Designing Recombinant Ecologies

“Ecology as a science is based on the negation of all things natural. It makes nature into a constituent element of an interrelationship with urban production. This marks the end of nature as an indeterminate field on its own. Now it has to be translated in terms of resources and their exploitation, and ecology—the infinite expansion of the oikos—confines it within borders… and provide(s) an inventory of whatever is available for exchange or exploitation.”

recombinant ecology model 01

WATERSHED URBANISM
The 17 Ecological Services of Watersheds

1. Atmospheric regulation
2. Climate regulation
3. Disturbance regulation
4. Water regulation
   5. Water supply
6. Erosion control and sediment retention
   7. Soil formation
8. Nutrient cycling
9. Waste treatment
10. Pollination
11. Species control
12. Refugia/habitat
   13. Food production
14. Raw material production
15. Genetic resources
16. Recreation
17. Cultural

existing site in the Athletic Valley watershed
Project Scope

1. Remediate College Branch stream
2. Design campus gateway experience
3. Provide transit facilities
4. Keep band practice field
5. Accommodate 100,000 sports fans
6. Maintain 1,400 parking spaces

highway bridge threatened by erosion
“Peak” Planning Determinants

Due to the automobile, the first hour of stormwater runoff has a pollution index far greater than that of raw sewage. Event driven parking peaks in less than an hour.

Campus flooding occurs during every significant rainfall.

Urban civil engineering dangerously elevates stream metabolism, subverting its intrinsic capacity for self-regulation.
Proposed Planning Scenarios

1. Hydrology Pixelation incremental
2. Riparian Bands realignment
3. Total Marsh radical

A solution may be implemented incrementally as per funding availability and political will, or all three may be phased successively in an evolutionary process.
This modest approach introduces flood control and decentralizes stormwater management. It allows the site to operate as a sieve for recharge through localized rainwater gardens distributed across the site.

1. Carlson Terrace Pedestrian Loop
2. Visitor Center and Transit Station
3. Carlson Terrace Existing Housing
4. Multi-way Boulevard
5. Reclaimed Stream Floodplain
6. Stream Floodway
7. Flow Attenuation Mounds
8. Flood Detention
9. Band Practice Field
2. Riparian Bands

Riparian Bands stratifies east-west land uses from most natural to the most developed.

1. Housing Pedestrian Loop
2. Visitor Center and Transit Station
3. Carlson Terrace Existing Housing
4. Multi-way Boulevard
5. College Branch Floodplain
6. College Branch Floodway
7. Band Practice Field
8. Gabion Wall System
9. Bioswale
10. Flood Detention
11. Flow Attenuation Bands
Visitor’s Center as eco-history, interpretive, and intermodal transit facility.

Banded parking landscape

- Tree box filter
- Stormwater diverter
- Bioswale
- Epiphytic wall
- Flood detention

Filter strip
Pervious paving
Bioswale
Infiltration basin
Attenuation bands
3. Total Marsh

Total Marsh maximizes the area devoted to floodplain and stormwater management.

1. Housing Pedestrian Loop
2. Visitor Center and Transit Station
3. Carlson Terrace Existing Housing
4. Parking Garage Pre-treatment Buffer
5. Stormwater Filter Strip
6. Stormwater Infiltration Basin
7. Reclaimed Stream Floodplain
8. Stream Floodway
9. Band Practice Field
10. Multi-Way Boulevard
11. Flow Attenuation Mounds
12. Flood Detention
LOW-IMPACT NEIGHBORHOOD DEVELOPMENT

HOUSE  PORCH  YARD  GREEN STREET  OPEN SPACE

recombinant ecology model 03
The Shared Street: From a Traffic World to a Social World

Streets are designed as multipurpose landscapes to calm vehicular traffic, provide UD management functions, and reclaim social functions lost to the automobile’s dominance. Modeled after the Dutch woonerfs, shared streets have a remarkable record of safety where they are implemented. Streets are key components of the stormwater runoff treatment train, incorporating bioswales, sediment filters, and infiltration trenches. This eliminates costly curbs, gutters, pipes, and catch basins in conventional civil-engineered systems, which often flood at a 50-year event. Streets and attending green spaces are recombined as a treatment network to create “production park” spaces, sponsoring active passive and active recreation. Since coverage of more than 30% of the site by hard surfaces for walks, roads, and roofs leads to irreversible watershed degradation, pervious surfaces for parking and walking are used in place of asphalt. The site is essentially designed to function like a sponge, recharging and evapotranspiring treated runoff after its initial absorption during a storm event.

