An Introduction to Permaculture

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Permaculture

- Is a scientific, ethical, design system for the construction and indefinitely prolonged perpetuation of complete human centered ecosystems.
- (all of those words are important)
- Put simply, Permaculture is farming with your head, your heart, and … trees. All to make less work for the farmer.

Scientific

- Facts and techniques used in Permaculture need to be vetted by rigorous objective examination of the world as it exists.
- The process of doing Permaculture follows the methods of science. Experiments are tried, evaluated, and repeated or discarded based on the results. Producing new science.

Ethics

- Earth Care: The practice of Permaculture must improve the conditions of the Earth for life.
- People Care: Permaculture concerns itself with improving the lives of people. Wild spaces which are functioning well, should be left untouched.
- Return of surplus: Set limits on consumption, and apply any surplus to improving the first two ethics.
- “The only ethical decision is to take responsibility for our own existence, and that of our children” — Bill Mollison

Design System

- Permaculture is based on design. Thought is given in advance to determining, as much as possible, the work on the land, and its evolution through time, before any work is done.
- Permaculture is a system, in which each piece is implemented considering its effects on all the other pieces, and vice versa.
- “Though the problems of the world are increasingly complex, the solutions remain embarrassingly simple.” — Bill Mollison

Construction & Indefinitely prolonged perpetuation

- A Permaculture garden is an investment of work at the beginning in order to create a system that will perpetuate itself for long periods with a much reduced workload.
- A typical garden requires at least weekly maintenance, a mature forest garden requires little more than harvesting.
- A Permaculture forest garden could last many decades, or even perpetuate itself for many generations of trees.

Human Centered

- Humans are monopolizing about 83% of the biomass production of the planet.
- Much of that is misused. For example, lawns account for more area and resources than the top 9 crops combined, in the US.
- Permaculture aims to improve the efficiency of the human portions of the planet to allow more land for wild natural ecosystems.
- "We can grow the same nutritional value on 4% of equivalent land area currently under agriculture."

  — Geoff Lawton

Complete Ecosystems

- A complete ecosystem is one in which very little is imported, and little is exported.
- Excess production (of anything) is pollution, and leads to a chaotic condition.
- Continually input into a system is obviously unsustainable.
- A complete ecosystem maximizes the use of outputs as inputs into other elements, increasing interactions, and thus increasing the robustness of the entire system.

Benefits

- Reversal of desertification.
- Retention of and increase of water in the water table. Moderation of drought periods.
- Increase in carbon sequestration.
- Improved yield per area compared to modern industrialized farming.
- Slow the loss of topsoil.
- Fresher, healthier, cheaper, more diverse food for you and your family (Brix rating for nutrition).

