Population and Environment

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BIO 331 Environmental Science
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goals

- a planet able to sustain human life
- options-opportunities
- ability to remain and adapt in place

problem
ALL development WILL =
incremental and
cumulative losses

URBAN COVERAGE

W Allegheny Plateau 40%

N Central Tillplain 50%

N Atlantic Coast 100%

Mid-Atlantic Coast 80%

Chesapeake 75%

Carolina Piedmont 80%

Florida Peninsula 75%

Tropical Florida 80%

Gulf Coast Marsh 50%

Tallgrass Prairie 70%

W Cascade 80%

Puget Trough-Willamette Georges Bank 90%

Great Central Valley 60%

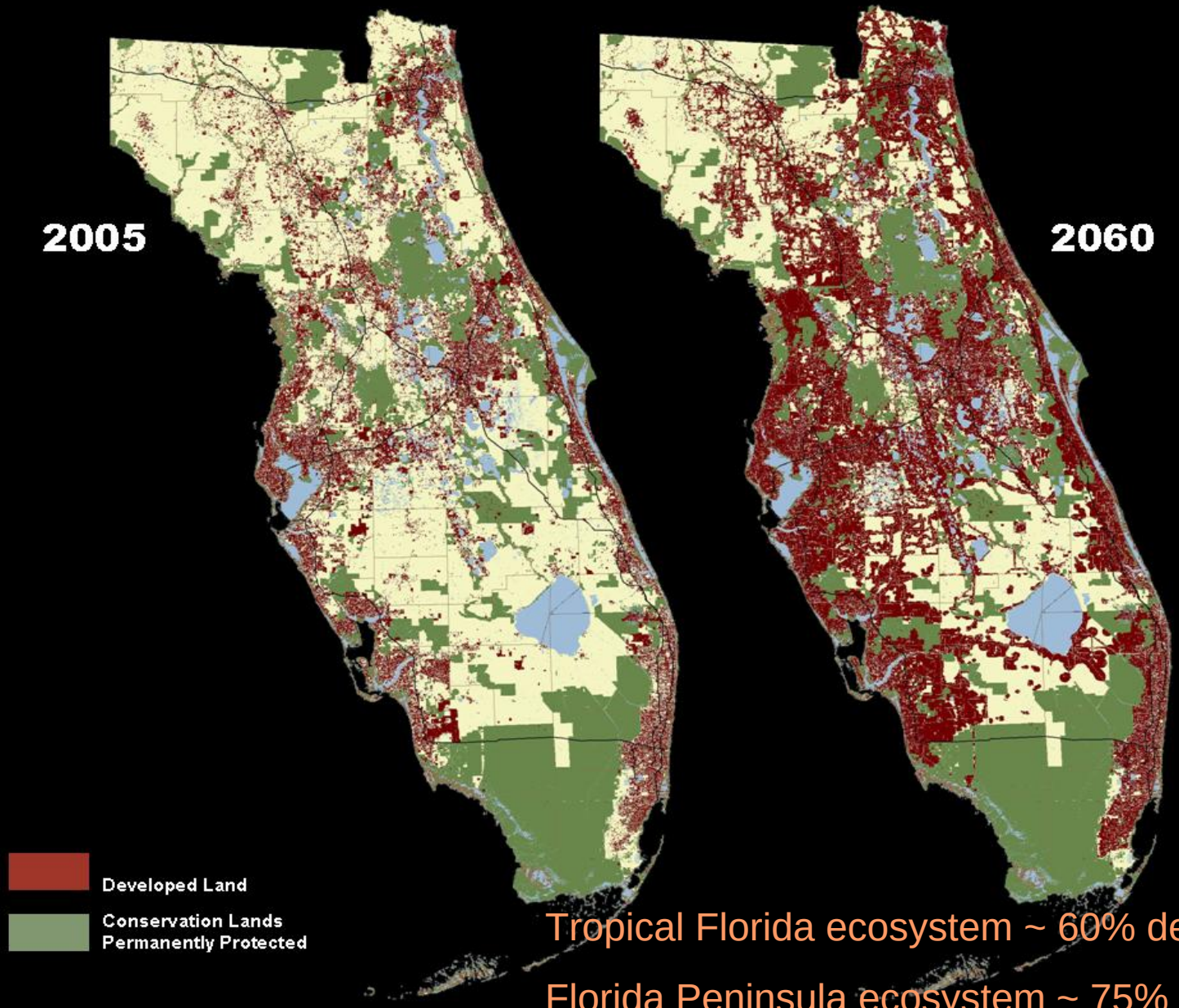
California Central Coast 75%

California S Coast 60% - 100% of US portion

Sonoran Desert 30% - 60% of US portion

Figures do not account for losses from agricultural development.

