responses to changes in the environment (Bode, 2004). In our case, benthic macroinvertebrate assemblages are monitored to aid in the analysis of stream health. Benthic macroinvertebrates are organisms that lack a backbone (invertebrate), spend at least part of their life at the bottom of a water body (benthos) and are large enough to be detected by the naked eye (macro), the latter making them ideal candidates in studying stream health (Bode, 2004). Benthic macroinvertebrates, including insects, worms, mollusks, and crustaceans, can be sensitive to pollutants, making their community sizes or mere presence valuable tools in the assessment of stream health (Bode, 2004). In addition, macroinvertebrates provide a temporal analysis of stream health as organisms are constantly exposed to their habitats and are therefore more greatly affected by them. Since the SBU was initiated in New York State in 1972, it has been successful in making use of macroinvertebrates as indicators of contamination and water quality. Biomonitoring is an engaging experience and is constructive in the inclusion of local citizens with their natural environment. Because biomo

supplement government data collected by RIBS. While chemical analysis can sometimes provide more concrete data, our project includes the involvement of citizens of all ages and chemical use could potentially be hazardous to younger candidates, deterring future involvement. By creating an easily accessible view of the biotic world, we hope to encourage a closer relationship between citizens and their natural environment. We believe that there is no better way to accomplish this than to work and be in the natural world. Biomonitoring is more intuitive, user-friendly, and would attract a wider audience than chemical water testing. Ideally, future citizen monitoring practices could integrate both chemical and biotic components of analysis to provide a more complete view of stream health.

We believe that water quality is not static and should be monitored more than once every five years as the RIBS initiative currently implements, especially since this task currently falls upon only two government employees. With this in mind, the inclusion of community members could serve as a valuable resource in the data collection process. The availability of water quality monitoring resources is similarly inadequate across the northeast and, as a result, several states have already implemented volunteer-based biomonitoring programs. Virginia, New York, Pennsylvania, and the EPA signed the Chesapeake Bay agreement in 1987, promising the protection of the bay's natural resources from human activity-related degradation. In order to keep track of contamination and disturbances, the agreement called for local stream monitoring to assess changes in water quality. The sheer number of streams among those states (100,000+) hindered monitoring agencies' attempts to effectively and efficiently monitor the entire area (Nichols, 1992). Virginia was one of the first states to receive the EPA's approval for a volunteer-based monitoring program (Gowan, 2007). In collaboration with the Izaak Walton League of America, the Virginia Save Our Streams program was formed, which uses cost effective methods to monitor water quality and raise awareness of human impacts on surface waters (Firehock, 1995). Similar attempts to include the local community in biomonitoring assessments have been implemented in other watersheds and have proved useful in the collection and analysis of water quality data.

Another citizen stream program is currently being implemented in Ohio as part of the states' Scenic Rivers Program, in which junior high school students complete most of

the monitoring. Teachers in the area have jumped at the chance to teach stream ecology and activism with the Stream Quality Monitoring Program (SQM). Illinois now uses a similar program, having recognized the value in an educational protection initiative. Other states including Massachusetts, North Carolina, and Kentucky also have citizen stream monitoring programs (McDonald, 1991). In addition, Connecticut has started a volunteer-based monitoring program in cooperation with the existing River Watch Network. As of 1995, twenty-seven state regulatory agencies use volunteer-gathered data in reports to Congress (Penrose, 1995).

Jennifer Lough Fuller (2007) explored the mechanical and instructive aspects of stream biomonitoring methods for educators and citizen monitors in Alabama. Her efforts focused on increasing accuracy in citizen-based analysis compared to trained science professionals'. This goal was successful and increased maximum accuracy from 53% to 60% by modifying their protocol to better guide citizen science members, (Fuller, 2007). In an evaluation of community based monitoring, the main problems were separated into three groups; organization, data collection, and data use. Without organization, interest and information, any data collected will most likely be inaccurate and unreliable by government standards (Conrad, 2010). Another community based monitoring experiment based in Mexico found that training community members to monitor water quality by collecting data with standardized, simplified and less expensive methods allowed for more sampling over a greater area (Campbell, 2007). Yet another study focusing on the Virginia Save-Our-Streams program demonstrated that volunteer initiatives could produce valuable and accurate data if every protocol of standard methods was followed (Engel, 2002). The creation of a citizen guide could potentially standardize the science of biomonitoring at a community level, produce viable data to help supplement the RIBS initiative.

Many organizations and communities could benefit from this amalgamation of professional scientists and local citizens in the Saratoga Lake Watershed including the Friends of the Kayaderosseras, Saratoga Lake Association, Trout Unlimited, Clifton Park and local boy-scout troops. In Saratoga County 2.14% of stream and river segments and 0.07% of ponds and lakes are classified as impaired, making continual monitoring all the more relevant (USGS, DEC 303-D). The Friends of the Kayaderosseras organization's

mission is to promote awareness and appreciation while fostering a mindset geared towards conservation and protection of the Kayaderosseras Creek. The Friends are currently looking for a program to unite people of all ages with the creek and surrounding environment. In this respect, a community-based program focused on the creek's

We worked in close collaboration with Blue Neils, A.J. Smith, and Larry

macroinvertebrate identification, and has cards containing general characteristics, size and a photo of each order or phyla of water quality importance. A one-page break down of all macroinvertebrates is also provided. Chapter four is composed of a sample data sheet, with numbers and macroinvertebrate tallies filled in to represent what a data sheet would look like in the field. The last section amounts to the appendices, accounting for a map of the DEC random probabilistic sampling sites, contact information, equipment purchasing information and references. These five sections of BIOMAK were laminated and spirally bound to make the manual field-durable. In addition to this, multiple copies of the simple macroinvertebrate key and the data sheet were provided on waterproof, tear-resistant paper, located in a folder at the very end of the guide.

To conclude our project, we selected a focus group with the help of the Blue Neils and Friends of the Kayaderosseras in order to preview our Citizen BIOMAK Guide. This gave us both citizen and scientist feedback and showed us the holes and challenging parts in our guide, while still allowing sufficient time to make the appropriate adjustments to the BIOMAK Guide.

Discussion of Guide Design and Implementation:

After the completion of a polished draft of our Citizen BIOMAK Guide, we distributed our guide among the Fr

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