#### Simulation of Natural Vegetation with SWAT

#### C. Allan Jones

Senior Research Scientist Texas A&M AgriLife Research Email: cajones@tamu.edu

### **The Problem**

- Many SWAT users have difficulty simulating land uses representing "natural" vegetation (natural forests, woodlands, shrublands, savannas, deserts, etc.).
- This is of special concern in tropical, boreal, and mountainous regions of the world where vegetation parameters provided on the SWAT website may be inappropriate.

## **Proposed Solution**

- Select internationally recognized descriptions and maps of "natural" vegetation types worldwide.
- Modify the SWAT plant growth module to assure that the biomass and leaf areas of this "natural" vegetation remains within observed ranges.
- Calibrate SWAT plant growth parameters for "natural" vegetation types.

# FAO Ecofloristic Zones (EZs)

- 20 "natural" vegetation types that would occur in the absence of human disturbance.
- Maps, statistics, and narrative descriptions of the EZs in: North and Central America, South America, Europe, Asian part of Former Soviet Union, Remainder of Asia, and Australia.
- Each EZ in a region is characterized by:
  - temperature regime (tropical, subtropical, temperate, boreal, and polar)
  - vegetation type (humid forest, dry forest, moist deciduous forest, shrubland, steppe, desert, etc.).

# **FAO Ecofloristic Zones**

- Tropical rain forest
- Tropical moist deciduous forest
- Tropical dry forest
- Tropical shrubland
- Tropical desert
- Tropical mountain systems
- Subtropical humid forest
- Subtropical dry forest
- Subtropical steppe
- Subtropical desert
- Subtropical mountain systems

- Temperate oceanic forest
- Temperate continental forest
- Temperate steppe
- Temperate desert
- Temperate mountain systems
- Boreal coniferous forest
- Boreal tundra woodland
- Boreal mountain systems
- Polar



#### UN Food and Agricultural Organization Global Ecofloristic Zones

 Maps of floristic zones in each geographic region: <u>http://databasin.org/datasets/dc4f6efd1fa</u>

84ea99df61ae9c5b3b763

 Introduction and narrative descriptions of the floristic zones of each geographic region:

http://www.fao.org/docrep/006/ad652e/ad 652e16.htm#TopOfPage

### **Critical SWAT Plant Parameters**

• Maximum Above-Ground Biomass.

Olson et al. (1985)

- Maximum and Minimum Leaf Area Indexes. Asner et al. (2003)
- Optimum and Base Temperatures.

Mean air temperature during periods of most active growth from weather station and CFSR data

## **Key References**

- Asner, G.P., Scurlock, J.M.O. & Hicke, J.A. 2003. Global synthesis of leaf area index observations: implications for ecological and remote sensing studies. *Global Ecology & Biogeography* 12, 191– 205.
- Olson, J.S., Watts, J.A. & Allison, L. J. 1985. Major world ecosystem complexes ranked by carbon in live vegetation: A Database. NDP-017, Carbon Dioxide Information Center, Oak Ridge National Laboratory, Oak Ridge TN.





#### Progress

- Draft SWAT vegetation growth parameters have been developed for EZs worldwide.
- Testing of plant growth in selected EZs in North America is under way using SWATlite (R. Srinivasan).