Loess Plateau 86,000 acres

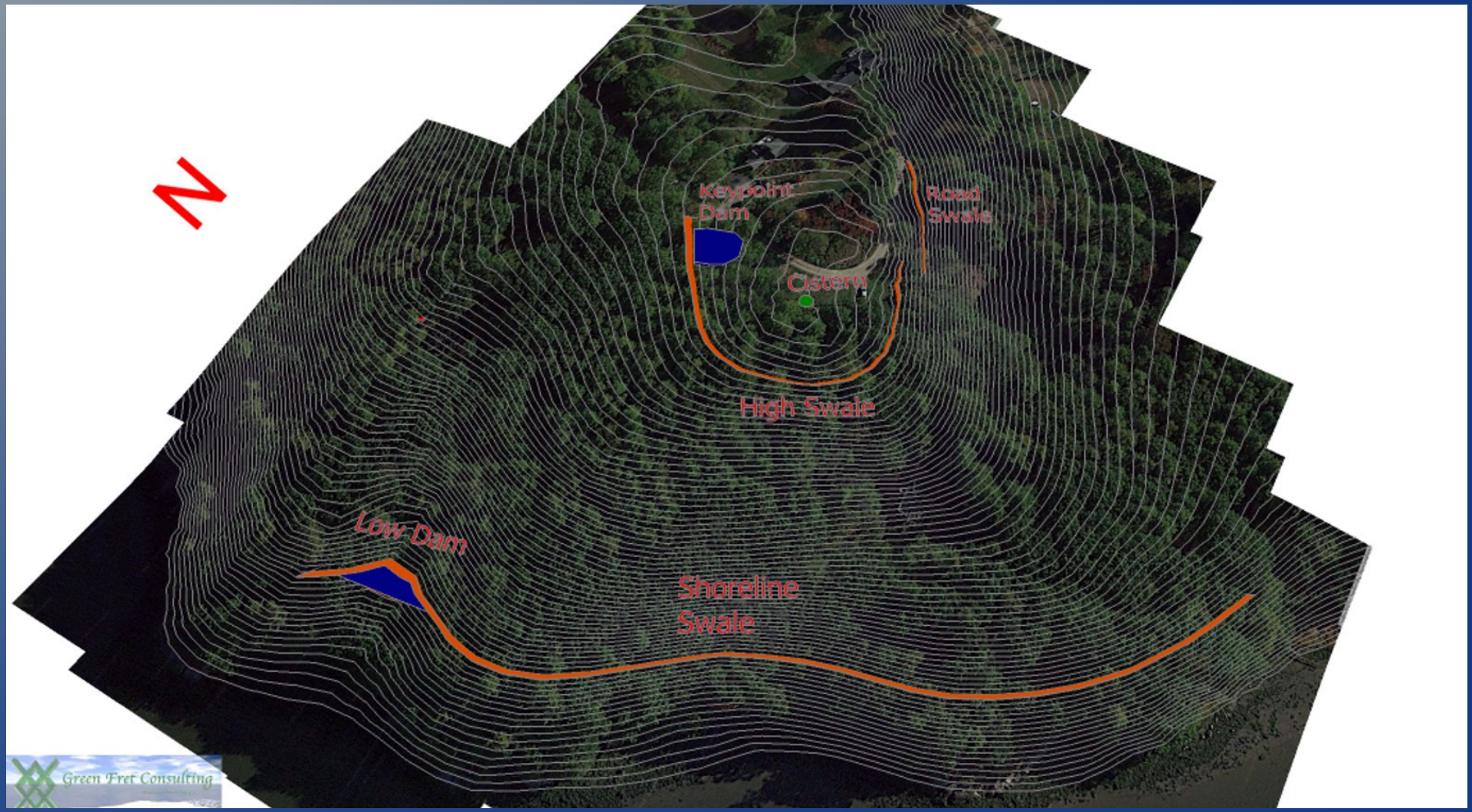
Why Maine is perfect for Permaculture

- It has lots of cleared fields which are currently underutilized, with no, or little, history of chemical fertilizers, herbicides, or pesticides.
- Our climate will produce a forest given half a chance; unlike many places which remain deforested from a thousand years ago.
- Low population density and low population growth mean lots of land opportunities without having to outbid developers.
- Winter breaks pest cycles.

Analysis of Site

- Observation!
- Deductions from nature (history & responses)
- Vision (what would we most like to live in?)
- Slopes (watershed, valleys, ridges, flat areas contour lines, dam sites, etc.)
- Zones (nearness to human activity)
- Sectors (directions of incoming 'energy')
- Succession (evolution over time)
- Flow (pathways of people, water, nutrients, etc.)