Developed Land and Permanent Conservation Lands



Tropical Florida ecosystem ~ 60% developed

Florida Peninsula ecosystem ~ 75% developed

human life requires ns

ecosystem goods –

food, fiber, materials, medicinal plants, wild genes

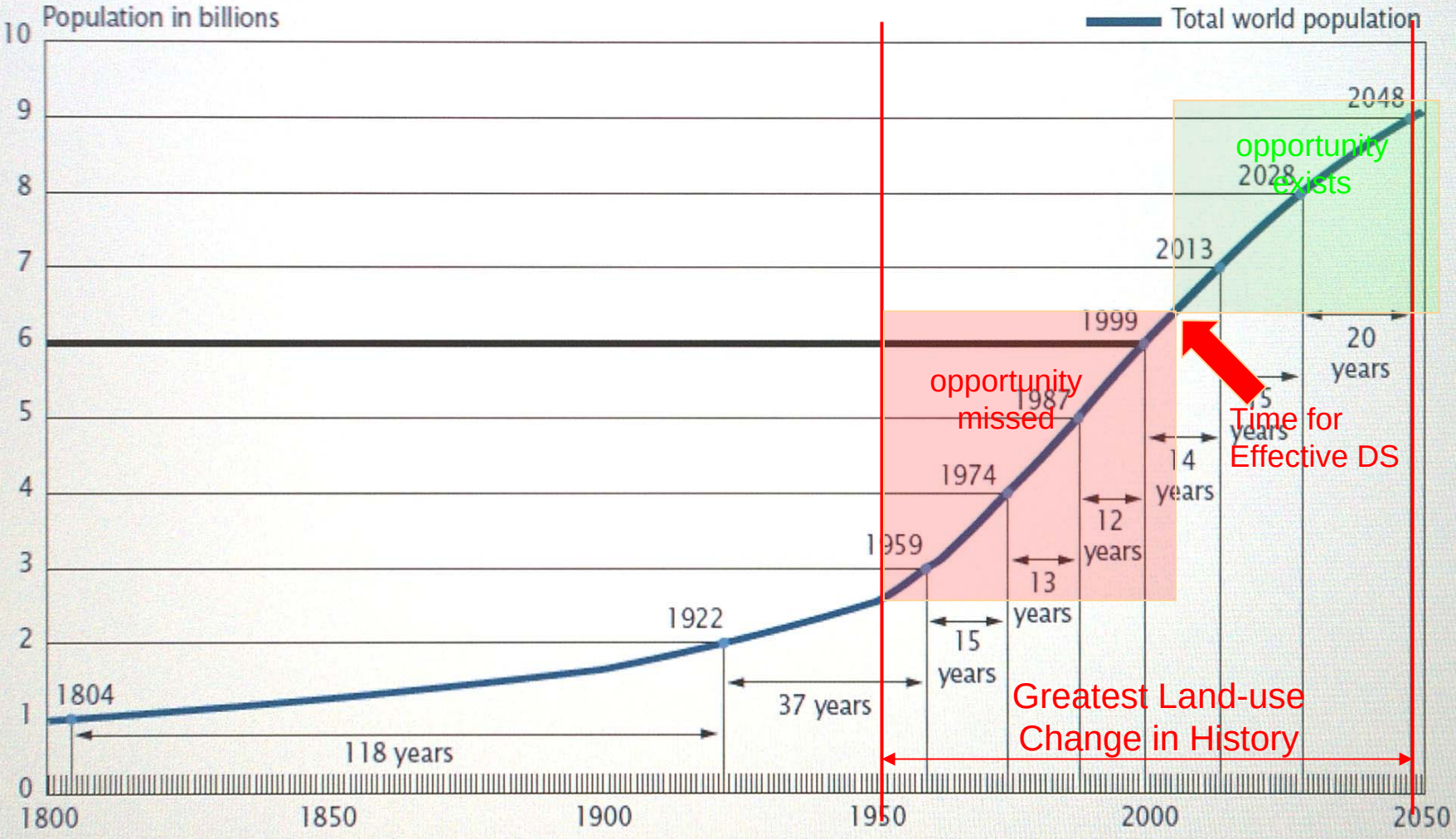
ecosystem services –

hydro cycles, regulating climate, cleansing water/air, maintaining atmosphere, pollination, generating/maintain soils, nutrient flux/cycling, absorbing/detox pollutants, beauty/inspiration

