

Considering Forest and Grassland Carbon in Land Management



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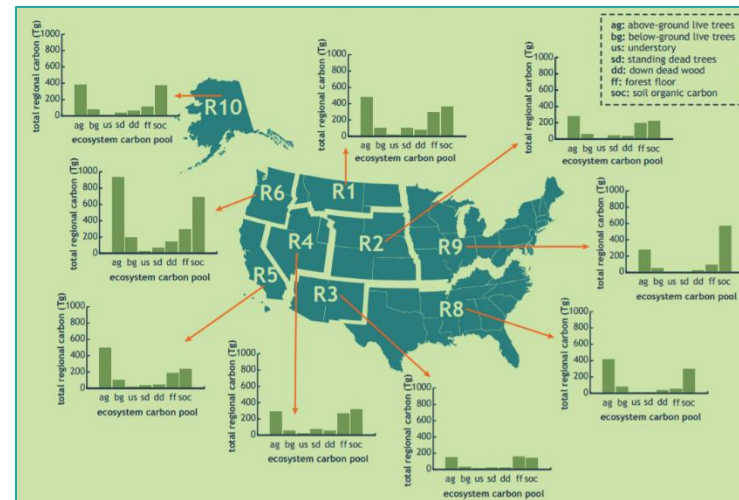


background

Continued interest from managers about carbon.

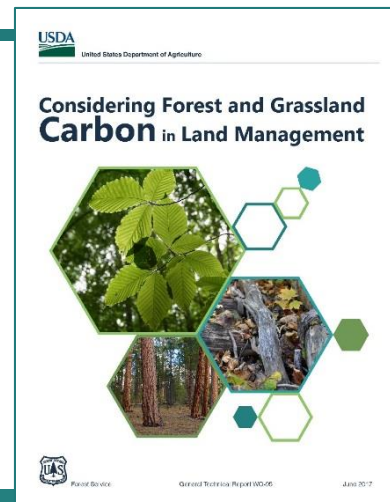
Existing products:

- ❑ [Topic Pages](#) and [Carbon Tools](#) on the Climate Change Resource Center
- ❑ [Forest and Grassland Carbon in North America](#) Short Course (via CCRC)
- ❑ Review papers by [McKinley et al.](#), [Ryan et al.](#)
- ❑ Carbon assessments for units and regions



background

- NIACS and the USDA Northern Forests Climate Hub synthesize scientific information on climate change and carbon for land managers.



New Synthesis Report!

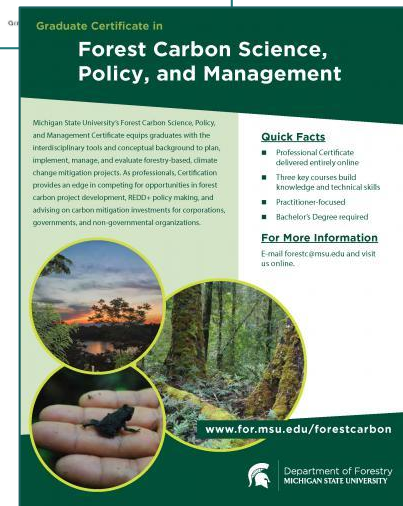
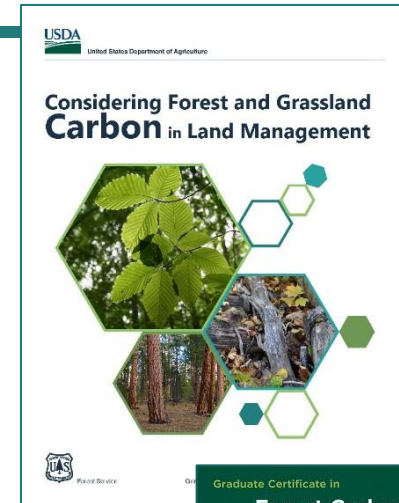
www.treearch.fs.fed.us/pubs/54316

Janowiak, M., W.J. Connelly, K. Dante-Wood, G.M. Domke, C. Giardina, Z. Kayler, K. Marcinkowski, T. Ontl, C. Rodriguez-Franco, C. Swanston, C.W. Woodall, M. Buford. 2017. **Considering Forest and Grassland Carbon in Land Management**. Gen. Tech. Rep. WO-95. Washington, D.C.: United States Department of Agriculture, Forest Service. Gen. Tech. Rep. WO-95. 68 p.

background

- NIACS and the USDA Northern Forests Climate Hub synthesize scientific information on climate change and carbon for land managers.
- Michigan State University has a Forest Carbon and Climate Program to increase understanding and implementation of climate-smart forest management

