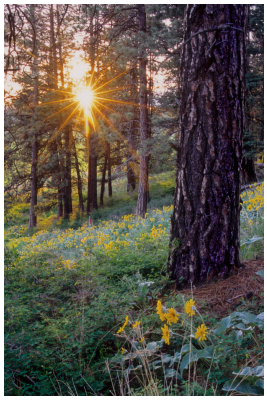

Gathering Summary: Smart Use of Trees, October 27, 2010

A Presentation by Sally Janover

Summary by Catherine Haug

Photo of ponderosa and arrowleaf balsamroot understory (from behind Bigfork Post Office) by Brett Thuma

Introduction

Sally is an artist with a wide range of interest. Many years ago, while living in Ojai, California, she worked with the Tree People, "*an environmental nonprofit that unites the power of trees, people and technology to grow a sustainable future for Los Angeles.*" (1) She helped to plant smog tolerant street trees in lower income areas, and was a supervisor for reforestation projects after forest fires.

Through the Tree People she met Bill Mollison who is considered the "father of permaculture," an agricultural system for sustainable living. From this experience, Sally saw that the urban area could benefit from his permaculture principles, and went through a UCLA's certification program for residential landscape design.

After certification, Sally opened her landscape design business in Ojai, where she was the first Residential Permaculture Designer in the US for many years. She designed landscapes for various ecosystems, from ocean coastal regions to interior desert systems where problems ranged from salt water influences to drought, fire suppression and hillside erosion.

Everywhere she has lived, she has planted trees. They are the royalty of the vegetative world, the big work horses of the environment. One tree does more for the planet than any other single plant.

Trees & Shrubs

For the purpose of her presentation, Sally considered trees and shrubs in the same category, referring to both as 'trees,' for simplicity.

Trees perform an incredible service - they are the soldiers of our planet. They have a symbiotic relationship with humans (and other creatures), taking up our carbon dioxide and giving us essential oxygen, keeping our breathable atmosphere in balance.

The Value of a Tree

Sally presented a beautiful drawing of a deciduous tree, its roots, and its immediate surroundings, to illustrate all the functions a tree performs that benefit its environment.

Tree canopy

- Provides shade and habitat for birds and small mammals; filters dust and noise; and controls wind;
- Filters rainfall through the leaves, which then percolates to the aquifer, bringing nutrients to the soil and eliminating salts in the root zone by carrying them to deep water;
- Takes up carbon dioxide (CO_2) gas from the air, converting it into carbohydrates which are stored in the roots;
- And gives up oxygen (O_2) gas to the air.

Tree litter

- Builds & conserves soil, allowing water filtration to the aquifers, preventing erosion;
- Provides nutrients back to the soil. In your autumn landscape, make a mulch of the leaves around the drip line of your trees to replicate what happens in an unmanaged tree system;
- Lichen grow on trees, then fall to the ground to fix nitrogen in soil

Tree roots

- Break up the soil, penetrating it;
- Help to prevent erosion of the land;
- Have symbiotic relationship with fungal mycorrhizae, which store cellular nutrients such as carbohydrates and mineral-rich water for the tree (3);

Tree decomposition

- Provides mulch and life support for new trees, grasses, insects, bacteria and fungus;
- Provides habitat for birds and small animals.

Water vapor cycle

- At night: Condensation from fog and mist settles on leaves and branches, then drops on soil below;
- During the day: ground moisture evaporates into the atmosphere.

Microclimates

- Create beneficial environment for other plants and for animals including humans.;
- Transpiration or evaporation of ground moisture cools the area by day; condensation of ground moisture into fog or mist warms the area at night.

Tree and Forest Facts

Our forests are the lungs of our planet, yet they are being decimated to make room for housing and agriculture. Our planet is not a movie set; we are rooted as much as the trees.

In the 1600's, 80% of America was forest, and this remained fairly constant until recently (the last 100 years or so). Climate change is a major consequence.

Sally had an easel board that listed facts about trees and the forest canopy. From the board:

On the carbon sink

- "Forests are the second largest carbon reservoir on the planet, after oceans.
- Each acre of tropical forest stores 180 metric tons of carbon
- About half of the greenhouse effect is caused by carbon dioxide (CO_2). Trees remove CO_2 from the atmosphere during photosynthesis, storing carbon [as carbohydrate] and returning oxygen (O_2) to the atmosphere. They serve as a carbon sink, absorbing and storing carbon [primarily in their roots] for long periods of time.
- A single mature tree can absorb carbon dioxide at a rate of 48 pounds/year, and release enough oxygen back into the atmosphere to support 2 human beings.
- Planting trees is the cheapest, best way to take excess CO_2 out of the atmosphere.
- If every American family planted just one tree, the amount of CO_2 in the atmosphere would be reduced by one billion pounds annually. This is almost 5% of the amount that human activity pumps into the atmosphere each year."