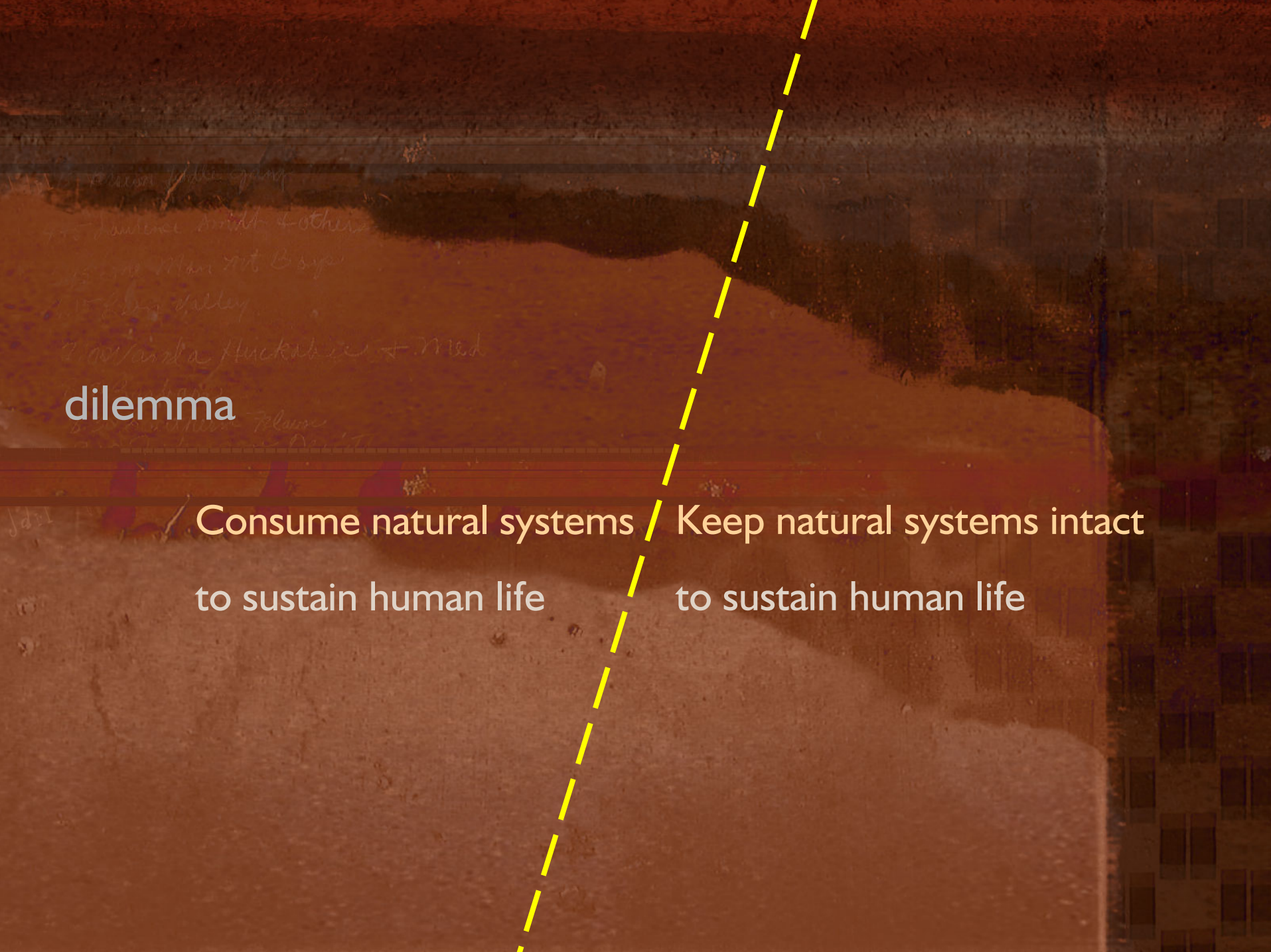
Figure 1.

Time to Successive Billions in World Population: 1800-2050

The sixth billion accrues to world population in record time!



Source: United Nations (1995b); U.S. Census Bureau, International Programs Center, International Data Base and unpublished tables.


dilemma
Consume natural systems
to sustain human life
Keep natural systems intact
to sustain human life

challenge

options

manage the environment

manage human activities/behaviors

"People will not be able to completely avoid any alteration in the natural eco system, but they can so order their activities so as to avoid serious decrease in environmental quality. Much depends on the way in which human decisions are made and the factors which enter into evaluating the outcomes."

Gilbert White, 2006, personal communication

premise

hypothesis

natural systems – sustainable w/ humanity
as long as essential attributes remain intact
establishes a conditional relationship
planning process likes
conditional relationships

planning mandates

must be safe
must meet regulations
must be within budget
must exist within space available
must exist within Newton's Laws of Physics