New collaborative project:
**Understanding Forest Carbon Management:
An E-Learning Program** (funded by NIFA)



planned e-learning products

1) E-Course on Forest Carbon Management

- Audience: natural resource managers, extension specialists, consultants
- Several hours of online, modular content
- Certificate of completion from MSU & continuing education credits

2) E-Module on Forest Carbon Management

- Audience: broader audience incl. natural resource managers
- ~1 hr. of content
- Made available via FS Climate Change Resource Center



climate change science



effects on forests



management responses

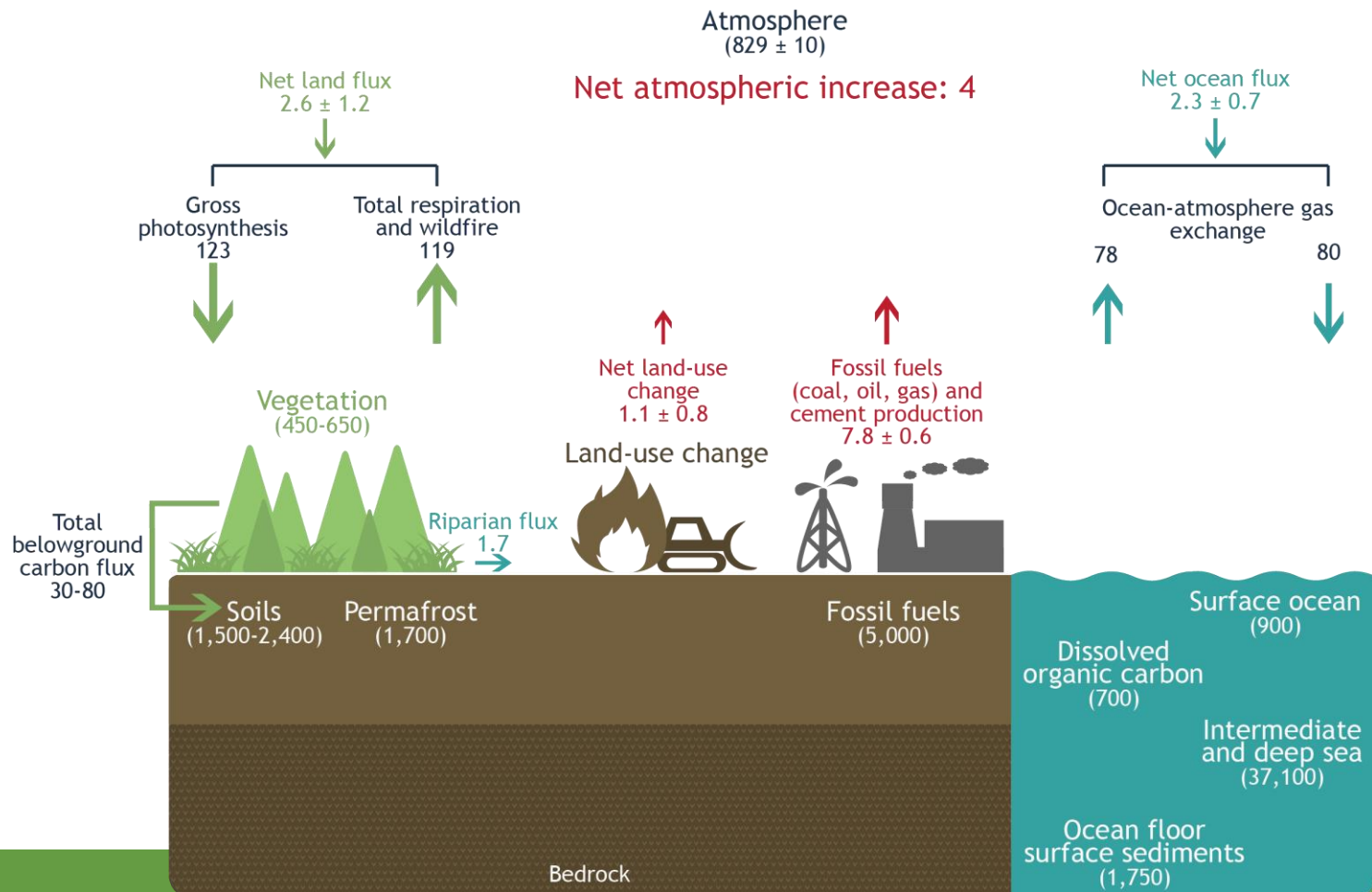
What do managers need to know?

- What information and skills to professionals need to know to do their jobs?
- What is the current level of knowledge?
- What topics are of greatest interest?
- What types of communication are most effective?



