Rising Sea Levels Coastal Systems Model PBLP (Grades 7–12)

Objective: To explore how rising sea levels impact ecosystems, infrastructure, equity, and long-term community sustainability. Learners examine rising sea levels as a system, driven by environmental change, coastal development patterns, technological tools, policy decisions, and community preparedness, and analyze how resilience models can strengthen local adaptation. Through STREAMSS disciplines, learners inquire about discipline related topics to understand rising sea level changes.

Round Table

- ❖ **Discussion Questions:**
    - ➢ What causes sea levels to rise, and what systems are most affected?
    - ➢ Which neighborhoods, ecosystems, or infrastructures in our region are most vulnerable?
    - ➢ How does rising sea level risk differ based on geography, income, access, and zoning?
- ❖ **Purpose:** Introduce learners to the idea that sea level rise is not only an environmental challenge but a systems challenge, one that intersects with coastal community planning, technology use, communication, and community access. Understand how coastal flooding and erosion events act like "stress tests" for existing systems, revealing vulnerabilities in infrastructure and emergency preparedness.
- ❖ **Materials:** Reflection journal

Reflection Point

- ❖ **Discussion Questions:**
    - ➢ Where do current preparedness systems break down during flooding or storm-related surges?
- ❖ **Materials:** Reflection journals

Knowledge Setting

Science (S): Climate Systems & Environmental Impact	❖ **Objective:** Understand how thermal expansion, glacier melt, and climate systems influence rising sea levels and coastal change. ❖ **Activity:** Study sea level datasets, storm surge patterns, local climate projections, and ecosystem impacts (wetlands, erosion, salinity changes). Compare historical trends with future projections.
Technology (T): Mapping & Digital Monitoring Systems	❖ **Objective:** Understand how digital tools predict, track, and model rising sea levels and coastal flooding. ❖ **Activity:** Evaluate digital tools and real-time sea level dashboards. Analyze how open data tools help communities prepare.
Research (R): Investigating Local Coastal or Flood-Risk Patterns	❖ **Objective:** Investigate how rising sea levels disproportionately affect various coastal communities, infrastructures, and ecological zones. ❖ **Activity:** Collect and compare data on flood frequency, storm damage, displacement rates, mitigation spending, and access to emergency resources.

Engineering (E): Neighborhood Coastal Resilience	❖ **Objective:** Understand municipal infrastructure vulnerabilities and redesign options. ❖ **Analyze**: Public documents that are geared towards flooding readiness.
Arts (A): Visualizing Climate Futures & Community Narratives	❖ **Objective:** Understand how visual storytelling communicates risk, resilience, and community voices. ❖ **Activity:** Analyze maps, illustrations, or multimedia pieces depicting future scenarios, cultural memory, community resilience, and local stories about environmental change.
Mathematics (M): Modeling Flood Risk & Sea Level Projections	❖ **Objective:** Understand how data is used to forecast sea level rise, calculate risk intervals, and allocate resources. ❖ **Activity:** Analyze datasets on elevation, rainfall, storm frequency, and cost projections.
Social Studies (SS): Policy, Land Use, and Coastal Equity	❖ **Objective:** Understand how policy decisions, zoning laws and land use structures influence vulnerability. ❖ **Activity:** Analyze which policies support protection and which create barriers to preparedness.

Project Examples

| Progress Map for Project Delivery | ❖ **Step 1: Project Proposal**

Learners gather foundational knowledge through a collaborative knowledge-setting session to prepare for a project-based learning process. They meet with community partners (if possible) and create a written proposal outlining the project focus and intended community benefit.

❖ **Step 2: Initial Project Proposal and Community Engagement Plan**

Learners submit proposals and reflect on community input, refining their plans. They outline how the project addresses real-world needs and aligns with learning objectives.

❖ **Step 3: Research Progress Update**

Learners conduct research and gather data by consulting with community partners to guide their project development and ensure accuracy.

❖ **Step 4: Draft of Final Project**

Learners compile findings into a working draft of their final project proposal.

❖ **Step 5: Final Project Refinement and Approval for Implementation**

Learners apply final feedback to strengthen their project and submit it for approval. Approved projects move forward to the community involvement and assessment phases outlined in the SOP. |

Science (S): Ecosystem & Environmental Impact Resilience Report	❖ **Project Example:** Partner with a local environmental group to analyze how wetland loss, soil erosion, or salinity increases influence regional ecosystems. Create an Environmental Impact Resilience Plan with strategies that are relevant to the coastal community.
Technology (T): Sea Level Open-Data Early Warning Hub	❖ **Project Example:** Collaborate with a community center, school, or disaster-readiness program to design an open-data dashboard displaying tide levels, flood alerts, safe routes, and resource updates.
Research (R): Community Flood-Risk Equity Report	❖ **Project Example:** Work with local coalitions to gather data on flood frequency, property elevation, emergency access, and insured vs. uninsured households. Produce a Community Equity Report identifying structural vulnerabilities.
Engineering (E): Neighborhood Coastal Resilience	❖ **Project Example:** Partner with municipal planning, public works, or local emergency teams to map drainage pathways, infrastructure vulnerabilities, and redesign options. Propose engineered solutions such as porous pavement, bioswales, raised infrastructure, or living shoreline systems.

Arts (A): Rising Sea Levels Visualization & Public Awareness Exhibit	❖ **Project Example**: Collaborate with a library, museum, or cultural center to create a visual exhibit comparing present-day landscapes with projected sea level changes.
Mathematics (M): Sea Level Projection & Cost Modeling Tool	❖ **Project Example**: Partner with a local emergency preparedness agency to develop a model that calculates projected sea level rise effects, infrastructure repair costs, risk probability, and resource distribution needs.
Social Justice (SS): Coastal Resilience Policy & Land-Use Reform Proposal	❖ **Project Example**: Partner with local policymakers or advisory boards to examine zoning, emergency preparedness, transportation routes, and relocation protections. Draft a mock Coastal Equity & Resilience Reform Proposal.

Community Involvement

❖ **Objective:** Implement learner-designed resilience projects through partnerships with environmental groups, emergency readiness organizations, city planning departments, libraries, and community coalitions. Learners document how resilience models improve preparedness and safety.

Assessment

- ❖ **Objective:** Evaluate accuracy, quality, clarity and community impact.
- ❖ **Methods:** Use rubric-based assessments grounded in interdisciplinary depth, innovation, and application, complemented by partner and peer evaluations.

Feedback Loop

- ❖ **Activity**: Learners reflect on how resilience systems changed their understanding of rising sea level impacts, infrastructure design, equity, and preparedness.
- ❖ **Journal Prompt**:
    - ➢ What would strengthen communication, transparency, or resource coordination in the most vulnerable area?

Resume Integration

- ❖ Draft their STREAMSS-based climate resilience project experience, emphasizing real-world implementation, interdisciplinary research, coastal adaptation, and systems-thinking.

For more STREAMSS 8-Step Project-Based Lesson Plans, go to our website at www.steamsinitiative.org.

For all inquiries, please email **info@steamsinitiative.org**