Proposed Modification to Biomass Succession Extension
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We propose to create a new library (Biomass Library) to contain functions and classes shared among multiple succession extensions. Currently, the development of new succession extensions that use cohorts carrying additional attributes (beyond species, age, biomass) has required the duplication of extensions to work with the new cohort structure. By moving some functions and classes to a shared library which can manage conversions between cohort structures, the need to duplicate extensions to work with different cohort structures is removed (for disturbance and output extensions that use only species, age and biomass information). The property that makes this possible is the inheritance of the Biomass Cohort structure by the new succession cohorts. Conversions among inherited cohort structures can be handled within the Biomass Library. Non-succession extensions would no longer be dependent on the succession extensions, but instead be dependent on the Biomass Library.

Contents of Biomass Library:

- BaseCohortsSiteVar

- CohortDefoliation

- EcoregionAuxParm

- Pool

- SpeciesAuxParm

- Util

Advantages of reorganization:

1. Removes Biomass Succession dependency within biomass disturbance extensions and biomass output extensions.

2. Enables any succession extension with cohorts inheriting from Biomass Cohorts to work with biomass disturbance and output extensions.

Disadvantages of reorganization:

1. Requires updates to all extensions that utilize any of the functions or classes moved to the Biomass Library. Base Drought, Biomass Harvest, Biomass Insects and Output Biomass have been identified as needing updates. Updates are simple and have already been completed in code branches.

2. Adds the Biomass Library to the dependencies, which is another layer in the (already complex) hierarchy.

The current hierarchy: model-core → succession extension → biomass-cohort

This now becomes: model-core → succession extension → biomass-library → biomass-cohort

A granular structure where cohort, pool, species parameter, ecoregion parameter, etc. each have their own library might be a viable alternative but requires a lot of rewriting. Care should be taken that the task of Biomass Library is well defined, i.e., that it does not become a bin for all kinds of objects that have no clear place.

3. Century succession cohorts do not currently inherit from biomass cohorts, so Century succession would need to be altered to benefit from this change. Implementing inheritance has been tested for Century succession and can be done, but adds some extraneous code to Century succession.

4. The Forest Carbon Succession (ForCS) extension is built from Biomass Succession, which means changes to Biomass Succession should be incorporated into ForCS. The code for ForCS is not publicly accessible on the code repository, so changes will have to be handled by the authors of the ForCS extension. The only changes required are

    a. Removing the reference to Biomass Succession

    b. Add the reference to biomass library

    c. Change 'using Biomass.Succession' on top of .cs files to 'using biomass.library'

 They have been notified of this potential change and will work with us to make the necessary changes as they prepare for the next release of ForCS. In the meantime, ForCS will be incompatible with our updated version of Biomass Succession. Users will be able to have either Biomass Succession or ForCS installed, but not both. We recommend a warning message be placed on the ForCS and Biomass Succession extension sites to make this clear to potential users. Upon release of an updated ForCS extension the warnings can be removed.

Proposed Actions:

- Update code for Biomass Succession, Base Drought, Biomass Harvest, Biomass Insects and Output Biomass extensions to use the Biomass Library and remove dependency on Biomass Succession

- Update documentation for affected extensions to reflect a new minor release

- Update installer scripts for affected extensions to implement 'replacesameversion' Flag to ensure the most current version of files are always installed (not related to this change but needs to be done anyway)

- Update installer scripts for affected extensions to include dependency on Biomass Library dll

- Rename the Base Drought Extension to Biomass Drought because it works only with Biomass Succession (not related to this change but needs to be done anyway)

- Compile new installers for affected extensions

Timeline:

The proposed actions will be completed and tested by June 27, 2014. The new installers will be made available on the LANDIS-II website as of July 1, 2014.

Alternative:

The alternative to this proposed change is a series of disturbance and output extensions that work only with PnET-Succession. This would follow the trajectory of Century Succession where many extensions are duplicated to make them compatible, but our hope is to avoid the headache of creating and maintaining all of these other extensions.