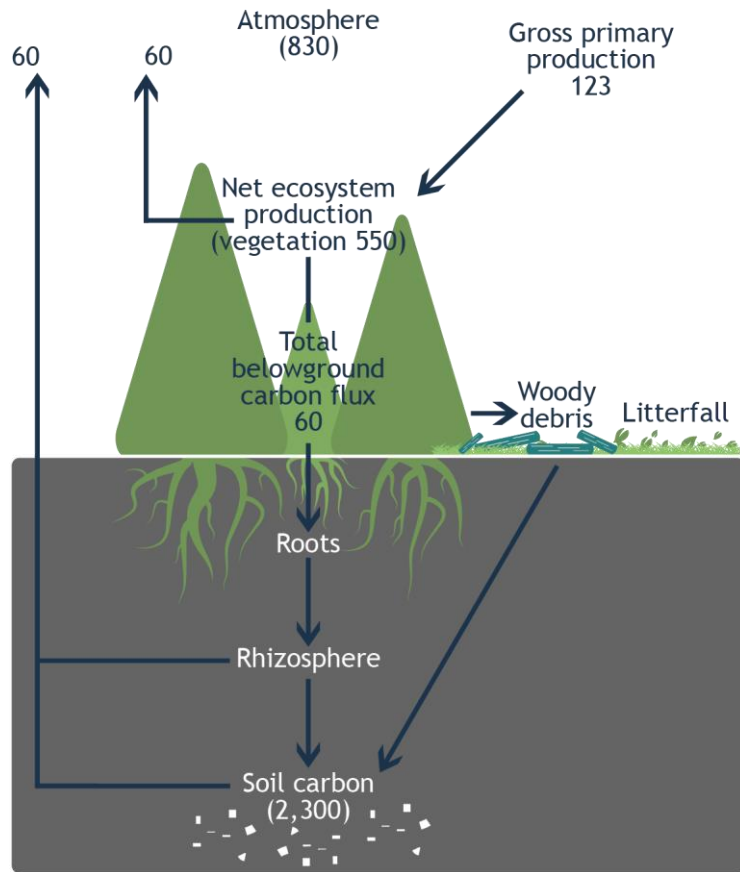
the importance of ecosystems

the global carbon budget

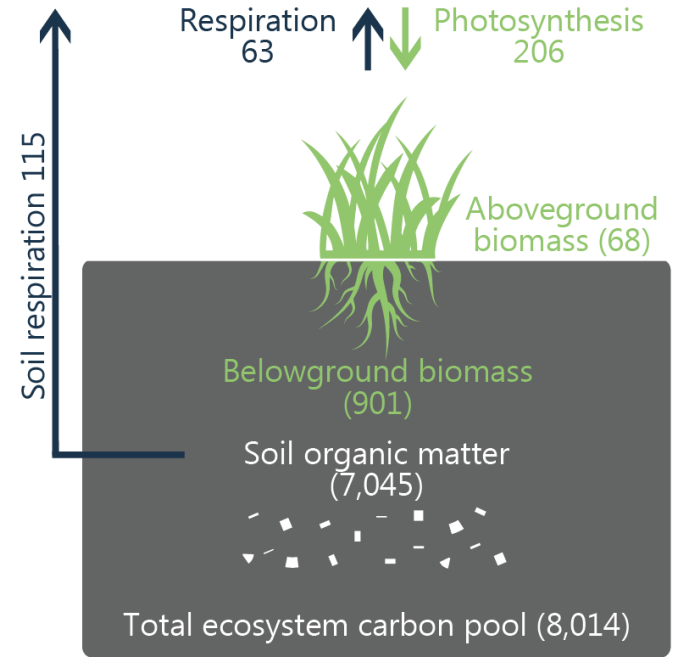


carbon cycling

ecosystem carbon cycles



