**Patroon Creek Field Trip**

*Basic Information on the State of Pollution and Socio-Geographic Settings of Patroon Creek Watershed*

The Patroon Creek crosses Albany’s north side, flowing generally from west to east into the Hudson River (see the map below). The Patroon Creek is one of two remaining creeks in Albany. The Normans Kill, the other remaining stream, forms the City’s southern boundary several miles south of the Patroon Creek.

Patroon Creek originates at Rensselaer Reservoir and Murray pond, flowing eastward into the Hudson River. For much of its length, it is adjacent to an interstate highway (I-90) and a main railroad route (Conrail). The Mereco mercury recycling facility (see the star on the map) is located along the north branch just upstream from the confluence with the main branch. The Patroon Creek watershed drains portions of the Pine Bush Natural Area, the Town of Colonie, and the City of Albany. WHBEEC = W. Haywood Burns Environmental Education Center (grass root organization serving a large population of African Americans on watershed).

As shown on the map above, the Patroon Creek watershed encompasses five water bodies. The main branch of Patroon Creek originates in Rensselaer Lake Reservoir and flows east approximately 6 miles to its mouth on the Hudson River at Albany. The northern branch originates at Murray Pond before it joins with the main branch just upstream of Patroon Reservoir. Trivoli Lakes Reservoir is located on a smaller tributary that joins the main branch further downstream. About 75% of the creek flows above ground. The midsection flows in pipes and culverts (NYSDEC, 1992), reportedly since industrialization in the late 1800’s.

Most of the watershed is covered by urban land uses-large transportation, industry, commercial facilities, and dense residential development of low rise, one to four unit homes. The easternmost watershed developed 300 years ago adjacent to the Hudson River. Later, large industry developed in the west encouraged by available labor, natural resources, and proximity of rail and water (Hudson River) transportation. Past industries include the West Albany Railroad Shops, which employed thousands, and the First Prize Meat packing plant. The watershed also includes a 50 year old, operating, regional solid waste landfill. For much of its length, the creek flows within 200 meters of a major highway (I-90) and a major rail used by Conrail Amtrak.

Large sections of the Patroon Creek watershed are polluted. *It is identified on the NYSDEC 1996 Priority Waterbodies List as stressed due to urban runoff (NYSDEC, 1996).*

Storm water from urban areas, industrial parks, and subdivisions make up the bulk of flow in the upper reaches of the creek. In the lower reaches, downstream of Patroon Reservoir, sedimentation, sewage discharge, non-point source pollution, and illicit dumping led the creek to the listed as one of the ten most severely impacted streams in New York State (Bode et. al., 1993). *In the 1970s, mercury was found to be entering the creek’s Northern Branch from the Mereco site (placed on EPA’s National Priorities List in 1983).* The storm sewer systems and catch basins that sewer the Mereco site have been designated as Areas of
Concern by NYSDEC (1996). The former National Lead Industries converted uranium into armor-piercing ammunition and airplane parts until its close in 1983. It is a federal Superfund site adjacent to a tributary of the Patroon Creek. Uranium by-products have migrated into Patroon Creek and its sediments. A portion of the former Albany railroad shops is being investigated as a brownfield site: others are suspected.

For approximately 3 miles the Creek travels north of old city residential neighborhoods – West Hill, Arbor Hill, Sheridan Hollow and North Albany. These are populated by high proportion of low income minority households and are designated targets of local, state, and federal urban revitalization effort (HUD Community Development Block Grant program, federal Enterprise Community designation, and State Economic Development Zone Program). There is a history of environmental degradation and contamination here. Arbor Hill in particular was impacted for over 10 years by airborne ash and by-products from State operating incinerator (“ANSWERS”), that closed in 1994 after lawsuits brought on behalf of the community. The soil quality is still poor due to dumping of coal ash and from air emissions from the ANSWERS plant.

It will be 3 stops in our trip:

1. Rensselaer Reservoir (Pine Bush Nature Preserve)
2. Patroon Reservoir
3. Corning Preserve (Hudson River)

Information you need to complete the work in this field trip:
1. The area of Patroon Creek watershed is 34 square kilometers (A=34 km²=34 x 10⁶ m²).
2. The discharge (Q) can be estimated as a product of the averaged speed of the water current (Vmean) and the effective crosssection area (S) at the point of your measurements:

   \[ Q = V\text{mean} \times S \]  

(1)

3. The crosssection area can be estimated if you approximate the shape of crosssection in this shallow creek with a shape of rectangle. Thus, you need to measure the distance across the creek (l) and the averaged depth (d) along the crosssection:

   \[ S = l \times d \]  

(2)

4. The flux (F) of given pollutant (chlorite, phosphate, nitrate and sulfate) from the Patroon Creek watershed to Hudson River can be estimated by multiplying the concentration of this pollutant (Ci) as measured at the point 3 (Corning Preserve) to the discharge, measured at the same location:

   \[ F = C_i \times Q \]  

(3)

NOTE: Please, remember that the concentration of a pollutant must be recalculated from the mg per litter [mg/L] as given by Ion Chromatographer to kg per cubic meter [kg/m³], and the discharge must be in cubic meters per hour [m³/h], thus the flux of the given pollutant will be in kg per hour [kg/h].

5. The flux density (f) of relevant pollutant can be calculated as a ratio of the flux of the given pollutant and the area of the watershed:

   \[ F = \frac{F}{A} \]  

(4)
Your field measurements must be written in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Stop 1: Rensselaer Reservoir (Pine Bush)</th>
<th>Stop 2: Patroon Reservoir</th>
<th>Stop 3: Corning Preserve (Hudson River)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved Oxygen [%]/[ppm]</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Temperature [°C]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbidity [NTU]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance across: l [m]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth d [m]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed V [m/s]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Write down all measurements made in your group (e.g. 5 people should generate 5 numbers). These number might be slightly different from each other.

Discharge [m³/h]

NOTE: In order to calculate discharge use the AVERAGE speed from the data above.

GENERAL NOTE: In class we will estimate the accuracy of your estimates of the discharge. It is very important to write down all filed measurements of the speed at all 3 locations.

The filed trip will require about 2and 1/2 hours.