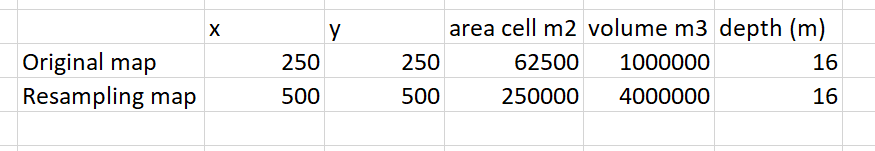
**Description of the Land Use and Subsidence model**

1. Agents

* **Sluice gate**
  + Location
* **Pumper** 
  + Location
  + Aquifer(qh, qp3):
  + Power (m3/day)

reflex:

* + - If Pumper is located in a non\_water of qh aquifer, it should take water in qp3, subsidence rate is higher.

* **Lake**
  + volume
* **GroundWaterCell (qh)**
  + WaterVolume = Value \* 10^6
  + groundWaterDepth = Water volume/pixel\_size ^2
  + 

**Actions:**

* + UpdateVolume(waterExtracted): Water volume - waterExtracted
* **LandCell**
  + Landuse
  + Elevation
  + WaterVolume
  + groundWaterDepth (Water volume/pixel\_size ^2)
  + WaterDemand
  + plantHealth:
  + WaterExtracted: Water volume - waterExtracted
  + loseDepth: groundwater extracted is converted to water depth lose (WaterExtracted/pixelSize)
  + DEM

**actions:**

* + calWater demand
  + Update subsidence:
    - init\_level – loseDepth
    - WaterExtracted: cumulative water extracted is calculated based on WaterExtracted +waterUsed
    - loseDepth: (**GroundWaterCell.** WaterVolume –WaterExtracted)/pixelSize
    - DEM = DEM – loseDepth
* **AEZ\_Simple**
  + Region
* GPlayLand
  + 4 representative regions: 1: Coast of Tien Giang & Long An; 2: Ben Tre – Tra Vinh; 3: Soc Trang; 4 West coast – Ca Mau

Corresponding to 10x10 cells in Game play (scale 1:3000)

* + Score
  + Heath
  + totalTreeDead
  + salWaterUnit
  + FreshwaterUsed
  + NumberPumper **<-**1
  + volumePump
  + list playerPumper
  + list playerlake
  + list playerSluicegate
  + list VRPumper
  + list VRLake
  + lít VRSluice

**Actions**

* **DEM**
  + Size 500x500m
  + Elevation: DEM
* SubsidenceCell
  + Elevation <- DEM
  + Init\_level: Init with subsidence in 2018 of Minderhood
* AquiferQHCell
* AquiferQP3Cell

1. Parameters

* timeStep: 1 year (30s in Game play – Call step every 30s)
* timeExchange: 30s
* scale\_Gplay\_GAMA” 1:3000
* paraWaterUsedSluice
* paraWaterUsedPumper
* paraWaterUsedLake
* lstSluicegate (list object)
* lstPumper (list object)
* lstLake (list object)
* maxwaterPumingVolume: maximum volume allowed per day < 10m3/day--> 10 \* 30day\*3months

1. Global actions
   1. CalWaterUsed.

- calculate total ground water used per year.

- calculate water demand of crops (landuse)

- groundWaterUsed (in dry season) is based on number pumper, lakes, sluice, AEZ\_simple region. The coastal AEZ lack of surface fresh water in the dry season.

- totalWaterPump = Sum ( GPlayLand.numberPumper \* maxwaterPumperVolume)

* 1. updateSubsidenceAquifer
  + calculate water extracted by pumpers
  + Update watẻ volume
  + Update elevation from subsidence (DEM)
  + Upate eleveation caused by the Sluicegate
  1. Get parameter(every 30s)

- list of objects: list of Pumpers, lakes, sluicegates

* 1. SendParameter
  + List of object: GPlayLand (score, subsidenceRate, salwaterUnitRate)

1. **Strategy:**
   * Init:
     1. Number of saltwater unit = number of trees
     2. Fresh water of lake: 50% waterunit of init\_salwater unit
     3. Fresh water of Pumper: 30% waterunit
   * No contruction: Trees dead all, no Subsidence: GameOver.
   * Sluicegate only: Trees dead (70%) cause by saltwaterand lack freshwater, subsidence 10%
   * Lake only: Trees dead 60% cause by the limitation of volume water, no Subsidence.
   * Pumpers only: Tree dead (50%) caused by saltwater, Subsidence 100%
   * Combination:
     1. Sluice + pumper: Tree lost ~30%, subsidence 70%
     2. Sluice + lake+pumper: Tree lost 20%, Subsidence 50% (placing in good places)
   * **Adding 1 more Pumper:** If Subsidence rate >0, saltwater of next year increase amount rate%/5

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1. Score: Subsidence, unitSalwater,
2. Đang chơi làm sao cho ngowif choi hiểu được tác dụng của các công trình đã được xây dựng.
3. Indicator cho mỗi hoạt động: VD tăng sụt lún, giảm thietj hại cây tròng ( Kèm mô tả cho mỗi yếu tố) . Thể hiện sự tác động của mỗi chu kyuf tiếp theo có thể dùng khu nước mặn chuẩn vị xuất hiện
4. Tutorial : Simple environment -> adding trees -> add conctruction
   * Hơ student know the density ( number tree)
   * Students plan new trees?

Annex