On deforestation

- "Deforestation releases [stored] carbon all at once with devastating consequences to climate, land, environment, wildlife economies; and long term consequences for human communities to support themselves sustainably, if at all.
- Primarily, deforestation removes the most important soldiers we have in the war to decrease the carbon, and other toxic elements, in our environment.
- Deforestation is largely due to grazing, mining, mining, clearing, digging for fossil fuels, large scale farming, expansion of commercial and community development, and the corresponding growing demand for wood products."

On energy consumption

- "Trees can reduce our need for fossil fuel energy to make electricity. Trees shading a house in the summer can reduce air conditioning consumption by 30%.

- Trees lower local air temperatures by transpiring water and by shading surfaces, particularly hard surfaces like sidewalks and streets. Evaporation from a single large tree can produce the cooling effect of 10 room size air conditioners operating 24 hours/day."

On air pollution

- "A total of 300 trees can counterbalance the amount of pollution one person produces in a lifetime.
- One urban park's tree cover removed pounds of street particulate pollutants daily, at a rate of $136 per day.
- Trees also remove: sulfur dioxide (from coal burning plants), ozone, and nitrogen oxides (from auto exhaust)."

On erosion and runoff

- "Trees reduce topsoil erosion, reduce storm water and surface runoff, and act as natural pollution filters. Tree roots remove harmful nutrients that otherwise would harm water quality.
- Less runoff and erosion allows for more recharging of the ground water supply."

Summing it up

- "Over a 50-year lifetime, a tree generates $31,250 worth of oxygen; provides $62,000 worth of air pollution control; recycles $37,500 worth of water; and controls $31,250 worth of soil erosion."

Comment from the audience: "Forests are dynamic, but people think they are static."

Effect of fire & land developments

This discussion resulted from a question from the audience, and input by members of the audience from the Forest Service.

Some trees rely on fire but fire also burns off the carbon sink. Some burn frequently with low-intensity fire while others burn infrequently (250-500 years) with intense fire.

Putting out fires as opposed to letting them burn is a subject of much discussion. Developments play a big role by applying pressure to protect homes from fires. Developments also destroy the interconnection of habitat and all the natural systems in an uninterrupted forest ecology.

We need to have a consciousness of what trees do by natural plan, and to be aware of the conflict between what we are doing and the natural (sustainable) plan.

A few permaculture principles relevant to trees & shrubs

The less we do to change our environment, the better.

Around each home, 5 zones are identified. That closest to your home (zone 1) is the most impacted and requires the most care. The 5th zone is the interface with wilderness.

Maximize purposes for all you do:

- stack them up above and below the soil
- make them interrelated
- build whole system to maintain itself. Use native species as much as possible.

Native species

In our area, natives are not easy to transplant and start, but are worth the effort.

Keep in mind Urban vs Rural landscaping needs

Sally presented a plant game we could play, that includes categories of:

Habitat, Nitrogen Fixing, Food, Products, Filters, and Other.

Some categories were filled-in for a particular tree or shrub; others left blank for us to fill in. Sally showed us a few examples but we didn't go further with the game. Examples:

Alder: Nitrogen fixing; increase organic matter 20%. Its sap is used to make vinegar and sugar. It has medicinal bark, and its wood is good for smoking meats. It is useful for waterside filtering.

Hawthorne: Provides food and shelter for birds, mammals and lepidoptera; food for nectar-feeding insects; jams, jellies and alcoholic beverages; its wood is hard to rot making it good for fence posts and tool handles; great rootstock for drafting; medicinal value as a heart tonic.

Box Elder: Sap is high in sugar content; seeds can be roasted or boiled; inner bark can be pounded into flour, or used for medicinal tea; wood for pulp, low-grade furniture, interior trims; branches can be made into charcoal for drawing/painting.

For more information about Montana native species, refer to the Montana Native Plant Society website.

Landscaping Considerations

Choose your trees first, as they take the longest to grow. Stacking is important - what grows under the trees?

Creating an 'Urban Forest' in developed areas reduces the amount of energy needed for heating and cooling homes.

Identify the answers to these questions, to help you identify trees and other plants that will work for you:

- Where does the sun rise and set?
- What is level of wind?
- What's already growing in the area
- What do you need? For example, for a southern exposure you want a deciduous tree to provide shade in summer and allow light in winter?
- Do you want to prolong the growing season by creating micro-climates with trees?
- What is your soil like?
- What is the slope?
- Is erosion a problem?
- Do you need swales?
- What are good companions?
- Consider effect that acid-producing trees will have on a planned garden.

