

BIOS 3013 ECOSYSTEM CARBON ACCOUNTING

Credit Points 10

Legacy Code 300856

Coordinator Matthias Boer ([https://directory.westernsydney.edu.au/search/name/Matthias Boer/](https://directory.westernsydney.edu.au/search/name/Matthias%20Boer/))

Description A critical part of society's response to climate change is to measure the movement of greenhouse gases. Once this is done, steps taken to reduce these gases can be correctly targeted and the impact of such steps monitored. This unit will introduce students to the scientific measurement of greenhouse gas uptake and emissions, including assessment of uncertainties and verifiability of measurement. Ecosystem-level models will be used to estimate and quantify movement of greenhouse gases, allowing quantification of the net greenhouse gas emissions over the life cycle of a product. These approaches are vital steps in moving our society to a sustainable future.

School Science

Discipline Ecology and Evolution

Student Contribution Band HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 3 subject

Pre-requisite(s) EART 2001

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Describe the key components of the global carbon cycle, particular natural and anthropogenic CO₂ emissions, CO₂ uptake and release of managed and natural ecosystems, storage of carbon in the oceans and on land.
2. Describe and critique the measurement techniques available for measurements of carbon stocks in managed and natural ecosystems.
3. Describe sources of measurement error, spatial and temporal variability, and report uncertainty of estimates using confidence intervals.
4. Apply appropriate techniques to quantify carbon stocks of managed and natural ecosystems, with critical evaluation of the limitations of the methods.
5. Use the full carbon accounting model (FullCAM) to estimate pools and fluxes of carbon in forest ecosystems, and evaluate effects of alternative management strategies and environmental variation.
6. Describe and quantify the carbon storage in forestry products over their expected lifetime.
7. Communicate results of enquiry using a range of formats and media.

Subject Content

Components of the global carbon cycle: pools and fluxes
 Ecosystem carbon balance: processes and measurement
 Measurement of carbon storage: field methods, measurement error and sampling variability

Quantifying carbon storage: carbon sequestration in vegetation and soils

Ecosystem-level models for greenhouse gas accounting (Full Carbon Accounting Model, FullCAM)

Trade-offs between carbon sequestration and the water cycle: plantation water use, groundwater and salinity

Understanding carbon footprint, and the impact of substituting wood products for fossil fuels

Carbon accounting in an international context : important international treaties and initiatives (Kyoto, carbon trading, REDD), and the varying role of forestry plantations

Comparing greenhouse gas emissions with offsets created by forest plantations

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Item	Length	Percent	Threshold	Individual/Group Task
Scientific Report: Carbon sequestration of trees	1,500 words	20	N	Individual
Scientific Report: Carbon emission and sequestration	1,500 words	20	N	Individual
Life cycle analysis: Slide presentation (10%, group mark); Talk (10%, individual mark)	Slides: 20 - 30 slides; Talk: 5 - 8 mins	20	N	Individual
Final examination: Short answer and essay questions	2 hours	40	N	Individual

Teaching Periods