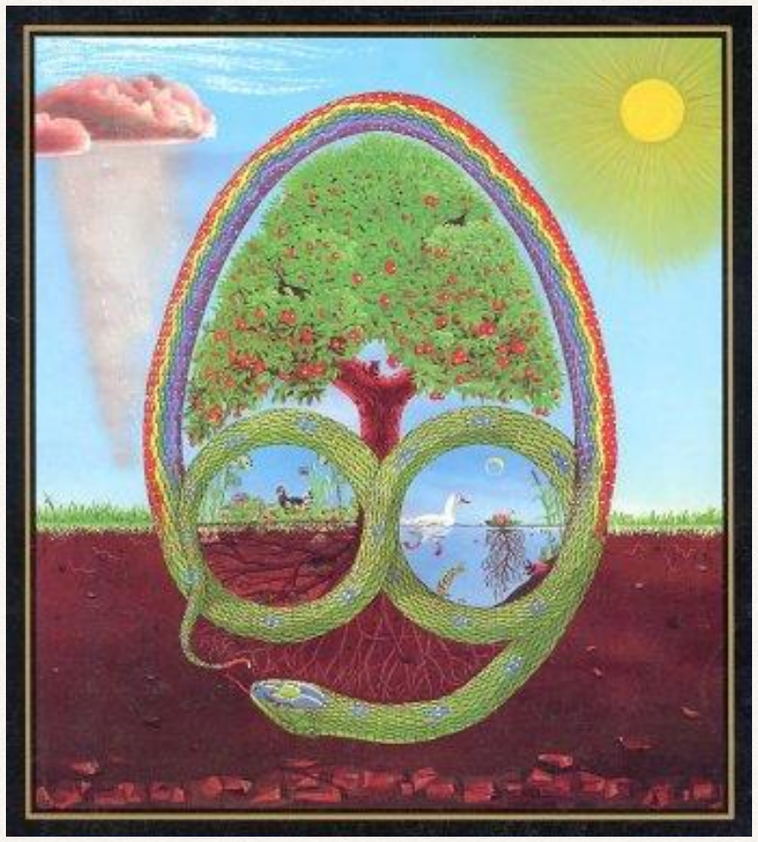
Permaculture Design

“Permanent Agriculture”



“Permanent Culture”

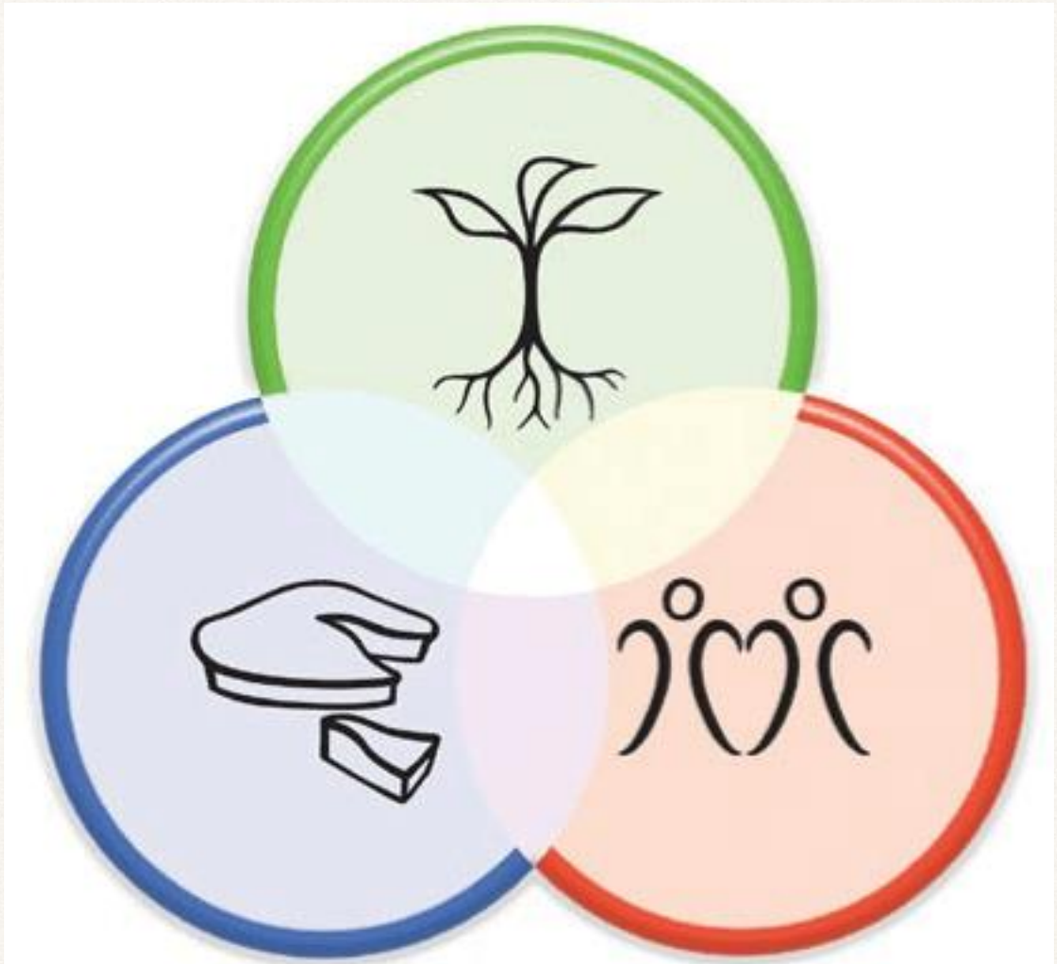
“Meeting Human Needs While Increasing Ecological Health.”

“The Post-Modern Synthesis of All Wise Human Behavior.”

VISION DESIGN NETWORK

Permaculture Ethics

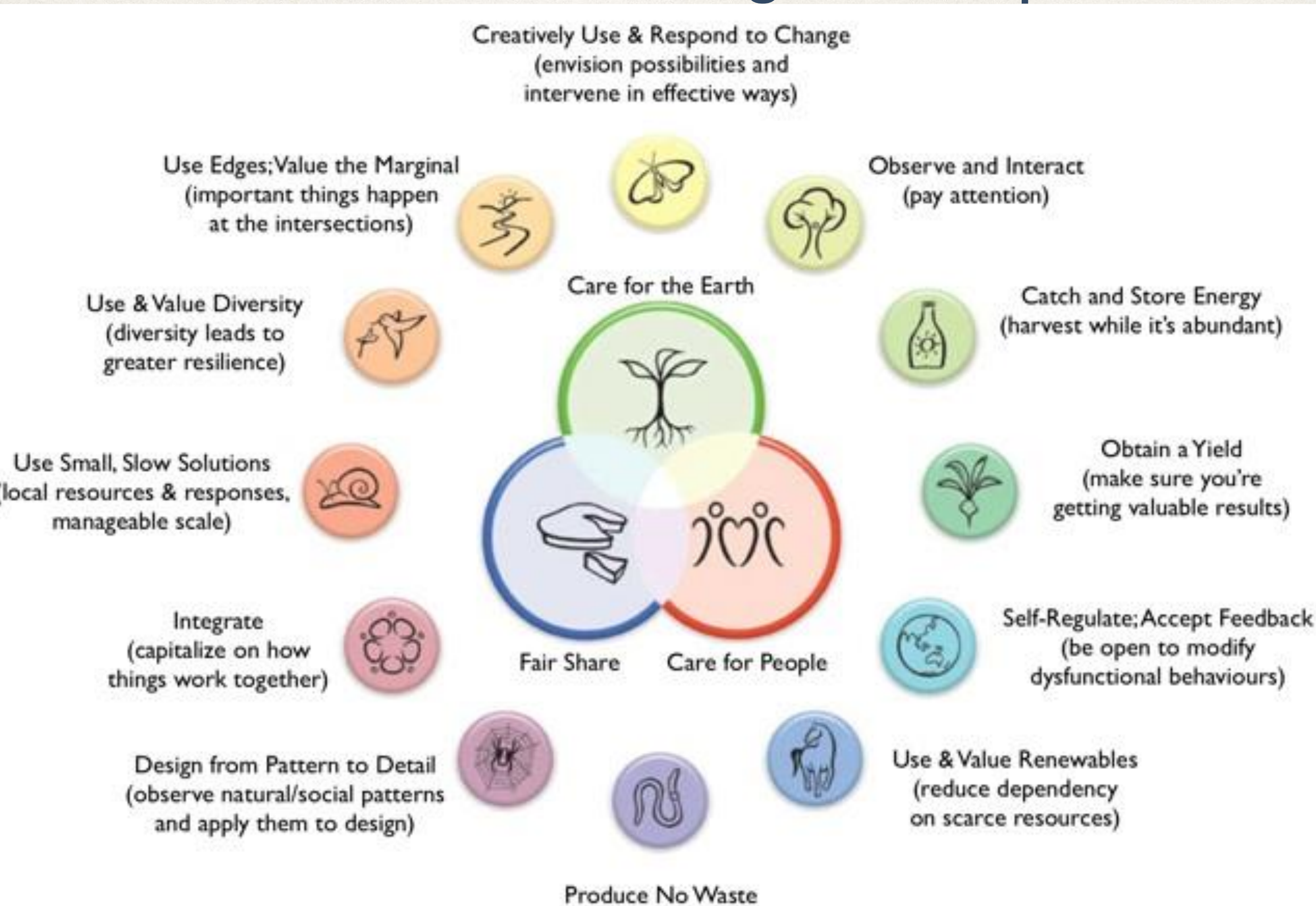
“Earth Care”