Slopes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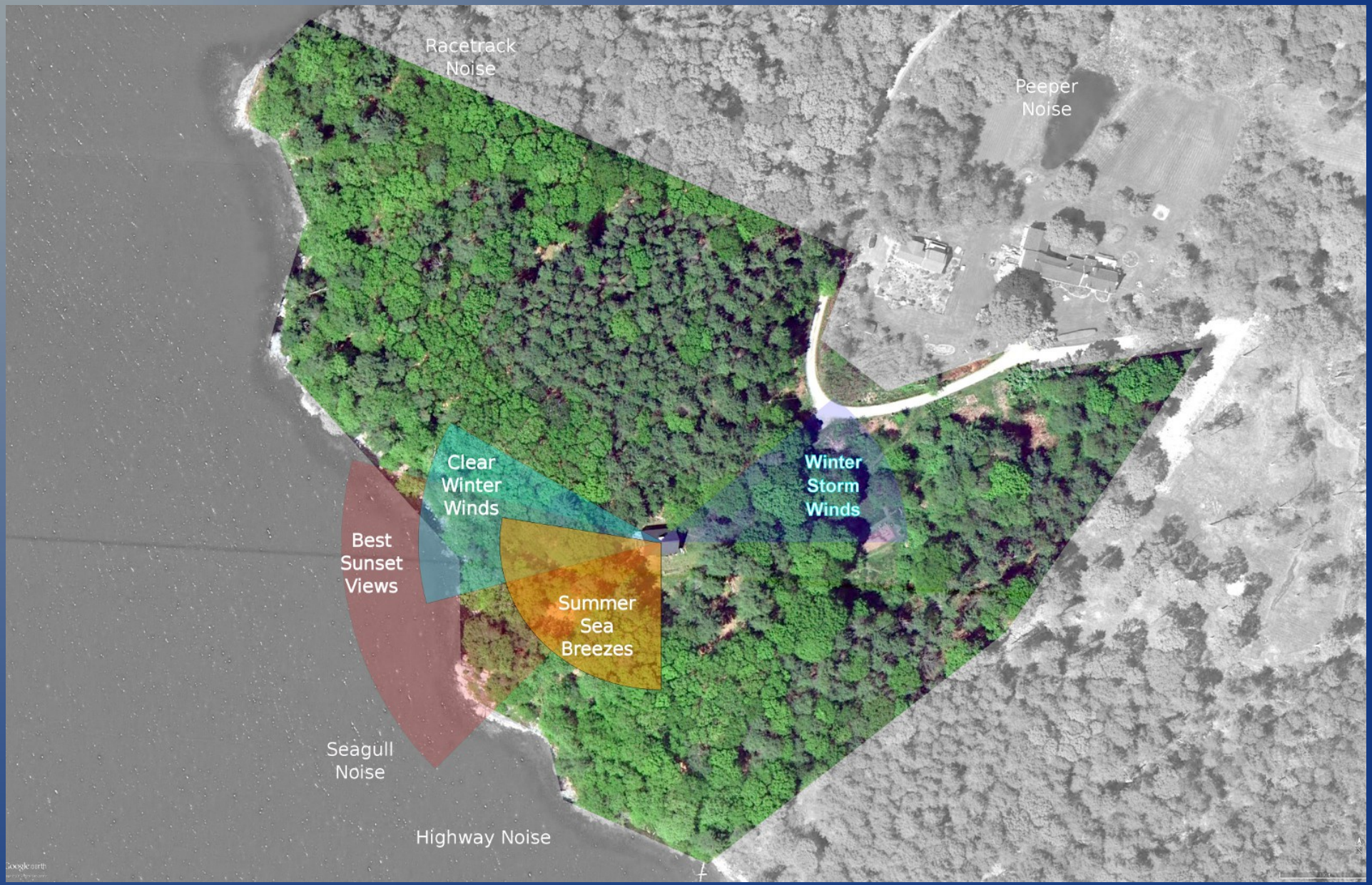
Green Fret Consulting