Sources

Books

- Montana Native Plants and Early Peoples, by Jeff Hart and illustrated by Jacqueline Moore

Web resources

- Arbor Day Foundation: www.arborday.org
- The Tree People: www.treepeople.org
- Tree Link: www.treelink.org
- Montana Native Plant Society: www.mtnativeplants.org
- Permaculture Institute of the USA: www.permacultureusa.org

Sally's informational web references, by topic

On Tree Care and Planting

- Arbor Day Foundation: Nine tree planting and care tips, www.arborday.org/trees/tips; Anatomy of a Tree, www.arborday.org/trees/treeGuide/anatomy.cfm;
- Videos on How to Plant a Tree: www.arborday.org/trees/video/howtoplant.cfm and www.treepeople.org/plant-right-way
- Tree Care & Design: blog.arborday.org; www.treepeople.org/how-care-tree
- How to Prune a Tree: www.arborday.org/trees/pruning/animation/launch.cfm and www.ehow.com/video_4952155_prune-neglected-apple-trees.html

On Landscaping & Plant Selection:

- Fire-Resistant Plant Species Adapted to Montana: www.urbanforestrysouth.org/resources/library/fire-resistant-plants-for-montana-landscapes/file
- Description of Montana Trees: www.snowwowl.com/rlmontanatrees.html
- Identifying trees & uses: msuextension.org/publications/OutdoorsEnvironmentandWildlife/2B0323.pdf
- Plants discovered by Lewis and Clark: www.gardenguides.com/97780-plants-lewis-clark-discovered.html
- NW Native Plant Journal (2003): www.nwplants.com/information/emag/vol1-2.pdf

On Benefits of Trees:

- Overview & benefits of trees: 1) www.coloradotrees.org/benefits.htm#water, 2) www.treelink.org/linx/?navSubCatRef=56, 3) www.treepeople.org/top-22-benefits-trees, 4) www.montgomerycountymd.gov/dectmpl.asp?url=/Content/dep/climatechange/treeoverview.asp
- The Water Cycle: www.treehugger.com/files/2008/03/green-basics-explanation-water-cycle-pictures-diagrams.php?page=2
- Trees protect our water: www.coloradotrees.org/benefits.htm
- Landscape Shading: www.energysavers.gov/your_home/landscaping/index.cfm/mytopic=11940
- Landscape Windbreaks: www.energysavers.gov/your_home/landscaping/index.cfm/mytopic=11950
- Permaculture Food Forest: www.permaculture.org/nm/index.php/site/Permaculture-Food-Forest/
- Creating microclimates: www.energysavers.gov/your_home/landscaping/index.cfm/mytopic=11930
- Effects of Trees on Soils, by Dr. Anthony Young: www.agroforestry.net/overstory/overstory61.html
- Nitrogen Fixing Trees - The Multipurpose Pioneers: www.permacultureusa.org/2008/09/29/nitrogen-fixing-trees-the-multipurpose-pioneers
- Trees are natural air conditioners: www.treehugger.com/files/2008/11/trees-air-conditioners.php, www.treehugger.com/files/2008/01/trees_vs_solar.php, planetgreen.discovery.com/home-garden/shade-air-conditioning.html, planetgreen.discovery.com/home-garden/cool-home-evapotranspiration.html;
- Thank a Tree! How trees benefit the environment and insects, mammals and birds: findarticles.com/p/articles/mi_m0EPG/is_4_35/ai_71767533/

On Deforestation and Global Warming:

- Primer on relationship between deforestation and global warming: www.brighthub.com/environment/science-environmental/articles/61415.aspx;
- Albedo (solar reflectivity) impact on global warming: www.brighthub.com/science/space/articles/56138.aspx;
- Colorado: benefits of trees in urban areas: carbon sequestration; reduction of other air pollutants: www.coloradotrees.org/benefits.htm;
- Forest cover before european settlement (of the Americas): www.nationalatlas.gov/articles/biology/a_forest.html;

Sally's pdf files

- How nitrogen is fixed in a tree (pdf)
- Presentation Facts on Trees & Shrubs (pdf)
- Reduction of Other Air Pollutants (pdf)
- Native Tree Selection Guide (pdf)

References

1. Michigan State University's Rain Forest Report Card
2. Causes and Consequences of Deforestation: www.brighthub.com/environment/science-environmental/articles/2372.aspx
3. Wikipedia on Mycorrhizae: en.wikipedia.org/wiki/Mycorrhiza