

Planning Sustainable Land-Use: The Experience of Stella, Missouri

Institutionalizing Sustainability Assessment
26 June 2009 1700hours

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SUSTAINABILITY
CONTEXT
APPLICATION



SUSTAINABILITY
CONTEXT
APPLICATION

Sustainable Assurance

WILL draw down natural accounts

forests
habitat
productivity
soil depl.
erosion
runoff

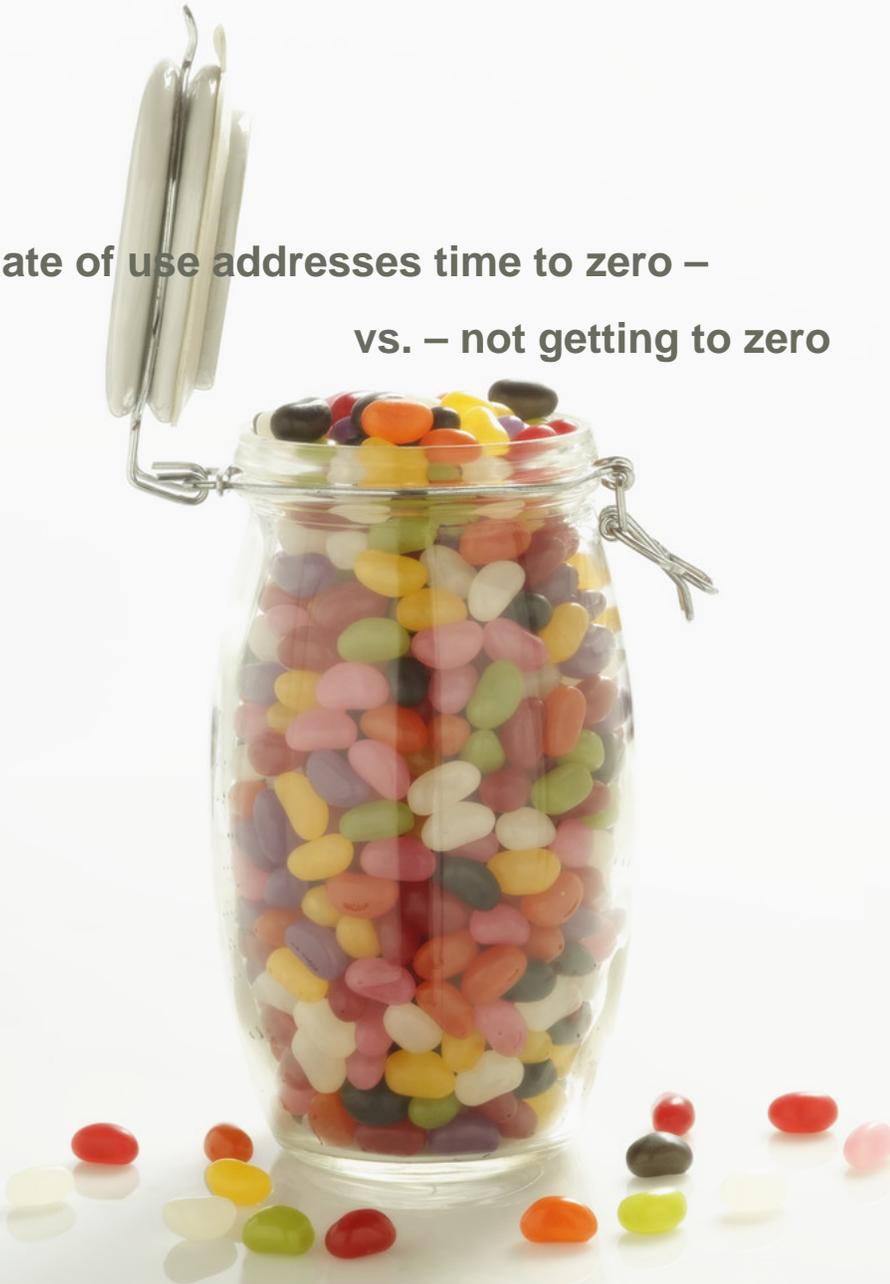
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“...accumulated debt...must someday be paid off”

(Waclermagel & Rees, 1995)

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**Rate of use addresses time to zero –
vs. – not getting to zero**



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“...economic development that meets the needs of the present generation **without compromising** the ability of future generations to meet their own needs.” (WCED 1987)

“...development that improves the quality of human life
while living within the capacity of supporting ecosystems.”

IUCN (1991) (Bell and Morse 1998)

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“...development that delivers basic environmental, social, and economic services to all **without threatening** the viability of the natural, built, and social systems upon which these services depend” (ICLEI 1993a) in (Brugmann 1996)

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“...economic development to be **compatible with** constraints set by the natural environment...” (Novartis 2002)

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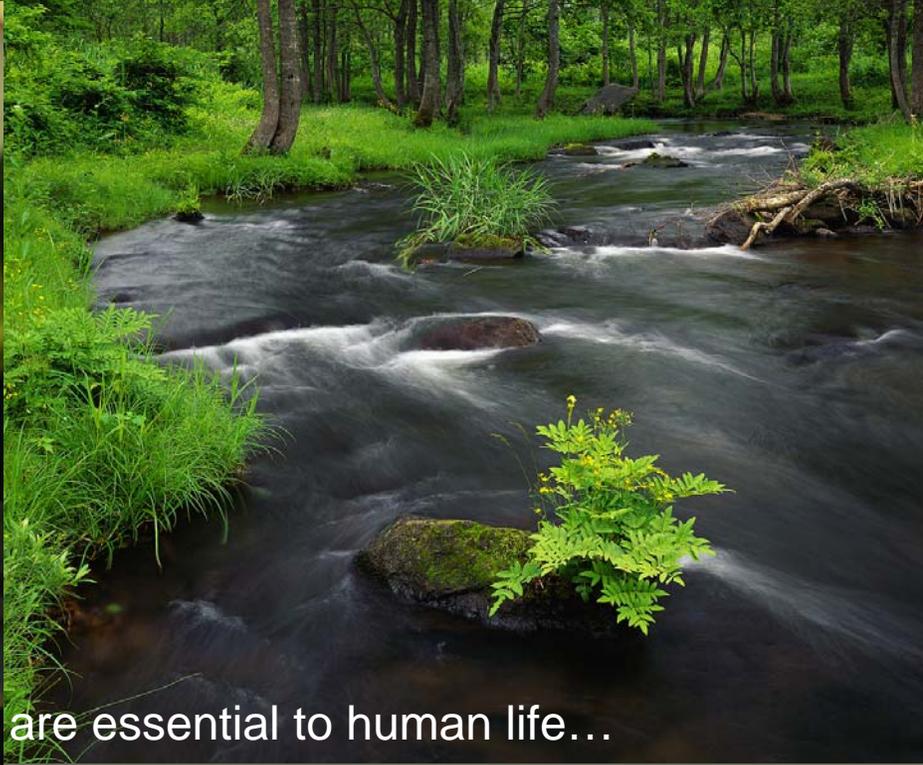
“...maximizing the net benefits of economic development,
subject to maintaining the services and quality of natural
resources over time.” Pearce and Turner (1990) (Bell and Morse 1998)