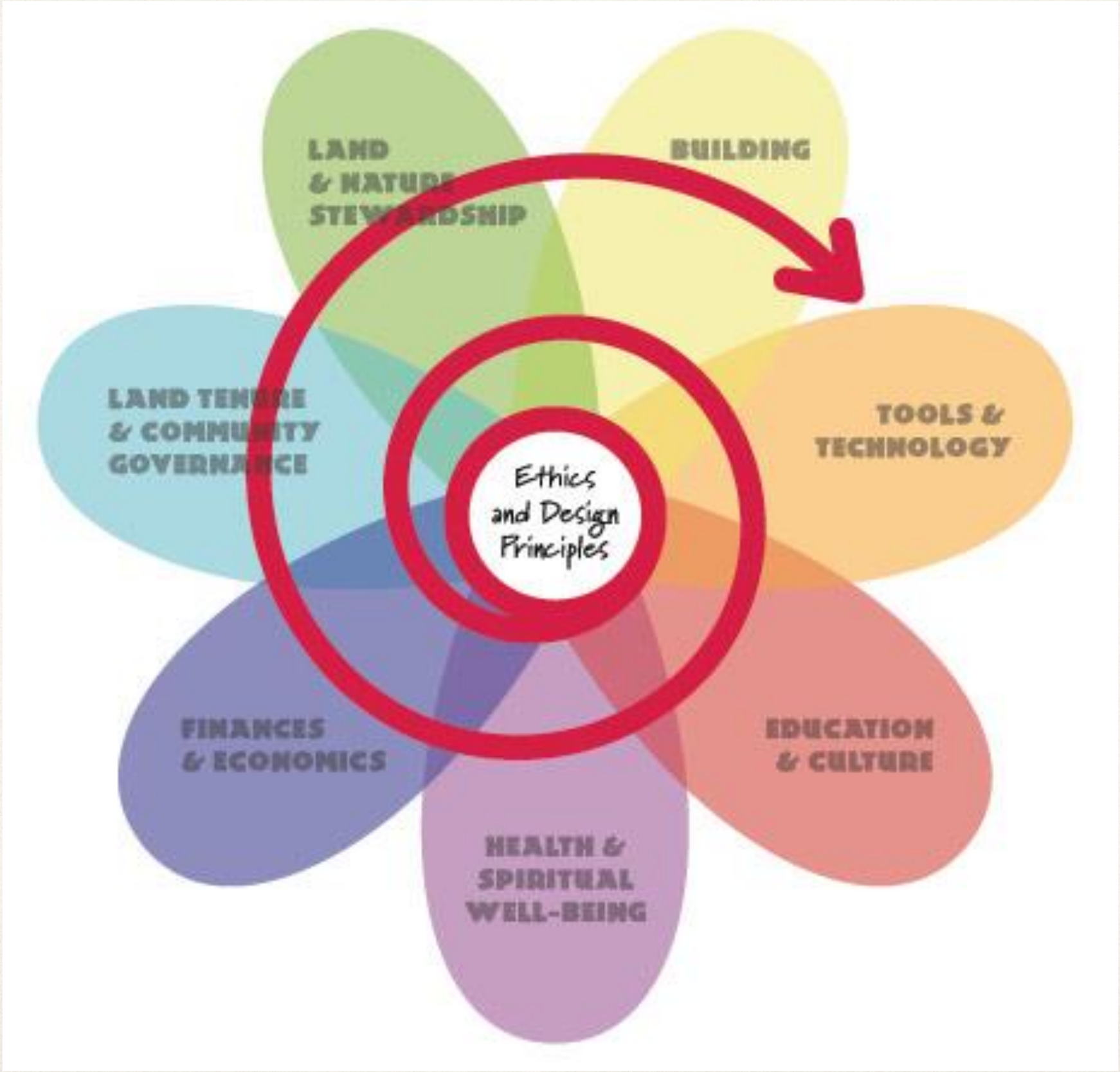
“Fair Share”

“People Care”

Permaculture Design Principles



Permaculture ‘Flower’



Integrated aquaculture

Bio-intensive gardening

Forest gardening

Water harvesting & reuse

Natural building materials

Wild harvesting

Agroforestry & nature-based forestry

Organic & BD agriculture

Seed saving

Biotechture

Owner-building

Passive solar design

Keyline water harvesting

Charcoal & wood gasification

Holistic Rangeland Management

Native title

Co-operatives / Body corporates

Microhydro

Conflict resolution

Hand tools

Eco-villages / cohousing

Bicycle transport

Emergy accounting

Reuse / Recycling

Ethical Investment

Home & Steiner education

Community Supported Agriculture

Reading Landscapes

Fair Trade Products

Participatory arts & music

WWOOFing

Spirit of place

Home birth / Breastfeeding

Social Ecology & Action Research

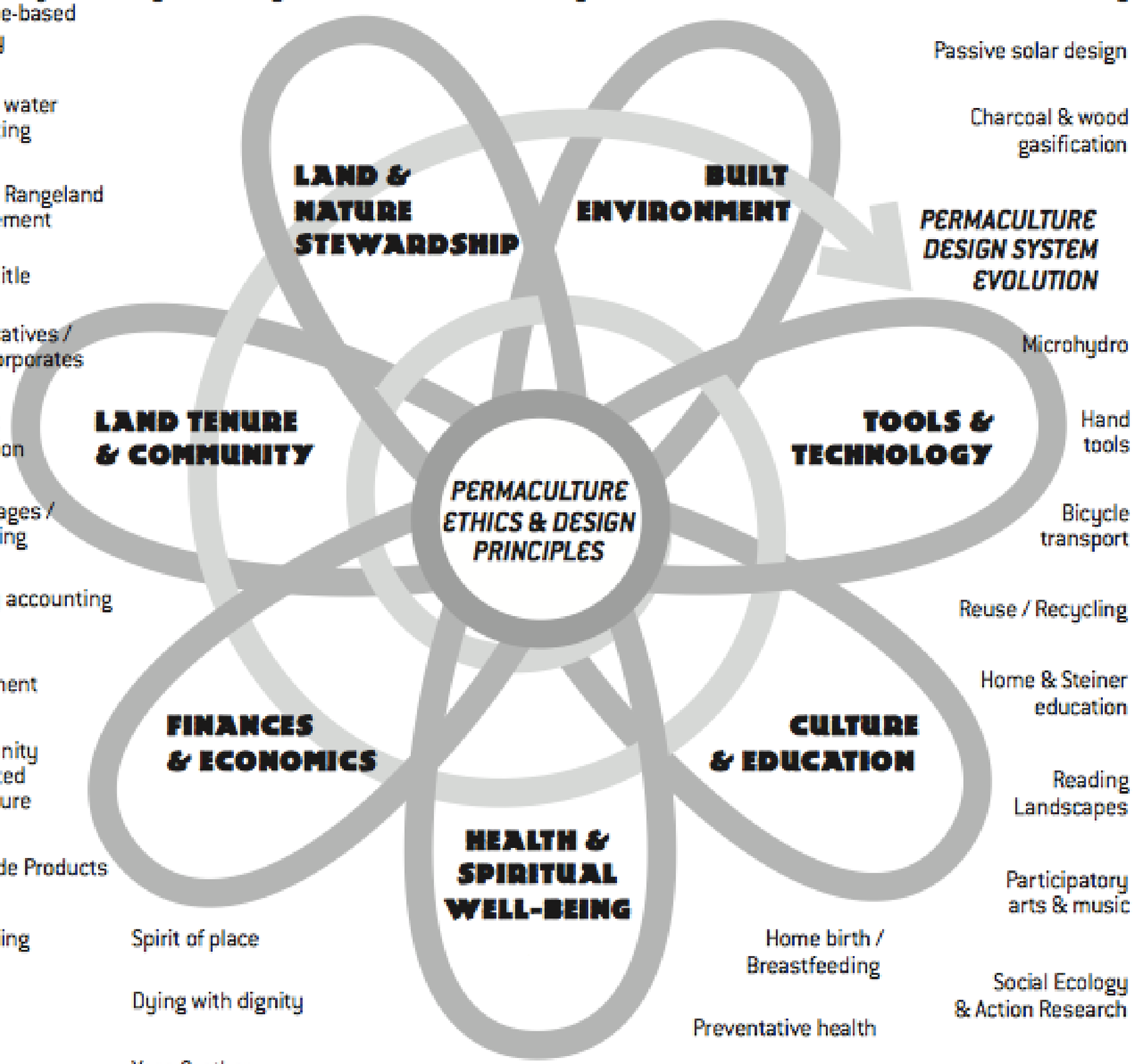
LETS

Dying with dignity

Preventative health

Yoga & other body/mind/spirit disciplines

Holistic medicine



Long-Term Comprehension

Long-Term Cooperation

Foresight: Long-Term Planning

Permaculture Design Process

- Goals Articulation

Our Farms are:

- Carbon Negative
- Climate Resilient
- Decreasingly Dependent on External Energy and Fossil-Fuel Derived Inputs
- Contributing to Resilient Land-based Local Economies

