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Cities as forces for good network

FOLLOW THE MONEY AND MATERIALS:
CITIES AS FORCES FOR GOOD IN THE ENVIRONMENT!

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Is it possible to re-engineer the infrastructure of cities such that — in the popular metaphor of the urban ecological footprint (EF) — cities might "walk on air"? The implied grand challenge is not entirely rhetorical. Bruce Beck and Rodrigo Villarroel Walker are setting about responding to it, through Beck's International Research Network on "Cities as Forces for Good (CFG) in the Environment" (see www.cfgnet.org). CFG was begun in 2006 and currently reaches around the world to Newcastle University and Imperial College in the UK, Tsinghua University (Beijing), Kathmandu, Nepal, and beyond. Nearer to home, Beck, Villarroel Walker and their Network are investigating how to re-engineer Atlanta so that it might become a force for good in the Upper Chattahoochee watershed.

Think not of Atlanta's footprint, then, but its pulse, or its metabolism. Taking an ever broader perspective — well beyond their original studies of just water and wastewater infrastructure — Villarroel Walker and Beck have developed a Multi-Sectoral Systems Analysis (MSA) for the water, energy, food, forestry, and waste-handling sectors of the Atlanta-Chattahoochee economy. Originally, they were interested in the flows of materials around this system: water, energy, carbon, nitrogen, and phosphorus. Putting a price on these materials, they have now added flows of money to the flows of materials. Not only can they see where the fattest flows of materials and money are being "wasted", they can also identify hot-spots ripe for invention and innovation. For example, if all the households of Metro Atlanta were to be re-plumbed with urine separating toilets, 16,600 tonnes of nitrogen (N) and 1,700 tonnes of phosphorus (P) could be recovered annually, with a market value (as fertilizer) of $22M.

Turning from cities as Confined Human Feeding Operations (CHFOs) to the more familiar recovery of resources from Confined Animal Feeding Operations (CAFOs), the widespread introduction of pyrolysis of poultry litter enables recovery of sizeable amounts of fertilizer and biofuels: 900 and 2,100 tonnes per year of N and P fertilizer respectively, with a combined value of $6M; and liquid and gas biofuels with an energy value of 250 GWh, i.e. worth some $12M annually (these figures are for the Upper Chattahoochee watershed). There again, if micro-algae were grown from the fertilizer recovered at a future R M Clayton Fertilizer Plant (it is currently Atlanta's R M Clayton Water Reclamation Center), it too could generate some 46,000 gallons of biodiesel each year (worth nearly $140,000).

Today we strive (expensively) to remove nutrient pollutants from sewage. And we do so, because these nutrients grow green matter in water (micro-algae, in fact), instead of on land, and we call this pollution from "eutrophication". In pursuit today of such pollution control — and instead of receiving an income stream from recovered fertilizer — it could easily cost around $2-4M to eliminate some 50 tonnes of pollutant P each year of operation. Indeed, costs might be greater still, depending upon the scale of facilities and how aggressive pollution control upgrades need to be. Tomorrow, we might well be utterly dedicated to recovering these invaluable nutrient resources: for fertilizer, for biofuels, or to be issued as nutrient supplements for enhancing the ecosystem services of a most healthy future Chattahoochee — Atlanta as a CFG, then.

M Bruce Beck