> c. Shrub beds: 80# Greenbelt (NPW – Information needed) d. Minor new plantings: 50# 12-12-12 e. Iron: 231 oz 6-0-0 E. Compost (estimate): up to 8 – 10 cu yards g. Soil: (estimate): up to 5 yards h. Tree fertilizer Sub-contracted to Excludes: Fertilizer treatments by Arborwell. (Information needed) <p>6. New plantings, shrubs, trees, ground cover: TBD, 1, 5, 15 gal., flats (Information needed)</p> <p>7. Color rotation 2 x year (95% annuals, 5% perennials): 2,592 – 4"</p> <p>8. Fossil fuels to power landscape trucks and equipment,</p> <ul style="list-style-type: none"> a. Vehicle use: for site supervision, delivery of materials, meetings (Information needed) b. Equipment use based upon estimates from Account Manager. Noted as hours of operation annually <ul style="list-style-type: none"> Cart (electric or gas powered? Information needed) Blowers: 310 hours x 2 = 620 hrs. annually Mowers 36", 21" total 192 hours annually Yankee 48 hours annually Woodwhippers 48 hours x 2 = 96 hours annually Hedge trimmers (for ivy shearing) 48 hours x 2 = 96 hours annually <p>Estimate of power equipment use: 1052 hours annually Fuel: estimating 1 gal. of fuel per 1 hour of operation = 1052 gal. Oil: not calculated (Information needed)</p> <p>9. Irrigation parts, equipment (Information needed)</p> <p>10. Other: Miscellaneous such as landscape stakes, ties, etc. (Information needed)</p> | <p>1. Debris removal: 260 cu. yards (Note: \$8,490.)</p> <p>2. Storm water runoff (not calculated)</p> <p>3. Greenhouse gas (GHG) emissions per unit of water delivered (not calculated): (Possible future determination from San Bruno Water Department, 650-616-7065 or the California Department of Water Resources) Note: Water related energy use accounts for 19% of California's total electricity use, and almost 30% of natural gas use (Integrated Energy Policy Report, 2005)</p> <p>4. Ecosystem Services:</p> <ul style="list-style-type: none"> a. Nutrient cycling potential. Estimates from Earthfort range from 75 – 300# / acre / "cycle" assuming a healthy "soil food web" b. Wildlife Diversity: site observation of squirrels, hawk, several species of hummingbirds, butterflies and bees. Not quantified. c. Habitat quality: Visual observation, minor percentage of native plants in plant palette. Further assessment needed. d. Air quality: not calculated e. Temp modulation: not calculated f. Carbon sequestration: not calculated g. Soil water storage (retention): not calculated h. GHG Emissions (per hour of power equipment use) from EPA web site* 1 mower used weekly generates 87 lbs GHG Co2 and 54 lbs of other pollutants annually. Using a lawn mower as a unit of comparison to all other landscape power equipment listed, yielded a conservative estimate of emissions: from 9 pieces of power equipment operating annually: 1179 lbs of GHG and pollutants annually (excludes cart, trucks, cars used for site operations and administration) |
| Inputs Recycled / Recaptured | | |
| <ul style="list-style-type: none"> 1. Arborist chips from on-site tree removal operations (Local) Up to 30 yards cu. yards (Information needed) 2. Arborist chips (imported) (Arborwell) up to 20 cu yards (Information needed) 3. Plant containers, Stakes, Oil, etc. (Information needed) 4. Grass clippings mulched back into turf generate 325 # N annually (approximately 5# N per 1000 sq feet) | | |
| | | <p>*One hour of a new gas powered lawn mower operation is equivalent to the emissions (volatile organic compounds and nitrogen oxides emissions) generated by 11 new cars being driven for one hour.</p> |
| <p>June 21, 2013</p> | | |



Sustainable Landscapes

1. Respect and Know Your Soil

- Use professional soil tests to assess your soil
- Use OMRI certified organic fertilizers and natural soil amendments
- Protect the soil food web
- Mulch frequently
- Make compost