PERMA-CANNA-CULTURE

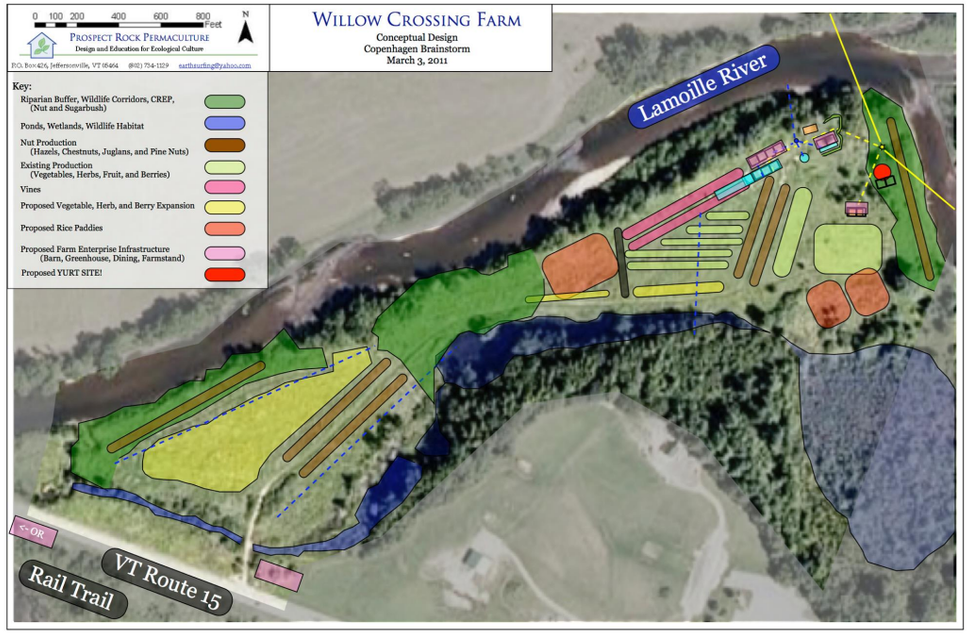
HEALING OUR FARMS AND THE EARTH WITH CANNABIS MEDICINE

UVM HEMP CONFERENCE FEBRUARY 8, 2019

PROSPECTROCK.ORG

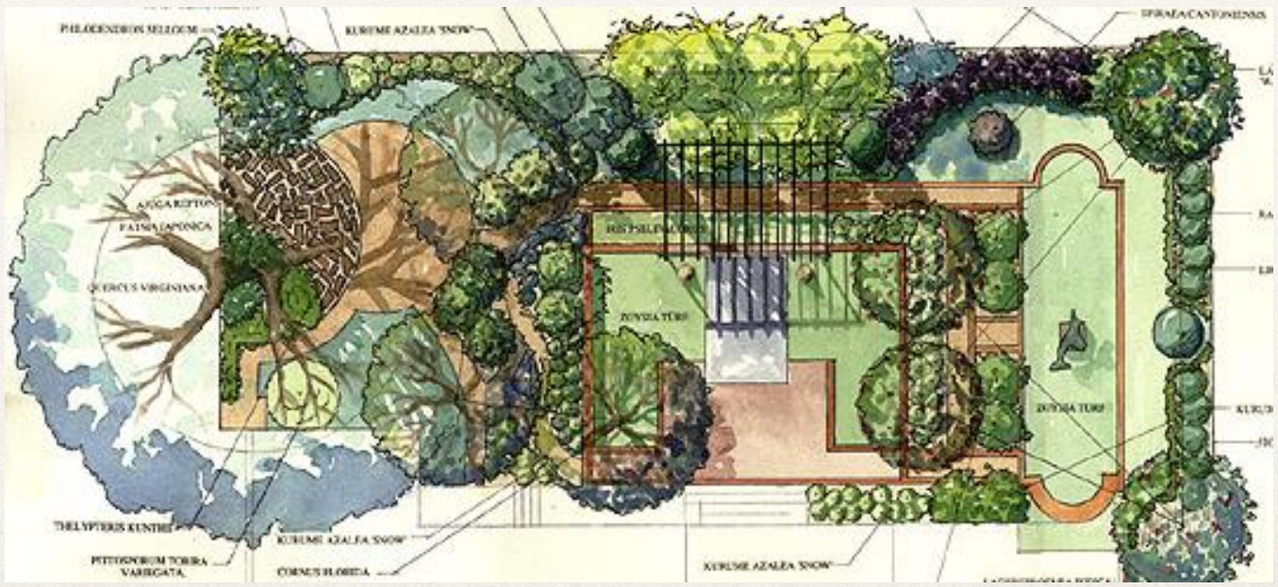
DESIGN AND EDUCATION
FOR ECOLOGICAL CULTURE

Willow Crossing Farm



PROSPECT ROCK PERMACULTURE

DESIGN AND EDUCATION FOR ECOLOGICAL CULTURE



PROSPECTROCK.ORG

Willow Crossing Farm

Conceptual Design
Copenhagen Brainstorm
March 3, 2011

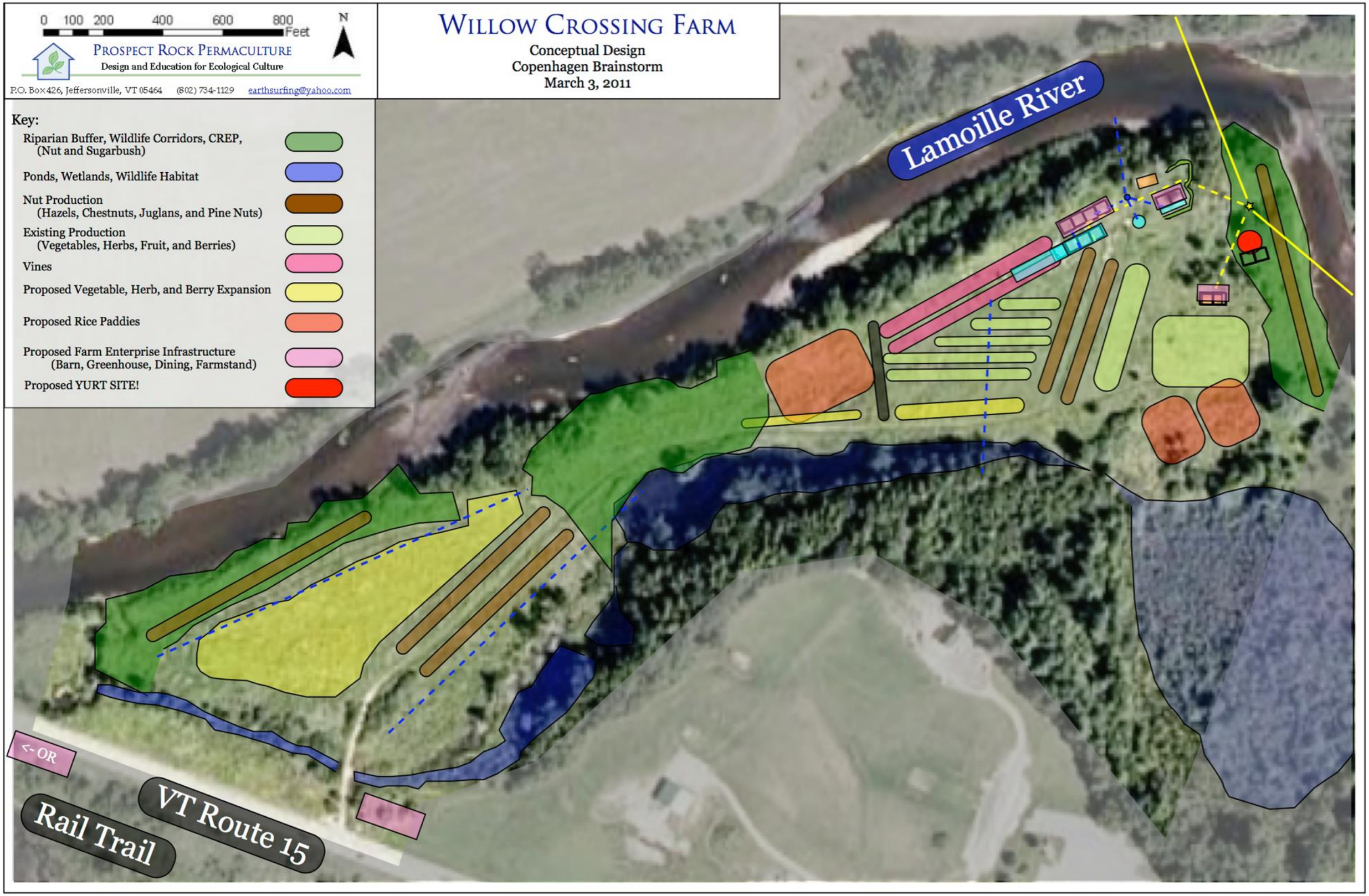
Prospect Rock Permaculture
Design and Education for Ecological Culture
P.O. Box 426, Jeffersonville, VT 05464 (802) 734-1129 earthsurfing@yahoo.com

0 100 200 400 600 800 Feet

N

Key:

- Riparian Buffer, Wildlife Corridors, CREP, (Nut and Sugarbush)
- Ponds, Wetlands, Wildlife Habitat
- Nut Production (Hazels, Chestnuts, Juglans, and Pine Nuts)
- Existing Production (Vegetables, Herbs, Fruit, and Berries)
- Vines
- Proposed Vegetable, Herb, and Berry Expansion
- Proposed Rice Paddies
- Proposed Farm Enterprise Infrastructure (Barn, Greenhouse, Dining, Farmstand)
- Proposed YURT SITE!



