

## **Problem-Based Learning Unit Template**

### **Topic**

**Water/Matter  
Goals/Objectives**

**6.1, 6.3, 6.4, 6.5, 6.6, 6.7, 6.9**

### **Theme**

**Human impact on water and living systems**

### **Scenario**

**The City of Salem needs a new landfill. Consideration as been given to using the land on which Moyer Sports Complex, the skate park and part of the greenway which runs along the Roanoke River now exist on which to build a new landfill. How can we manage the impact of this project?**

### **Culminating Activity**

**Students will present their findings to the city council.**

## Problem Question

### Level 1 Question

**How can we mitigate the effects that human activity has on Virginia watersheds?**

### Level 2 Questions

- 1. What are the environmental impacts of this project?**
- 2. What are the economic impacts of this project?**
- 3. What are the cultural impacts of this project?**

### Level 3 Questions

#### **Economic**

How much will it cost to build? (6.9 d)

How much will the land cost? (6.9 d)

Who will build it? (6.7 f 6.9 a ,b ,c, d)

How much will it cost to filter water that goes through the landfill?(6.4 b, c, e, g 6.9 a, c,d 6.7 a, d, f, g 6.1 a, b, c, d, e , j, k)

Agriculture in the Classroom activity: Streambed design challenge, water filtration system creation with pebbles coffee filter and sand

How will they pay for it?(6.9 d)

Culminating activity

Will our city make money by taking garbage from other places? 6.9 a,c,d

How will our city use the money that it makes?6.9 d

#### **Environmental**

Is this the best place to build it in Salem?6.9 a,c,d

Can't we build it somewhere else?6.9 a,c,d

What is a watershed?(6.7a,b,c,f)

Design challenge: Students will build a model that has at least 3 rivers which drain into the same body of water, VA DOE Scope and Sequence Activity "The Key to Life", VA DOE Scope and Sequence Activity "Where are Virginia's watersheds?", VA DOE Scope and Sequence activity "Wetlands" and VA DOE Scope and Sequence Activity "Stream Flow and Slope"

What is our watershed?(6.7 a,b,c,)

VA DOE Scope and Sequence Activity “Where are Virginia’s watersheds?” and “Wetlands”

What is a landfill? 6.9a,c,d

[www.teachengineering.org](http://www.teachengineering.org) activities “Eek, It Leaks” (design challenge) and “Landfills: Building Them Better” (design challenge), “Design, Build, and Test Your Own Landfill”

Is the water in the Roanoke River clean enough to use?(6.7 a,b,c,f,g,6.9 a,c,d)  
Field trip

Do we really need a landfill?6.9

VA DOE Scope and Sequence Activity “Conservation and the Environment”

Why do we need a landfill?6.9

VA DOE Scope and Sequence Activity “Conservation and the Environment”

Can we fish in the river? 6.9

Can we swim in the river? 6.9

Where does the water come from?(6.9 a,c,d 6.3c,d, 6.6 d)

“Drop in the Bucket” Project Wet/Save Our Streams demonstration

VA DOE Scope and Sequence Activity “Waste Not, Want Not”

What animals will it affect?6.9 a,c,d,

VA DOE Scope and Sequence Activity “The Key to Life”

How will it affect the animals there? (6.9 a,c,d) 6.5

VA DOE Scope and Sequence Activity “The Key to Life”

What plants will it affect?6.9 a,c,d 6.5b

VA DOE Scope and Sequence Activity “The Key to Life”

How will it affect the plants?6.9 a,c,d 6.5 b

VA DOE 6.5 b Scope and Sequence Activity “The Key to Life”

Can we just build it somewhere else?( 6.9 a,c,d)

Will it affect temperature?(6,5 b, d 6.3 c, 6.6 e)

Gizmo – “Coastal Winds and Clouds”

How will they keep the river from getting polluted? (6.9 a,c,d 6.5 f)

VA DOE 6.5 b Scope and Sequence Activity “Water Quality”

What is water made of?(6.4 a-g)

Atom Builder, Element Builder Gizmo

What is in water?(6.4 a-g 6.5 a,c)

Element Builder Gizmo, Alien Juice Bar computer game, VA DOE 6.5 b Scope and Sequence Activity “Water Testing” and VA DOE 6.5 b Scope Sequence Activity “Water Quality”

What are the properties of properties of water? 6.5 a, b

VA DOE 6.5 b Scope and Sequence Activity “Molecular Attraction” and “Universal Solvent”

### **Cultural Impact**

Where will we play our games? (6.9 a,c,d)

Where will we ride our skateboards? (6.9 a,c,d)

Can we skate on the river?(6.5 b, d 6.4 a,c)

VA DOE 6.5 b Scope and Sequence Activity “Water Formations” and “How Dense Can It Be?”

Can we get biomass gas from the landfill? 6.2 d

### **Student Role**

Students are research assistants for the SW VA water authority.