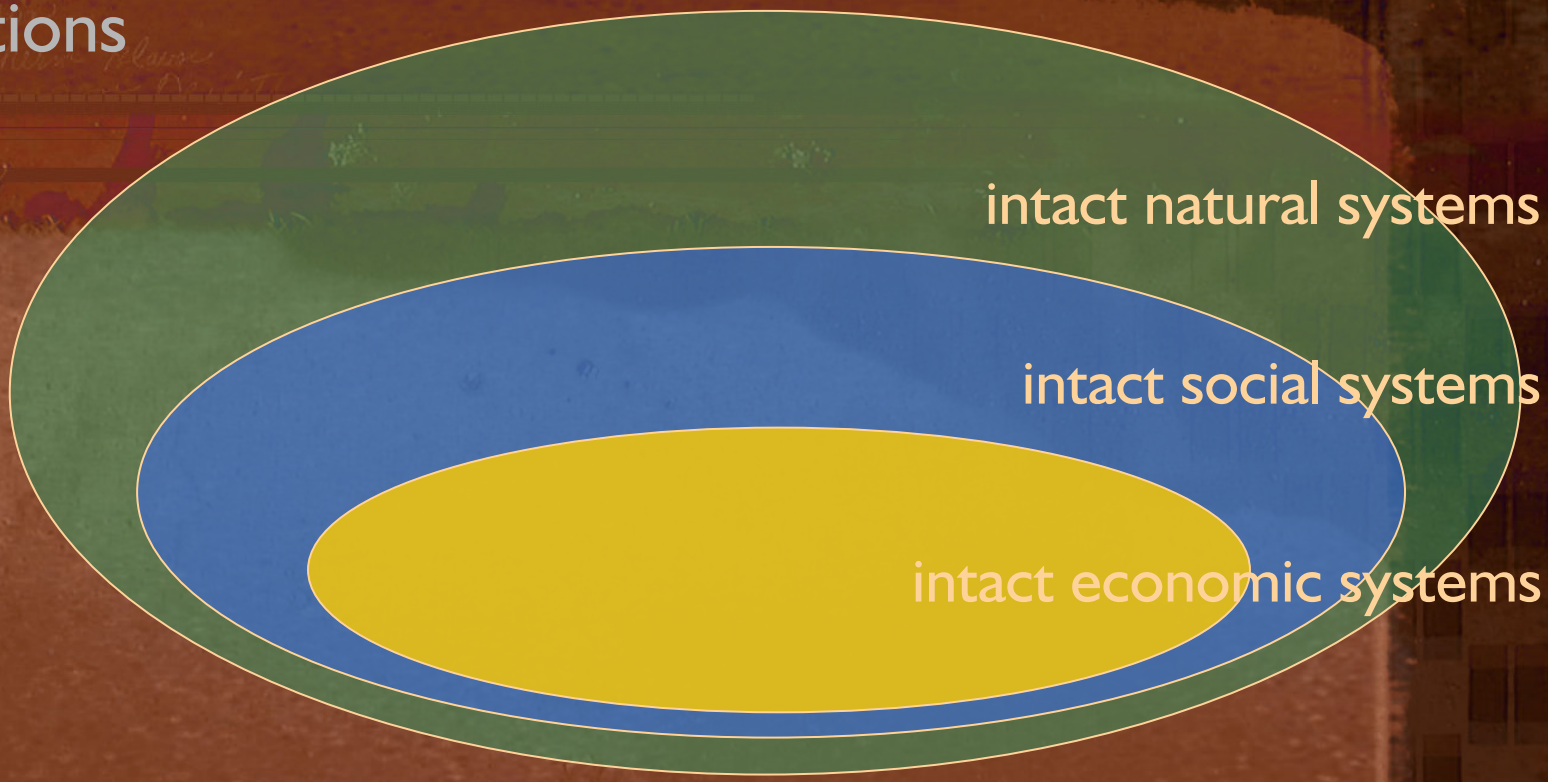
must keep natural systems intact

objective

identify the conditions

align human actions/behaviors with these conditions

conditions


intact natural systems
intact social systems
intact economic systems

conditions

intact natural systems

near-natural conditions of:

