Youth & Schools

Peecycling Education Kit

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The Rich Earth Institute offers educational events and resources for learning about watershed health, sustainability, and ecological sanitation. Through the lens of "peecycling," Rich Earth engages people in thinking about water conservation and watershed health, the nutrient cycle, food production, infrastructure, and community resilience.

Why urine?

Human urine contains vital plant nutrients. When flushed, urine wastes precious potable water and can contribute to downstream nutrient pollution. But when urine is reclaimed as a fertilizer, it can be used to grow more food, thereby completing the local food nutrient cycle. Rich Earth operates a community-scale urine recycling program based in Brattleboro, VT which serves as its platform for research and education.

Our Approach

By learning about peecycling, students build their content knowledge and understanding of the Big Ideas of Sustainability. We aim to cultivate curiosity, creativity, and critical thinking about systems in the world. Programming strengthens students' understanding of the relationships between our bodies, ecologies, and the differences between linear and circular systems.

We take a collaborative approach to education. Rich Earth is eager to partner with diverse organizations (garden clubs, watershed groups, and schools) to develop programming that works best for you.

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Standards Connections

Peecycling Programming supports learning and engagement in the following Next Generation Science Standards Disciplinary Core Ideas:

- LS1.A - Structure and Function
- LS1.C - Organization for Matter and Energy Flow in Organisms
- LS2.A - Interdependent Relationships in Ecosystems
- ESS3.A - Natural Resources
- ESS3.C - Human Impacts on Earth Systems

The program also incorporates concepts from the following K-2 Common Core Health Standards:

- Explain that living things grow and mature.
- Name and describe the five senses.
- Identify practices that are good for the environment, such as turning off lights and water, recycling, and picking up trash.
- Discuss how individual behavior affects the environment and community.

Formats & Pricing

Pricing is suggested but open to negotiation depending on your school/organization's ability and need.

At our Research Center
Programming is offered in our large Research Center room April - October, or in a smaller, temperature controlled office space seating small groups October-April. Typical program length is 1 hour. $75/hour, $50 for each hour thereafter.

In your school or community
We'll come to you, year round! $100/hour, $50 for each hour thereafter, +$0.56/mile.

Virtual
Rich Earth offers virtual presentations and webinars for attendees across the country and around the world! $75/hour, $50 for each hour thereafter.

Contact

Please get in touch with Rich Earth's education director Julia Cavicchi at julia@richearthinstitute.org to collaborate and book a program.

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Grades K-5

Intro to Peecycling

Students will learn the basics of how our bodies are part of natural cycles, including the food nutrient cycle. The workshop starts with a discussion of what plants need to grow. With large cut-out pictures, we walk through the conventional linear nutrient flow, discussing each step as we go (Grow, Eat, Pee, Flush). Then we rearrange the steps to make a cycle (Grow, Eat, Pee, Save).

Activity: Students draw their own food nutrient cycles. We engage them in talking about each step as it relates to their own home, community, and watershed, and encourage them to ask questions as they draw.

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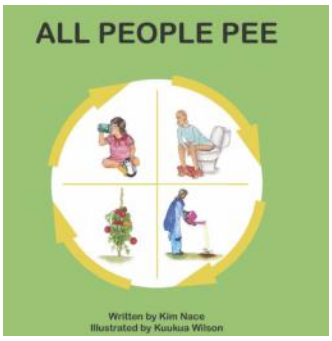
Extensions:



Produce Labels - Students imagine and draw labels that a farmer might use to put on their urine-fertilized produce.

Act it out - Students break up into groups of four and stand in a circle. Each student picks a step of the cycle to be. Students then explain each step of the nutrient cycle to the class, passing a toy which symbolizes nutrients as they go.

Video - Students watch a short animation (3 and 6 minute versions available) narrated by "Uri" which explains peecycling.

Book - We read aloud the book *All People Pee*, written by Rich Earth co-founder, Kim Nace. This companion book to *Everyone Poops* offers an introduction to the connections between humans, animals, our environment - and pee! We can also read *Poo to Peaches,* a book about composting toilets for kids developed by the Watershed Management Group.