Farm Overview / Design Concept

NRCS / AMA Irrigation Plan

Well Location: ~30 gal/min @ 440' depth Static height ~20' from surface

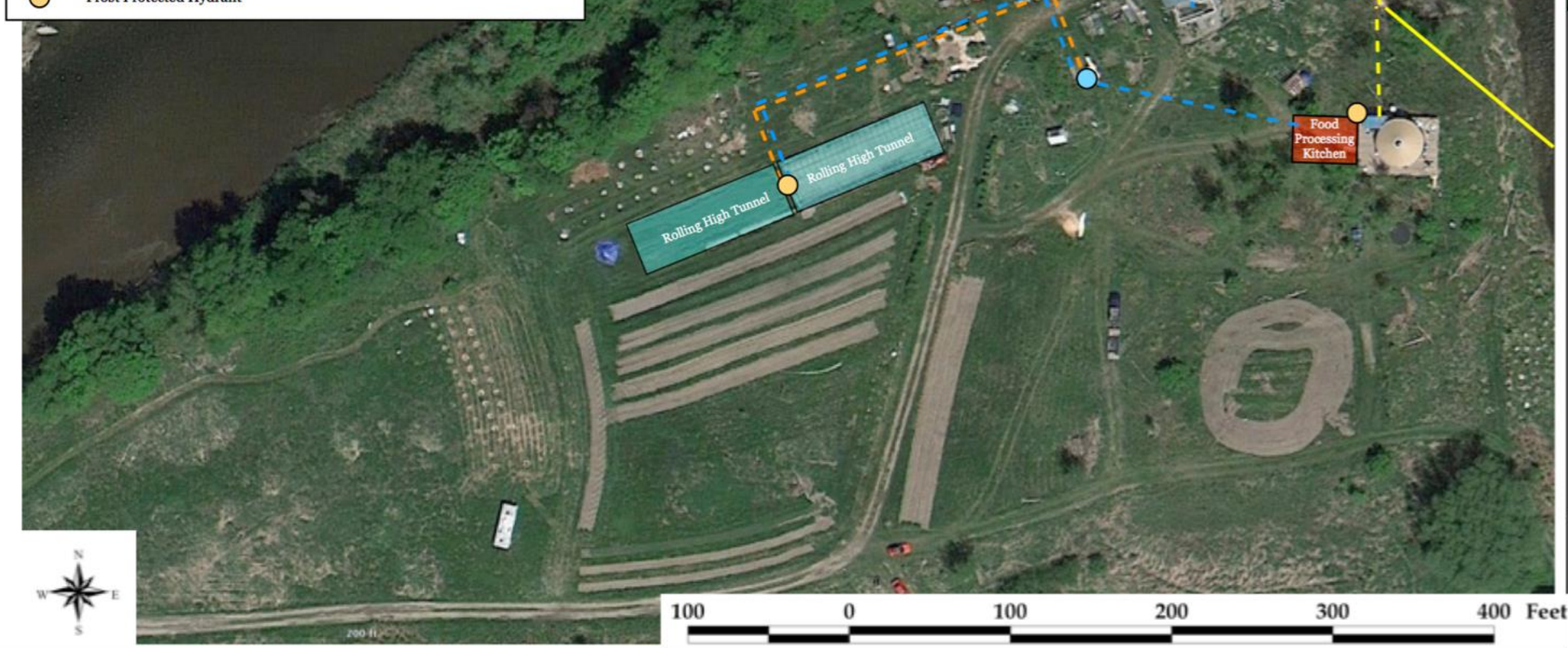
Existing Grid Power (overhead)

Existing Grid Power (buried)

Proposed Expansion of Power (buried)

Proposed Frost-Protected Water Line

Frost Protected Hydrant



Willow Crossing Farm

NRCS / AMA Irrigation Plan

Key:

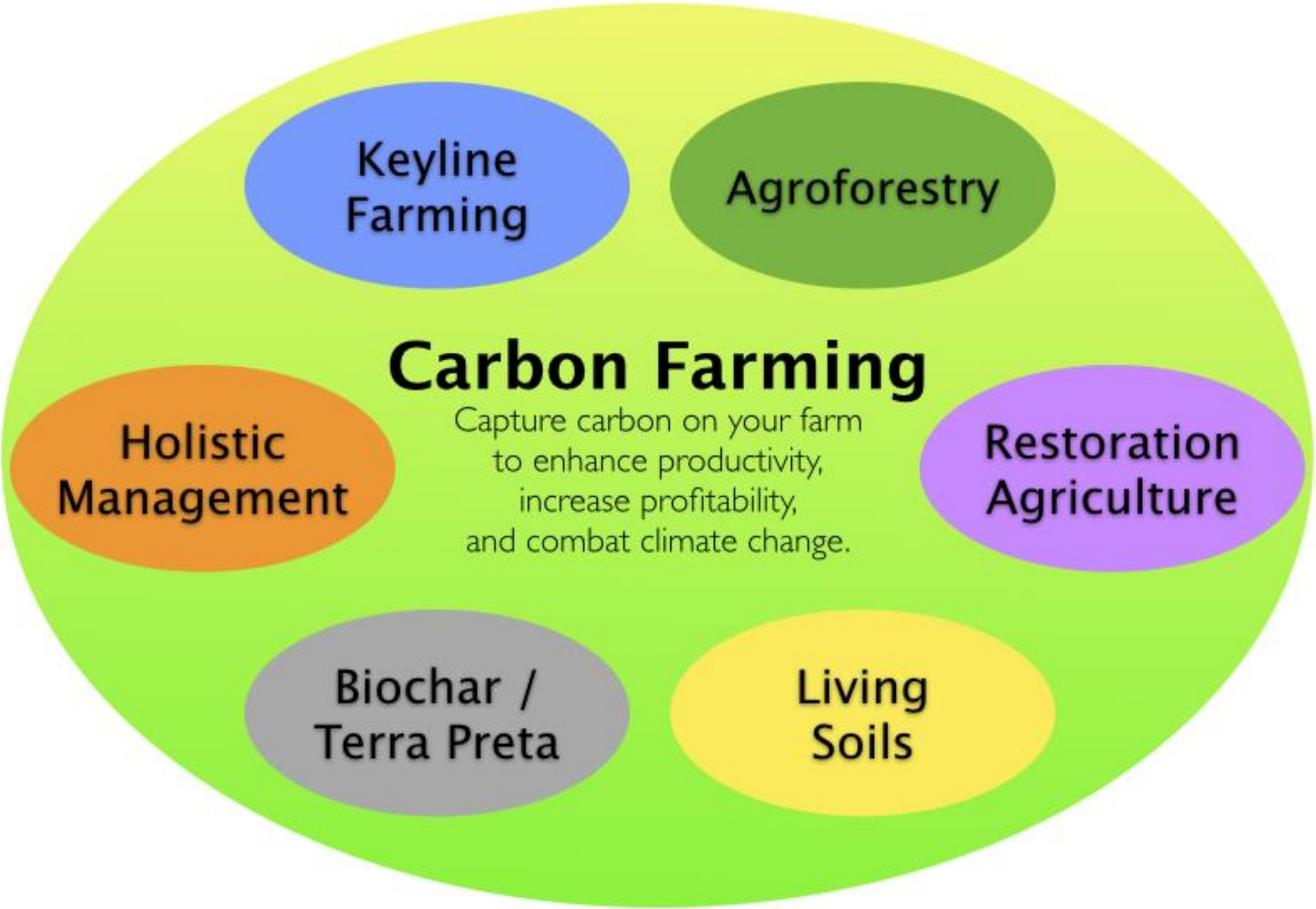
- Riparian Buffer, Wildlife Corridors, CREP, (Nut and Sugarbush, Berries, Medicinal herbs)
- Ponds, Wetlands, Wildlife Habitat
- Nut Production (Hazels, Chestnuts, Juglans, and Pine Nuts)
- Existing Production and Proposed Expansion (Vegetables, Herbs, Fruit, and Berries)
- Vines (Kiwis, Grapes, Schisandra)
- Apiaries
- Proposed Farm Enterprise Infrastructure (Barn, Greenhouse, Dining, Farmstand)

Prospect Rock Permaculture

Design and Education for Ecological Culture

www.ProspectRock.org

Box 426, Jeffersonville, VT 05464 (802) 734-1129 Keith@ProspectRock.org


Keyline Farming
Agroforestry
Carbon Farming
Capture carbon on your farm
to enhance productivity,
increase profitability,
and combat climate change.
Holistic Management
Restoration Agriculture
Biochar / Terra Preta
Living Soils

