UNIVERSITEIT GENT

Studiefiche

Vanaf academiejaar 2024-2025

Tropical Forestry (I002705)

Cursusomvang *(nominale waarden; effectieve waarden kunnen verschillen per opleiding)*

Studiepunten 5.0 **Studietijd 150 u**

Aanbodsessies in academiejaar 2024-2025

A (semester 1) Engels Gent

Lesgevers in academiejaar 2024-2025

Van Acker, Joris	LA20	Verantwoordelijk lesgever
Hubau, Wannes	LA20	Medelesgever

Aangeboden in onderstaande opleidingen in 2024-2025	**stptn**	**aanbodsessie**
Master of Science in de bio-ingenieurswetenschappen: bos- en natuurbeheer	5	A
Uitwisselingsprogramma bio-ingenieurswetenschappen: land- en bosbeheer (niveau master-na-bachelor)	5	A

Onderwijstalen

Engels

Trefwoorden

Tropical forest carbon balance, tropical biodiversity, tropical forest classification, tropical forest types, sustainable forest management, ecosystem services, reforestation, agroforestry, tropical forest inventory, tropical dendrology, tropical forest conservation

Situering

This course is oriented towards students with a strong interest in tropical forests and the current issues regarding their ecology, management and conservation. A first part describes tropical forest ecology, with a focus on climate, ecosystem ecology (mainly the carbon balance), community ecology (e.g. patterns in biodiversity) and forest classification (zonal and edaphic forest types). A second part highlights different general and technical aspects of tropical forest management, planted forests, reforestation, agroforestry and non-timber forest products. This part also focuses on international forest management and timber trade regulations. A third part is a practical exercise, where the students get the chance to analyse a real dataset from permanent forest inventory plots that were measured multiple times. Students will calculate different metrics describing forest structure, dynamics and biodiversity. As such, they will gain insight in differences among forest types. In the dendrology chapter, we will discuss geographic distribution, ecology and diagnostic field charateristics of the most dominant tree species in the dataset. Students will also compare characteristics and abundance of the dominant species versus the most important commercial timber species. Finally, we will invite guest speakers to talk about their field experience. These speakers will highlight specific forest management, conservation and ecology issues. All parts cover the three tropical forest areas (South America, Africa, Southeast Asia), except the practical exercise which focuses on African tropical forests. The formal lectures are illustrated with video films where possible. The course is based on widely recognised manuals and books, as well as top-notch recent research published in scientific journals. All students are required to prepare a report on the practical exercise.

Inhoud

PART 1 Tropical forest ecology
Chapter 1 Tropical climate

Chapter 2 Tropical ecosystem ecology
Chapter 3 Classifying tropical vegetation
Chapter 4 Tropical forest community ecology

PART 2 Tropical forest management
Chapter 5 Tropical forest management - general
Chapter 6 Tropical forest management - technical
Chapter 7 Planted forest and reforestation
Chapter 8 Agroforestry and non-timber forest products

PART 3 Practicum
Chapter 9 Computer exercise
Chapter 10 Tropical dendrology

PART 4 Guest lectures

Begincompetenties

No prior knowledge is required, except for a basic course on general ecology.

Eindcompetenties

1 Knowledge about the link between zonal parameters and edaphic factors and the occurrence and characteristics of tropical forest types
2 Be able to interpret (spatial) statistics on tropical forest cover
3 Understand dynamics of moist tropical forests due to natural and antropogeneous causes

4 Describe differences (structure, composition, human use, ecosystem services,...) between zonal tropical forest types, and between edaphic forest types.

5 Understand and interpret definitions of tropical forest loss and degradation, and estimate their possibilities in an operational context.
6 Differentiate between proximate and underlying causes of tropical deforestation and fragmentation
7 Identify ecosystem services from video reports detailing tropical forest management issues
8 Understand sustainable tropical forest management, including current issues, future (research) challenges, current C&I's.