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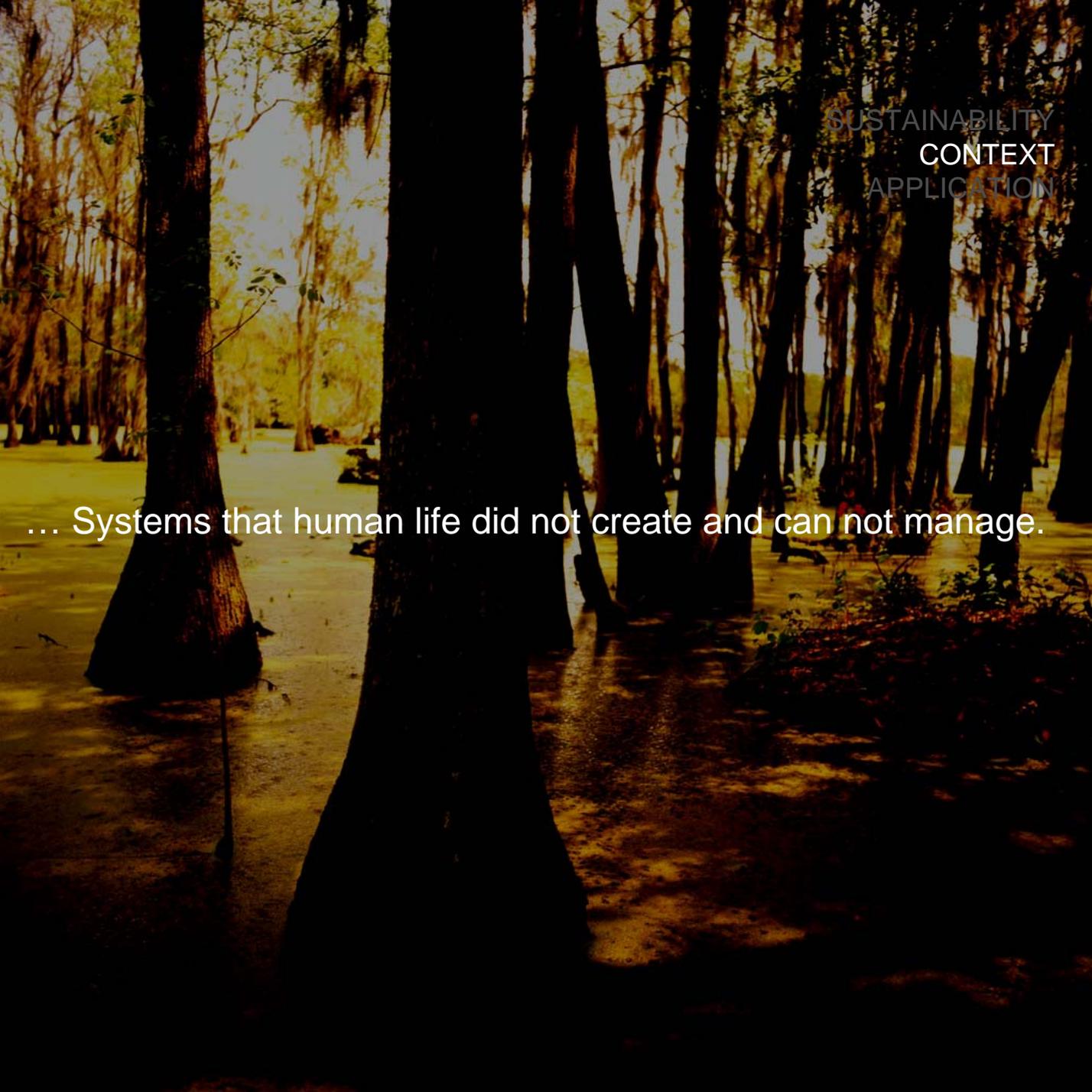
“...improving the quality of human life **while living within** the carrying capacity of supporting ecosystems.”

(Farrell and Hart 1998)

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Natural Systems are essential to human life...

A photograph of a swampy forest, likely a cypress swamp, with tall, thin trees and a body of water in the background. The lighting is warm and golden, suggesting late afternoon or early morning. The trees are densely packed, and the ground is covered in water and mud. The overall mood is serene and natural.

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... Systems that human life did not create and can not manage.

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A photograph of a dense forest. A narrow, gravelly path winds through the center of the frame. The forest floor is covered in vibrant green moss and various ferns. Tall, slender trees with thick trunks stand on either side of the path. The lighting is soft and diffused, creating a serene and natural atmosphere.