Sectors

- Sunlight (Winter sun path, Summer sun path)
- Winds (prevailing, cold winter, cooling summer)
- Views (good, bad, privacy)
- Noise (roads, neighbors, racetracks)
- Odors (smoke, pollution, sea)
- Wildlife corridors (encouraging, diverting)
- Fire (uphill, prevailing summer dry wind)
- Flood areas (100 year flood or sea level rise)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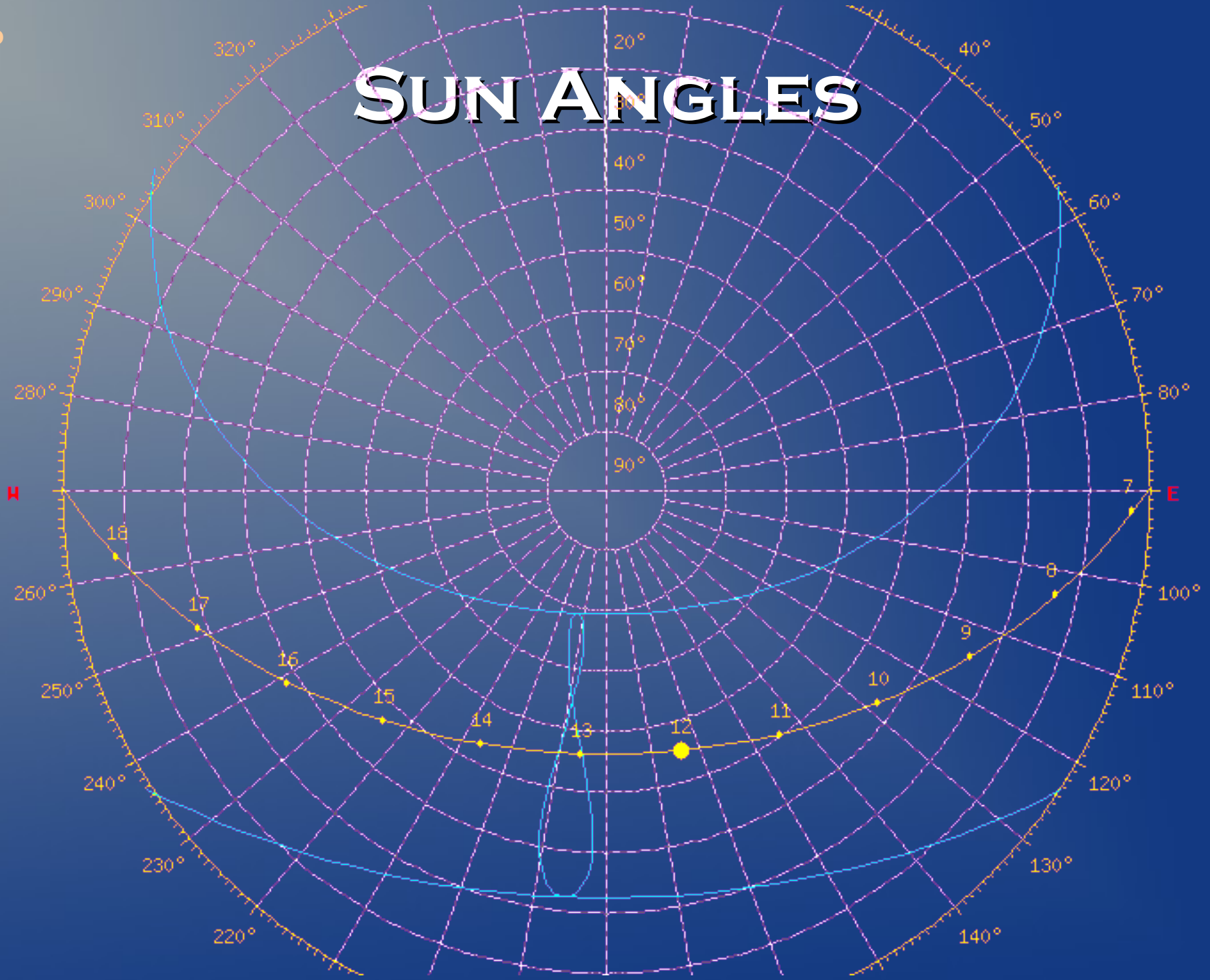
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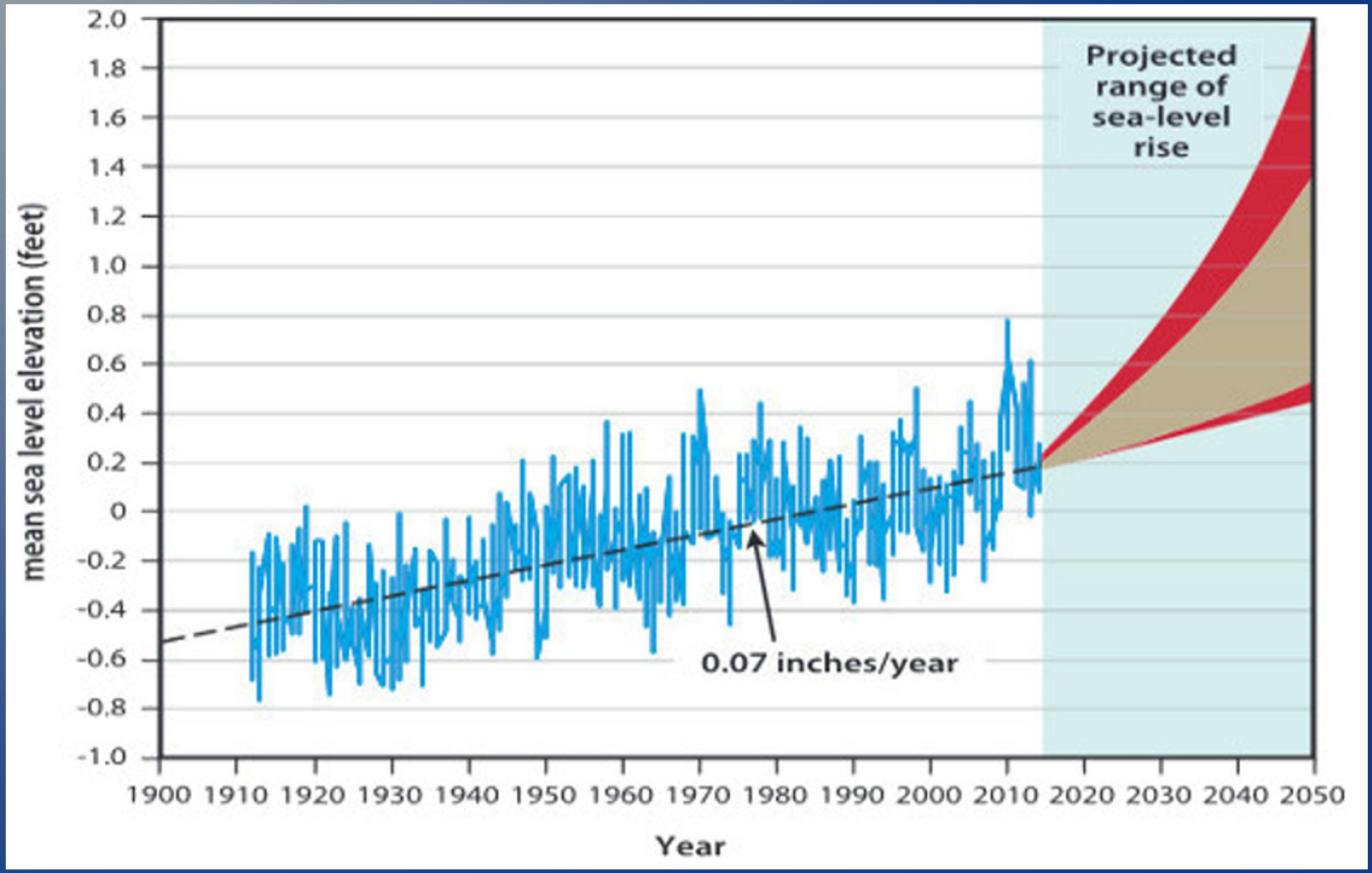
Sea Level Rise, Portland