9 Have knowledge of the tropical forest certification process, and be able to comment on its challenges and achievements

10 To explain the current state of art in tropical forest management (including technical and research capacity) against issues and trends in the past, and discern and explain geographical differences.
11 To understand the concept, constraints and final objectives of domestication of moist tropical forests, and be able to illustrate the concept with bad and good cases of particular management systems.
12 To discuss the reasons why tropical planted forests are important
13 To explain the determining factors guiding the choice of tree species for planting in function of particular management objectives
14 To understand the technical issues of tropical tree nursery establishment and management
15 To understand the technical issue of planting trees in the tropics
16 To explain the biological and socio-economic features of an agroforestry system in general, and of the tree component in particular
17 To discuss typical (management) features of agroforestry systems in the three geographical tropical zones, including the provision of goods and services.
18 To produce a short or long term paper on a current issue in tropical forest management, and to present it orally to fellow class mates.
19 To have knowledge (botanical, silvicultural, ecosystem services,..) of selected tree species in the tropics, and be able to identify them from carefully selected photographic documents
20 To gain awareness of the importance of science-based evidence to support and implement tropical forest management

21 Kennis en inzicht hebben van beheer- en planningsstrategieën om de door de maatschappij gevraagde goederen en diensten van (half-)natuurlijke ecosystemen optimaal te verstrekken
22 Gevorderde kennis van de componenten van (half-)natuurlijke ecosystemen in België en de wereld, inzicht in de processen die er plaatsvinden en inzicht in de invloed van het menselijk handelen op deze componenten en processen
23 Toepassen van kwalitatieve en kwantitatieve technieken ter ondersteuning van het bos-, natuur- en landschapsbeheer (bv. inventarisatie- en planningstechnieken, ruimtelijke informatietechnieken, verwerkingstechnieken van houtige biomassa)
24 Toepassen van de nationale en internationale beleidskaders voor bos en natuur
25 Problemen over bos- en natuurbeheer vaststellen en analyseren en heldere onderzoeksvragen formuleren met het oog op het bereiken van effectieve en potentieel toepasbare oplossingen

Creditcontractvoorwaarde

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk na gunstige beoordeling van de competenties

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Werkcollege, Hoorcollege

Toelichtingen bij de didactische werkvormen

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Studiemateriaal

Geen

Referenties

Books

- Elliott S. et al. (2013) Restoring tropical forests. Kew: Royal Botanical Gardens
- Evans J. (1992) Plantation forestry in the Tropics (Oxford: Clarendon Press)
- Günter S. et al. (2011) Silviculture in the tropics. Heidelberg: Springer.
- Higman S. et al. (2006) The sustainable Forestry Handbook. London: Earthscan.
- Lamprecht H. (1984) Silviculture in the tropics (GTZ Eschborn)
- Meunier Q. et al. (2015) Les arbres utiles de Gabon. Les presses Agronomiques de Gembloux.
- Mille G. & Louppe D. (2015) Mémento du forestier tropical. Versailles Ed. Quae, 1198 p. ISBN 978-2-7592-2340-4
- Montagnini F. & Jordan C.F. (2005) Tropical Forest Ecology. Heidelberg: Springer.
- Poorter L. et al. (2004) Biodiversity of West African forest trees. Wallingford: CABI.
- Richards P.W. (1996) The tropical rainforest (Cambridge: CUP)
- Utteridge T. & Bramley G. (2014) The Kew Tropical Plant Families Identification Handbook. Kew: Kew Publishing.

Book chapters

- Richter M. (2014a) Classifications of Climates in the Tropics. In: Köhl M., Pancel L. (eds) Tropical Forestry Handbook. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-41554-8_35-1
- Richter M. (2014b) Climate Aspects of the Tropics. In: Köhl M., Pancel L. (eds) Tropical Forestry Handbook. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-41554-8_34-1
- Peters T. (2014) Climatic Types of Water Balances in the Tropics. In: Köhl M., Pancel L. (eds) Tropical Forestry Handbook. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-41554-8_2-1
- Peters T., & Richter M. (2014) The Atmospheric Circulation. In: Köhl M., Pancel L. (eds) Tropical Forestry Handbook. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-41554-8_36-1