Sample Chemical Soil Analysis

A & L WESTERN AGRICULTURAL LABORATORIES

1311 WOODLAND AVE #1 • MODESTO, CALIFORNIA 95351 • (209) 529-4080 • FAX (209) 529-4736



REPORT NUMBER: 07-043-051

CLIENT NO: 99999

SEND TO: L.J. NOVY & ASSOCIATES
PO BOX 969
FAIRFAX, CA 94978-

GROWER:

SUBMITTED BY: LINDA NOVY

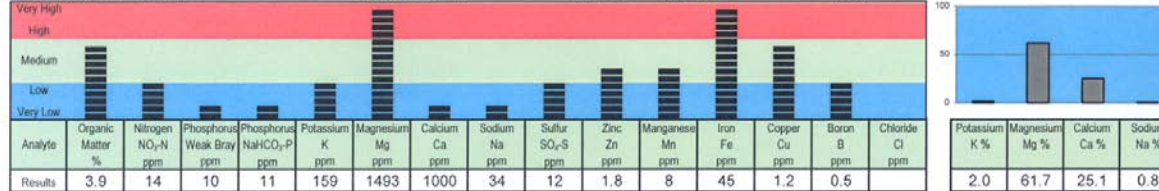
Graphical Soil Analysis Report

DATE OF REPORT: 02/15/07

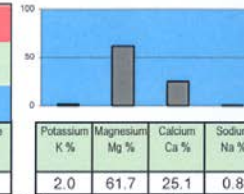
LAB NO: 52131

SAMPLE ID: UPHILL

PAGE: 2



Percent Cation Saturation (computed)



Ex. Lime



Soil Fertility Guidelines

CROP: LANDSCAPE

RATE: lb/1000 sq ft

NOTES:

| Dolomite (70 score) | Lime (70 score) | Gypsum | Elemental Sulfur | Nitrogen N | Phosphate P ₂ O ₅ | Potash K ₂ O | Magnesium Mg | Sulfur SO ₄ -S | Zinc Zn | Manganese Mn | Iron Fe | Copper Cu | Boron B |
|---------------------|-----------------|--------|------------------|------------|---|-------------------------|--------------|---------------------------|---------|--------------|---------|-----------|---------|
| | 70 | | | 2.8 | 2.0 | 3.5 | | 0.5 | | | | | |

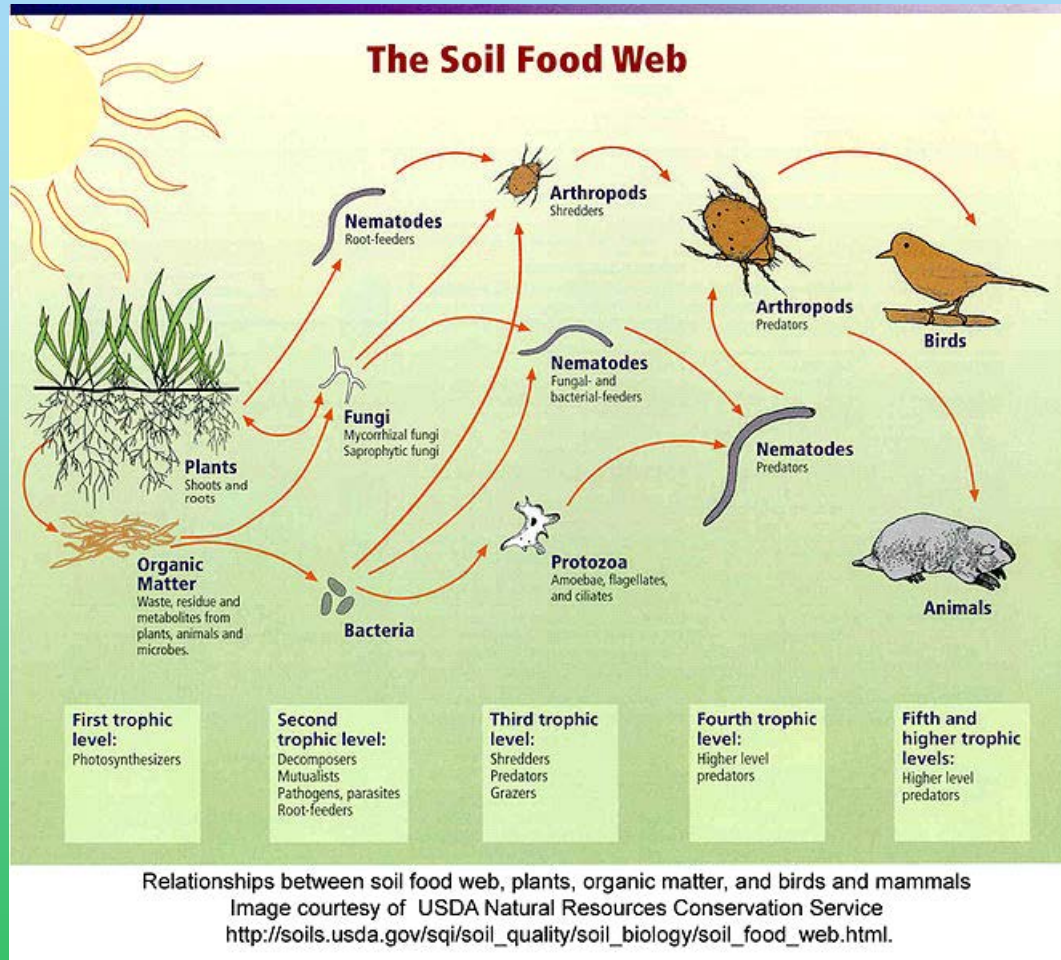
- C** SPLIT any extra nitrogen evenly over the active growing season. Adjust rate according to local conditions and requirements. Allow for adequate establishment first (up to 30 days).
- M** MICRONUTRIENTS: Where levels appear to be high, avoid any further applications for the time being. Very high (VH) levels may not necessarily be toxic, but avoid. Maintain correct soil pH.
- E** LIME REQUIREMENT: Liming may be necessary if buffer index is less than 6.9. Guidelines are based upon common agricultural lime (70-score) per six-inch depth to raise soil pH to about 6.5.
- N** common agricultural lime (70-score) per six-inch depth to raise soil pH to about 6.5.
- T** PLEASE note that the previous comments where applicable, apply to the entire report. Thank you.
- S**