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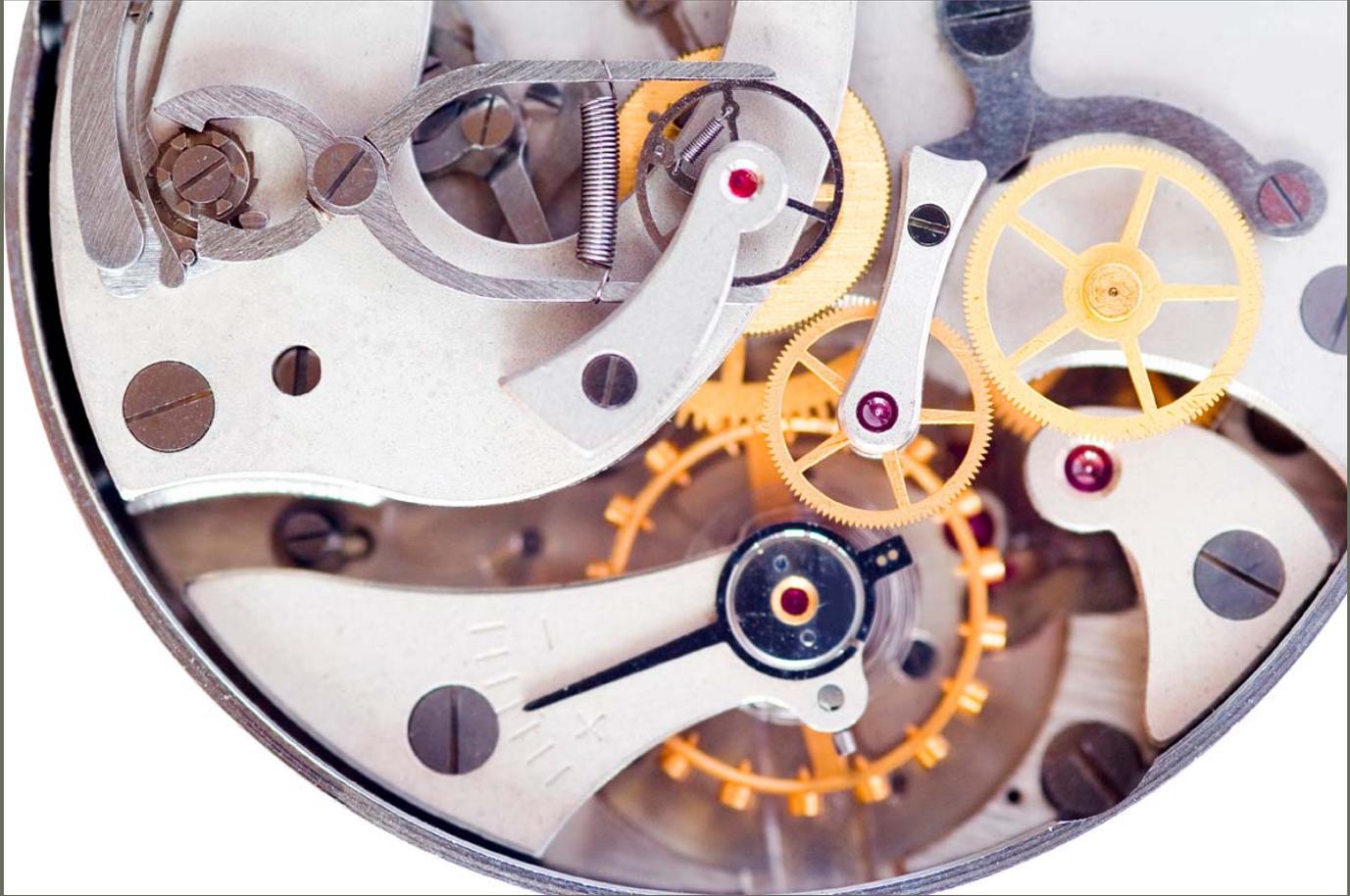
Premise: Natural systems did and would **manage** without us.

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Hypothesis: Natural systems would **manage** with us
AS-LONG-AS essential attributes of NS remain intact.



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a question of function



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a question of value

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A. Humanity needs goods and services provided by nature



B. ... makes us dependent upon intact natural systems



C. ...physical form of socio-physical env. is **conditional** upon B.



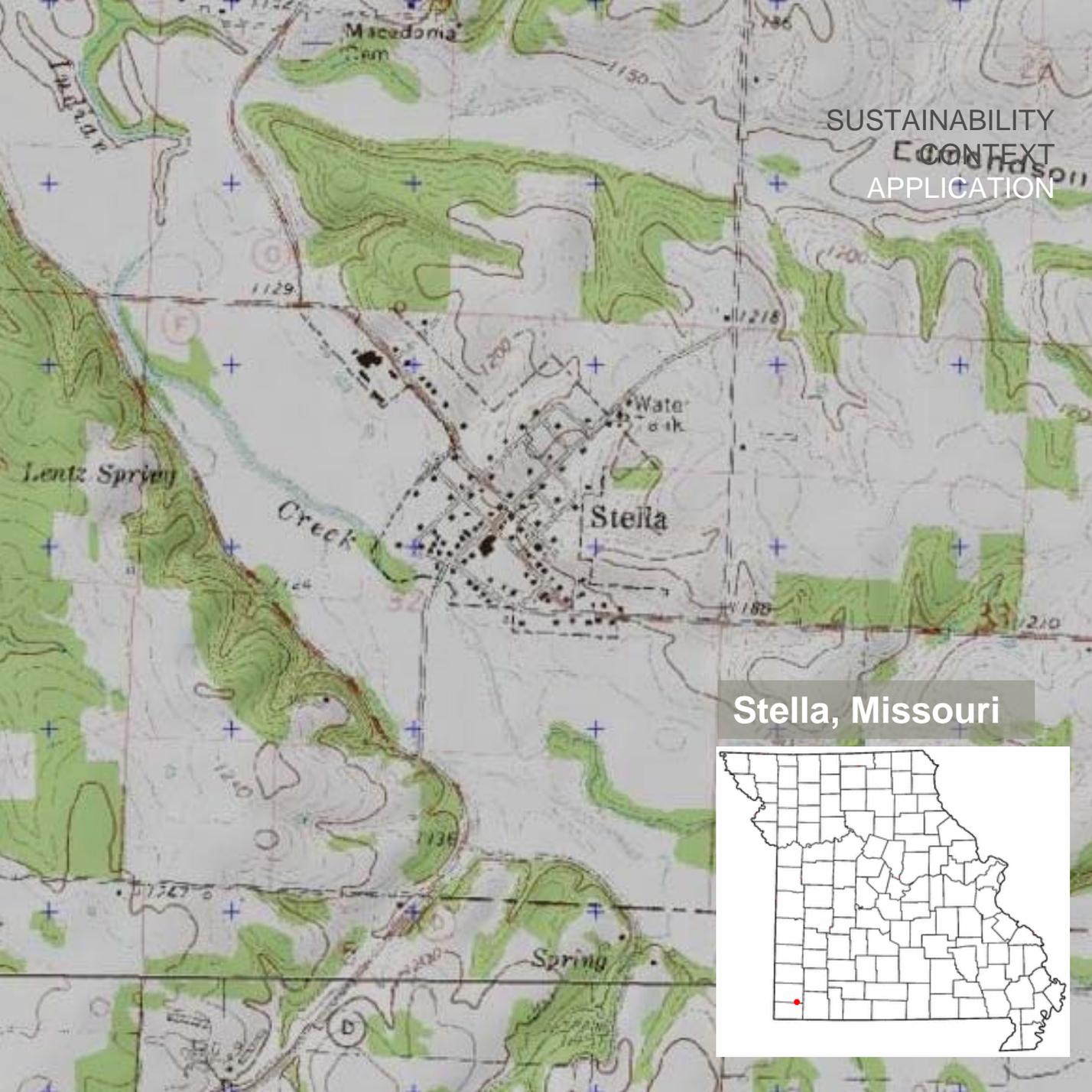
incl. reversion

“...In the end, sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change **are made consistent with** future as well as present needs.”
(WCED 1987)

Challenge:

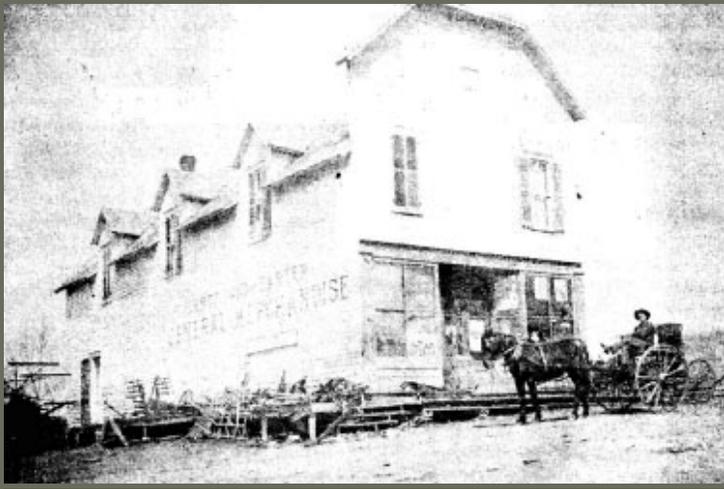
How to initiate a process of change (plan) that: exploits resources; invests; develops technologies and institutions consistent with future and present needs?

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Stella, Missouri





SUSTAINABILITY
CONTEXT
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future and present needs - from the community



SUSTAINABILITY CONTEXT APPLICATION

1. Clean, well-kept community
2. Deeply rooted sense of place
3. Historical character
4. Historic preservation
5. Natural history preservation
6. Small “country” atmosphere
7. Rural setting
8. Landscape – welcoming look
9. Natural beauty
10. Indian Creek
11. Open space
12. Wildlife habitat
13. Vegetation
14. Not crowded
15. No suburban sprawl
16. Quiet
17. Friendly
18. Low population
19. Low traffic
20. Walkable community
21. Clean air without odors
22. Clean water
23. Vegetation – minimal paved areas
24. Viewable stars
25. Security
26. Safe from stray dogs
27. Slow pace
28. Embracing people from outside
29. Embracing people within the community
30. Places high value on family
31. Flag flying
32. Embrace change
33. Services
34. Health
35. Day-care
36. Public facilities
37. Good schools
38. Churches
39. Historical society
40. Human resources
41. Recreation
42. Areas for play
43. Dancing
44. Infrastructures
45. Water
46. Sewer
47. Electric energy
48. Telephone, internet, tv
49. Security
50. Safe from stray dogs
51. Slow pace
52. Embracing people from outside
53. Embracing people within the community
54. Places high value on family
55. Flag flying
56. Embrace change
57. Health services
58. Day-care
59. Public facilities
60. Good schools
61. Churches
62. Historical society
63. Human resources
64. Recreation
65. Areas for play
66. Dancing
67. Infrastructures
68. Water
69. Sewer
70. Electric energy
71. Telephone, internet, tv
72. Trash collection
73. Local businesses
74. Retail
75. General store
76. Gasoline station
77. Grocery store
78. Restaurant/café
79. Institutions
80. School as vital part of community
81. Library/learning center
82. City council
83. Regulations
84. Police
85. Town hall
86. Opportunities
87. Social activities
88. Networking
89. Chance meetings
90. Know your neighbors
91. Church family
92. Community fellowship
93. Show off and appreciate good cooks.
94. Scout meetings/activities
95. Growth
96. Population growth
97. Work/jobs
98. Economic expansion
99. Family and social ties
100. Education and mental stimulation
101. Housing variety
102. Business
103. Recreation
104. Areas to fish
105. Nature viewing
106. Walk in the woods
107. Swimming hole
108. Kids play spaces
109. Baseball field
110. Dances for youth
111. Parks
112. Outdoor music venue