Journal articles

- Bastin J.-F. et al. (2015) Seeing Central African forests through their largest trees. Scientific Reports 5: 1–8.
- Bauters M. et al. (2018) High fire-derived nitrogen deposition on central African

forests. PNAS 115: 549–554.
- Bayon G. et al. (2012) Intensifying weathering and land use in iron age Central Africa. Science, 335: 1219–1222.
- Brienen R. J. W. et al. (2015) Long-term decline of the Amazon carbon sink. Nature 519, 344–348.
- Dargie G. et al. (2017) Age, extent and carbon storage of the central Congo Basin peatland complex. Nature 542: 86–90.
- Fauset S. et al. (2012) Drought-induced shifts in the floristic and functional composition of tropical forests in Ghana. Ecology Letters, 15: 1120–1129.
- Fauset S. et al. (2015) Hyperdominance in Amazonian forest carbon cycling. Nature Communications, 6: 6857.
- Feldpausch T. et al (2011) Height-diameter allometry of tropical forest trees. Biogeosciences, 8, 1081–1106.
- Fine P.V.A. and Ree, R.H. (2006) Evidence for a time-integrated species–area effect in the latitudinal gradient in tree diversity. American Naturalist, 168: 796–804.
- Fine P.V.A. et al. (2008) The disparity in tree species richness among tropical, temperate, and boreal biomes: The Geographic Area and Age Hypothesis. In: Tropical Forest Community Ecology (Carson, W.P. & Schnitzer, S.A., Eds.). Wiley-Blackwell, Chichester, UK, pp. 31-45.
- Hua W., Zhou L., Chen H., Nicholson S.E., Raghavendra A., Jiang Y. (2016) Possible causes of the Central Equatorial African long-term drought. Environ. Res. Lett. 11, 124002.
- Hubau W. et al. (2019) The persistence of carbon in the African forest understory. Nature Plants 5: 133–140.
- Hubau W. et al. (2020) Asynchronous carbon sink saturation in African and Amazonian tropical forests. Nature, 579, 80–87.
- Lewis S. L. et al. (2013) Above-ground biomass and structure of 260 African tropical forests. Philos. Trans. R. Soc. B 368, 20120295 (2013).
- Lewis S. L. et al. (2019) Regenerate natural forests to store carbon. Nature 568, 25–28.
- Maley J. et al. (2018) Late Holocene forest contraction and fragmentation in central Africa. Quaternary Research, 89: 43–59.
- Malhi Y. (2012) The productivity, metabolism and carbon cycle of tropical forest vegetation. Journal of Ecology, 100, 65–75.
- Muscarella R. et al. (2020) The global abundance of tree palms. Global Ecology and Biogeography 29: 1495-1514.
- Neumann, K. et al. (2012) Comment on “Intensifying weathering and land use in iron age Central Africa”. Science, 337: 1040.
- Pan Y. et al. (2011) A large and persistent carbon sink in the world’s forests. Science 333, 988–993
- Phillips O.L. et al. (2009) Drought sensitivity of the Amazon rainforest. Science 323, 1344–1347.
- Qie L. et al. (2018) Long-term carbon sink in Borneo’s forests halted by drought and vulnerable to edge effects. Nat. Commun. 8, 1966.
- Schnitzer S.A. & Bongers F.B. (2011) Increasing liana abundance and biomass in tropical forests: emerging patterns and putative mechanisms. Ecology Letters 14: 397–406.
- Slik, F. et al (2015) An estimate of the number of tropical tree species. PNAS, 112: 7472–7477.
- Sullivan M. J. P., et al. (2020) Long-term thermal sensitivity of earth’s tropical forests. Science (80-.). 368, 869–874
- Sullivan, M. J. P. et al. (2017) Diversity and carbon storage across the tropical forest biome. Scientific Reports, 7: 1–12.
- Zhou L., Y. Tian, R. B. Myneni, P. Ciais, S. Saatchi, Y. Y. Liu, S. Piao, H. Chen, E. F. Vermote, C. Song, T. Hwang (2014) Widespread decline of Congo rainforest greenness in the past decade. Nature. 508, 86–90

Vakinhoudelijke studiebegeleiding

Ufora

Evaluatiemomenten

periodegebonden en niet-periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Mondelinge evaluatie, Schriftelijke evaluatie met open vragen

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Mondelinge evaluatie, Schriftelijke evaluatie met open vragen

Evaluatievormen bij niet-periodegebonden evaluatie

Werkstuk

Tweede examenkans in geval van niet-periodegebonden evaluatie

Niet van toepassing

Eindscoreberekening

Theory: 16/20
report practicum (Part 3): 4/20

De examinator kan de student die zich onttrekt aan periodegebonden en/of niet-periodegebonden evaluaties voor dit opleidingsonderdeel niet-geslaagd verklaren.