MEDICINE

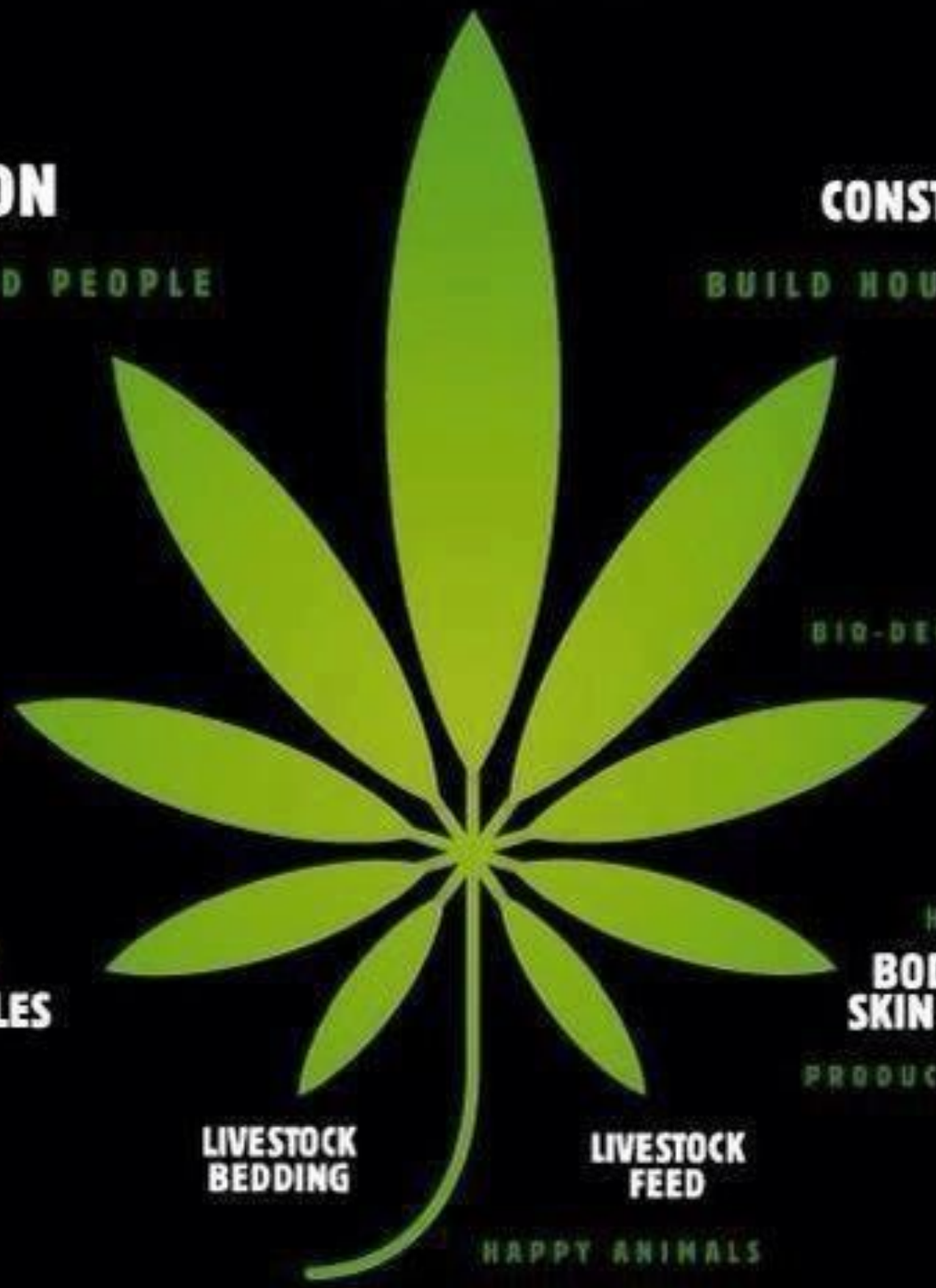
CURE CANCER

NUTRITION

FEED PEOPLE

CONSTRUCTION

BUILD HOUSES



MORE

PAPER

PER VOLUME

BIO-DEGRADABLE

PLASTICS

HIGH QUALITY

TEXTILES

HEALTHY

BODY & SKIN CARE

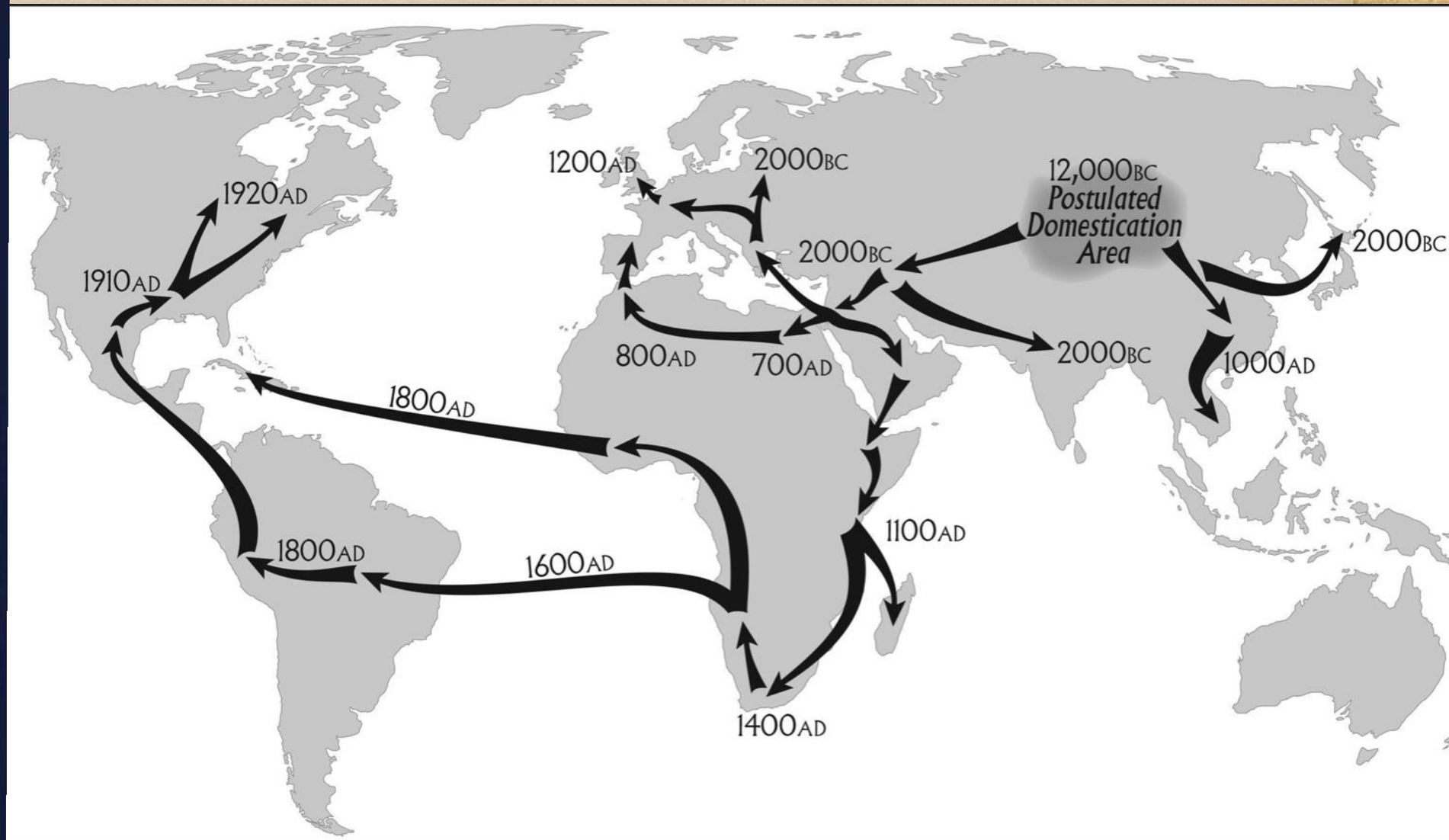
PRODUCTS

LIVESTOCK BEDDING

LIVESTOCK FEED

HAPPY ANIMALS

You don't have to be stoned to appreciate the beauty of Cannabis.


1920AD
1910AD
1800AD
1800AD
1600AD
1400AD
1200AD
2000BC
2000BC
12,000BC
Postulated
Domestication
Area
2000BC
2000BC
800AD
700AD
1100AD
1000AD

Ford

GROWN FROM THE SOIL

HEMP CAR

One of Henry Ford's first cars ran entirely on Hemp ethanol. The body was also constructed from Hemp plastic, which was 10X stronger than steel.

Unfortunately, Hemp was outlawed due to the damaging effect it would have on many powerful industries at that time; including the oil, plastics & paper industries.

"Why use up the forest which were centuries in the making and the mines which required ages to lay down, if we can get the equivalent of forest and mineral products in the annual growth of the fields?"

— Henry Ford —

DOW®

DUPONT®

CANNABIS AND THE HUMAN CB RECEPTORS

(endocannabinoid system)

Our body naturally has an endocannabinoid system (CB receptors). Cannabinoids from the cannabis plant bind to these receptors in certain ways to provide medicinal relief.

CBD

* Not psychoactive. However, acts as an agonist for the other cannabinoids (allows them to function more efficiently)
* Anti-psychotic (helps manage psychosis)
* Anti-spasmodic (eases muscle spasms)
* Anxiolytic (eases anxiety/panic attacks/post traumatic stress)
* Anti-inflammatory
* Antagonist to GPR-55 receptor. (has an effect on cell cytoskeleton, bone function, and other processes)
* anti-epileptic
* anticancer
* neuroprotective
* anti-emetic
* vasorelaxant
* antibacterial
* antispasmodic
* anti-diabetic
* anti-ischemic
* anti-psoriatic
* anti proliferative
* intestinal anti-pro kinetic
* immunosuppressive
* analgesic
* anxiolytic
* bone-stimulant
* anti-psychotic
* anti-inflammatory
* Does not bind to CB-1 or CB-2 receptors
--CBD is helpful for not only activating other cannabinoids, but increasing blood flow, which is important for any sort of healing.]+

THC-9

Delta9-THC is the principal psychoactive constituent of cannabis
Analgesic (pain-killer) *
Anti-inflammatory *
Anti-emetic (eases nausea) *
Euphoriant (makes you happy) *
Appetite stimulant *
Anti-spasmodic (suppresses muscle spasms)
Affects CB-1 receptors in the brain and GPR-55 receptor
Eases eye pressure (glaucoma)
Eases neuropathy, and muscle spasms
An aromatic terpenoid (lipid) are found in all classes of living things)

CBG

* Anti-inflammatory
* Bone-stimulant
* Anti-bacterial
* Anti-proliferative
* Has some affinity for CB-1
* Shown to relieve intra-ocular pressure (treats glaucoma)
* Non psychoactive, however acts as an 5-HT1A receptor antagonist, and CB1 antagonist

CBN

Mildly psychoactive *
Sedative *
Anti-convulsant *
Anti-biotic *
Anti-insomnia (sleep aid) *
Anti-inflammatory *
Anti-spasmodic *
Primary product of THC degradation (THC molecule breaks down into CBN)
Binds to CB-1 & CB-2 receptors, with higher affinity for CB-2
Similar properties to THC, with relatively less affinity for CB-1 receptors

CBC

* May contribute to the anti-viral effects of cannabis
* Anti-proliferative (anti-cancer)
* Anti-inflammatory
* Bone-stimulant
* Antimicrobial (pain relief)
* May Also contribute to analgesic effects

THC-V

Bone-stimulant *
Anti-epileptic (reduces seizures) *
Antiemetic (appetite suppressant) *
Anti-oxidant (soaks up free radicals)
May play a future role in treating obesity and cardiometabolic diseases
Possible treatment for Parkinson's like diseases.
Associated with the 'fragrance' of the plant
Somewhat 'softens' the effect of THC-V by antagonizing CB-1 receptors, this would make the effects of the CB-2 and other receptors more prevalent.