...and youth

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

A process of change

- meets future, present needs

- intact natural systems

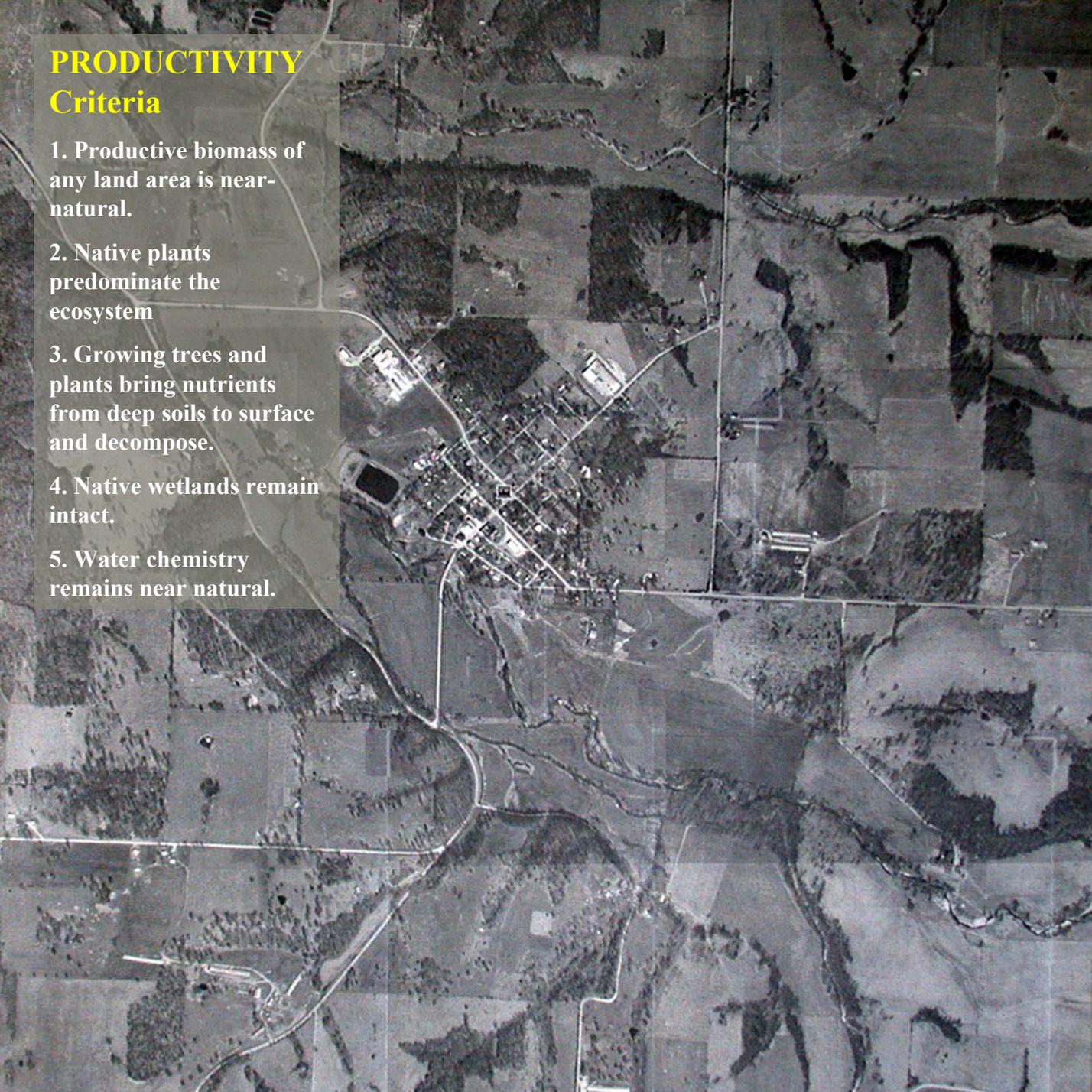
- intact social systems

- intact economic systems

PRODUCTIVITY

Criteria

- 1. Productive biomass of any land area is near-natural.**
- 2. Native plants predominate the ecosystem**
- 3. Growing trees and plants bring nutrients from deep soils to surface and decompose.**
- 4. Native wetlands remain intact.**
- 5. Water chemistry remains near natural.**



PRODUCTIVITY Responses

1. Locate and protect remnants of true native landscapes.
 2. Maintain existing forest canopy.
 3. Replant forest in native species wherever possible.
 4. Eliminate non-native plant species and replace with native species.
 5. Avoid monoculture agriculture – mix crops whenever possible.
 6. Retain/restore/maintain native pollinator insects.
 7. Re-vegetate disturbed land as quickly as possible.
 8. Isolate decorative non-native planting from native landscaping.
 9. Restore native grassland clearings in forests.
 10. Conduct controlled burns to mimic natural disturbance, allow natural successions of plants.
 12. Anticipate and plan for inevitable flooding of Indian Creek and Edmondson Hollow.
 13. Restore historic flows to Indian Creek.
- 

BIODIVERSITY Criteria

6. Genetic diversity exists.
7. Native and non-native species are isolated from each other.
8. Fragments of truly native environments remain intact.
9. Natural disturbance regimes exist or are simulated.
10. Distribution of redundant species is maintained across multiple time/space scales.
11. Habitats exist to meet needs of native populations.
12. Habitats are renewed with clean water.
13. Native spawning, birthing, and hatching sites exist.
14. Migratory routes are open and seasonal habitats are accessible/available.
15. Habitats exist beyond range of stochastic events.
16. Connectivity between habitats is redundant.
17. Unique environments remain intact.



BIODIVERSITY Responses

1. Keep 200m wide riparian corridor obstruction free and free of invasive species.

2. Add 200m wide connectivity along drainage between riparian corridors.

3. Restore continuity to tree canopy within riparian corridor and to connectivity (see no. 2 above).

4. Constructed wetlands between lagoons and discharge to Indian Creek, to clean water and available to waterbirds, fish, vegetation.

5. Building-free floodplain.

6. Large boulders across creek to create continuous set of pools for fish and water oxidation.

7. Stream bank restoration, install: a) rootwad revetments; b) imbricated rip-rap; c) boulder revetments; d) lunkers; e) a-jacks; and f) vegetative stabilization.

8. Larger dead trees stand as roosts for Eagles.

Intact Forest -
Unbuildable Hillside

200m wide
Riparian Corridor

Existing Wastewater
Lagoons

Flood Plain (estimated)

200m wide
Connectivity Corridor



SOILS

Criteria

18. Soil minerals are renewed.

19. Adequate moisture exists to make nutrients soluble.

20. Soil chemistry and ph sustain native soil bacteria, microorganisms, and plants.

21. Organic natural wastes are abundant.



SOILS Responses

1. Minimize area of land disturbance during development.
2. Use no-till farming practices.
3. Restore stream banks (see BIODIVERSITY).
4. Reduce erosion by slowing velocity of surface flows, maintaining vegetation along stream banks, eliminating livestock from riparian corridors.
5. Use compost from anaerobic landfill to restore vitality to soils. Eliminate chemical fertilizers, pesticides, and herbicides.
6. Use renewable energy – so there are no particulates, heavy metals from mining, sulfur from mining and petroleum, or acid rain.



WATER Criteria

22. Ground water recharge \geq withdrawals.

23. Surface water recharge \geq all combined water uses.

24. Wetlands exist to purify water.

25. Avenues for groundwater recharge are clean.

26. Air and water must be clean enough for autotrophs to live.

27. Water quality and speed of surface flows meet historic cycles, durations, and intensities.

28. Soil compaction, impermeability, and cover do not increase runoff above near-natural levels.

29. Trees/plants break the force of falling rain and loosen soils to allow absorption and slow runoff.



WATER Responses

1. Retain infiltration by: a) reduce street paving width to 22 feet; b) use of turf-block for driveways; c) houses with greater floor area/roof ratio.
2. Install wet ponds for stormwater retention and water quality improvement.
3. Install dry ponds for stormwater surges from residential areas.
4. Install bio-retention planting between parking lot bays.
5. Install rain gardens on residential sites and landscaping on commercial sites.
6. Restore water quality to Indian Creek.
7. Restore public access to natural spring sites.
8. Install constructed wetlands to purify discharge water.
9. Promote best management practices in agricultural areas.
10. Use gray-water for irrigation.



AIR/ATMOSPHERE Criteria

30. Sufficient forests exist to generate Hydroxyl radicals to process pollutant levels in the atmosphere.

31. New deciduous forests and crops exist in higher latitudes and old forests exist to consume CO₂.

AIR/ATMOSPHERE Responses

1.Reduce generated pollutants by using renewable energy, lower need for transport.

2. Retain and restore forest canopy.

3. Use compact development to reduce the need for forest encroachment.

4.Increase forest connectivity and decrease forest fragmentation.



ENERGY Criteria

32. Forests exist in sufficient contiguous sizes to translate and moderate energy influx.

ENERGY Responses

1. Retain and restore forest canopy.

2. Use compact development to reduce the need for forest encroachment.

3. Increase forest connectivity and decrease forest fragmentation.

4. Use energy that comes from renewable sources – so there are no emissions.

5. Reduce the need for air conditioning by: highly insulated buildings, deep porches, roof overhangs, deciduous shade on East, South, and West sides of buildings, add shade pergolas to public spaces.

6. Create walkable community with low reliance upon automobiles.

7. Minimize outdoor lighting during evenings and eliminate through most of the night to reduce light pollution and increase visibility of night sky.