productivity

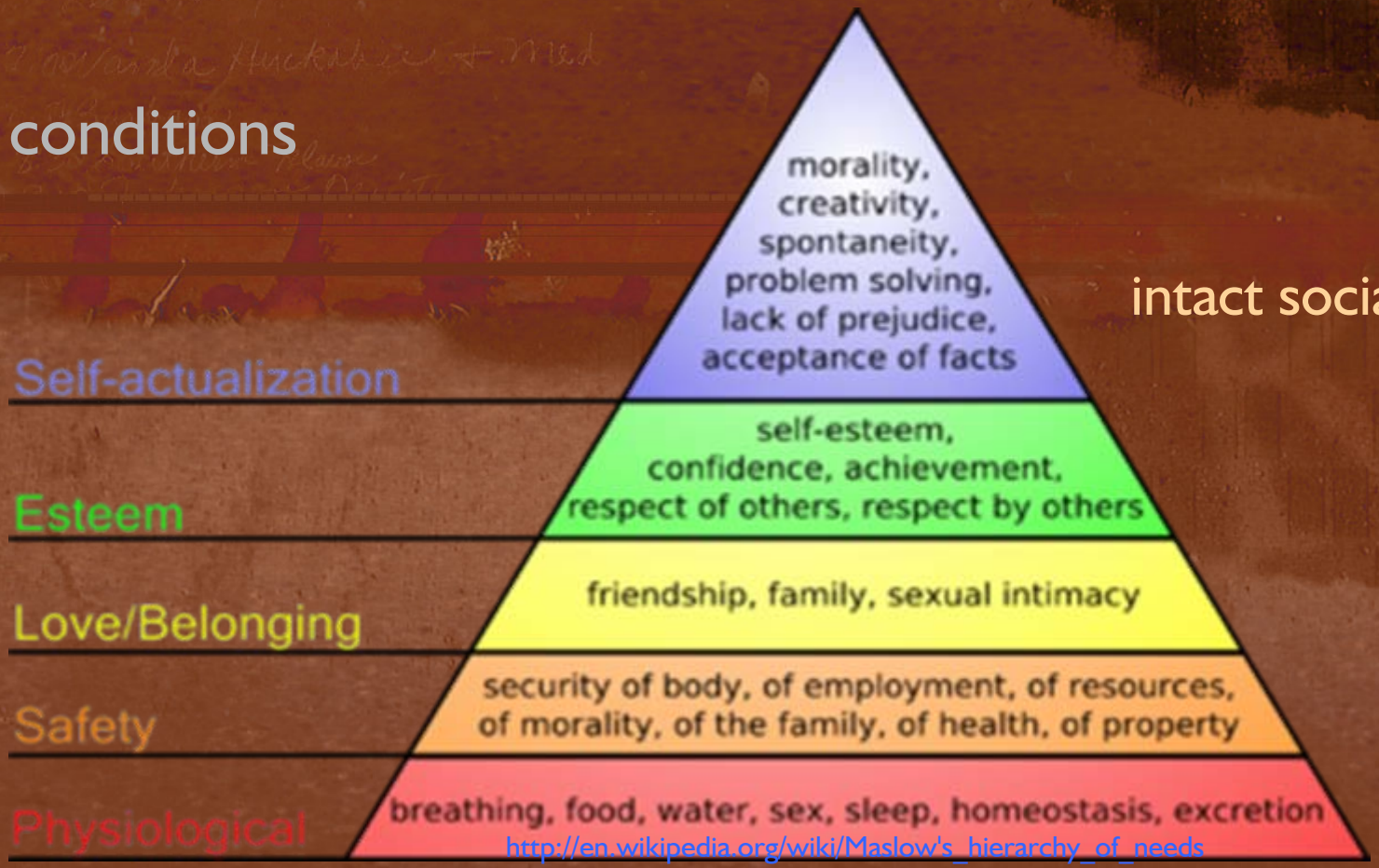
biodiversity

soils

water

Environmental Condition	#	Essential Attribute of Intact Natural Systems
Productivity	1.	Native plant communities predominate
	2.	Natural disturbance regimes exist.
Biodiversity	3	Habitats exist in forms that support MDP (minimum dynamic populations) native species (Baydack, Campa et al. 1999).
	4	Unique features of landscapes are protected.
	5	Contiguous habitats exist beyond the reach of stochastic events.
	6	Connectivity between habitats is redundant and grain appropriate for native species.
	7	Resources essential to migratory species exist.
	8	Flowing water has no non-negotiable obstruction to passage of native life.
Soils	9	Soils retain natural mineral nutrient levels and moisture content to sustain native plant species.
	10	Soils retain natural porosity and percolation, stormwater retention, and erosion resistance.
	11	Soils remain clean enough to support native plants, bacteria, fungi, and soil organisms.
Water	12	Water quantity and speed of surface flows meet historic cycles, durations, and intensities.
	13	Average volumes of groundwater are balanced between withdrawals and recharge.
	14	Water quality of all surface and groundwater is free of contaminates that threaten life.
Air	15	Air quality poses no threats to life and photosynthesis.
	16	Global climate is unaffected by human actions
Atmosphere	17	Atmospheric radiation shield is maintained.

conditions



http://en.wikipedia.org/wiki/Maslow's_hierarchy_of_needs

intact social systems

Social Condition	No.	Essential Attribute of Intact Social System
Needs	1	Basic human needs are met.
	2	Resources necessary for human survival are accessible.
Safety/Security	3	Future options are protected.
	4	Human life is isolated from stochastic events.
	5	Risks to human life/health are known.
	6	Right to safe environment is institutionalized.
Equity	7	Natural resources benefit people.
	8	Institutions exist to serve collective.
	9	Individuals have a voice in matters that affect them.

conditions

intact economic systems

efficient

equitable

Economic Condition	No.	Essential Attribute of Intact Economic System
Efficiency	1.	*Resource use* must be linked with *resource investment*.
	1a.	Maximize efficient use of natural resources and invest profits in increasing supply of natural resources (Daly 2002).
	1b.	Economic investments preserve the capacity for natural capital to be re-invested (Lovins, Lovins et al. 1999).
Equity	2.	Qualitative community resources are improved (Kinsley 1994; USEPA 1998).
	3.	Net economic effects are greater than costs incurred to natural and social systems.
	3a.	Consumption of natural resources is counted as a cost (Daly 2002).
	3b.	Costs are calculated prior to being incurred.
	4	Financial resources are sufficient to maintain community infrastructures, institutions, and services.

response

- align with natural systems

Community input

A - Z

A. Clean, well-kept community
B. Deeply rooted sense of place
C. Historical character
D. Historic preservation
E. Natural history preservation
F. Small "country" atmosphere
G. Rural setting
H. Landscape – welcoming look
I. - unused
J. Natural beauty
K. Indian Creek
L. Open space
M. Wildlife habitat
N. Vegetation
O. - unused
P. Not crowded
Q. No suburban sprawl
R. Quiet
S. Friendly
T. Low population
U. Low traffic
V. Walkable community
W. Clean air without odors
X. Clean water
Y. Vegetation – minimal paved areas
Z. Viewable stars