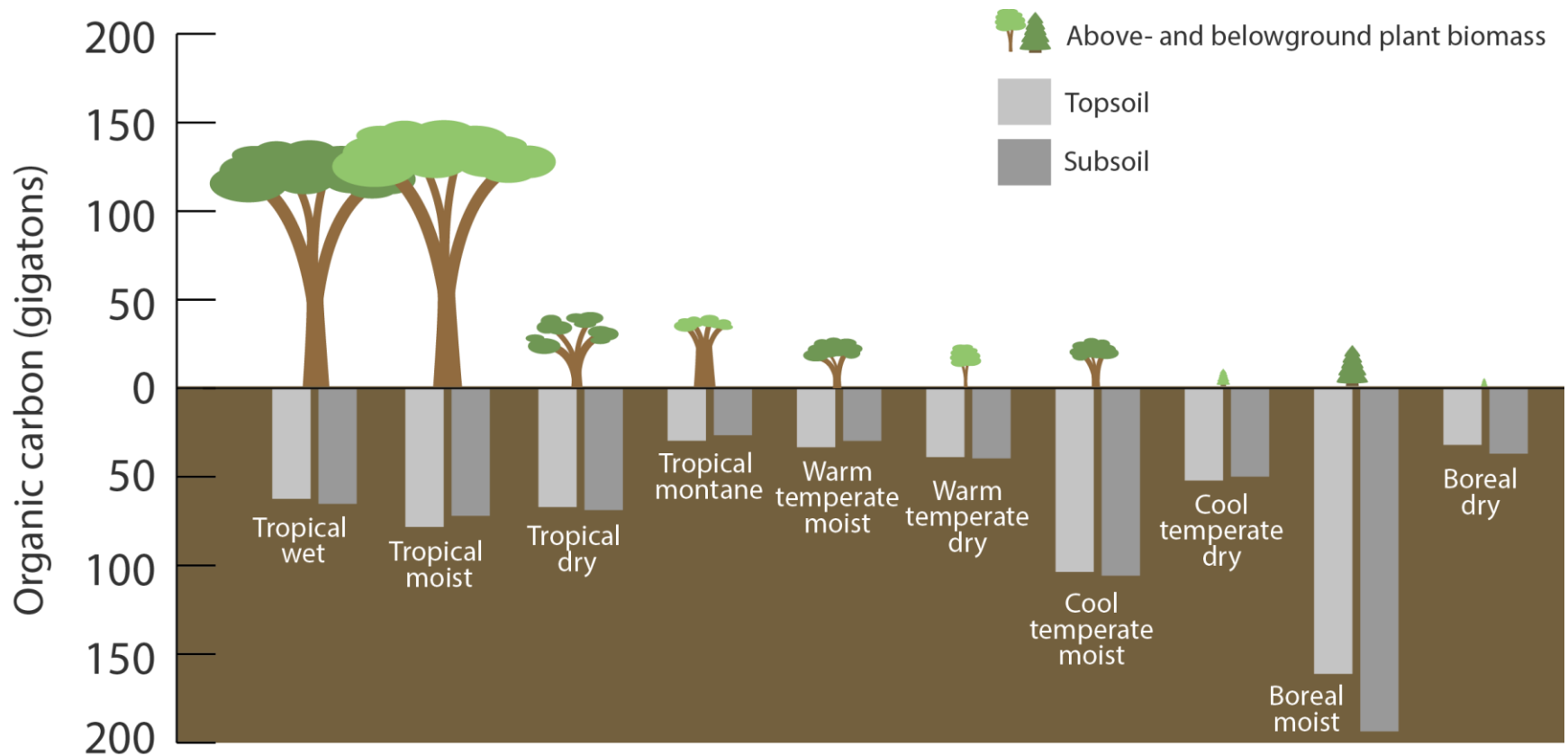
forests



grasslands

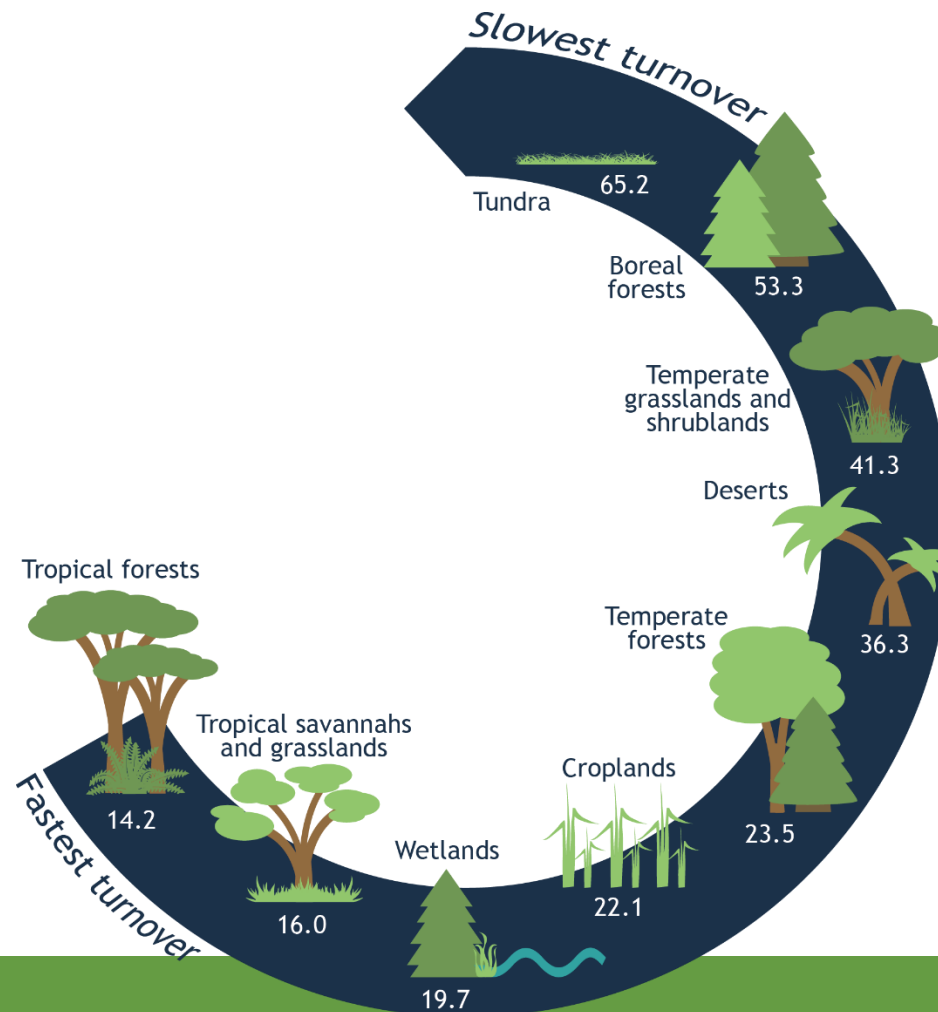
carbon cycling

differences in ecosystem carbon storage...



