Ecosystem Services are processes that take place in the natural world that benefit mankind. Ecosystem services are provided by the complex functional interactions that occur between the ecological components of natural resources. These services contribute to the stability, productivity and sustainability of landscapes.

This factsheet should stimulate your thinking about enhancing these important valuable and free functions in habitats such as yards, gardens, small farms, etc. *This is not a recipe book!* The plants suggested are primarily for the coastal plain area of the southern U.S. Many other plants are available to augment specific services and we have not included any large tree species. We focus on augmentation of pollinators, beneficial insects (parasites and predators), butterflies, and wild life as well as trap crops for stink bugs.

Notice that the list contains native, exotic and cultivated species. Key factors are resource availability (usually flowers with pollen or nectar) and quality (seeds) in relation to time of year. It is important to have resources available either continuously or at least during key periods when targeted organisms are present. Many plants provide more than one resource (e.g., pollen, nectar, prey, seeds) or service. Plantings should also be tailored to the type of habitat (ex. uplands vs. wetlands) or unusual function (rain gardens) and to avoid choosing species that may have undesirable characteristics (e.g. invasiveness) in specific habitats.

Much supporting literature is available on the web if you search using key category words**.** Relevant terms would include dooryards, home gardens, windbreaks, shelterbelts, hedgerows, and agroforestry.

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Plant Species	Common Name	Season of Service	Ecological Service				
			Flowers, Nectar[1], Pollen, Fruit and Seeds for:				Trapping Stink and Leaffooted Bugs
			Pollinators	Beneficial Insects[2]	Butterflies	Wildlife	
Trees							
Callistemon viminalis	Weeping bottlebrush	Wi-Sp	X	X	X	X	
Cercis canadensis	Redbud	Sp-Su	X			X	
Cornus florida	Dogwood	Sp				X	
Ilex opaca	American holly	Su-Fa	X	X		X	
Lagerstroemia indica/faurei	Crapemyrtle	Su-Fa	X	X	X		
Malus angustifolia	Crabapple	Su-Fa	X	X		X	
Osmanthus fragrans	Tea olive	Wi-Sp	X				
Prunus persica	Peach[1]	Sp	X	X	X	X	
Prunus sp.	Wild Plum, plum[1]	Sp-Su	X	X		X	
Shrubs							

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Abelia sp.	Glossy abelia	Su-Fa	X		X		
Aloysia virgata	Sweet almond	Su-Wi	X	X	X		
Camellia spp.	Camellia	Wi-Sp	X	X			
Cliftonia monophylla	Buckwheat tree[3]	Sp	X			X	
Fatsia japonica	Japanese aralia	Fa-Wi	X	X	X		
Lonicera fragrantissima[c]	Win. honeysuckle	Wi-Sp	X			X	
Mahonia bealei	Leatherleaf mahonia	Wi	X			X	
Osmanthus fragrans	Tea olive	Wi-Sp	X	X			
Rhododendron	Wild azalea	Sp	X		X	X[4]	
Rhododendron	White wild azalea	Sp	X		X	X	
Rubus sp.	Blackberry	Su-Fa	X			X	X
Sambucus nigra	Elderberry[1]	Sp-Su	X	X	X	X	
Vaccinium arboreum	Sparkleberry	Su-Fa	X				
Vaccinium corymbosum	Blueberry	Sp-Su	X	X		X	
Vines							
Campsis radicans	Trumpet vine	Su-Fa	X		X	X[4]	
Jasminum nudiflorum	Winter jasmine	Wi	X				
Passiflora spp.	Passionflower[1]	Su-Fa	X	X	X	X	
Vitis rotundifolia	Muscadine	Su-Fa				X	
Annuals and Perennials							
Abelmoschus esculentus	Okra[1]	Sp-Fa	X	X	X		X
Agastache nepetoides	Giant hyssops	Su	X	X	X		
Anethum graveoleus	Dill	Sp-Fa	X	X	X		
Andropogon sp.	Native grasses	Su-Fa				X	
Asclepias sp.	Butterfly weed	Su-Fa	X	X	X[6]	X[4]	
Bidens alba	Spanish needles	Su-Fa	X	X	X		
Brassica sp.[C]	Rape, collards…	Wi-Sp	X	X	X	X	
Bouvardia ternifolia	Firecracker bush	SP-Fa	X			X[4]	
Buddleia davidii	Butterfly bush	Sp-Fa	X		X		
Cassia fasciculata	Partridge pea[1]	Su-Fa	X	X	X	X	
Coreopsis sp.	Tick seed	Su		X		X	
Coriandrum sativum	Coriander	Sp-Fa	X	X	X		
Cosmos sulphurea	Cosmos	Su-FA	X	X	X		
Costus talbotii	Spiral ginger[1]	Su	X		X		
Echinochloa sp.	Barnyard grass	Su-Fa				X	X

