DYNAMICS ECOLOGICAL DESIGN
Site Planning • Landscape Design • Construction • Education • Permaculture
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Some Key Definitions For Guild and Polyculture Design

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Species Niche:

* "The multi-dimensional space a species occupies in an ecosystem;"
* The relationship of an organism to food, allies, predators & environment and its core strategy for making a living;
* A species' multiple inherent:
  - ~ ***Needs, tolerances*** *and* ***preferences***: environmental & resource conditions required for survival, thrival, reproduction, yield
  - ~ ***Uses***: human uses: food, fuel, fiber, fodder, farmaceuticals, fun
  - ~ ***Functions***: ecosystem functions such as nutrient accumulator (fertilizer), nectary, groundcover
  - ~ ***Architecture***: above and belowground structure; form, habit.
  - ~ ***Behavior***: e.g., aggressive, persistent, time of flowering, fruiting,
  - ~ Etc.

Community Niche:

* *Functional role* in a community (similar to priest, baker, shoemaker, cop). For forest gardens includes functions, uses, architecture and behavior.
* Essentially the same as the core species strategy, but looked at from a community perspective.
* Each species brings its unique attributes to its community role, just as every person brings their unique attributes to their job role.

Polyculture: any *mixture of plant species* cultivated or naturally growing together *in the same* ***patch*** of ground at the same time.

Patch: the basic organizational unit of plant communities; a physical space in an ecosystem that:

* Varies significantly from its context in terms of vegetation architecture and/or species composition;
* Has its own successional path distinct from its surroundings;
* Has "fairly definite" edges.

Guild: a set of plants, animals, fungi and other organisms that interact in specific ways that generate desired emergent properties, *but guild members do not necessarily have to grow/live in the same patch*. Three kinds of guilds have been identified so far that each have specific kinds of relationships within and generate specific emergent properties (see below).

Effective Polyculture: A polyculture with enough functional guilds that the polyculture as a whole exhibits desirable emergent properties, such as overyielding; increased productivity, plant health, and stability; and/or reduced work, stress, and competition.

Not all guilds are polycultures!
All effective polycultures contain guilds.

Guilds: Groups of species that interact in specific ways that generate desirable emergent properties. So far, three kinds of guilds have been identified:

1) Community Function Guild: A set of species that all perform the same community function, and therefore fill the same community niche.
- Members typically occupy the same food web position (e.g., producer, herbivore, carnivore).
- The guild may contain different types of organisms, but all of them do the same "job."
* Embodies *The Principle of Redundancy Principle*: with more than one organism filling a job role, the role is likely to be filled even if one or more organisms die out because others are there to do the work.
* Supports *The Principle of Community Functional Vitality* by helping us understand and fill more community niches.
→ Provides redundancy—and therefore stability—of ecosystem function.
→ Increases diversity.
→ Increases ecosystem resilience.
Challenge: May engender competition if species niches overlap too much. Ideally, community function guilds will *also* function as resource-partitioning guilds.

2) Resource-Partitioning Guild: Species that partition a shared scarce resource by time, space, or kind to avoid competition (also known as a resource-sharing guild).
- Members typically occupy the same food web position (e.g., producer, consumer, carnivore).
- Organisms may differ but they partition the same resource by time, space, or kind.
- Members may or may not be in the same patch. Partitioning root space underground likely requires they share a patch, but flowering plants partitioning pollination services could be widely dispersed and still partition the shared resource (bees and other pollinators).
* Embodies *The Polyculture Partitioning Principle* by using members with divergent niches relative to scarce resources so as to limit or avoid competition, and increase the chances of additive yielding.
→ Reduces competition; reduces stress caused by competition or lack of resources.
→ Increases biodiversity, since more species can "make a living" in the same space.
→ Increases productivity for individual guild members and the ecosystem as a whole, because fewer resources are devoted to competition.

3) Mutual Support Guild: A set of species from different community niches whose needs and yields interconnect for the benefit of one, the other, both, or third parties in the guild.
- The species in mutual support guilds can interact both between different levels of the food web and within the same levels of the food web.
- Can be complex, involving many different kinds of species and many kinds of species interactions (predation, competition, inhibition, facilitation, cooperation, mutualism, etc.).
- Depending on the interactions, species may or may not be in the same patch or in proximity.
- Consider species beyond plants in the design of these guilds: birds, frogs, reptiles, insects, bacteria, and fungi all offer functions that can support each other.
* Embodies *The Principle of Functional Interconnection* because the needs of one element are met by the yields of another element in the guild.
→ Needs met, so increases harmony, reduces stress and work to maintain the system.
→ Increases system stability by increasing the health of members and strengthening stabilizing relationships.
→ Reduces waste and pollution, because inherent yields utilized.

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