Shared streets deliver numerous social services (e.g., traffic safety, recreation, aesthetics, crime prevention, conviviality) and, unlike conventional streets, do not constitute an environmental liability. The street becomes a net producer of ecological and urban services. Solving for such multiple bottom lines represents the next frontier of housing affordability, regenerative neighborhood infrastructure. Since individual property value is contextually created through collective environmental and social forces, neighborhood infrastructure is the key to sustained homeownership. What better way is there to leverage the investment of low-income home owners and ensure the same rate of equity appreciation enjoyed in other market grades of housing?
**A. Autocourt**
Serving as a catchment for 50% of the onsite water, the autocourt collects and filters runoff from surrounding houses.

**B. Community Gardens**
Located in a wetland buffer, the organic gardens and pond provide a viable flood retention area.

**C. North Shared Street Plaza**
Housing a range of pedestrian facilities, the plaza contains infiltration trenches, bioswales, and tree box filters, the most comprehensive treatment train.

**D. Mews Court**
This midblock green space sits above one of the site's largest retention basins surrounded by infiltration trenches.

**E. South Shared Street Plaza**
Housing a heritage pecan tree, the plaza integrates a play area with bioswales and infiltration trenches.

**Open Space**
open space + porches + houses
Porchescape's
low impact development solution

1. infiltration zone
2. constructed stream
3. bioSwale
4. conserved wet meadow

110 acres off-site input

5. agricultural pond
6. reclaimed detention pond
7. existing, surveyed zones, rights
8. curb-gutter-pipe

conventional pipe-and-pond solution
"Traffic in residential streets is governed, to a large extent, by the degree to which residents have psychologically retreated from their street."

- David Engwicht, Mental Speed Bumps: The Smarter Way to Tame Traffic

south shared street plaza subwatershed
Traffic is more a social problem than an engineering problem. "If you want motorists to behave as if they are in a village, then build a village."

-Hans Mondeman, Dutch traffic engineer

autocourt subwatershed
In transitioning from a traffic world to a social world, public right-of-ways may sponsor the emergence of new and viable neighborhood economies.
Three factors in the street environment cause motorists to slow down: intrigue, uncertainty, and humor. “The more neighborhoods that build the social life of their street, the greater the uncertainty that is created in the motorists mind even when there is no social activity in the streets.”

-David Engwicht, Mental Speed Bumps: The Smarter Way to Tame Traffic

north shared street plaza subwatershed
the "L"
1150 Square Feet
Since NWA is growing rapidly, how might we responsibly urbanize the “Natural State”?

One possible future might include regional light rail. Take a look and see what you think...
UACDC’s Visioning Rail Transit in Northwest Arkansas: Lifestyles and Ecologies published 2007
35 students participate in TOD studios at the University of Arkansas and Washington University in St. Louis 2006
Washington D.C. meeting with the Federal Transit Administration to discuss feasibility 2006

2006 NWA population: 282,867 people
2006 Lake Ft. Smith constructed for water supply
2006 NWA #6 fastest growing MSA in the nation
2005 NWA Light Rail Forum, NWA-LRTs founded
2005 UACDC’s Planning Primer TOO published
1999 I-540 completed (cost $460 million)
1998 XNA completed (cost $107 million)
1992 Two-Ton Project established to provide water supply

1880 NWA population: 24,000 people
1881 Rogers founded
1907 Drake Field built as NWA’s first air field
1949 Lake Fayetteville constructed
1966 Beaver Lake constructed for purposes of flood control, hydropower generation, and water supply (dam cost $46 million)

1828 Fayetteville founded
1840 NWA population: 7,148
1881 NWA becomes connected to the Missouri-Arkansas train corridor

NWA population: 1,000,000 by 2050
Current Footprint of Springdale

Footprint of 41,600 New Housing Starts Projected for 2050

4 units / acre
10,400 acres
Current Footprint of Rogers

Footprint of 35,400 New Housing Starts Projected for 2050

4 units / acre
8,852.5 acres
WAL*MART
world's largest corporation

nation's second largest trucking company

J.B. HUNT

ACXIOM
global leader in customer data integration

RICELAND
world's second largest miller and marketer of rice and soy products

Stephens Inc.
largest brokerage firm in the US outside of Wall Street

Tyson
world's largest processor and marketer of meat

UNIVERSITY OF ARKANSAS
top recipient of private donations
More Dense

LESS DENSE

Peer “New Start Cities” Urbanized Area Comparisons
the case for rail in NWA

Based on regional morphology (geometric structure and services distribution), NWA is an ideal candidate for rail transit development, arguably fulfilling the Federal Transit Administration’s New Start criteria better than many recent recipients.
retool NWA...
by integrating existing transportation systems before leapfrogging them with new systems. Redundancy will amplify efficiencies in each mode of transportation.