A^1 – Z^1

A. Security
B. Safe from stray dogs
C. Slow pace
D. Embracing people from outside
E. Embracing people within the community
F. Places high value on family
G. Flag flying
H. Embrace change
I. - unused
J. Services
K. Health
L. Day-care
M. Public facilities
N. Good schools
O. - unused
P. Churches
Q. Historical society
R. Human resources
S. Recreation
T. Areas for play
U. Dancing
V. Infrastructures
W. Water
X. Sewer
Y. Electric energy
Z. Telephone, internet, tv

A^2 – Z^2

A. Trash collection
B. Local businesses
C. Retail
D. General store
E. Gasoline station
F. Grocery store
G. Restaurant/café
H. Institutions
I. - unused
J. School as vital part of community
K. Library/learning center
L. City council
M. Regulations
N. Police
O. - unused
P. Town hall
Q. Opportunities
R. Social activities
S. Networking
T. Chance meetings
U. Know your neighbors
V. Church family
W. Community fellowship
X. Show off and appreciate good cooks.
Y. Scout meetings/activities
Z. Growth

A^3 – Z^4

A. Population growth
B. Work/jobs
C. Economic expansion
D. Family and social ties
E. Education and mental stimulation
F. Housing variety
G. Business
H. Recreation
I. - unused
J. Areas to fish
K. Nature viewing
L. Walk in the woods
M. Swimming hole
N. Kids play spaces
O. - unused
P. Baseball field
Q. Dances for youth
R. Parks
S. Outdoor music venue