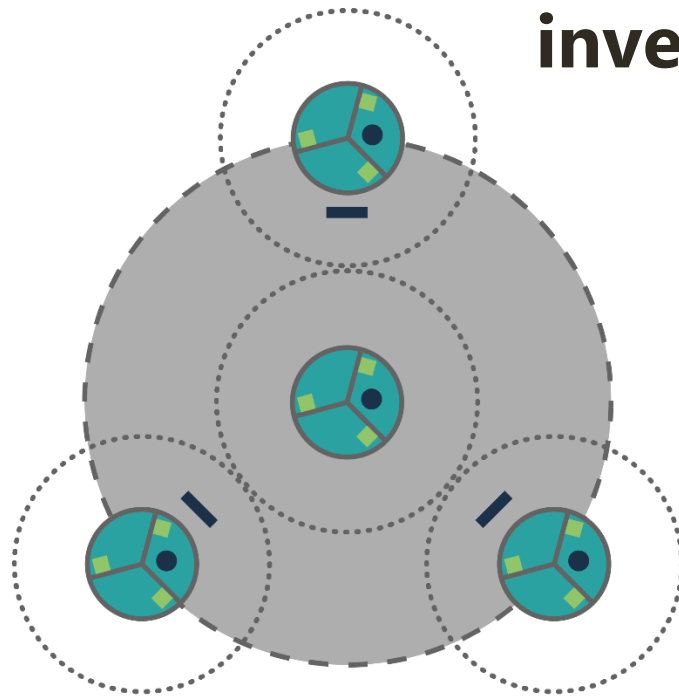
carbon cycling

...and turnover



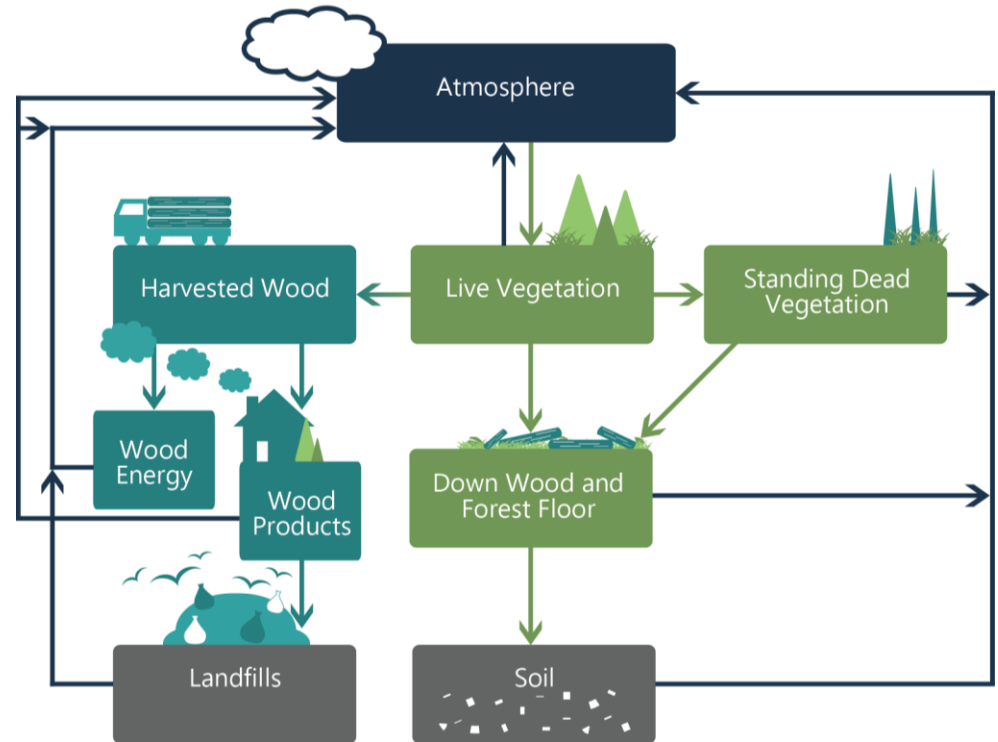
carbon measurement

inventory methods



	Subplot	24.0 ft (7.32 m) radius
	Microplot	6.8 ft (2.07 m) radius
	Annular plot	58.9 ft (17.95 m) radius
	Lichens plot	120.0 ft (36.60 m) radius
	Vegetation plot	1.0 square meter area
	Soil sampling	(point sample)
	Down woody debris	24 ft (7.32 m) transects

