



DAFTAR PUSTAKA

- Adawiah, R., & Syaharuddin. (2022, July 12). Perbandingan Model Regresi Curah Hujan di Wilayah Bandar Udara Nusa Tenggara Barat. *Seminar Nasional LPPM UMMAT*.
- Anggraini, N., Adawiah, S. W., Purwanto, A. D., Parwati, D. E., Daya, B. S., Pesisir, W., Laut, D., Penerbangan, L., & Nasional, A. (2015). Analisis Spektral Reflektan Mangrove di Segara Anakan Dengan Menggunakan Data Penginderaan Jauh. *Prosiding Pertemuan Ilmiah XX*.
- Anurogo, W., Sari, L. R., Lubis, M. Z., Pamungkas, D. S., Mufida, M. K., & Lestari Situmorang, A. D. (2018). An Integrated Comparative Approach to Estimating Forest Aboveground Carbon Stock Using Advanced Remote Sensing Technologies. *2018 International Conference on Applied Engineering (ICAE)*, 1–6.
- Appi', W. T., Mananohas, M. L., & Langi, Y. A. R. (2019). Penentuan Model Persamaan Regresi Alometrik Terbaik Untuk Menduga Biomassa Pohon Cempaka (*Elmerrillia ovalis*) Di Kecamatan Tareran Kabupaten Minahasa Selatan. *D'Cartesian*, 8(1), 69–75. <https://ejournal.unsrat.ac.id/index.php/decartesian>
- Argamosa, R. J. L., Blanco, A. C., Baloloy, A. B., Candido, C. G., Dumalag, J. B. L. C., Dimapilis, L. L. C., & Paringit, E. C. (2018). Modelling Above Ground Biomass of Mangrove Using Sentinel-1 Imagery. *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 4(3), 13–20. <https://doi.org/10.5194/isprs-annals-IV-3-13-2018>
- Aripin, R. R. (2017). *Model Regresi Multivariat Untuk Menentukan Faktor-Faktor Yang Memengaruhi Kesejahteraan Kabupaten atau Kota di Jawa Tengah*. Institut Teknologi Sepuluh Nopember.
- Astriani, H., Santoso, K. B., Arifatha, N., Prasetya, R., Utomo, S. D., Juniandari, V. C., & Kamal, M. (2018). Perbandingan Citra Landsat 8 OLI dan Sentinel-2A Untuk Estimasi Stok Karbon Kelapa Sawit (*Elais Guineensis Jacq*) di Wilayah PT Perkebunan Nusantara VII Unit Rejosari, Natar, Kabupaten Lampung Selatan. *Seminar Nasional Geomatika 2017: Inovasi Teknologi Penyediaan Informasi Geospasial Untuk Pembangunan Berkelanjutan*, 21–28.
- Awiyah, N. (2020). Dasar Teori. In *Analisis Data Spasial Eksploratori* (pp. 18–30). Institut Teknologi Nasional.
- Badan Standardisasi Nasional. (2011). *Pengukuran dan penghitungan cadangan karbon - Pengukuran lapangan untuk penaksiran cadangan karbon hutan (ground based forest carbon accounting)* (Patent 7724:2011). www.bsn.go.id
- Bathmann, J., Peters, R., Reef, R., Berger, U., Walther, M., & Lovelock, C. E. (2021). Modelling mangrove forest structure and species composition over



tidal inundation gradients: The feedback between plant water use and porewater salinity in an arid mangrove ecosystem. *Agricultural and Forest Meteorology*, 308–309, 108547.
<https://doi.org/10.1016/j.agrformet.2021.108547>

Bei, A. (2021). *Mengenal Mangrove*. Pusat Pengendalian Pembangunan Ekoregion Kalimantan (P3EK), Kementerian Lingkungan Hidup dan Kehutanan.

Bilgili, A. V., van Es, H. M., Akbas, F., Durak, A., & Hively, W. D. (2010). Visible-near infrared reflectance spectroscopy for assessment of soil properties in a semi-arid area of Turkey. *Journal of Arid Environments*, 74(2), 229–238.
<https://doi.org/10.1016/j.jaridenv.2009.08.011>

Buwono, Y. R. (2017). Identifikasi dan Kerapatan Ekosistem Mangrove di Kawasan Teluk Panggang Kabupaten Banyuwangi. *Samakia: Jurnal Ilmu Perikanan*, 8(1), 32–37.

Castillo, J. A. A., Apan, A. A., Maraseni, T. N., & Salmo, S. G. (2017). Estimation and mapping of above-ground biomass of mangrove forests and their replacement land uses in the Philippines using Sentinel imagery. *ISPRS Journal of Photogrammetry and Remote Sensing*, 134, 70–85.
<https://doi.org/10.1016/j.isprsjprs.2017.10.016>

Chen, Y., Feng, X., Tian, H., Wu, X., Gao, Z., Feng, Y., Piao, S., Lv, N., Pan, N., & Fu, B. (2021). Accelerated increase in vegetation carbon sequestration in China after 2010: A turning point resulting from climate and human interaction. *Global Change Biology*, 27(22), 5848–5864.
<https://doi.org/10.1111/gcb.15854>

Cheng, X., Naiara, P., & Gong, J. (2012). Terrain radiometric calibration of airborne UAVSAR for forested area. *Geo-Spatial Information Science*, 15(4), 229–240.
<https://doi.org/10.1080/10095020.2012.745050>

Clevers, J. P. W. (1986). The application of a vegetation index in correcting the infrared reflectance for soil background. *International Archives of Photogrammetry and Remote Sensing*.