Due to historic railroad development, two-thirds of today’s NWA population live within one mile of the 32-mile long rail right-of-way.
It's not just about transportation, but also...

Mobility

Urbanism

Commerce

Environment

What if choices in transit mode beyond the car were provided in NWA?

What if rail transit revived the amenity-rich environments of historic NWA downtowns?

What if commerce were integrated into the development of NWA neighborhoods?

What if NWA directed its growth to become a model region for sustainability, lowering energy footprints, and weaving nature into the city?
1 Mobility

What if choices in transit mode beyond the car were provided in NWA?

- Will provide convenient access and transportation choice for all households and reduce household travel budget.
- Will benefit the logistics industry as automobile traffic demand is shifted to rail, expanding highway capacity for trucking and commerce.
- Will relieve traffic congestion and reduce time wasted driving on crowded roads.
<table>
<thead>
<tr>
<th></th>
<th>Light Rail</th>
<th>Bus</th>
<th>Car</th>
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<tbody>
<tr>
<td><strong>Total Vehicle-miles</strong></td>
<td>54</td>
<td>7,077</td>
<td>1,628,332</td>
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<tr>
<td>(in millions)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Total Passenger-miles</strong></td>
<td>1,437</td>
<td>150,042</td>
<td>2,556,481</td>
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<tr>
<td>(in millions)</td>
<td></td>
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<tr>
<td><strong>Passenger Cost per Mile</strong></td>
<td>.14</td>
<td>.20</td>
<td>.51</td>
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<tr>
<td>(in dollars)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>System Operating Expenditures</strong></td>
<td>682</td>
<td>13,704</td>
<td>320,732</td>
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<tr>
<td>(in millions)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>System Revenues</strong></td>
<td>204</td>
<td>1,118</td>
<td>58,508</td>
</tr>
<tr>
<td>(in millions)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Percentage of Return</strong></td>
<td><strong>30%</strong></td>
<td><strong>8%</strong></td>
<td><strong>18%</strong></td>
</tr>
<tr>
<td>(revenue/expenditure)</td>
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*Source: U.S. Department of Transportation, Bureau of Transportation Statistics (2001)*
new development captures a premium market value due to being well-connected to the rest of NWA. Well-designed pedestrian facilities and civic spaces are important anchors in creating desirable public environments around transit stations.
connect regional mobility with local commerce
to create great civic places

Dickson Street, Fayetteville
Urbanism

What if rail transit revived the amenity-rich environments of historic NWA downtowns?

Will allow walking to be a routine transit option, promoting physical activity and healthy lifestyles.

Will facilitate new venues for social engagement, culture, and entertainment.

Will provide new urban housing products—like walk-ups, lofts, and condominiums that feature auto-independent lifestyles.

Will reward preservation of historic structures and reuse of underutilized urban resources.
Successful rail transit demands good pedestrian environments and compact, mixed-use urban environments and compact, mixed-use urban development as a source of ridership.
3

Commerce

What if commerce were integrated into the development of NWA neighborhoods?

Will support small businesses and regional supply chains, enhancing the availability of locally produced quality products and services.

Will produce a vital and interesting street life, reestablishing community and personal relations in local commerce.

Will improve convenience of everyday shopping through farmer’s markets, urban arcades, neighborhood grocers, green grocers, and street vendors.
introduce landscape systems into transit corridors

green streets facilitate greater social and economic exchange

Johnson
revitalize and strengthen regional commercial anchors
the single-use zoning of the NWA Mall area could be readily transformed into a mixed-use neighborhood

NWA Mall
Environment

What if NWRA directed its growth to become a model region for sustainability, lowering energy footprints, and weaving nature into the city?

- Will support less land consumption since rail transit prompts urban and dense development.
- Will reduce energy consumption, as rail requires less energy per capita than the automobile.
- Will reverse land development sprawl, allowing for conservation of valuable ecological systems.
in one year of the Iraq War—a war essentially about oil—the U.S. spent enough money to construct nearly 200 regional light rail systems
regional commercial anchor with emerging mixed uses
“The total lack of ludic solutions in the organization of social life prevents urbanism from rising to the level of creation.”

Constant Nieuwenhuis, The Great Game to Come
the future is now

More than 60 "new economy" regions nationwide have developed rail transit systems. Could rail transit help NWA to become the "Center of the New Smart South"?
Design: The City as Ecology