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MB Buttriss
Mike Buttriss, CPAg

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Protect the Soil Food Web



Protect the Soil Food Web

Let Living Soil work for you!

- Retains water on site and releases it gradually like a “living sponge”
- Filters pollutants
- Contains beneficial organisms
- Have a compost “Tea”
- Soil is like a savings account



Sustainable Gardens

2. Use Resources Sustainably

- Water
 - Use efficient irrigation systems
 - Group plants according to water needs
 - Harvest rainwater
 - Cultivate drought resiliency
- Energy
 - Conserving water conserves energy
 - Local products equal less embedded transportation miles
- Inputs/Outputs
 - Recycle, recapture, reuse
 - Keep track



Sustainable Gardens

3. Protect Air Quality and the Bay

- Reduce GHG Emissions by operating less power equipment
- Plant Trees to absorb air pollutants and sequester carbon
- Implement an Integrated Pest Management program
- Use non-toxic, OMRI certified organic products
- Reduce water run off – your property is part of the watershed





Sustainable Gardens

Integrated Pest Management (IPM)

- Learn how to identify pest problems
- Follow the IPM decision-making process
- Plant to attract beneficial insects and increase biodiversity
- Prevent weeds before they start by sheet mulching
- Cut weeds before seed heads mature



Statewide IPM Program
www.ipm.ucdavis.edu



Sustainable Landscapes

4. Create and Protect Wildlife Habitat

- Assess natural areas surrounding your garden and landscape
- Dedicate areas to native plants and animals
- Provide water sources
- Provide food sources – nectar, pollen, berries, seeds, nuts
- Create habitat niches for lizards, frogs and other welcome visitors
- Leave some ground untouched for native bee nesting





Sustainable Landscapes

5. Contribute to a healthy community
 - Use least toxic treatments to protect the safety of children pets and wildlife
 - Grow vegetables organically and share with your neighbors
 - Manage and minimize neighborhood hazards: fire danger, weed seed dispersal and rodent habitat

Sustainable Landscapes

“That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics.

That land yields a cultural harvest is a fact long known, but latterly often forgotten.”

Aldo Leopold. *A Sand County Almanac*. 1948

Thank You!

