

Core Model Proposal #365: Add Land Use History Output

Product: Global Change Assessment Model (GCAM)

Institution: Joint Global Change Research Institute (JGCRI)

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Related sector: land

Type of development: C++ code

Purpose: This Core Model Proposal adds the ability to output land use history data going back to the year 1700 to the GCAM database. Note that before 1975, all cropland is allocated to OtherArableLand; data on historical land allocation by cropland category is not available pre-1975.

Description of Changes

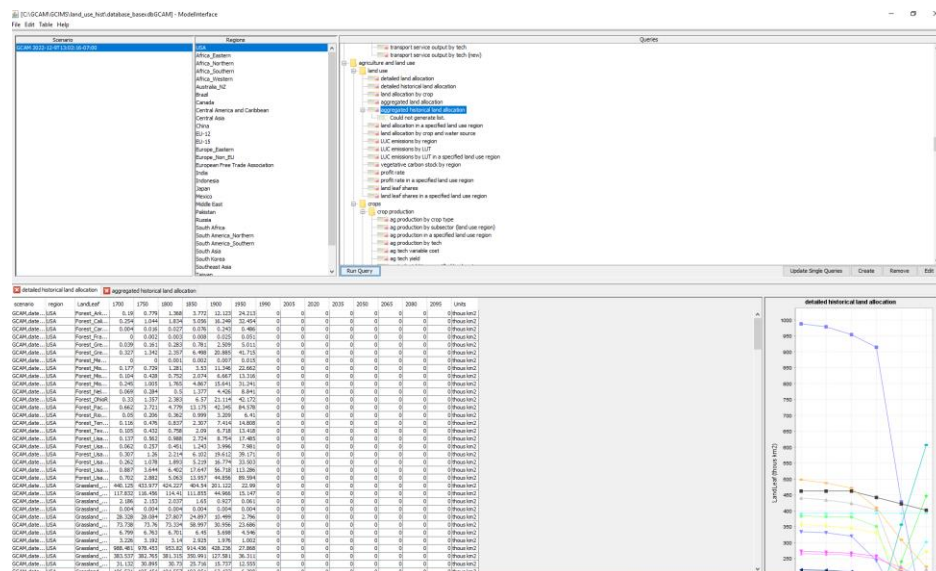
We added a `getHistoricalLandUse()` function in the `LandLeaf` class that returns a `LandUseHistory` pointer to the `mLandUseHistory` member variable.

In `xml_db_outputter`, we added a loop over land use history output to write historical land allocation ("hist-land-allocation") in thousand km² for each year of land use history. Additionally, for this to work we needed to include "land_allocator/include/land_use_history.h" and define a map `LandMapType` in `xml_db_outputter.cpp`.

Finally, we added a "detailed historical land allocation" query to `Main_queries.xml` to retrieve historical land allocation output in each `LandLeaf` and an "aggregated historical land allocation" query that aggregates this data to the same aggregate groups as the "aggregated land allocation" query.

Validation

Information on "detailed historical land allocation" and "aggregated historical land allocation" is written to the database and retrieved via the new queries (below). Note that before 1975, all cropland is allocated to `OtherArableLand`; data on historical land allocation by cropland category is not available pre-1975. For this reason, cropland data is filtered out of the new historical land allocation queries.



aggregated historical land allocation

million hectares

Year

Legend:

- Forest (shaded green)
- Forest (dark green)
- Grass (light green)
- Pasture (yellow)
- Arable (pink)
- Urban (blue)
- Other (grey)