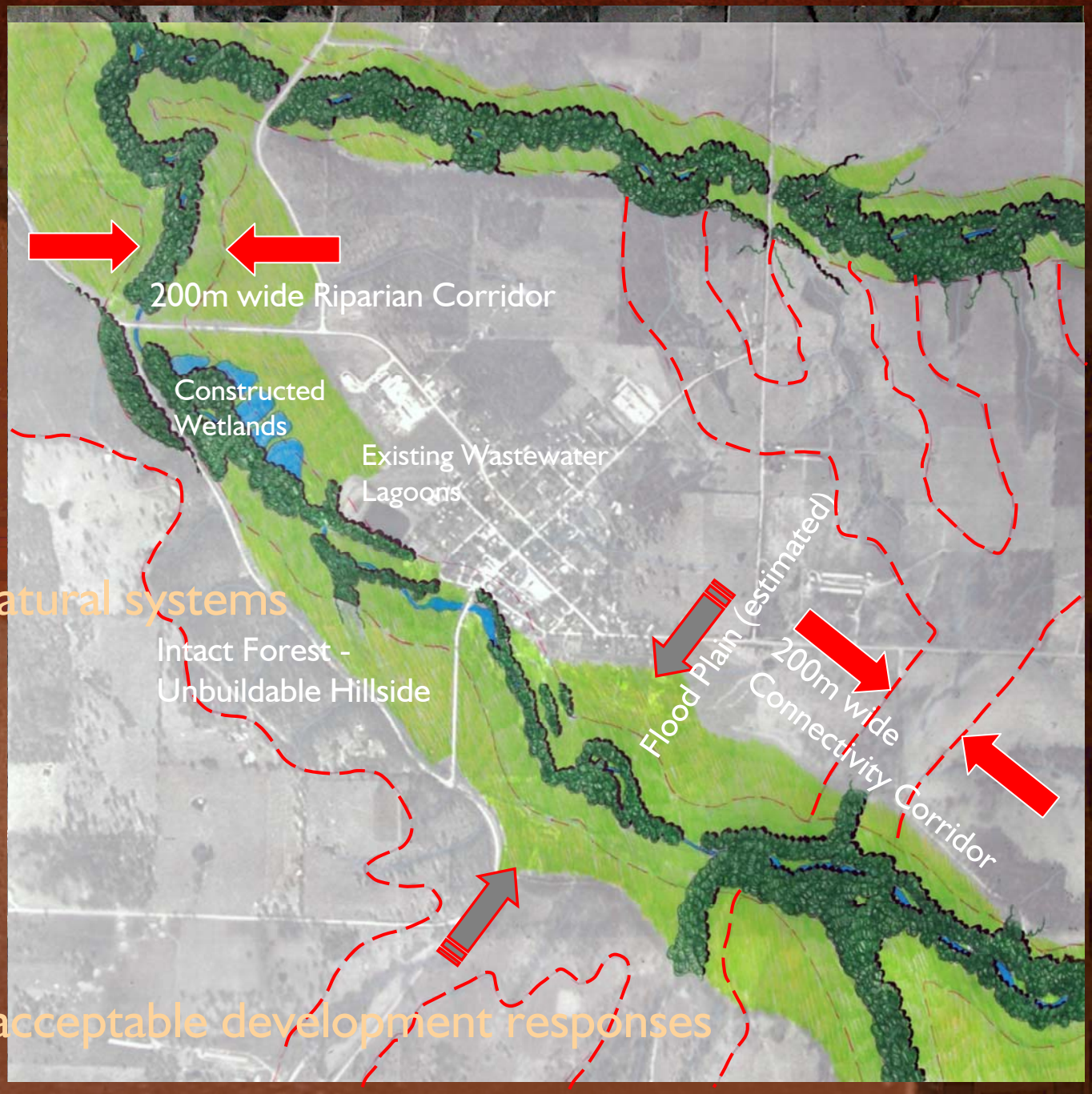
Youth

A. Community feel
B. Clean town
C. Local amenities
D. Safe environment
E. School-town connection
F. Youth activities

Sustainability Criteria Filters

response

align with natural systems



<u>conditions define:</u> acceptable development responses

response

- align with natural systems

School Development Area –
approx 28 acres
10th Fairway
Community
Barn
Rec Center –
Emergency
Shelter
Wastewater Lagoons
Parking
Well
Skatebd
Park
Historic Soc.
Practice Green
Parking
Flagpole
Le-Ru
Grocery
Veterans Memorial
Masonic
Lodge
18th Fairway
Golf Cntr
Professional-
Medical Bldg
Well
PO
L-C
Town Hall
Outdoor
Theater
'Mill' Restaurant
Flagpole
Football & Soccer
Field
Baseball Park
Park

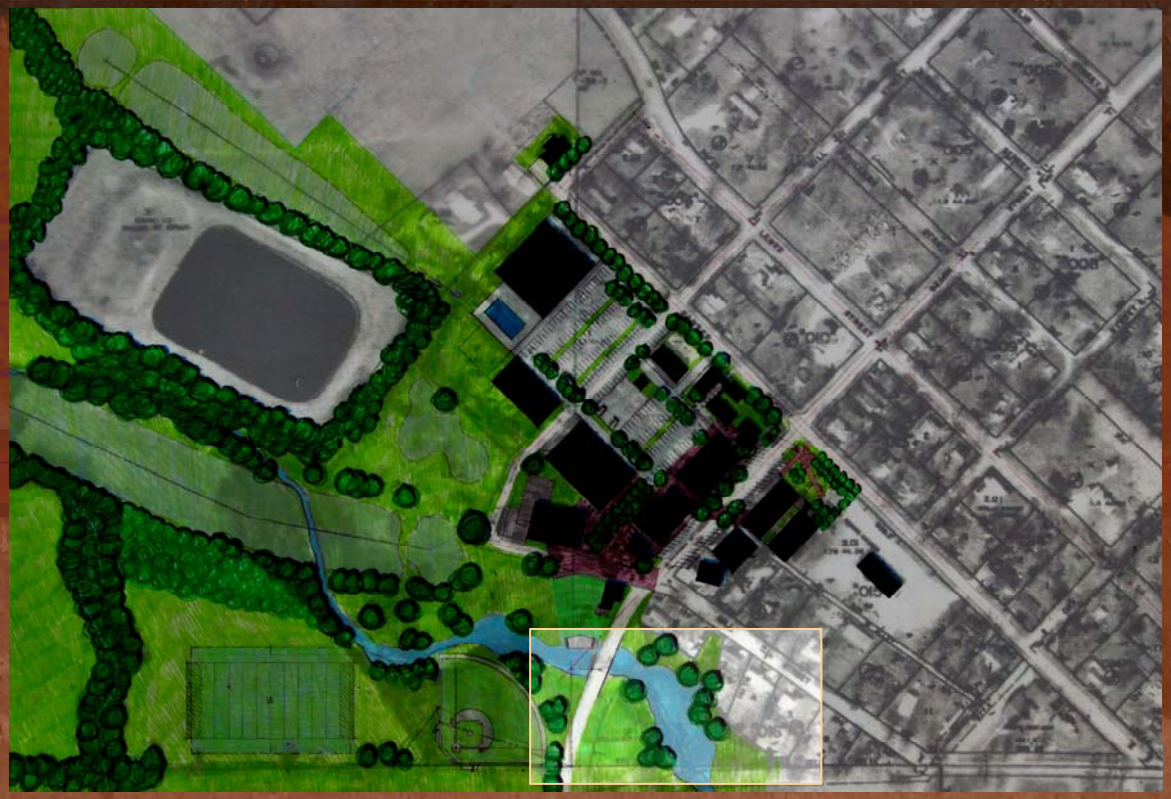
Building Community PROJECT 1 – Gateway Gardens - Completed

1. Obtain permission from property owners at each location.
2. Identify plants that fit climate.
3. Design gardens to change with seasons without extra planting.
4. Plant
5. Maintain

Building Community PROJECT 2 – Dogwood Trees - Completed

1. Enlist property owners at each location to permit and help plant Dogwood trees
2. Obtain trees
3. Plant Dogwood trees in afternoon shade of larger trees.
4. Trim as needed
5. Check to maintain health, treat as needed.
6. Place Stella back on the annual "Dogwood Tour".
7. Enjoy the beauty and the joy you provide.