Zones

- Zone 0: House.
- Zone 1: Yard. Herb & kitchen garden, high maintenance items, most infrastructure.
- Zone 2: Main crop gardens, animal pens.
- Zone 3: Farm crops, and grazing animals.
- Zone 4: Farm forest garden.
- Zone 5: Natural reserve, for enjoyment, observation and contemplation.


Zone 5
Zone 3
Zone 4
Zone 5
Zone 2
Zone 4
Zone 1
Zone 3
Zone 5

Patterns

- Are simplifications and codifications of chaotic diversity to improve understanding.
- Nature's patterns (branching, wavy flows)
- Edges: are the most productive areas, since they have two or three times the diversity. We want to increase edge. (keyhole path garden)
- On contour: shares water and nutrients.
- Herb spiral: dry herbs on top, water lovers at bottom, all reachable.
- Much more is available for study.

Edges

- Edges are where things are happening.
- Increasing the edge by crenelation increases the fertility of the land.
- Which direction is that edge moving?
- Keyhole paths and gardens maximize single reach beds area while minimizing path.
- Chinampas maximize edge between land and shallow water.

Elements

Plants, Animals, Structures

- Every element should be analyzed to establish what inputs it requires, what outputs it produces, and what behaviors it exhibits.
- Ideally, all of those things will be utilized on site.
- Each element should have at least three uses, and interconnect with at least three other elements.

Element example - Chickens

- **Inputs:** Food, water, air (at correct temp), grit (for gizzard), dust (for baths), other chickens, control, protection from predators, shelter from elements, perches, nest boxes, light.
- **Outputs:** Eggs, meat, manure, heat, feathers.
- **Behaviors:** Scratching soil, eating bugs and seeds to break pest cycles, 'gardening'.
- Which of these can be provided from, or used, within the system, which need to be imported, or exported?

Water

- Even in Maine with our ample, and (more importantly) even precipitation, water is one of the most important and precious resources.
- We only rent water (for about a month).
- It is incumbent upon us to return it in the condition we got it, and to the source we got it from.
- This is why fracking and other pollution is so dangerous, it removes water from the usable cycle. It buys water at rental prices.

Water (where is it?)

- 97% of water is salty.
- 2.25% is frozen (and when it thaws will be salty)
- 0.405% is deep water that can not be replaced
- 0.33% is shallow ground water.
- 0.009% is lakes and ponds (mostly Superior).
- 0.0018% in soils.
- 0.00105% in atmosphere (cleaning system).
- 0.0009% in rivers (mostly Amazon).

Duties of Water

- Procreate life (all life).
- Aquaculture (growing fish, high energy plants)
- Produce energy (electric generation, mechanical power)
- Cleaning pollution (reed beds, silt traps).
- Transport: in bulk, in suspension, in solution.

- Rainwater collection for personal water.

Dams

- Valley dams: toughest to build; water pressure already exists. Most common.
- Ridge point dams, Saddle dams.
- Earth tank: A hole and wall on flat land.
- **Key Point Dam**: Where the highest valley goes from convex to concave.
- **Property Keypoint**: Lowest point on the highest boundary gets the longest contour line.
- **Y-Point Dam**: Where two valleys converge.

Swales

- Are long shallow ditch / low ridge running level along contour lines, with loose soil.
- Can be used to massively increase the catchment for a dam. Allow the spillway to be far from the dam. Hydrates the land from the dam when it is full. Links multiple dams.
- Slows, spreads, and soaks landscape with water. Concentrates and spreads water.
- Tree growing structure.
- Swivel pipes to (adjustably) release water.

Filtering with Reeds

- At the top of your property, to filter the pollutants from incoming water (particularly important if it comes from the road).
- At the bottom of you property to capture the nutrients just before they leave your property.
- For greywater or black-water processing on site (check legality for small operations).
- The best local reed is cattails, available everywhere. Just grab a cattail from any still water source.

Trees & their energy transactions

- Wind effects: Trees slow wind, causing it to drop any dust, or nutrient it is carrying.
- Temperature effects: Trees moderate both highs and low temperatures.
- Precipitation effects: Trees add up to 80% of total precipitation in condensed moisture.
- Soil effects: fungi dominated, web of life.
- 20% of land area can be used for shelter, with no loss in productivity.

Forest Layers

- Climax canopy layer.
- Under-story trees.
- Shrubs and bushes.
- Herbs.
- Climbing vines.
- Ground cover.
- Root crop layer.
- All niches will be filled. Fill them with your choices, or accept what comes in on its own.

Succession

- Pioneer species: Damage fixers: nitrogen fixers, dynamic accumulators, loose soil consolidators, deep root compactors, pH circumventers.
- Grasses.
- Wood shrubs. Defensive plants (thorns etc.).
- Vines to move from edges of forests.
- Pioneer medium shrubs (e.g. sumac)
- Pioneer trees (aspen, birch).
- Canopy long term trees (oak, beech, chestnut).

Consider an Apple Tree

- **Old way**: Dig a hole in a field, plant a tree, fertilize it, protect it, mow around it for 10 years.
- **Permaculture way**: Prepare the ground with chickens. Plant the apple tree, with nitrogen fixing ground cover, bushes, and trees, and other support species. Fill the space, no space for weeds. Maintain merely by pruning the support species for mulch around the apple, once a year. In 10 years, the tree and its few remaining support species are self-sustaining.

