**Sustainable Island Game**

**Objective:** You are to create an island environment that is sustainable for **at least 6 generations**. If you exceed the number of beads (for any category) than you are allotted, you have **NOT** succeeded.

1. **Record the number of each in your data table**:

**CUP 1**: 70 **BLUE, WHITE, & CLEAR** beads that represent the **water supply** drawn from the lake that is on the island

**CUP 2**: 40 **GREEN, PINK, & ORANGE** beads that represent the **land acreage** that is farmed/cultivated on the island

**CUP 3**: 40 **BLACK & PURPLE** beads that represent the **energy supply used** by the people of the island

**CUP 4**: 4 **RED & YELLOW** beads to represent the **people** originally on the island

**CUP 5**: empty; for beads that will be **discarded** during the activity

1. **Select** your energy source\* and primary source of employment. **Record** your selection:
* **ENERGY**
	+ coal-fired electric utilities
	+ hydroelectric
	+ nuclear
	+ solar
	+ geothermal
	+ wind energy
* **EMPLOYMENT** 3/4 of the inhabitants have to be employed
	+ industrial workers
	+ service industry workers
	+ farmers (must have farmers)

\*Can be entirely one or combination of energy and employment types

\*\* **LOOK** through the RESOURCE RULES ***BEFORE***you make your energy and employment choices\*\*

\*\*\****Before*** starting **EACH** generation you may change your type(s) of employment and energy\*\*\*

1. Fill in the first row of your table and discard any beads into cup 5 that you have used. Remember to **SHOW CALCULATIONS** and record your bead consumption in the data table.

**CALCULATIONS**

* Multiply the # of people by 1.75 to represent the increase in population due to births and immigration (round to a whole number).
* Add that number of yellow beads to your current population.
* Take 20% of the current population (rounding again) and discard those people (yellow beads) due to death and emigration to another island.

***Example:*** 4 people x 1.75 = 7 (3 yellow beads are added to the cup that already has 4)

0.20 x 7 = 1.4 = round down to 1 (1 yellow bead is discarded)

7 – 1 = 6 (number of people to begin generation 2)

*Any beads (water, land, or energy) that remain in CUP #5 are now to be discarded forever (returned to the*

*bead storage containers).*

***Outcome:*** If at any time you run out of any beads (you no longer have the correct # of beads to be able to

discard them) your colony has died out due to lack of water, land resources, or energy needs.

**RESOURCE RULES:**

**Water, Food, & Shelter**

* ***Each person***uses 1 **water-blue-** bead per generation for basic water uses
* 1 **land-green-** bead & 1 additional **water-blue-** bead supports up to **10 people** for their food supply
* 1 additional **land-green-** bead is needed for up to 10 people for their housing (add more when you go over 10)

**Population growth**

* ***Before*** starting the **4th generation**, roll the die once. Record the number on your data table.
* If you rolled a “**6**” then your births will remain the same throughout the upcoming generations
* If you rolled a “**3**” then your population will only increase by 1.35 x the rate of the population
* If you rolled a “**5**” then your population will increase by 2 x the rate of the population
* All other numbers, continue with the 1.75 x the rate of the population and 20% deaths

**Energy**

* **Coal-fired electric utility** supports a maximum of **10 people** for their household needs
	+ Uses **1 energy bead, 2 land beads, and 1 water bead** per generation
	+ For **multiples of 10** people that use this energy you have to start another plant
* **Hydroelectric plant** supports a maximum of **5 people**
* Uses **1 energy bead and 1 land bead** per generation
* Also, for every **2 hydroelectric plants** installed there is an additional water bead used per generation
* **Nuclear power plant** supports a maximum of **10 people**
* Uses up **1 energy bead, 1 land bead, and 1 water bead** per generation
* Because of the need for storage of radioactive waste on site, every 1 generation spends another water and land bead
* All other types of energy are lumped together as **“alternative energy”**
	+ **EACH** supports a maximum of **4 people**
	+ For every **3 alternative energy sources** there is **1 energy bead** per generation
	+ Alternative energy sources aren’t without costs, as they require water, land, & other resources to generate the resource. For every **3 generations**, **1 land bead and 1 water bead** is used.

**Employment**

* EACH **industrial plant** supports a maximum of **10 jobs**
	+ Uses **2 land beads and 1 energy bead per generation**. (If more than 10 people work in industry you have to start a 2nd plant.)
* EACH **service industry** supports a maximum of **10 jobs**
	+ Uses **1 land bead and 1 energy bead/generation**
* EACH **farming operation** supports a maximum of **4 jobs**
	+ Uses **1 land bead & 1 energy bead/generation**
	+ Each farming operation covers 10 acres & every additional farm is also 10 acres in size
		- There is a **loss of 1 land bead** after every **3 generations** due to soil erosion
	+ **1 water bead** is used to water each farming operation EACH generation

**Waste And Water Treatment**

* 1 land bead supports a maximum of **10 people** for their waste disposal needs in a sanitary landfill or incinerator for a period of **3 generations**
* **1 energy bead** is used in EACH generation for disposal of equipment.
* **1 land bead** supports a maximum of **20 people** for the treatment of their drinking water and wastewater treatment
* **1 energy bead** is used EACH generation for running the treatment plants

**Redemption Rules For Each Generation**

* Sincewater is a renewable resource, you may retrieve all but 3 of the water beads you discarded.
* The 3 that remain discarded were due to water evaporation and contamination.
* You may regain 1 of these water beads per generation by your group implementing water conservation methods at the expense of **1 energy bead** per generation (water conservation is an ongoing endeavor)
* Since land is ever present, you may retrieve all but 2 of the land beads you discarded.
* The 2 that remain discarded were due to poor farming and construction practices that lead to soil erosion and sedimentation.
* You may regain 1 of these land beads per generation by your group implementing soil conservation methods – at the expense of 1 energy bead per generation (soil conservation is an ongoing endeavor).
* You may only use this option of land conservation 3 times during the game
* Only **energy** beads that were used as an alternative energy source may be retrieved since most forms of energy cannot be returned to their once usable state (natural gas and coal).
	+ You may regain **3 of these energy beads/generation** by your group implementing energy conservation methods (e.g., Installing energy efficient lighting, appliances, regulated thermostats, recycling, etc.) at an expense of **1 energy bead**. You may only use this **option 3 times** during the game

**DATA COLLECTION**

**Tracking of Resources Used -** *Be sure to remember to consider each of the following activities when completing the resource use data table:*

* Food
* Water
* Shelter
* Waste
* Water treatment
* Employment
* Redemption for sustainable actions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Generation** | **Water** | **Land** | **Energy** | **People** |
|  | **Uses** | **Gains** | **Losses** | **Uses** | **Gains** | **Losses** | **Uses** | **Gains** | **Losses** | **Activities** | **Gains** | **Losses** |
| 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| \*4 – population growth |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |  |  |  |

**Summary of Generations & Resource Use**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Generation** | **Water** | **Land** | **Energy** | **People** |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |
| 6 |  |  |  |  |