**Article 26**

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# A Study of Paired Catchments Within Peavine Creek Drainage in Atlanta

Most studies that have evaluated the relationship between impervious cover and stream quality were conducted by measuring dozens of catchments or subwatersheds. Fewer investigations have utilized the paired watershed study design, in which two nearby catchments of different levels of impervious cover are intensively studied over time to assess comparative conditions and impacts.

Recent work by Barrett Walker (1996) is an example of such a paired catchment study. The study, conducted in metropolitan Atlanta, provides further evidence that impervious cover is a good indicator of overall stream health. The study suggests that impervious cover as low as 5% within a catchment can be correlated to early signs of channel erosion and instability.

*Differences Between the Two Catchments*

For a paired catchment study to be most effective, it is important to choose catchments with nearly identical physical characteristics (e.g., order, slope, aspect, length, etc.). This makes it easier to detect differences in stream dynamics (such as biological diversity, flow, pollutant loads, and channel stability), in response to an independent variable (in this case, impervious cover). As can be seen from Figure 1 and Table 1, the two catchments in this study have remarkably similar physical characteristics.

The paired catchments are located within a larger urban watershed called Peavine Creek. The catchments are similar in size, aspect, slope, and soils and receive virtually identical rainfall. The major contrast is in impervious cover. The Fernbank Forest catchment (77 acres and 5% impervious) is protected as an urban forest preserve and serves as the reference catchment, while the Deepdene Park catchment (89 acres and 19% impervious) serves as the impacted catchment. The development that is present in the catchments is predominantly residential and relatively dated (i.e, older than 50 years); however, there is a small component of institutional land use in the Fernbank Forest catchment.

The Deepdene neighborhood was designed at the turn of the century by the eminent landscape architect Frederick Law Olmsted. Public sewer exists in both catchments, located within the street rights-of-way and away from the channels. Deepdene Branch is fed by a storm drain collection system that collects and conveys runoff from roofs, roads, and driveways before it is discharged to the stream. The Fernbank Branch, in contrast, has a relatively small number of homes and accompanying roads, and the majority of the runoff occurs as overland flow across the forest floor. Both catchments benefit from a well-established forested riparian buffer; however, the buffer width of the Deepdene Branch is significantly narrower than that of the Fernbank Branch (see Figure 1).

*Study Methods*

Biological, flow, suspended sediment, and channel geometry data were collected as part of the study. The sampling methods used were simple, rapid, and

**Table 1: Summary of Catchment Characteristics**

| Descriptive Data | Deepdene Catchment | Fernbank Catchment |
|---|---|---|
| Watershed Area (acres) | 89 | 77 |
| Imperviousness (%) | 19 | 5 |
| Stream Length (ft) | 2,297 | 2,625 |
| Stream Slope (%) | 3.3 | 3.4 |
| Watershed Orientation | West | West NW |
| Drainage Infrastructure | storm drains outfall to stream | none - overland flow |
| Riparian Buffer | Good | Excellent |