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Erigeron sp.	Fleabane	Su-Fa		X	X	X	
Fagopyrum esculentum	Buckwheat	Sp-Fa	X	X	X	X	X
Flaveria linearis	Yellowtop[3]	Sp-Wi	X	X	X	X	
Gossypium sp.	Cotton[1]	Su-Fa		X			
Helianthus annuus	Sunflower	Sp-Fa	X	X		X	X
Hibiscus coccineus	Scarlet hibiscus[3]	Su-Fa	X				
Hibiscus syriacus	Rose of Sharon	Su	X				
Hyptis mutabilis	Tropical bushmint	Su-Fa	X		X		
Hyssopus officinalis	Herb hyssop	Sp-Fa	X				
Indigofera hirsuta	Hairy indigo[5]	Su-Fa	X	X		X	
Kosteletzka virginica	Marsh mallow	Su	X				
Lantana sp.	Lantana	Su-Fa	X	X	X		
Lobelia cardinalis	Cardinal flower	Su	X			X[24]	
Lobularia maritima	Sweet alyssum#	Sp-Fa-Wi	X	X	X		
Malvaviscus arboreus	Turk's Cap	Su-Fa		X	X	X[4]	
Mimosa strigillosa	Sensitive Briar	Su-Fa	X				
Monarda fistulosa	Bee balm	Su-Fa	X	X	X		
Oenotheria sp.	Evening primrose	Sp-Su	X	X		X	
Pennisetum glaucum	Millet	Sp-Fa	X	X		X	X
Pentus lanceolata	Penta flowers	Su-Fa	X		X		
Phacelia tanacetifolia	Phacelia	Su	X	X	X		
Phaseolus sp.	Beans[1]	Su-Fa	X	X	X	X	X
Pycnanthemum floridanum	Florida Horsemint or Mountainmint	Su-Fa	X		X		
Pyrrhopappus carolinianus	Carolina false dandelion	Sp	X	X	X		
Raphanus raphanistrum	Wild radish	Sp	X	X	X		
Richardia scabra	Florida pusley	Su-Fa	X			X	
Rudbeckia sp.	Coneflowers	Su	X	X		X	
Salvia disjuncta	Mexican sage	Su-Fa	X		X		
Salvia sp.	Salvia	Sp-Su	X				
Sida rhombifolia	Prickley sida	Sp-Fa	X		X	X	
Solidago sp.	Goldenrod	Su-Fa	X	X	X	X	
Sorghum bicolor	Sorghum	Sp-Fa	X	X		X	X
Spermacoce verticilata	False buttonwood	Su-Fa	X	X	X		

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Tanacetum parthenium	Feverfew	Su	X	X	X		
Trifolium incarnatum	Crimson clover	Wi-Sp	X	X	X	X	X
Triticale hexaploide	Triticale	Sp		X		X	X
Verbena sp.	Verbena	Su-Fa	X		X	X[4]	
Viburnum spp.	Viburnum	Wi	X	X			
Vicia sativa	Common vetch[1]	Wi-Sp	X	X	X	X	X
Vigna unguiculata subsp	Cowpeas[1]	Su-Fa	X	X		X	X

[1]Extrafloral nectaries; [2]Arthropod parasites and predators; [3] Needs to be near water; [4]Hummingbirds; [5]Suppresses soil nematodes; [6]Especially for Monarch butterflies.

Comments on recommended plants:

1. *Lonicera* spp. bloomed throughout Jan.-Feb. 2010 which was a very cold period with nighttime temperatures consistently in the low-mid 20's F for over six weeks. *Mahonia* is one of the few truly winter-blooming plants present in north Florida. Honey bees work it during warm days.

2. *Camellia* spp. are late winter-early spring bloomers and the species with open blooms containing pollen are one of the few blooming plants available during the colder months.

