**Coastal ABM Pseudocode**

**Simulation Setup:**

1. *s = ICOMSimulator()* – Instantiates pynsim simulation object “s”
2. *s.set\_timestep\_information* – Adds timestep information to s (s.timesteps)
3. *s.set\_landscape* – Adds landscape/network to s using census geography table input (s.network). Key attributes of the network include:
   1. *s.network.nodes* – a list of nodes, each node corresponding to a census geography (e.g., a unique block group)
4. *s.network.add\_institution(CountyZoningManager())* – Adds institution that will make zoning decisions
5. Adds institution that will make levee construction decisions
6. *s.network.add\_institution(AllHHAgents(name='all\_hh\_agents'))* - Adds institution that serves as a container for all household agents
7. *s.convert\_initial\_population\_to\_agents* – Adds household agents as mobile entities to the model (i.e., can re-locate between nodes/block groups)
8. Add various engines to the simulation
   1. *s.add\_engine(AgentLocation))*
   2. *s.add\_engine(FloodHazard(target))*
   3. *s.add\_engine(Zoning(target))*

**Simulation Process Sequencing (for each timestep):**

**Accounting Steps:**

1. *s.network.setup()* – **Updates total population** (self.total\_population) and block group populations (bg.population) based on agent locations. This is simply an accounting procedure and doesn’t change the state of the model.
2. *s.network.institutions[0].setup()* – **County zoning manager institution setup**. Currently nothing is performed here.
3. *s.network.institutions[1].setup()* – **All household agents institution setup.** Currently nothing is performed here.
4. *s.network.nodes[0].setup()* – **For each block group, update the population density** of the bg based on current population (self.population) and land area (self.area)

**Process steps:**

1. *s.engine[x].run()* – **New** **agent location choice engine runs.** Assigns new population from the “queue” to block groups with allowable development (as defined by the zoning agent, see **step X**). Next, determines agent re-location decisions. These are currently both represented as random processes as a placeholder.
2. s.engine[x].run() – **Real estate market engine runs**. Matches buyers in the market with available units.
3. *s.engine[x].run()* **– Levee construction engine runs.** Calls heighten\_existing\_levee() and build\_new\_levee() on levee manager institutional agent.
4. *s.engine[1].run()***– Flood hazard module runs.** This updates a flood hazard risk “score” for each block group / node in the model. Currently a placeholder.
5. *s.engine[2].run()* – **Zoning module runs**. Calls determine\_zoning() on zoning manager institutional agent. Currently restricts population increase if population density exceeds a threshold