The Potential for Restoration of Tan Brook, an Urban Headwater stream in Amherst, Massachusetts

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The potential for restoration of Tan Brook, an urban headwater stream in Amherst, Massachusetts
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MISSION: The goal of the Tan Brook Student Conservation Group is to educate undergraduate students at the University of Massachusetts-Amherst about freshwater sustainability. To accomplish this, the group will act to provide opportunities in original research, applied field and laboratory methods, and outreach. The initial goal for the group will be a collaborative project describing the ecological, historical, and social significance of the Tan Brook, which will result in an informative website and educational signage located at several locations in the town of Amherst and on University property where the Tan Brook enters campus. Ultimately, the group will contribute to multidisciplinary projects on applied and basic research about the sustainability of freshwater resources using the Tan Brook as the focus.

LONG-TERM GOALS:
1) Sustainability education/outreach
   • Promote the Tan Brook watershed as an outdoor classroom
   • Students will provide open source data and other materials about the Tan Brook watershed to be used in class exercises
   • Outreach activities will engage the local community about freshwater sustainability
2) Original research conducted by faculty, postdoctoral researchers, graduate and undergraduate students

Current Projects:

- Tan Brook runs through the UMass-Amherst campus and the town of Amherst
- Like most headwater streams (Elmore and Kaushel, 2008), the Tan Brook is primarily underground (73%)
- Discharges into the UMass-Amherst campus pond
- Storm water overflow diverted to soccer fields west of campus, causing erosion (see Figure 3)
- Total watershed area = 3,190,839 m²
- 45.5% of the watershed is impervious
- 83% of the watershed is developed

Methods

Used ArcGIS 10.1 to perform all land use analysis of the Tan Brook.
Determined potential sections for daylighting by using a flow accumulation raster created from a 1/3 arc second DEM from the USGS National Elevation Dataset.

Results and Conclusions

1) Standard Riparian Assessment

Determined potential sections for daylighting by using a flow accumulation raster created from a 1/3 arc second DEM from the USGS National Elevation Dataset.
- Undeveloped land, which is ideal for daylighting the Tan Brook, ranges from 0% to 27.2%.
- Parcipation recreation is also very common, especially on UMass’s campus.
- Developed land is ideal for daylighting the stream, ranges from 0% to 27.2%.

2) Extended Landscape Assessment

Surrounding watersheds will act as sources for potential colonists.
- We assumed that water and habitat quality decreases in watersheds with a lot of land use development.
- Watershed 2 is the least developed (71.4% undeveloped) and likely has the best water quality.
- Watershed 6 is the most developed (83.5% developed) and potentially poor water quality.
- Watersheds 2, 4, 5, and 6 are not hydraulically connected to the Tan Brook watershed, which would limit fish and swimming macroinvertebrate colonization.

Overall Conclusion

- Restoration is infeasible for buried headwaters
- We believe that a multidisciplinary approach examining conservation strategies that combine academic, local government, and local community interests is required to sustain urban headwater streams like the Tan Brook.

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