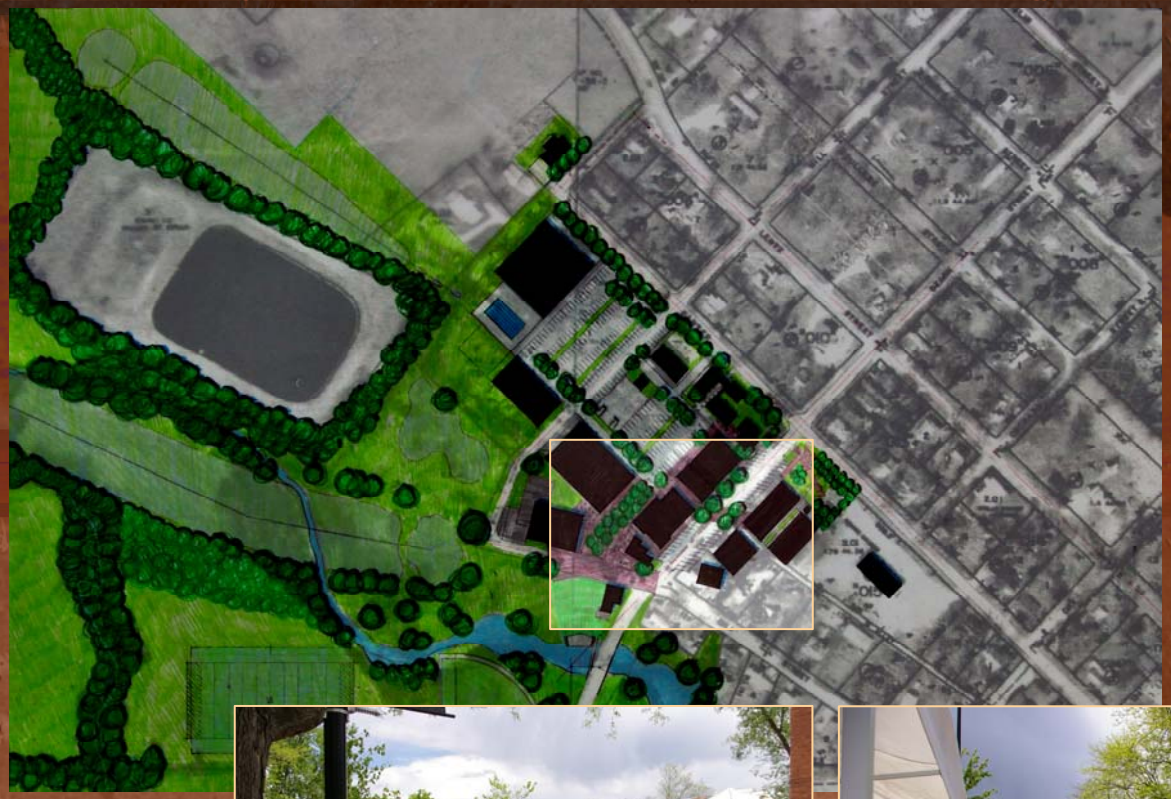
Building Community PROJECT 3 – Park - Completed



1. Plan development
2. Apply for parks grants
3. Enlist citizens to help clear, grade, plant, build play equipment.
4. Maintain regularly.
5. Organize community picnics, events.

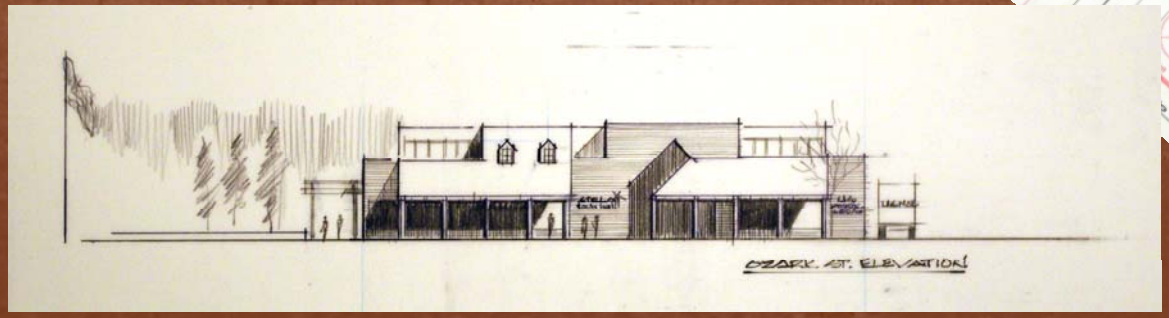
Building Community PROJECT 4 – Veterans Memorial (Seniors Project) - Completed

Building Community PROJECT 6 – Farmers Market



1. Organize co-operative for citizens to contract with farmers to grow food for local consumers
2. Organize distribution network
3. Designate local farmers market space and advertise

Building Community PROJECT 15 – Town Hall, Post Office, Housing - In Progress



first lessons

1. attributes of natural+social+economic systems → good foundation for land-use decisions
2. about BUILDING COMMUNITY.
3. greatest resource is PEOPLE.
4. imperative to create 'PLACE'
5. MEASURE is community's ability to: (a) meet its needs (b) endure over time (c) evolve in place
6. sustainability is a constant

conclusions

1. can affect alternative desirable futures.
2. can change behaviors to align with natural systems.
3. can leave future options open.
4. resources can be moved from solving problems to creating solutions