CB-1

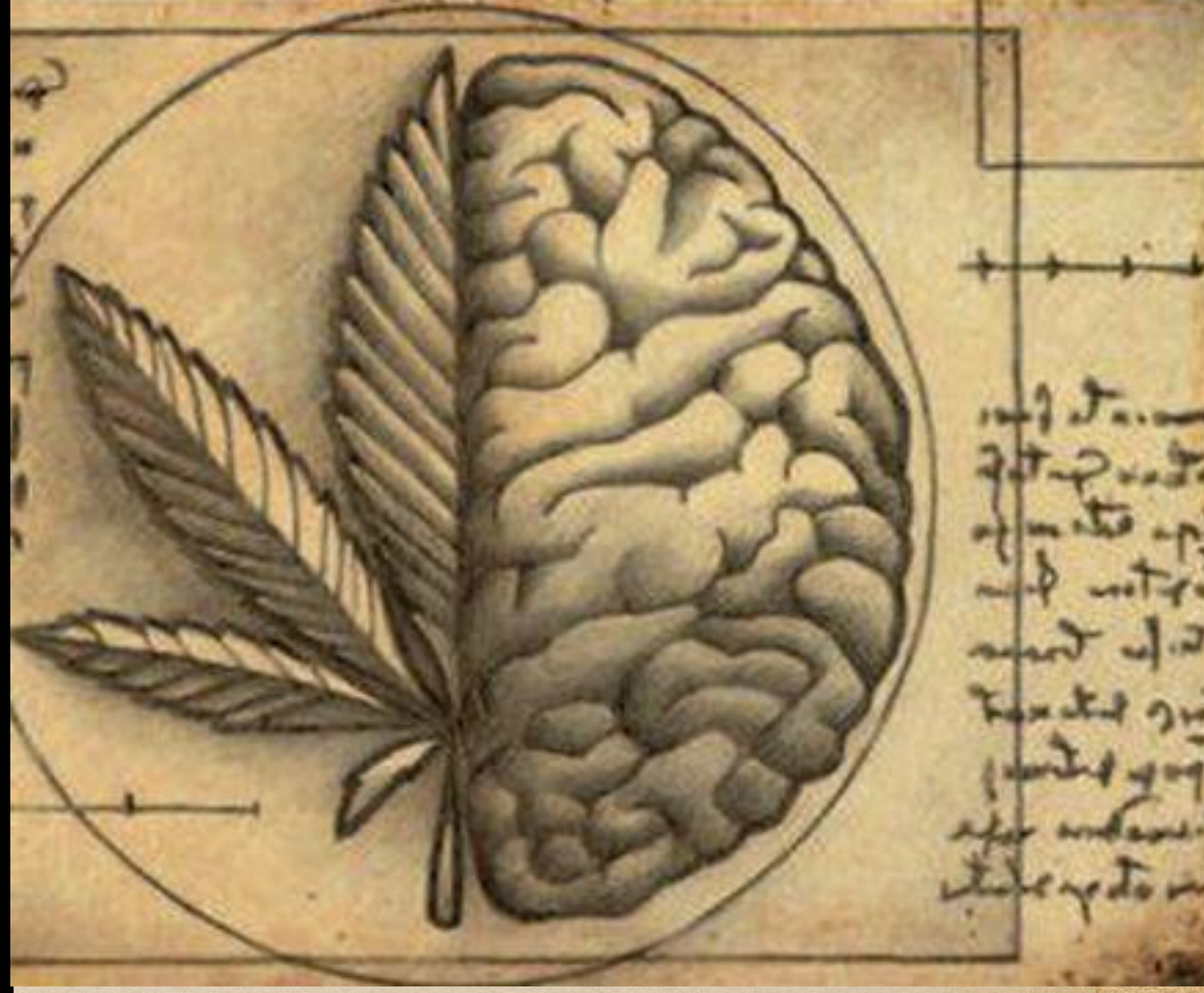
MENTAL HEALTH

(CB-1 G-protein coupled cannabinoid receptor 1)
Responsible for the euphoric and anti-convulsive effects of cannabis.

CB-2

BODY HEALTH

(CB-2 G-protein coupled cannabinoid receptor 2)
Closely related to CB-1
Has an effect on Cytokine release, which is



Cannabinoid Education

How can cannabinoids benefit YOU?

thc
Tetrahydrocannabinol

- Eases pain
- Helps with relaxation
- Suppresses pain from nerve damage
- Reduces risk of nerve damage
- Controls anxiety
- Suppresses muscle spasms and convulsions
- Controls certain cancers
- Eases nausea
- Slows inflammation
- Fights free radicals in the blood stream
- Encourages eating and appetite stimulation
- Stimulates new growth in nerve tissue
- Relieves chronic eye pressure and pain caused by glaucoma and other eye disorders

cbd
Cannabidiol

- Controls certain cancers
- Eases pain
- Stimulates bone growth
- Stops growth of bacteria
- Suppresses muscle spasms and convulsions
- Slows inflammation
- Reduces blood sugar levels
- Reduces the risk of artery obstructions
- Decreases pressure in the blood vessel walls
- Helps control epileptic seizures
- Reduces risk of nerve damage
- Decreases the social isolation caused by THC
- Eases nausea

cbc
Cannabichromene

- Eases pain
- Stops growth of fungi
- Slows inflammation
- Stimulates bone growth
- Encourages cell growth
- Stops growth of bacteria
- Assists in contraction of blood cells

thcv
Tetrahydrocannabivarin

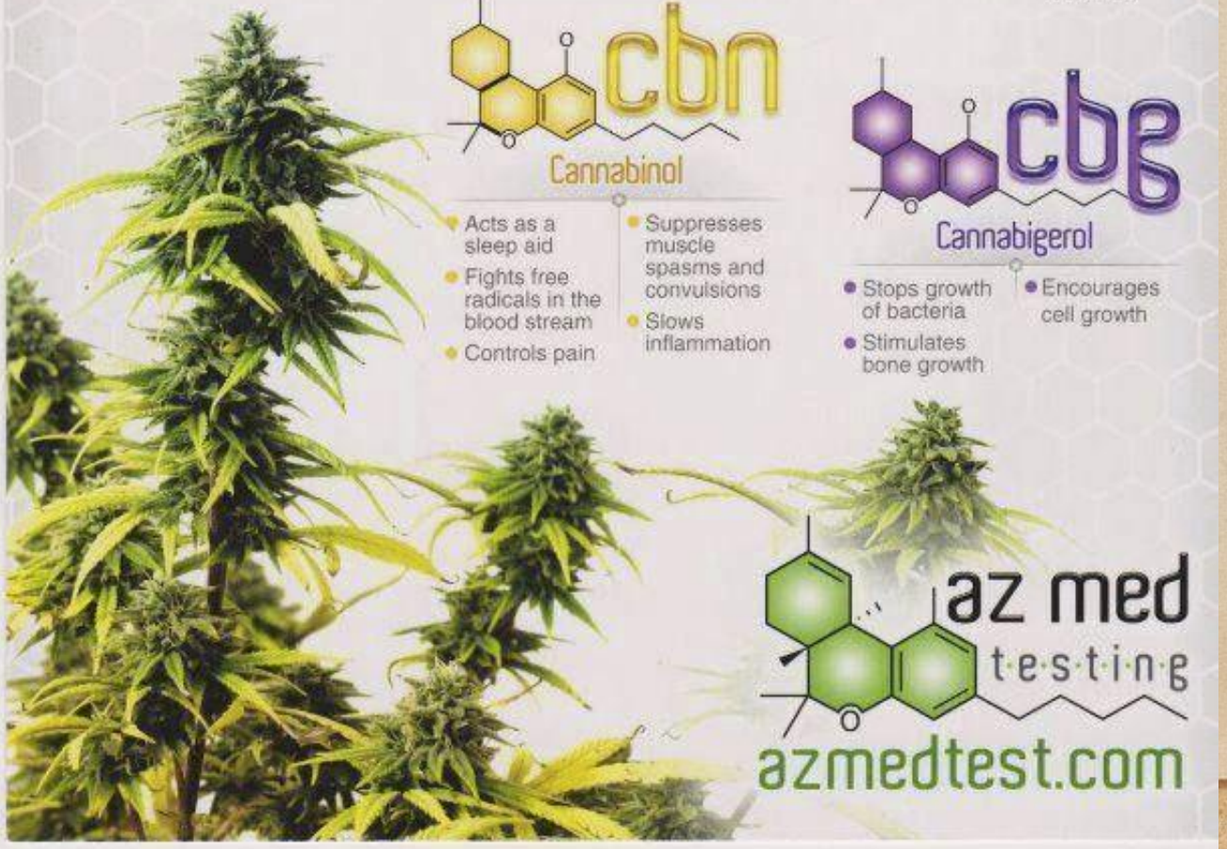
- Appetite suppressant
- Controls obesity
- Type II diabetes human testing currently underway

cbn
Cannabinol

- Acts as a sleep aid
- Fights free radicals in the blood stream
- Controls pain
- Suppresses muscle spasms and convulsions
- Slows inflammation

cbg
Cannabigerol

- Stops growth of bacteria
- Stimulates bone growth
- Encourages cell growth



az med testing
azmedtest.com

THERAPEUTIC
USES OF CANNABINOIDS

MEDICAL BENEFITS

	THC	CBD	CBG	CBN	CBC	THCV	THCA	CBDA
RELIEVES PAIN	●	●		●	●	●		
SUPPRESSES APPETITE				●		●		
KILLS OR SLOWS BACTERIA GROWTH		●	●	●				
REDUCES BLOOD SUGAR LEVELS		●						
REDUCES VOMITING AND NAUSEA	●	●					●	●
REDUCES SEIZURES AND CONVULSIONS		●				●	●	
REDUCES INFLAMMATION	●	●	●		●		●	●
AIDS SLEEP	●			●				
REDUCES RISK OF ARTERY BLOCKAGES		●						
INHIBITS TUMOR GROWTH / CANCER CELLS	●	●	●		●		●	●
NERVOUS SYSTEM PROTECTANT	●	●						
SUPPRESSES MUSCLE SPASMS	●	●		●			●	
RELIEVES ANXIETY	●	●	●		●	●		
STIMULATES APPETITE	●							
MODULATES THE IMMUNE SYSTEM		●						
REDUCES SPASMS IN SMALL INTESTINES		●					●	
TRANQUILIZING AND ANTIPSYCHOTIC		●						