Forest Inventory and Analysis



standard pools and fluxes

carbon measurement

units and calculations

1 Metric ton



1,000 Kilograms



General Sherman
Sequoia National Park

1,200
Metric tons

1,200,000
Kilograms

1 Gigaton $=$ **1** Billion
(Gt) metric tons

More than

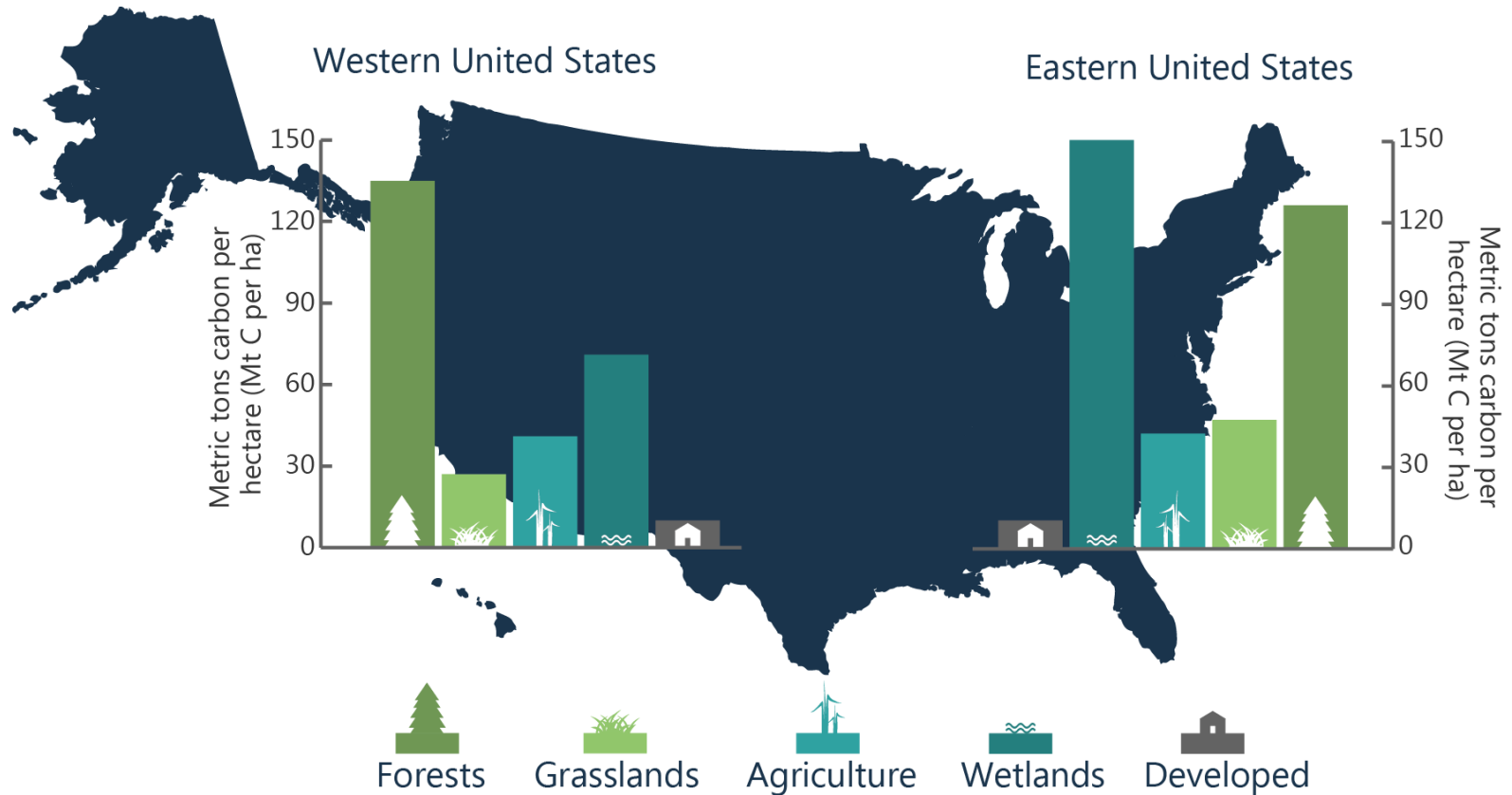
800,000



General Shermans

mitigation strategies

