

Ellen Banzhaf^{1,2}; Maik Netzband¹

¹ Center for Environmental Studies – Arizona State University, 929 S. Mill Ave. Ste 151, Tempe, AZ 85281
Ellen.Banzhaf@asu.edu; Maik.Netzband@asu.edu

² UFZ-Centre for Environmental Research Leipzig-Halle, Germany, Permoserstr. 15, D-04318 Leipzig,
elba@alok.ufz.de

What are Brownfields ?

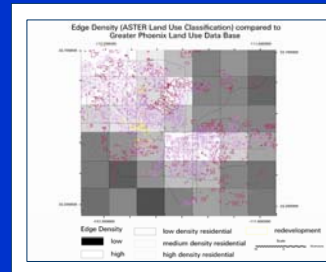
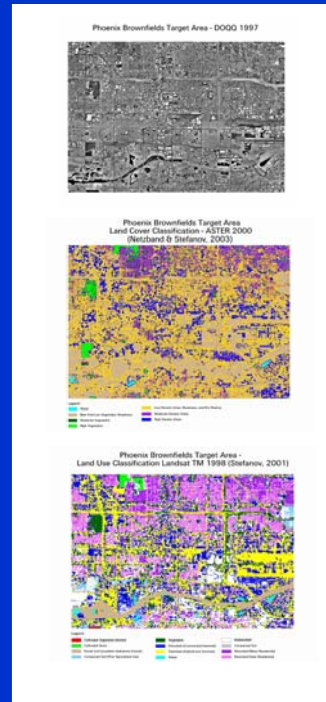
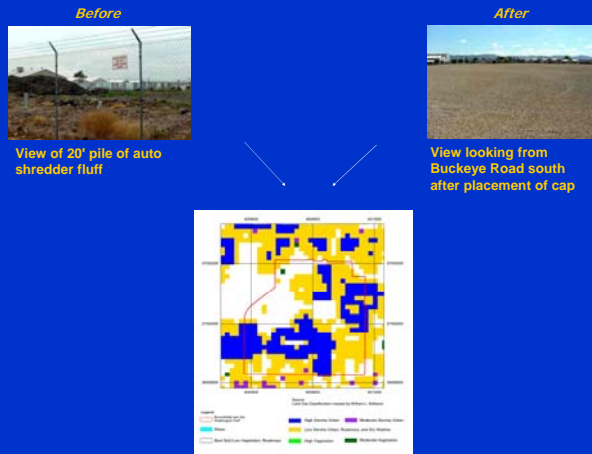
EPA defines Brownfields as "abandoned, idled or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination" (<http://www.epa.gov/epahome/hi-brownfields.htm>).

How to deal with Brownfields ?

The international urban environmental partnerships focus on Brownfields redevelopment: abandoned industrial properties should be turned into thriving economic centers, useful recreational areas and beneficial open spaces (U.S. Environmental Protection Agency).

How can Brownfields be spatially described ?

They consist of diverse objects that need to be characterized by their form, their position and their spatial context. They may consist of different objects such as buildings, impervious surfaces, roads, or road access, and vegetation.

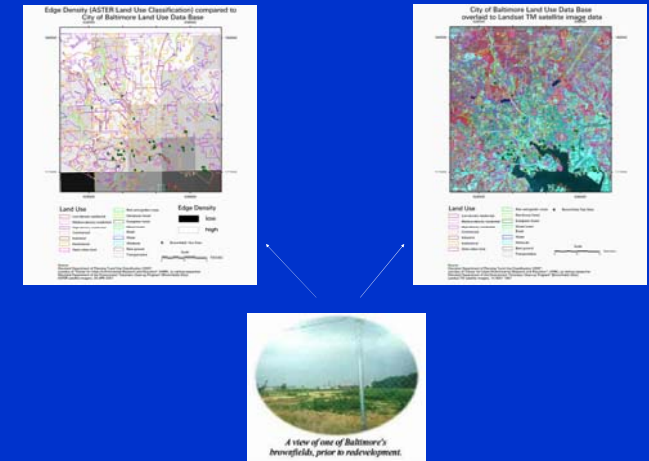


As the physical appearance of Brownfields sites may consist of different objects such as buildings, impervious surface, roads and sparse vegetation any multispectral classification scheme will fail to detect this object class.

How could potential Brownfields features be derived from remote sensing data?

Build-up structures, impervious surface, and roads: grey-level co-occurrence matrices (GLC) give a texture feature by analyzing the local environment of each pixel. In consequence, a texture feature can be derived which represents the characteristics of the GLC matrix in only one value. The directionality is eliminated by calculating texture feature pictures of different orientations (sum difference method).

Vegetation cover and the amount of impervious surface: NDVI and SAVI (a certain vegetation index including information on soil) deliver a detailed overview over the vegetation coverage which should differ between a Brownfields site with (e.g. sparse vegetation, natural succession) and its surrounding neighborhood with presumably better-maintained vegetation cover.



Spontaneous vegetation on Brownfields sites

In the middle latitude (e.g. Baltimore City) one criterion to typify is the high proportion of very dry biomass which is characteristic for rural fallows or urban Brownfields in spring time, whereas grasslands only possess little dry biomass throughout the whole vegetation period. Beyond this feature the rich vegetation of grassland distinctively differs from dry biomass in fall and can easily be distinguished from the sparse plants of fallows and Brownfields.

In rather extreme climatic conditions, such as in a desert (e.g. Phoenix Metropolitan Area), grassland and lawn / meadows are completely dependent on irrigation, whereas bushes and certain tree species might develop on vacant land within one to five years depending on the annual rainfall (bushes: tumble weed, desert broom – disturbance indicator; trees: palo verde, mesquite).

What does their neighborhood look like?

Their surrounding structural embedment: the structural complexity is measured by testing certain landscape metrics. The suite of spatial pattern metrics captures ecologically relevant aspects of specific patterns such as spatial fragmentation, patch shape, amount of edges and neighborhood relationships.

Once detected the question rises how to redevelop such sites? Are they located within a residential or a commercial / industrial area? Or are there potentials to improve the whole quarter / neighborhood by creating a new or temporary park / recreation area? Research on neighborhood functionality will help solve which way redevelopment would fit best in and for a neighborhood.

ACKNOWLEDGEMENT:

This project is funded through a scholarship donated by the Max-Kade-Foundation, New York.

References

Stefanov, W.L., Ramsey, M.S., and Christensen, P.R. (2001) Monitoring urban land cover change: An expert system approach to land cover classification of semi-arid to arid urban centers, *Remote Sensing of Environment* 77 (4), pp. 173-185.
Netzband, M., and Stefanov, W.L. (2003) Assessment of urban spatial variation using ASTER data, *International Archives of Photogrammetry, Remote Sensing, and Spatial Information Sciences* 34 (7/W9): 135-143.