THERAPEUTIC
USES OF CANNABINOIDS

MEDICAL BENEFITS

	THC	CBD	CBG	CBN	CBC	THCV	THC_A	CBD_A
RELIEVES PAIN	●	○		●	○	●		
SUPPRESSES APPETITE				●		●		
KILLS OR SLOWS BACTERIA GROWTH		○	●	●				
REDUCES BLOOD SUGAR LEVELS		○						
REDUCES VOMITING AND NAUSEA	●	○					●	○
REDUCES SEIZURES AND CONVULSIONS		○				●	●	
REDUCES INFLAMMATION	●	○	●		○		●	○
AIDS SLEEP	●			●				
REDUCES RISK OF ARTERY BLOCKAGES		○						
INHIBITS TUMOR GROWTH / CANCER CELLS	●	○	●		○		●	○
NERVOUS SYSTEM PROTECTANT	●	○						
SUPPRESSES MUSCLE SPASMS	●	○		●			●	
RELIEVES ANXIETY	●	○	●		○	●		
STIMULATES APPETITE	●							
MODULATES THE IMMUNE SYSTEM		○						
REDUCES SPASMS IN SMALL INTESTINES		○					●	
TRANQUILIZING AND ANTIPSYCHOTIC		○						

CANNABIS NUTRIENT DEFICIENCIES & EXCESSES

Primary Nutrients

N — NITROGEN

Excess / Deficiency

11. Stems become weak
10. Foliage becomes weak
9. "Greenness" moves up
8. Bottom leaves turn lush dark green
12. Water/fluid transport system becomes weak
13. Harvest tastes green
6. Plants are shorter with smaller leaves
2. Leaves lose luster
3. Yellowing progresses upward
1. Lower leaves turn yellow
4. Leaves continue to yellow, curl and discolor
5. Leaves start to drop
7. Premature flowering and low yield

P — PHOSPHOROUS

Excess / Deficiency

8b. New leaves grow thin blades
8a. Newer leaves develop interveinal chlorosis
8c. Leaf tips and margins burn
8d. Less internodal space
8e. Diminished harvest
8. Zinc and iron micro-nutrient deficiencies
9. Calcium and magnesium deficiencies appear
9a. Lower leaves curl, develop spots
10. Dry buds have a "chemical" taste
9b. Root tips die back
3. Vertical and lateral growth slows
6. Weak plant susceptible to diseases and pests
2. Petioles turn purplish color
1. Leaves turn bluish green
4. Dark copper-colored or purple-to-blackish dead blotches on lower leaves
5. Severely affected leaves develop dark bronzish metallic purple colored leaves continue to curl, contort, wither and drop
7. Weak plant susceptible to diseases and pests

K — POTASSIUM

Excess / Deficiency

7b. New leaves grow thin blades
7a. Newer leaves develop interveinal chlorosis
7c. Leaf tips and margins burn
7d. Less internodal space
7. Causes calcium, magnesium, zinc and iron deficiencies
7e. Lower leaves curl, develop spots
pH↓
6. Root zone is acidified
7f. Root tips die back
1. Older leaves turn pale and suffer chlorosis
2. Leaf margins, tips turn rusty color and "burn"
4. Stem branching may increase
5. Flowering retarded and diminished
3. Stems often become weak, scrawny, and sometimes brittle

Secondary Nutrients

Ca — CALCIUM

Excess / Deficiency

6. Minor leaf wilt
7. Growth may be stunted
8. Uptake of potassium, iron, magnesium and manganese blocked
5. Stunted plant, diminished harvest
3. Flower development is slow
2. Yellowish-brown irregular spots develop on leaves and margins
1. Lower leaves contort and curl
4. Root tips may die back

Mg — MAGNESIUM

Excess / Deficiency

4. Stunted growth
5. Dark green foliage
6. Symptoms appear as an overall salt toxicity
3. Overall sickly appearance
1. Deficiencies exist 4-6 weeks before outward signs are apparent
2. Interveinal yellowing and irregular rust-brown spots appear on older and middle-aged leaves
4. Olders leaves dry, often curl and drop

S — SULFUR

Excess / Deficiency

7. Overall smaller plant development and uniformly smaller, dark-green foliage
8. Leaf tips and margins could discolor and burn when excess is severe
6. Bud formation is slow and weak
1. Young leaves turn lime-green to yellowish, and growth is stunted
2. As shortage progresses, leaf veins yellow and lack succulence
3. Leaf tips can burn, darken, and hook downward
4. Long purple streaks might appear the length of the stem when combined with an overall nutrient deficiency
5. Stems often turn woody

Trace Elements

B — BORON

Excess / Deficiency

7. Leaf tips yellow before appearing burned
8. Leaves yellow and drop
1. Stem, tip and roots grow abnormally
2. Growth shoots appear burned and may contort
3. Necrotic spots develop between leaf veins
4. Leaves thicken and become brittle
5. Rust colored corky stems develop
6. Root tips often swell, discolor and stop elongating

Mn — MANGANESE

Excess / Deficiency

5. Young and newer growth develops chlorotic, dark orange to dark rusty-brown mottling on the leaves
6. Tissue damage shows on young leaves before progressing to older leaves
1. Young leaves show interveinal chlorosis symptoms first
2. Necrotic (dead) spots develop on severely affected leaves, which become pale and fall off
3. Telltale sign of manganese deficiency is where margins remain dark green surrounding interveinal chlorosis
4. Symptoms spread from younger to older leaves as the deficiency progresses

Zn — ZINC

Excess / Deficiency

5. Zinc overload is very rare but extremely toxic. Severely toxic plants die quickly
6. Excess zinc interferes with iron's ability to function properly and causes an iron deficiency
1. New and young leaves exhibit interveinal chlorosis, develop small, thin blades that contort and wrinkle
2. Often stem tips fail to elongate and growing shoots/tips become "bunched up."
3. The leaf tips, and later the margins, discolor and burn
4. reduces internode spacing, stunts new growth, including buds, and can severely diminish yield

Cl — CHLORINE

Excess / Deficiency

4. Yellowish-bronze leaves are smaller and slower to develop
5. Young leaves develop burned tips and margins
Note: Both severe deficiency and excess of chlorine have the same symptoms: bronze-colored leaves
1. Leaf tips and margins burn, turn bronze color
2. Young foliage turns pale green and wilts
3. Roots develop thick tips and become stunted

Mb — MOLYBDENUM

Excess / Deficiency

6. Causes a deficiency of iron
5. Leaves discolor
4. Leaves drop
1. In cold weather older and middle leaves yellow with possible interveinal chlorosis
2. Leaves become distorted, margins dry
3. Leaves drop

Cu — COPPER

Excess / Deficiency

4. Slower overall growth
5. Interveinal iron chlorosis
6. Fewer branches grow
7. Roots start to decay, or become thick and slow growing
1. Young leaves and shoots wilt, contort and may die back
2. Leaf tips and margins turn dark-green to copper-gray and die back
3. Growth is slow and yield decreases

Fe — IRON

Excess / Deficiency

5. Leaves turn bronze, with small dark-brown leaf spots
6. Phosphorous uptake is impaired, signs appear in lower leaves
4. Growth is slowed and harvest diminished
1. Young leaves and shoots develop interveinal chlorosis starting at opposite end of leaf tip
2. As deficiency progresses more and larger leaves demonstrate interveinal chlorosis
3. Leaves may develop necrosis and drop

Mobile & Immobile Nutrients

Avoid Nutrient Problems With:
- Air circulation
- Air ventilation
- Air temperature
- Air humidity
- Adequate light
- Clean water
- Organic soil
- Regular maintenance

5. Irrigation runoff is essential for healthy growth
1. Immobile nutrients show nutrient defficiency & excess on newer leaves
2. Mobile nutrients show deficiency & excess on older leaves
3. Toxic salt buildup locks out nutrients causing deficiencies & excesses
4. Overwatering is common. Causes nutrient deficiencies & excesses. Drowns and rots roots