protecting carbon in natural ecosystems



mitigation strategies

minimizing losses + increasing sequestration



minimizing soil disturbance



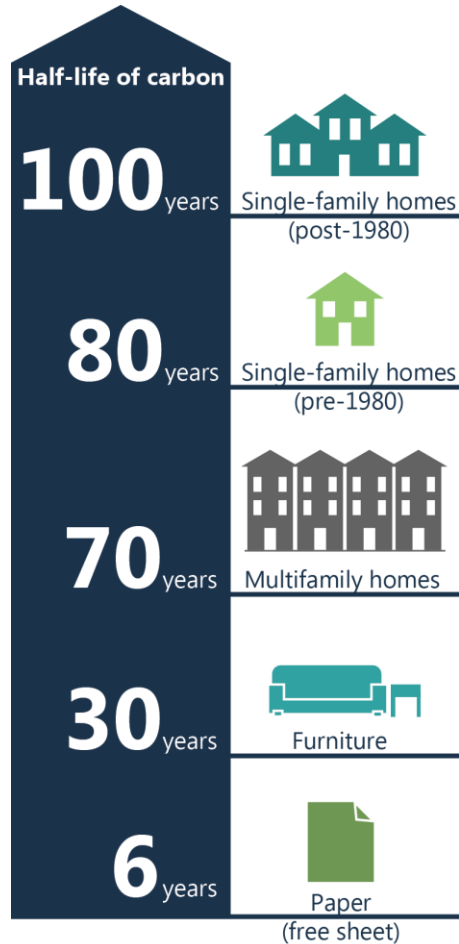
reforestation



extended rotations

mitigation strategies

using wood products and energy



wood products



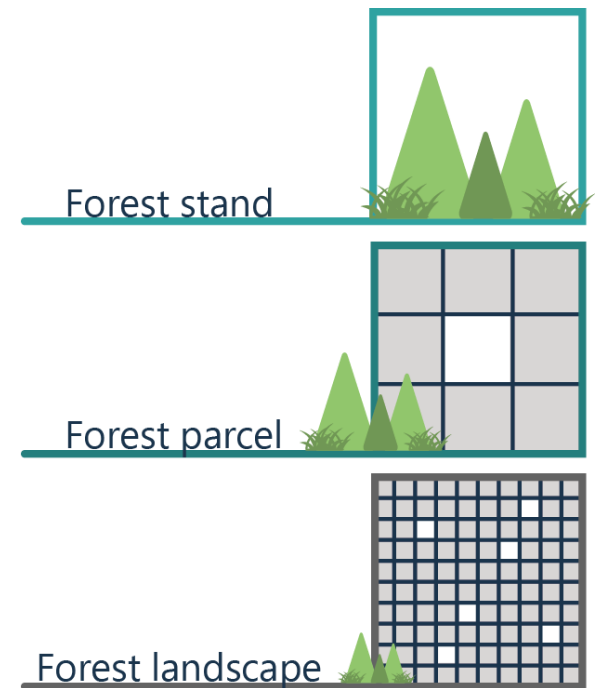
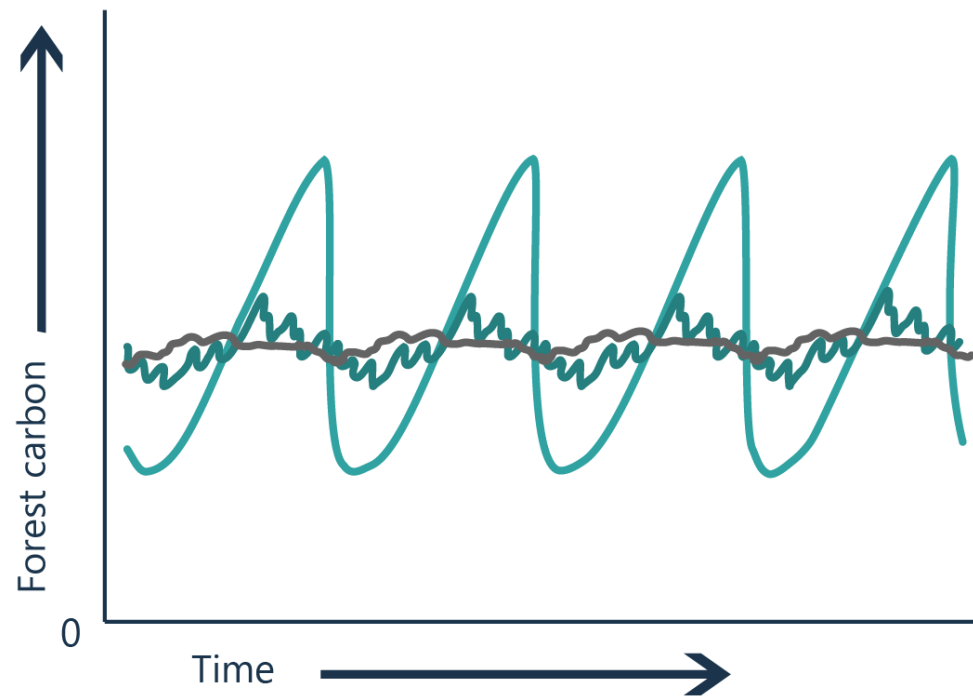
bioenergy