Produce Tastings - Rich Earth can bring vegetables grown in their demonstration garden to local classes for produce tastings.

Grades 6-8

Intro to Peecycling

Students are introduced to the concept of the food nutrient cycle, following the flow of nutrients through the environment. An overview of environmental and public health consequences of conventional, linear nutrient flows is provided, including synthetic fertilizer production and wastewater treatment. Then the steps of Rich Earth's community scale urine recycling program are described, including collection, transport treatment, and application.

Activity: Students draw the four steps of a community-scale urine nutrient recycling program: collection, transport, treatment, and application. We engage them in talking about each step as it relates to their own home, community, and watershed, and encourage them to ask questions as they draw.

Extensions:

Produce Labels - Students imagine and draw labels that a farmer might use to put on their urine-fertilized produce.

Cartoon - Students draw a cartoon focused on one person or animal (farmer, toilet user, town mayor, fish) imagining what they might think about peecycling.

Video - Students watch a short animation (3 and 6 minute versions available) narrated by "Uri" which explains peecycling.

Grades 9-12

Ex(pee)rimental Design

Students explore the effects of urine fertilizer on plants, soil, and water--experimenting with different amounts of urine and dilution levels, practicing careful plant observation, comparing how fertilized and unfertilized plants differ in yield, development, plant/insect interactions, disease etc. Rich Earth can provide small amounts of pasteurized urine to interested classrooms.

Extension:
Social Research - Students practice creating and implementing surveys and interviews. These can be used to explore attitudes towards the use of urine as a fertilizer. Examples of questions include: Would people feel comfortable eating food grown on crops that have been fertilized with urine? What words for communicating about urine fertilization do people prefer?

Chemistry of Pee

Students learn about processes of ammonia volatilization and pH change. Students can explore how hydrolyzed urine is an example of a buffer system and the role of pH in enzyme inhibition.

Urine Reclamation Life Cycle Analysis

Students explore the concept of life cycle analysis of systems, considering questions such as: How does using urine as a fertilizer compare to the use of similar synthetic fertilizers? How do different ecological sanitation systems compare to conventional wastewater treatment and septic systems? Rich Earth can introduce data about water consumption and greenhouse gas emissions to support this workshop.

College and beyond

Role-playing: Urine Diversion on Campus

Students engage in a role-playing activity using an online teaching case about decision-making for urine-diverting toilets. Students play the roles of different university stakeholders (Director of the Botanical Gardens, Dorm Facilities Manager, Environmental Engineer, Student, Housing Director, and Maintenance Staff) and discuss the pros and cons of installing urine-diverting toilets at an on-campus student dormitory and processing the collected urine into fertilizer.

Climate Resilience & Circular Sanitation

This webinar examines how our climate is affected by the fertilizer industry, conventional wastewater management systems, and modern agricultural practices. Students are encouraged to explore how urine recycling can help build local climate resilience through protecting water resources and supporting nutrient sovereignty.

Urine Fertilizer and Pharmaceuticals

What happens to the medicine in our urine? Is urine that contains pharmaceuticals safe to use as a fertilizer? In this presentation, we share what Rich Earth has learned from six years of research in partnership with the University of Michigan to answer this question - and what new questions we still have.

Introductory webinars (for school community)

Rich Earth can offer presentations for adults in the school community (including teachers, school staff, and student families) introducing the concept of urine nutrient recycling and addressing any questions/concerns that people may have prior to Rich Earth's engagement with students in the classroom.

Research Center Tours (all ages)

Class groups visit the Rich Earth Institute for tours to see nutrient recycling in action. (Preview with a virtual tour of Rich Earth). Rich Earth will give a brief introductory presentation and then walk student groups through the technology and processes that support collection, transport, treatment, and application as fertilizer on farms. The tour features Rich Earth's laboratory, demonstration garden, urine transport truck, treatment technologies, and a "toilet museum" of urine-diverting and composting toilets.