Note: Energy Consumption is addressed under economic criteria.

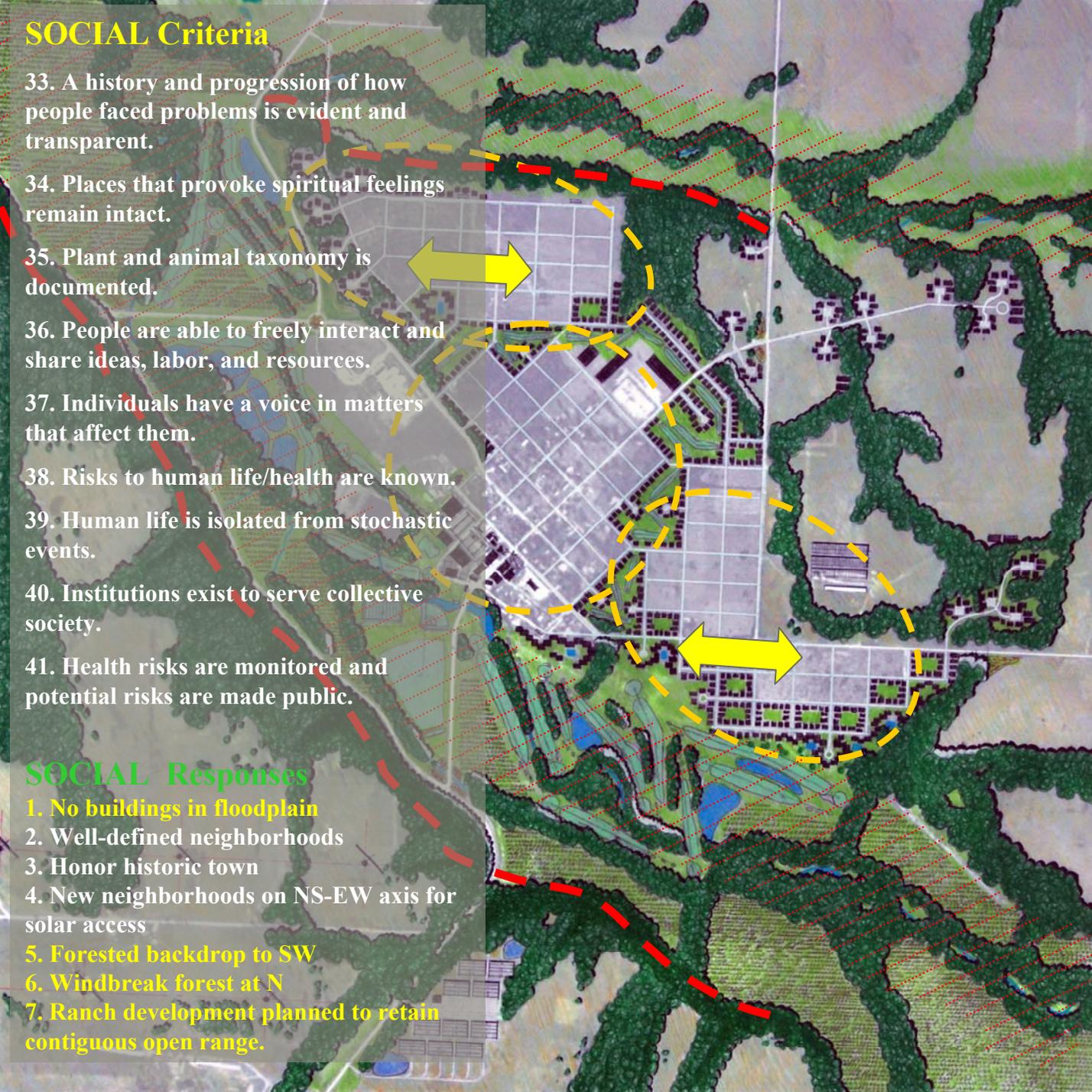


SOCIAL Criteria

33. A history and progression of how people faced problems is evident and transparent.
34. Places that provoke spiritual feelings remain intact.
35. Plant and animal taxonomy is documented.
36. People are able to freely interact and share ideas, labor, and resources.
37. Individuals have a voice in matters that affect them.
38. Risks to human life/health are known.
39. Human life is isolated from stochastic events.
40. Institutions exist to serve collective society.
41. Health risks are monitored and potential risks are made public.

SOCIAL Responses

1. No buildings in floodplain
2. Well-defined neighborhoods
3. Honor historic town
4. New neighborhoods on NS-EW axis for solar access
5. Forested backdrop to SW
6. Windbreak forest at N
7. Ranch development planned to retain contiguous open range.



SOCIAL Responses (continued)

- 8. Central activity space with attractive people-spaces.
- 9. Integrate school-community
- 10. Enable school to evolve and develop to meet educational needs.
- 11. Narrow streets to reduce paving and runoff.
- 12. Grid block pattern to provide multiple routes through town.
- 13. Walkable community – short distances, multiple routes, sidewalks, shade.
- 14. Well-defined urban boundary within existing agricultural landscape.
- 15. Retain character of the agricultural landscape.
- 16. Use landscaping to screen large buildings.



Normal walking speed ~ 3.6 km/h (2.24mph) ~ 15min per 1/2 mile
Brisk walking speed ~ 5.6-8.9km/h (3.5-5.5mph) ~ 5.5-8.6min per 1/2 mile