substitution

mitigation strategies

considering management across scales



mitigation strategies

balancing management with other objectives



wildlife habitat



water



climate change and other stressors



risk reduction

tools and resources

tools

Decision-Support Tools

		Bring Your Own Data	Spatial Scale	Output Metric	Ease of Use
<u>Cole</u>	COLE retrieves Forest Inventory and Analysis data for user-selected domain and converts it to ecosystem carbon and produces carbon yield tables.		(Larger) County to regional / national	Carbon Stocks	
<u>CTCC</u>	The CTCC Tree Carbon Calculator is the only tool approved by the Climate Action Reserve's Urban Forest Project Protocol for quantifying carbon dioxide sequestration from GHG tree planting projects.	minimal	Tree	Carbon sequestered (stocks) and avoided; CO ₂ equivalents of energy savings	
<u>FVS</u>	FVS is a stand-level vegetation growth simulator - many variants for U.S. regions and applications. FVS includes ecosystem and wood products carbon calculator.		Forest Stand	Growth and yield; carbon stocks	
<u>CCT</u>	A computer application that reads Forest Inventory and Analysis Program (FIA) data and generates state-level annualized estimates of carbon stocks on forestland based on FORCARB2 estimators		State to National Level	Carbon Stocks	
<u>CASA</u>	NASA's satellite-based model of productivity and carbon sequestration.		Forest to National Level	Carbon Stocks	
<u>NED2</u>	Forest ecosystem decision-support software that can be used by private land managers. This model utilizes fairly traditional growth and yield modeling.		Forest Stand	Forest Inventory	

case studies



- Real-world examples and issues:
 - Forest management
 - Carbon markets
- What data and skills were used in successful projects?
- Using appropriate tools and methods
- Access to markets and non-market considerations

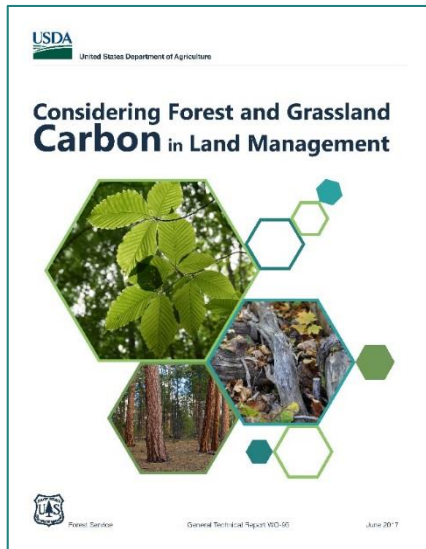
next steps

Timeline	Item
Fall 2017	Needs assessment
Winter-Spring 2018	Develop curriculum and create content
Fall 2018	E-course offered by MSU
Winter-Spring 2019	CCRC module development and launch

We're looking for feedback!

Send me an email to receive additional opportunities to direct the course curriculum.

THANK YOU!



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