Corbane, C., Politis, P., Kempeneers, P., Simonetti, D., Soille, P., Burger, A., Pesaresi, M., Sabo, F., Syrris, V., & Kemper, T. (2020). A global cloud free pixel-based image composite from Sentinel-2 data. *Data in Brief*, 1–8.
<https://doi.org/10.2905/0BD1DFAB-E311-4046-8911-C54A8750DF79>

Daneshgar, S. (2015). *Remote sensing observations for monitoring coastal zones, Volturno River mouth case study* [Politecnico d Milano].
<https://doi.org/10.13140/RG.2.1.3806.9209>

Danson, F. M., & Plummer, S. E. (1995). Red-edge response to forest leaf area index. *International Journal of Remote Sensing*, 16(1), 183–188.
<https://doi.org/10.1080/01431169508954387>



- Darma, B. (2021). *Statistika Penelitian Menggunakan SPSS (Uji Validitas, Uji Reabilitas, Regresi Linier Sederhana, Regresi Linier Berganda, Uji t, Uji F, R2)*. Quepedia.com.
- David, R. M., Rosser, N. J., & Donoghue, D. N. M. (2022). Improving above ground biomass estimates of Southern Africa dryland forests by combining Sentinel-1 SAR and Sentinel-2 multispectral imagery. *Remote Sensing of Environment*, 282. <https://doi.org/10.1016/j.rse.2022.113232>
- Davis, J. L., & Clayton, K. M. (1980). *Geographical Variation in Coastal Development (2nd edition)* (2nd ed.). Longman.
- Dharmawan, I. W. E., Renyaan, J., & Nurdiansah, D. (2022). Mangrove zonation, community structure and healthiness in Kei Islands, Maluku, Indonesia. *Biodiversitas*, 23(9), 4918–4927. <https://doi.org/10.13057/biodiv/d230962>
- Draper, N. R., & Smith, H. (1981). *Applied Regression Analysis* (2nd ed.). John Wiley & Sons.
- Elachi, C. (1988). *Spaceborne Radar Remote Sensing: Applications and Techniques*. IEEE.
- El-Darymli, K., McGuire, P., Gill, E., Power, D., & Moloney, C. (2014). Understanding the Significance of Radiometric Calibration for Synthetic Aperture Radar Imagery. *IEEE 27th Canadian Conference on Electrical and Computer Engineering (CCECE)*.
- Fahdi, M. (2018). Pengaruh Independensi dan Kompetensi Terhadap Kualitas Audit (Studi Empiris pada Inspektorat Se Provinsi Riau). *Valuta*.
- Farahdita, W. L., Soenardjo, N., & Suryono, C. A. (2021). Teknologi Drone untuk Estimasi Stok Karbon di Area Mangrove Pulau Kemujan, Karimunjawa. *Journal of Marine Research*, 10(2), 281–290. <https://doi.org/10.14710/jmr.v10i2.30466>
- Fariz, T. R., Ihsan, H. M., Lutfiananda, F., Sartohadi, J., Darmajati, Y., & Syahputra, A. (2023). Perbandingan Pengukuran Kerapatan Kanopi Dari Hemispherical Photography dan UAV Untuk Pemetaan Menggunakan Citra Sentinel-2. *Jurnal Hutan Tropis*, 11(1).
- Farzanmanesh, R., Khoshelham, K., & Thomas, S. (2021). Technological opportunities for measuring and monitoring blue carbon initiatives in mangrove ecosystems. *Remote Sensing Applications: Society and Environment*, 24. <https://doi.org/10.1016/j.rsase.2021.100612>
- Filipponi, F. (2019). Sentinel-1 GRD Preprocessing Workflow. *3rd International Electronic Conference on Remote Sensing*, 11. <https://doi.org/10.3390/ECRS-3-06201>