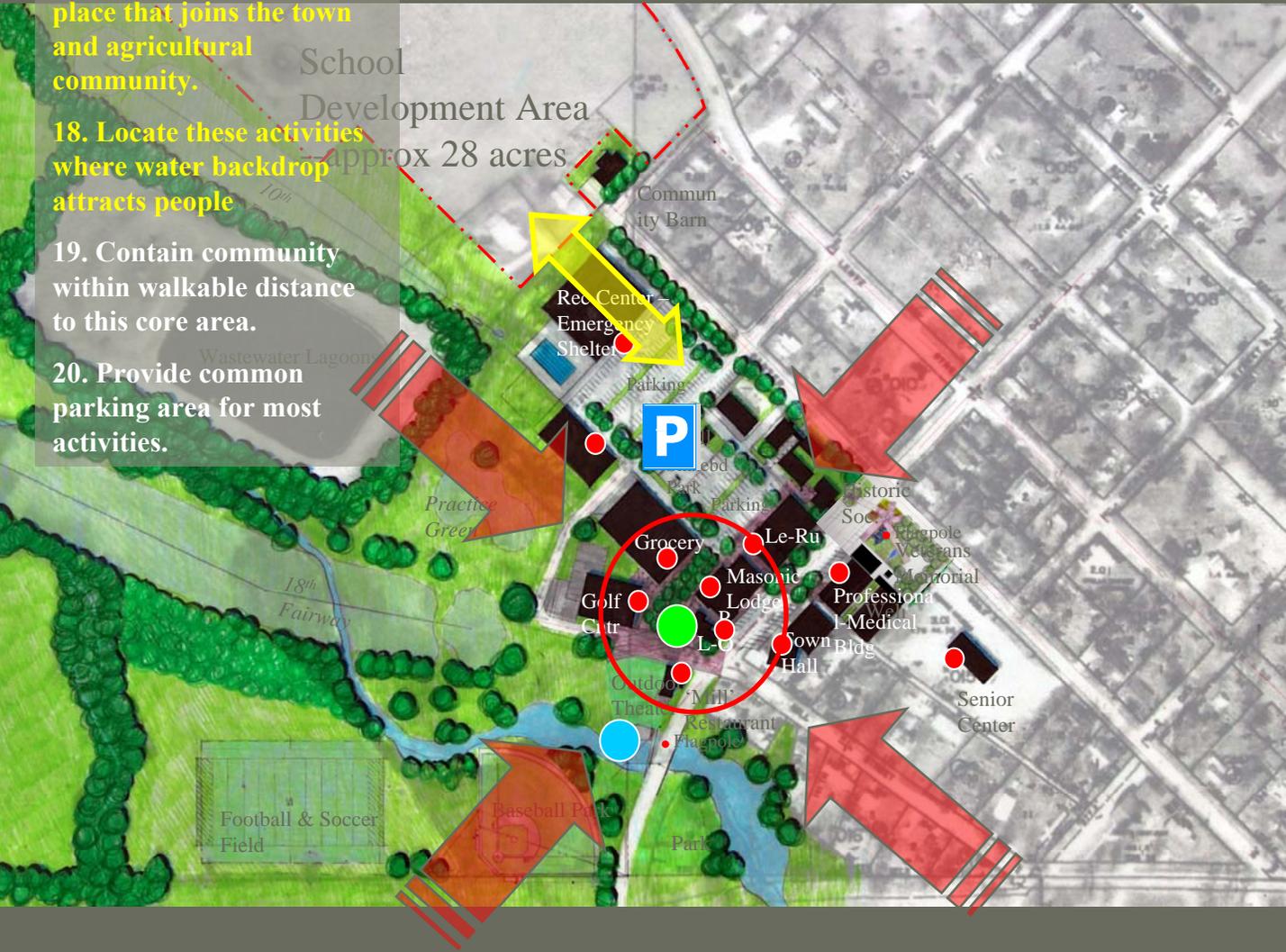
SOCIAL Responses (continued)

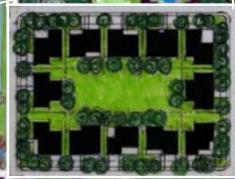
17. Congregate commercial, institutional, and public activities in one place that joins the town and agricultural community.

18. Locate these activities where water backdrop attracts people

19. Contain community within walkable distance to this core area.

20. Provide common parking area for most activities.





SOCIAL Responses (continued)

- 21. Housing variety to meet different individual/family needs.
- 22. Houses around auto-courts to reduce infrastructure, maintenance, retain open space, and create close-knit neighbors.
- 23. Infill development within old town.
- 24. New parts of town on NS-EW axis for solar access.
- 25. Heavily insulated –deep eave buildings to reduce heating/cooling loads.
- 26. Landscape to shelter from summer sun and winter winds.
- 27. Approximate density of 12 dwelling units per acre.
- 28. Housing at perimeter of block leaving open and secure green space for children play and neighbor gatherings.



SOCIAL Responses (cont)

29. Gateway Gardens (see other)

30. Dogwood trees (see other)

31. Restore Architectural Heritage of Stella: a) lapboard siding; b) white color; c) deep porches; d) gable roofs & variations; e) double-hung/4 pane windows; f) gabled dormers with windows cutting through eaves; g) approx 12" overhangs; h) native stone or concrete block stone foundation; i) without decoration and minimal mouldings; and j) wooden posts with chamfered corners.

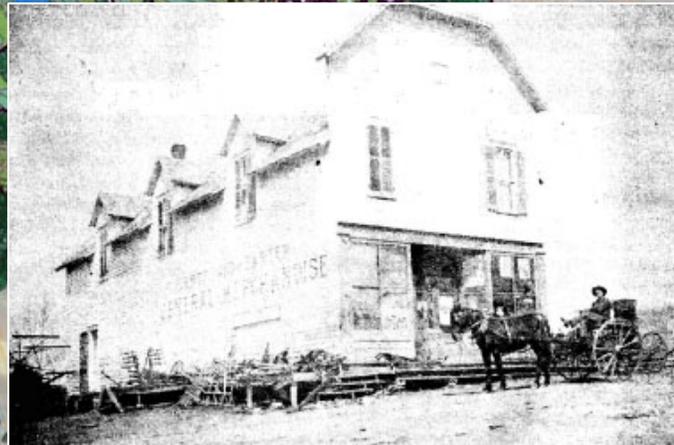
32. Rebuild and maintain Lentz-Carter building, post office building, and churches. Obtain 'Historic Landmark' status for applicable buildings.

33. Develop places where people want to be.

34. Provide activities.



The former home of Dr. Dan Cullers, one of the hospital's first doctors. Cullers, his wife, Ida, and sons Cecil and Noah were Stella residents for many years. *Current photo/Nin*



SOCIAL Responses (cont)

35. Green necklace to honor and delimit the old town of Stella.

36. Forested hillside backdrop for town.

37. View corridors through the trees to experience Indian Creek.

38. Widening of Indian Creek at the core area and at the park as a water feature for the town and backdrop for the core area.



SOCIAL Responses (continued)

39. Retain urban development within 'blue-line' = Retain agricultural economy and character, and a greenbelt for the town.



ECONOMIC Criteria

42. Materials are efficiently used and reused as much as possible.
43. Waste is attenuated by environmental processes.
44. Resource use is linked with investment in resource renewal.
45. Qualitative community resources are improved.
46. Net economic effects > costs incurred to natural systems.
47. Net economic effects > costs incurred to social systems.
48. Consumption of natural resources is counted as a cost.
49. All costs are calculated before being incurred.
50. Financial resources are sufficient to maintain community infrastructures, institutions, and services.