Plant Guilds

- Are groups of plants which work together to achieve mutual benefits.
- Classic example is Corn, Squash, Beans.
- Frustratingly hard to find more examples (since they do depend on location) or make your own.
- Instead, think about functions, nutrient gathers, deep rooters, pest deters, pollinator attractions, pest predator habitat, etc.
- Monoculture is the antithesis of Permaculture. All required inputs, unwanted waste.

Soils

- Most diverse life system on Earth.
- 50 Million genus of bacteria.
- 50 Million genus of fungi.
- 3 Main elements (Nitrogen, Phosporus, Potassium NPK)
- 12 Minor elements (Fe, Cu, etc.)
- 25 Trace elements.
- pH makes those elements available (or not).

Soil Collapse

- Plowing, and disking kill massive numbers of soil creatures, and drop colloidal clay.
- Fertilizers: salt based so must be washed in.
- Biocide cocktail: Fertilizers ► Pesticides ► Fungicides ► Herbicides.
- Alternative? Compost. 1 pile (yard^3) provides fertilizer enough to feed 1 person for 1 year.
- Small amounts, or in winter, from worm bins.

Compost

- Colloidal organic matter. (<50 micron particles)
- “If it lived once, it can live again.” — Geoff Lawton
- Essentially Nitrogen bound up in Carbon at a ratio of 1N to 25-30 C. Otherwise it forms ammonia, evaporates, and is lost to your land.
- High Carbon materials are brown, bulk materials (straw, sawdust, ground up leaves).
- High Nitrogen materials are green plants, manures, dead animals, etc.
- Needs to get hot (140°F), so minimum 1 yard^3.

Compost Activators

- Animal
- Fish
- Comfrey
- Yarrow
- Nettle
- Old good compost
- Moisture (1 drip test on squeezed handful)
- If it smells, add more Carbon.

Mulch

- NOT the 6” of bark around every tree.
- NOT a substitute for more diversity of plants.
- A repairing and covering function for open soil.
- A temporary preferencer for species we want.
- A transfer of nutrient to productive elements, from nearby support elements.
- **Graduate** to: Green mulch, and Chop and drop.
- Nitrogen fixers, Comfrey, any 'weeds'.

Bio-char

- Is activated charcoal made from 'waste' products.
- Is best produced in a low oxygen fire, specifically designed to none-the-less burn off the volatiles in wood completely.
- Should be run through a compost pile to accumulate soil organisms (which do the work).
- Upshot, if you must burn open piles of brush, put out the fire when it reaches the coals stage, and put it in your compost pile, on to garden.

Freeze on contour rip lines

- For materialization of soils.
- Run rip lines (deep extremely narrow furrows) on contour.
- These will accumulate water and over the winter, which will freeze and crack on a large scale, to aerate the soil.
- Also breaks up larger soil particles increasing surface area, and thus minerals.

Earthworks

- **Dams**: for accumulation of water
- **Swales**: for spreading and concentrating water.
- **Spillways**: release of excess water passively and slowly.
- **Roads**: for access
- **Paths**: for humans and animals, to minimize compaction to specific locations.
- **Terraces**: level spaces for crops & structures.

Roads & Paths

- Best locations are on contour. Level ground.
- Next is along the crest of a ridge line.
- Anything else is going to require drainage ditches, and crossing pipes.
- Avoid valleys (runoff).
- Avoid slopes.
- Consider where the snow is going to go!

Weeds

- Are generally early succession plants.
- Are an indication of your primary soil problem.
- Are often the solution to that soil problem.
- The easiest way to get rid of them is to help them do the job of fixing that soil problem.
- Phosphorous accumulators for fire damage.
- Deep rooters for compacted soils.
- Fine hair nets roots for overly loose soils.
- Nitrogen fixers & dynamic accumulators for overworked crop soils.