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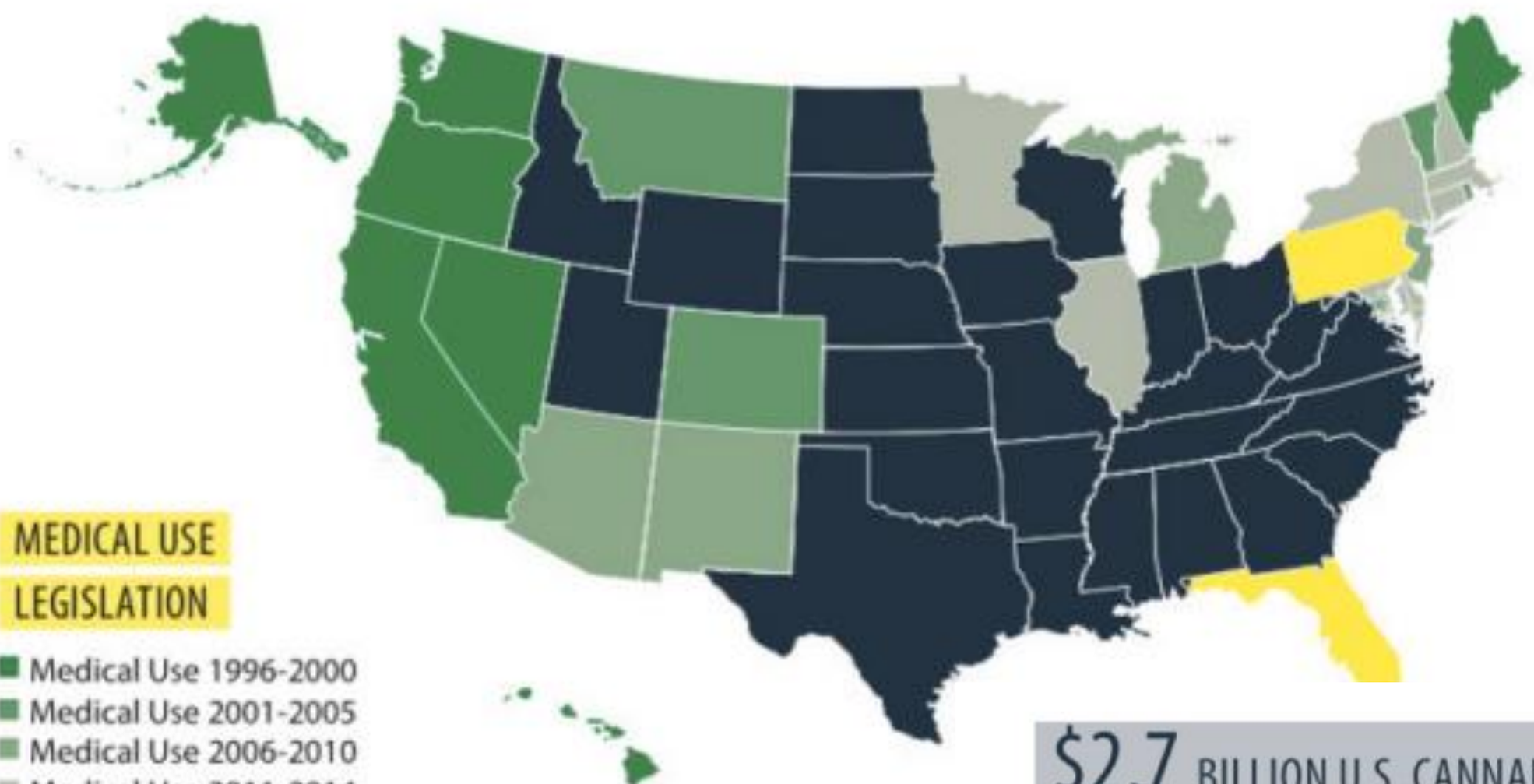
Dioecious

OIKOS (home) ~Ecology ~Economy

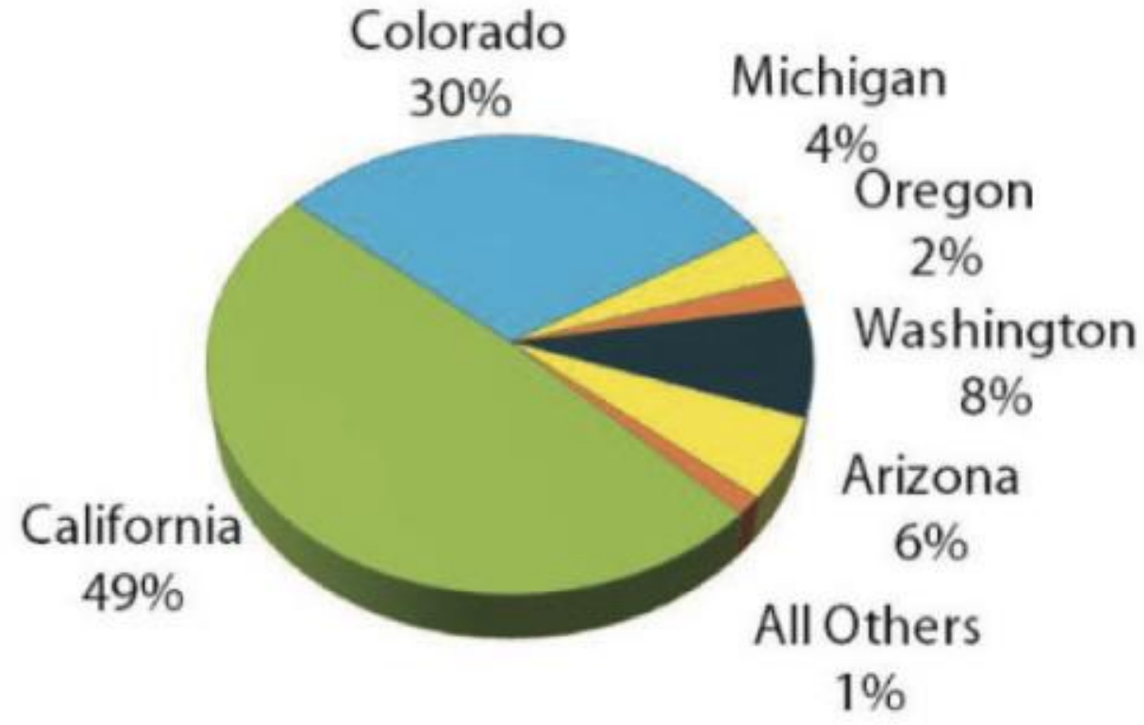


74% GROWTH IN 2014

U.S. legal cannabis market **GREW** from **$1.5 BILLION** in **2013** to **$2.7 BILLION** in **2014**

ourtesy of *ArcView Market Research.*

$2.7 BILLION U.S. CANNABIS SALES BY STATE IN 2014



Source: ArcView Market Research (consumer and wholesale sales)

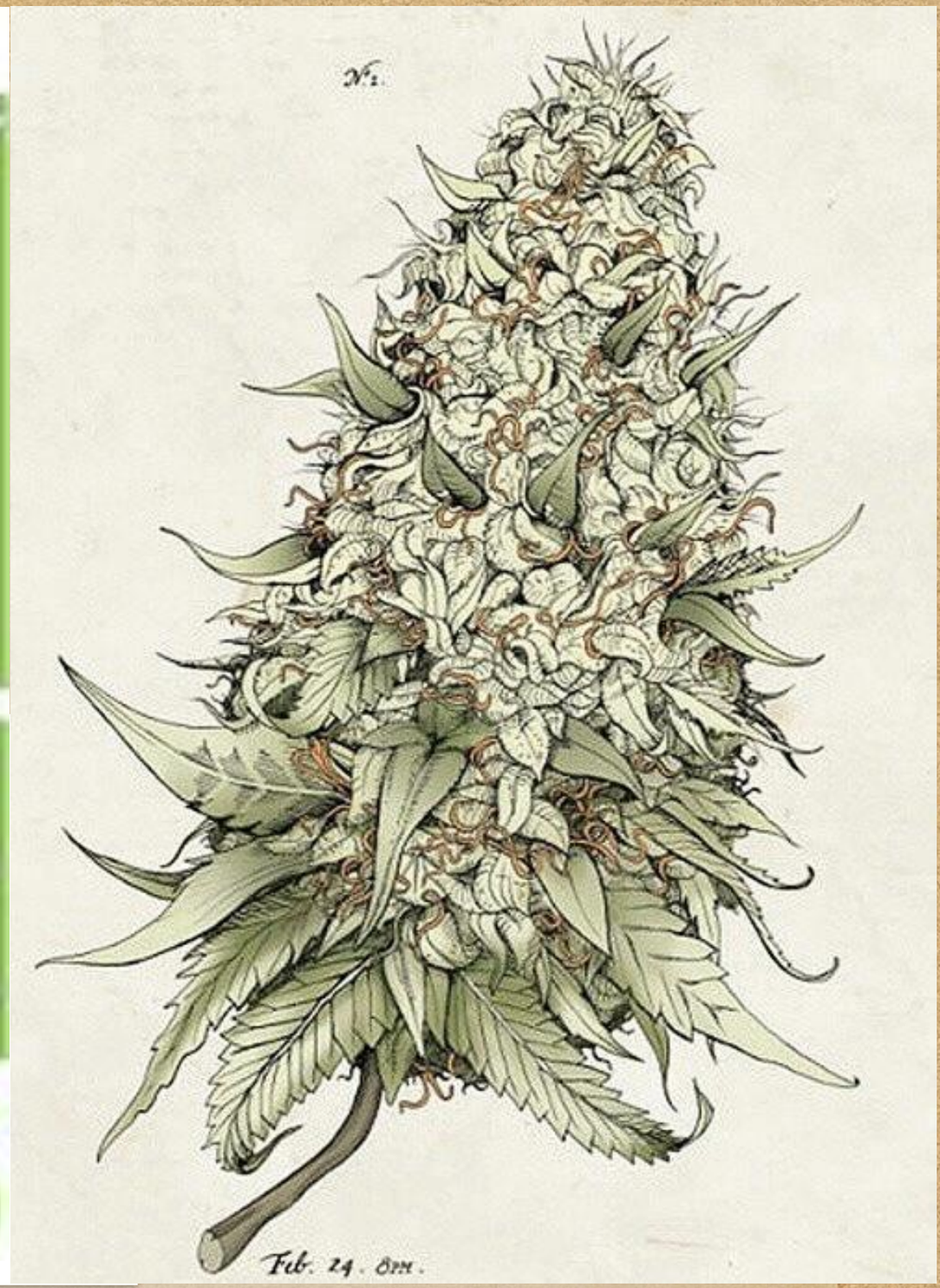
Understanding the differences between

THC & CBD

THE BUSINESS OF LEGAL CANNABIS
IS RAPIDLY GROWING ON BOTH MEDICINAL AND RECREATIONAL FRONTS

However, cannabis is a complex substance
– and not every crop is created equally.

ORGANIC CANNABIS



KEITH @ PROSPECTROCK.ORG