Curriculum Supplement Series
Ecological Networks

ISB Systems Education Experiences

This curriculum unit is divided into two modules. In the first module (Introduction to Systems), students in 6th-12th grade gain basic systems understanding and begin to develop the skills of systems thinking. In the second (Ecological Networks), students in biology, ecology, and STEM courses apply their understanding to a case study involving a mysterious water ecosystem that changes color. These 8 lessons may be taught separately or together as a two week unit.
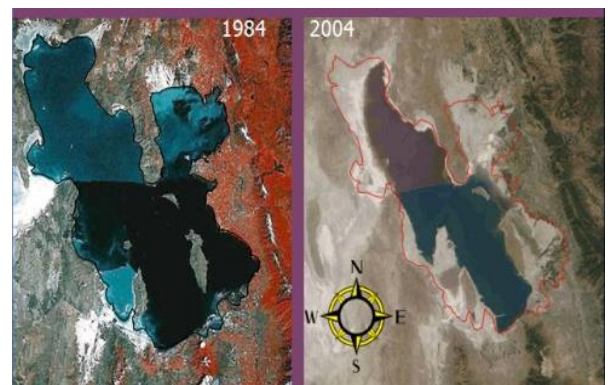
The Baliga Lab at the Institute for Systems Biology has been translating their research into user-friendly curriculum modules since 2004. Through forming collaborative teams comprised of scientists, educators, and students, today's research and methods have become hands-on, accessible activities for students. In 2007, the Ecological Networks module was certified by WA State LASER (Leadership and Assistance for Science Education Reform) as exemplary materials according to their rigorous guidelines.
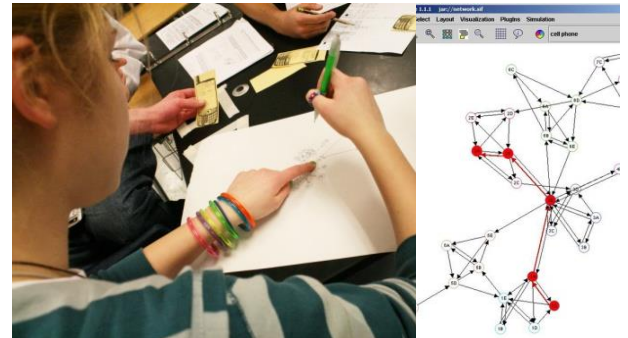
Introduction to Systems: The development of systems concepts for students begins with a highly interactive inquiry into cell phone networks. Cell phones serve as a handy knowledge base on which to develop understanding. Students learn how to build a network and discover the power of using computers to build and analyze a graphical depiction of a network. They apply their network understanding to represent complex ecological systems. Students use Cytoscape to author a system of their choosing while considering a variety of interconnected abiotic and biotic factors. *(Two lessons taught over three, 50-minute class periods)*

ECOLOGICAL NETWORKS KIT
Halobacterium culture
Halobacterium Culture Media
Beral pipets
labels
CD
List of credits
Falcon tubes
sterile toothpick
Beral pipet and microfuge tubes

Ecological Networks: Students are first introduced to extremophiles to better understand the broad range of life on our planet and to foster further conceptualization of the interdependence of a system. This leads to using networks to tackle a real world investigation. Students observe an environmental disturbance that has resulted from a man-made causeway across an unidentified body of water. After making observations and posing questions to the teacher, the students use evidence to design and test their hypothesis. After performing an experiment, they collaborate with other classes by pooling all data sets to complete a statistical analysis of their results. Comprehension is assessed when students go back to their original hypothesis and plan an experiment which is later peer evaluated. When completed, they revisit the new GSL network as a class and see how the experimental data is incorporated into and validates the most current network. *(Six lessons taught over seven, 50-minute class periods)*

1984   2004

NSF

Ecological Networks

Senior Scientist Marc T. Facciotti	Principal Investigators Nitin S. Baliga Patrick Ehrman	Director of Curriculum Development Kathee Terry
2003 Lab Development Team	**2004 Lab Development Team**	**2005 - 2006 Lab Development Team**
Hahn Nguyen, Garfield High School **Sharmila Pal**, Garfield High School	**Gregory Alvarado**, Sealth High School **Stephanie Gil**, Nathan Hale High School **Amardeep Kaur**, *Halo* Research Assoc. **Claudia Ludwig**, International School **Megan Meislin**, Univ. of Washington Intern **Jeannine Sieler**, Bellevue High School **Madhavi Vuthoori**, *Halo* Research Assoc.	**Katherine Alexander**, Nathan Hale High School **Teresa Bailey**, Ballard High School **Marian Deuker**, Ballard High School **Amardeep Kaur**, *Halo* Research Assoc. **Claudia Ludwig**, International School **Jamie Mazon**, *Halo* Research Assoc. **Jeannine Sieler**, Bellevue High School **Madhavi Vuthoori**, *Halo* Research Assoc. **Lu Zheng**, Roosevelt High School
	2004 Technology Team	**2005 Technology Team**
	Rich Bonneau, Senior Scientist **Paul Shannon**, Senior Programmer-ISB **Dan Tenenbaum**, Consultant **John Thompson**, Mt Rainier High School	**Patrick Mar**, Univ. of Washington Intern **Paul Shannon**, Senior Programmer-ISB **Dan Gallagher**, Interlake High School
	2004 Instructional Materials Development Team	**2005 Instructional Materials Development Team**
	Claudia Ludwig, International School **Simin Mirzanian**, Odle Middle School **Sarah Nehring**, Newport High School **Camille Scalise**, Chinook Middle School **Jeannine Sieler**, Bellevue High School	**Dan Gallagher**, Interlake High School **Sarah Hagenah**, Odle Middle School **Claudia Ludwig**, International High School **Nathan Manning**, Tyee Middle School **Simin Mirzanian**, Odle Middle School **Camille Scalise**, Chinook Middle School **Jeannine Sieler**, Bellevue High School

2004, 2005 and/or 2006 Field Test Teachers

Phil Allens, Interlake High School '06
Richard Androsko, Newport High School '04 – '06
Greg Bianchi, Interlake High School '04 – '06
Jeremy Brown, Newport High School '04 – '06
Ted Cox, Bellevue High School '04 – '06
Mike Dominoski, Robinswood High School '04 – '06
Dan Gallagher, Interlake High School '04 – '06
Lisa George, Sammamish High School '04 – '06
Sara Hagenah, Odle Middle School '05 – '06
Cooper Hatton, Bellevue High School '06
Kim Herzog, Sammamish High School '04 – '06
Lee Holt, International School '04 – '05
Kelly Howard, Highland Middle School '06
Debbie Knickerbocker, International School '06
Barry Levine, Newport High School '04 – '06

Claudia Ludwig, International School '04 – '05
Jennifer Lutz, Bellevue High School '04 – '06
Nathan Manning, Bellevue High School '04 – '06
Simin Mirzanin, Tyee Middle School '04 – '06
Marty Mogk, Sammamish High School '04 – '06
Sarah Nehring, Newport High School '04 – '06
John Pham, International School '05 -'06
Marcia Rainey, Bellevue High School '04
David Rupert, Bellevue High School '04
Camille Scalise, Chinook Middle School '04 – '06
Melanie Sidwell, Interlake High School '06
Jeannine Sieler, Bellevue High School '04 – '06
Kristi Sutton, Bellevue High School '04 – '06
Steve Westerside, Odle Middle School '06
Jennifer Wikrent, Newport High School '06

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