ECONOMIC Responses

1. Keep money in the community for as long as possible.
2. Citizen co-ops contract with local farmers to grow food and supply farmers market.
3. School is enabled to develop to its maximum potential.
4. Expand manufacturing space.
5. Golf course provides local activity and attracts golfers to town.
6. Golf clubhouse doubles as local restaurant, venue for receptions/parties.
7. Restored Lentz-Carter building provides, café, laundry, stores, commercial space, and gasoline station.
8. Central-cohesive shopping area.
9. Business/professional/medical and residential building to replace Cardwell Hospital.
10. Local services: machine and auto parts/repair.
11. Local energy production.
12. Bed and Breakfast(s)
13. Value added to home sites.
14. Activities provide opportunities to spend locally.



ECONOMIC Responses (continued)

1. New neighborhoods on NS-EW axis to enable passive solar collection.
2. Well insulated existing and new homes and buildings.
3. Solar collection panels on large buildings.
4. Greenhouse horticulture.
5. Wind turbine farm for generating electricity.
6. Winter wind breaks on north side of town and buildings.
7. Walkable community plan to minimize the need to drive.
8. Solar lighting for all signage and exterior lighting.
9. Recycling
10. Anaerobic compost landfill.
11. Local food production



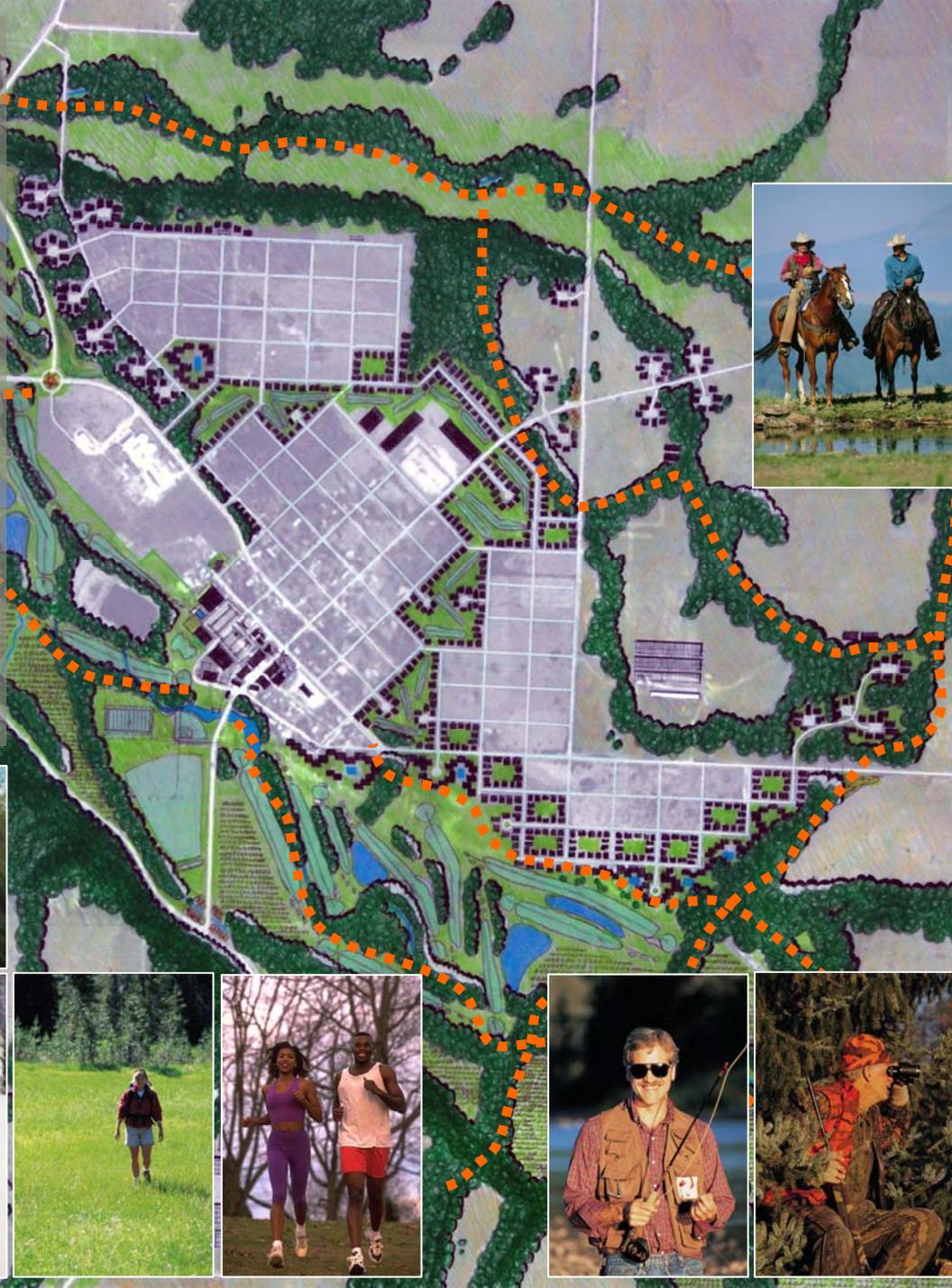
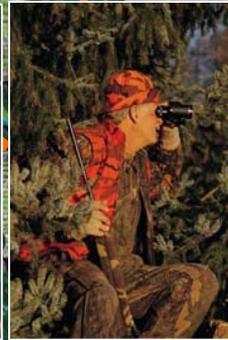
ACTIVITIES

1. Park.
2. Baseball/Softball field.
3. Football/Soccer fields
4. Skateboard park.
5. Disk/'birdie-ball' golf.
6. Walking
7. Bicycling
8. Equestrian riding
9. Fishing and hunting
10. Sledding
11. Golf
12. Monitored, protected outdoor play spaces.
13. Neighborhood gathering
14. Outdoor theater for concerts, plays, movies.
15. Parades
16. School-related activities
17. Historic society
18. Library
19. Swimming hole
20. Bird watching
21. Star gazing

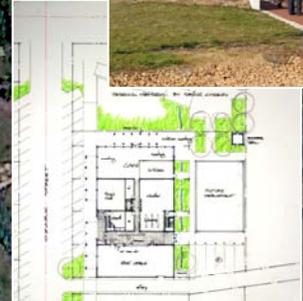


ACTIVITIES-TRAILS

1. Extensive trail network predominantly protected with tree cover.
2. Multiple access points.
3. Provide access to natural springs as destination sites and place for refreshment.
4. Provide for hunting in forests and grasslands away from trails.









Lessons

1. Protect/Sustain = BUILDING COMMUNITY
2. Greatest resource is PEOPLE
3. Sustainability is A PROCESS OF CHANGE – achieved daily and spanning decades
4. Imperative to create 'PLACE'
5. MEASURE of planning responses is community's ability to: (a) meet human needs; (b) endure over time; and (c) evolve in place

Thank you!

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