3. *Brassica* spp. such as rapeseed (*B. napus*) collards, broccoli and related "greens" are usually planted in fall or winter for food. When warm weather arrives these species flower "bolt" and the seed heads provide nectar, pollen and seeds as well as serve as hosts for whiteflies, aphids and other herbivores that may be alternate foods for beneficial insects.

4. The genera *Hyssops, Hyptis and Agastache* in the mint family are very confusing because the common names are often used interchangeably for species and cultivars of each. For example, blue giant hyssop is *Agastache foeniculum*.

5. Land owners are encouraged to evaluate and inventory the vegetation in their growing areas such as yards, gardens and other managed habitats such as hedgerows, shelterbelts, etc. "Homegardens" have been important to human beings for millennia and now are recognized in many parts of the world as critical areas with high biodiversity and as repositories of vanishing native plant species. A simple table of the plant species annotated by a number of variables such as the following will be helpful in any effort to use or improve the ecological services provided. Possible variables to record by species: tree, shrub, annual, perennial, habitat type, native, exotic, phenology (budding, bloom, fruiting dates, etc.), special characteristics such as fruit/seeds, medical properties, extrafloral nectaries, arthropod and wildlife associates (butterflies, hummingbirds, pests, beneficials).

6. Crape myrtles are very important ornamental plants in the landscape in the Southeast due to their horticultural characteristics. They are also very important in augmentation of beneficial insects and pollinators. The flowers do not produce nectar but have two types of pollen. Crape myrtles are attacked by crapemyrtle aphids, *Tinocallis kahawaluokalani*, which along with their honeydew serve as food for beneficial insects. The aphids are more prevalent on some cultivars of crape myrtle than others (Mizell and Knox 1993) and some newer cultivars such as 'Cherry Dazzle' and 'Raspberry Dazzle' have high populations of aphids every year without special treatment. Other crape myrtle cultivars will need to be managed to promote new growth by heavy pruning, fertilizer and sometimes irrigation. We recommend considering the following cultivars if one is trying to promote pollinators (Acoma, Osage, Apalachee, Miami, Natchez) or beneficials (Biloxi, Comanche, Apalachee, Tuscarora, Tonto, Cherry Dazzle, Raspberry Dazzle).

7. *Ecological bottlenecks* are extreme events that often severely affect organism survival on a local or larger level. Examples would be severe weather such as hurricanes or climatic conditions such as severe and prolonged droughts. Prolonged droughts can be devastating to insects because of the impact on their host plants. When such events occur, plants that are more tolerant of the imposed conditions become extremely important to sustain local insect populations. Crape myrtle is an example of such a plant and it is very important in sustaining both natural enemies and pollinators during droughts.

8. *Lobularia* "Snow Princess" (sweet alyssum hybrid) grows year round in north Florida

General comments: According to the Millennium Ecosystem Assessment (http://www.maweb.org/en/index.aspx, MA), "ecosystem services are the benefits people obtain from ecosystems." The MA classifies ecosystem services as follows:

- *Cultural:* nonmaterial benefits people derive from ecosystems, such as recreation, cultural and religious values, artistic and scientific inspiration, etc.
- *Provisioning:* products that come directly from ecosystems, such as food, fiber, fuel, pharmaceuticals, etc.
- *Regulating:* benefits accrued from regulating ecosystem processes, such as climate regulation, water purification, flood control, crop pollination, biological control, etc. (discussed in this publication).
- *Supporting:* services necessary for all other ecosystem services, such as soil formation, nutrient cycling, primary production, etc.

Further Reading:

Mizell, R. F., and G. W. Knox. 1993. Susceptibility of crape myrtle, Lagerstroemia indica L. to the crapemyrtle aphid, Sarucallis kahawaluokalani (Kirkaldy) in North Florida. J. Entomol. Sci. 28: 1-7.

Michener CD. 1994. The Bee Genera of North and Central America (Hymenoptera: Apoidea). Smithsonian Instit. Press, Washington DC. 304 pp.

Michener CD. 2007. The Bees of the World, 2nd Edition. The John Hopkins University Press, Baltimore, MD. 952 pp.

Pascarella JB. (September 2008). The Bees of Florida. Department of Biology, Georgia Southern University. http://www.bio.georgiasouthern.edu/Bio-home/Pascarella/Intro.htm (25 October 2010).