Permaculture Plants

- Black Locust (Nitrogen, firewood, posts)
- Comfrey (dynamic accumulator, chop & drop)
- Clover (Nitrogen, fast dirt cover, bee forage)
- Siberian Pea bush (Nitrogen medium term)
- Daikon radish (deep soil penetration)
- Bamboo (ground stabilizer, water & wind break)
- Yarrow (compost activator)
- Mushrooms (food and wood break down)

Fruit & Nuts for Maine

- **Fruits**: Apple, Apricot, Cherry, Fig, Grape, Hardy Kiwi, Mango, Mulberry, Paw Paws, Peach, Pear, Persimmon, Plum, Seaberry.
- **Nuts**: Almond, Black Walnut, Butternut, Chestnut, Filbert, Hickory, Pecan, Walnut.
- **Berries**: Blackberry, Blueberry, Cranberry (no bog needed), Currants (maybe), Elderberry, Honeyberry, Gooseberry, Raspberry, Strawberry, Wintergreen.

Hügel Mounds

- Hügelculture: plants growing on decaying wood.
- A Hügel mound is a long mound built of tightly packed rotting wood, covered with dirt and compost, and planted up.
- The rotting wood soaks & retains a lot of moisture; the decaying provides nutrients through fungi and bacteria.
- This is a good technique for our climate since most of the nitrogen using decay happens in winter, while the growing happens in summer.

Converting a garden

- Stop plowing and tilling.
- Arrange double reach beds, on contour.
- Never leave uncovered dirt.
- Cover with cardboard, compost, and a thick layer of mulch.
- Plant by making a hole down through that.
- Drop any weeds in place to add to the mulch.

Seedballs

- Are small clay and compost balls with many varieties of pioneer seeds (flowers, food, damage fixers) embedded.
- Are easy to make in large batches.
- Impervious to seed eaters and other hazards until they germinate.
- Naturally find holes and ideal places, waiting for water and other germination conditions.
- Are a prime means of guerrilla gardening. They can be tossed into vacant lots, exposed dirt, or any land in crisis.

Aquaculture

- 10 times the protein production per acre than land based production (1kg per 1meter^3).
- As small as 2-3 meter^3 with mechanical aid (pumps and external filtering via plants).
- As simple as stocking a pond (Maine requires fish from a registered stock source).
- Get the rest of the ecosystem (including small shellfish) from a healthy pond.
- Mosquito larva is fish food. Most mosquitoes come from small puddles, not fish ponds.

Aquaculture Plants

- Rice! Yes rice will grow in our climate. They grow in retention basins (i.e. the nutrients naturally increase). Baby ducks for weeding.
- Cress.
- Bulk quantities of forage for animals.
- Saltwater Marsh grass (no longer legal, due to other problems in shoreline zones).
- Chinampas: Systems of peninsulas to grow crops and harvest from the water. Edge!

More Quotations

"Permaculture is not the movement of sustainability and it is not the philosophy behind it; it is the problem-solving approach the movement and the philosophy can use to meet their goals and design a world in which human needs are met while enhancing the health of this miraculous planet that supports us."

— Toby Hemenway

More Quotations

"The ultimate goal of framing is not the growing of crops, but the cultivation and perfection of human beings."

— Masanobu Fukuoka

More Quotations

"How wonderful it is that nobody need wait a single moment before starting to improve the world."

— Anne Frank

Even More Quotations

"Traditional agriculture was labour intensive, industrial agriculture is energy intensive, and permaculture designed system are information and design intensive."

— David Holmgren

Yet More Quotations

"It should look as if it has always been like that, as if Nature had made it that way.

That's good design."

— Sepp Holzer

You know...

"We don't need a law against McDonald's or a law against slaughterhouse abuse--we ask for too much salvation by legislation. All we need to do is empower individuals with the right philosophy and the right information to opt out en masse."

— Joel Salatin

Funny Title goes here

"The only truly dependable production technologies are those that are sustainable over the long term. By that very definition, they must avoid erosion, pollution, environmental degradation, and resource waste. Any rational food-production system will emphasize the well-being of the soil-air-water biosphere, the creatures which inhabit it, and the human beings who depend upon it."

- Eliot Coleman

Last one

"Information is like compost; it does no good unless you spread it around."

— Eliot Coleman

Thank you for Listening

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