Exploring sequestration rates for trees in crop and pasture lands (global)

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Just a first pass at calcualting rates of sequestration for trees in crop and pasture lands.

```
library(tidyverse)
```

```
## -- Attaching packages ---------------------------------------------- tidyverse 1.3.0 --

## v ggplot2 3.2.1.9000     v purrr   0.3.3
## v tibble  2.1.3          v dplyr   0.8.3
## v tidyr   1.0.0          v stringr 1.4.0
## v readr   1.3.1          v forcats 0.4.0

## -- Conflicts ------------------------------------------------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(ggplot2)
```

Pull in mean growth rates from (Feliciano et al. 2018)

```
growth_rates <- read_csv("../data/growth_rates.csv")
```

```
## Parsed with column specification:
## cols(
##   continent = col_character(),
##   agroforestry_system = col_character(),
##   mean = col_double(),
##   variance = col_double(),
##   n = col_double(),
##   CP = col_character()
## )
```

Read in standing biomass histograms

```
crop_hist <- read_csv("../data/crop_hist_25.csv")
```

```
## Parsed with column specification:
## cols(
##   .default = col_character(),
##   ABBREV_LEN = col_double(),
##   ADM0_A3_UN = col_double(),
##   ADM0_A3_WB = col_double(),
##   ADM0_DIF = col_double(),
##   BIOME_NUM = col_double(),
##   BRK_DIFF = col_double(),
##   BRK_GROUP = col_logical(),
##   ECO_ID = col_double(),
##   GDP_MD_EST = col_double(),
##   GDP_YEAR = col_double(),
##   GEOU_DIF = col_double(),
##   HOMEPART = col_double(),
##   LABELRANK = col_double(),
##   LASTCENSUS = col_double(),
##   LEVEL = col_double(),
##   LONG_LEN = col_double(),
##   MAPCOLOR13 = col_double(),
##   MAPCOLOR7 = col_double(),
##   MAPCOLOR8 = col_double(),
##   MAPCOLOR9 = col_double()
##   # ... with 19 more columns
## )

## See spec(...) for full column specifications.

## Warning: 3 parsing failures.
##  row       col           expected            actual                         file
## 1348 BRK_GROUP 1/0/T/F/TRUE/FALSE Channel Islands   '../data/crop_hist_25.csv'
## 1351 BRK_GROUP 1/0/T/F/TRUE/FALSE Channel Islands   '../data/crop_hist_25.csv'
## 1490 BRK_GROUP 1/0/T/F/TRUE/FALSE Jammu and Kashmir '../data/crop_hist_25.csv'
```

```
pasture_hist <- read_csv("../data/pasture_hist_25.csv")
```

```
## Parsed with column specification:
## cols(
##   .default = col_character(),
##   ABBREV_LEN = col_double(),
##   ADM0_A3_UN = col_double(),
##   ADM0_A3_WB = col_double(),
##   ADM0_DIF = col_double(),
##   BIOME_NUM = col_double(),
##   BRK_DIFF = col_double(),
##   ECO_ID = col_double(),
##   GDP_MD_EST = col_double(),
##   GDP_YEAR = col_double(),
##   GEOU_DIF = col_double(),
##   HOMEPART = col_double(),
##   ISO_N3 = col_double(),
##   LABELRANK = col_double(),
##   LASTCENSUS = col_double(),
```

```
##   LEVEL = col_double(),
##   LONG_LEN = col_double(),
##   MAPCOLOR13 = col_double(),
##   MAPCOLOR7 = col_double(),
##   MAPCOLOR8 = col_double(),
##   MAPCOLOR9 = col_double()
##   # ... with 20 more columns
## )
## See spec(...) for full column specifications.
```

References

Feliciano, Diana, Alicia Ledo, Jon Hillier, and Dali Rani Nayak. 2018. "Which Agroforestry Options Give the Greatest Soil and Above Ground Carbon Benefits in Different World Regions?" *Agriculture, Ecosystems & Environment* 254. Elsevier: 117–29.