- Firdaus, V. R., & Fahrizqi, E. B. (2023). Hubungan Antara Kekuatan Otot Lengan dan Koordinasi Mata-Tangan Dengan Kemampuan Passing Bawah pada Peserta Ekstrakurikuler Bola Voli SMA Negeri 2 Kalianda. *Journal of Physical Education (JouPE)*, 4(1), 8–13.
- Fox, J. (2015). *Applied Regression Analysis and Generalized Linear Models* (3rd ed.). McMaster University.
- Franklin, J., Prince, S. D., Strahler, A. H., Hanan, N. P., & Simonett, D. S. (1991). Reflectance and transmission properties of West African savanna trees from ground radiometer measurements. *International Journal of Remote Sensing*, 12(6), 1369–1385. <https://doi.org/10.1080/01431169108929731>
- Ghazali, M. F., & Wikantika, K. (2021). Pre-assessment of the Potential of Dual Polarization of Sentinel 1 Data for Mapping the Mangrove Tree Species Distribution in South Bali, Indonesia. *Proceedings - 2021 7th Asia-Pacific Conference on Synthetic Aperture Radar, APSAR 2021*. <https://doi.org/10.1109/APSAR52370.2021.9688441>
- Giri, C., & Long, J. (2016). Is the Geographic Range of Mangrove Forests in the Conterminous United States Really Expanding? *Sensors*, 16(12), 2010. <https://doi.org/10.3390/s16122010>
- Hadidi, A. F., Nana, K. T. M., & Boedijantoro, P. M. H. (2022). Estimasi Stok Karbon Mangrove Strata Pohon di Kelurahan Trimulyo Kota Semarang Sebagai Upaya Konservasi Mangrove. *BIOMA*, 18(1). [https://doi.org/10.21009/Bioma18\(1\).2](https://doi.org/10.21009/Bioma18(1).2)
- Hakim, M. A., Kamal, M., & Arjasakusuma, S. (2022). Mapping Mangrove Surface Carbon Stocks Using Multisensor Imagery in Clungup Mangrove Conservation (CMC) Malang Regency. *JURNAL GEOGRAFI*, 14(2), 192. <https://doi.org/10.24114/jg.v14i2.33575>
- Hamaker, H. C. (1962). On multiple regression analysis. *Statistica Neerlandica*, 16(1), 31–56. <https://doi.org/10.1111/j.1467-9574.1962.tb01184.x>
- Hamdan, O., Khali Aziz, H., & Mohd Hasmadi, I. (2014). L-band ALOS PALSAR for biomass estimation of Matang Mangroves, Malaysia. *Remote Sensing of Environment*, 155, 69–78. <https://doi.org/10.1016/j.rse.2014.04.029>
- Hanifah, N. N. (2022). *Potensi Simpanan Karbon Biru Ekosistem Mangrove Delta Surabaya* [Universitas Gadjah Mada]. <http://etd.repository.ugm.ac.id/>
- Hardianto, Jaya, L. M. G., Nurgiantoro, & Khairisa, N. H. (2021). Perbandingan Metode Indeks Vegetasi NDVI, SAVI dan EVI Terkoreksi Atmoafer iCOR. *JAGAT (Jurnal Geografi Aplikasi Dan Teknologi)*, 5(1), 53–62.
- Hashim, T. M. Z. T., Suratman, M. N., Singh, H. R., Jaafar, J., & Bakar, A. N. (2020). Predictive Model of Mangroves Carbon Stocks in Kedah, Malaysia



using Remote Sensing. *IOP Conference Series: Earth and Environmental Science*, 540(1). <https://doi.org/10.1088/1755-1315/540/1/012033>

Hermayani, R. (2018). *Analisis Citra Sentinel-1A Untuk Estimasi Stok Karbon Di Atas Permukaan (Above Ground Carbon) Hutan Mangrove Pulau Kemujan, Taman Nasional Karimunjawa*. Universitas Gadjah Mada.

Hosseini, Z., Naghavi, H., Latifi, H., & Bakhtiari, S. B. (2019). Estimating biomass and carbon sequestration of plantations around industrial areas using very high resolution stereo satellite imagery. *IForest*, 12(6), 533–541. <https://doi.org/10.3832/ifor3155-012>

Houghton, R. A., Hall, F., & Goetz, S. J. (2009). Importance of biomass in the global carbon cycle. *Journal of Geophysical Research: Biogeosciences*, 114(3). <https://doi.org/10.1029/2009JG000935>

Huang, X., Ziniti, B., Torbick, N., & Ducey, M. J. (2018). Assessment of forest above ground biomass estimation using multi-temporal C-band Sentinel-1 and Polarimetric L-band PALSAR-2 data. *Remote Sensing*, 10(9). <https://doi.org/10.3390/rs10091424>

Huete, A. (1988). A Soil-Adjusted Vegetation Index (SAVI). *Remote Sensing of Environment*, 25, 295–309.

Huete, A., Didan, K., Miura, T., Rodriguez, E. P., Gao, X., & Ferreira, L. G. (2002). Overview of the radiometric and biophysical performance of the MODIS vegetation indices. *Remote Sensing of Environment*, 83(1–2). www.elsevier.com/locate/rse

Huete, A. R., Liu, H., & Van Leeuwen, W. J. D. (1997). The Use of Vegetation Indices in Forested Regions: Issues of Linearity and Saturation. *IEEE International Geoscience and Remote Sensing Symposium Proceedings. Remote Sensing - A Scientific Vision for Sustainable Development*.

Indriasari, N., Arief, R., Kustiyo, Budiono, M. E., Dyatmika, H. S., Rahayu, M. I., Payani, A. S., Amriya, Q., Maulana, R., & Ali, S. (2020). Analisa filter spekle single dan multitemporal data Sentinel 1-A. *IOP Conference Series: Earth and Environmental Science*, 500(1). <https://doi.org/10.1088/1755-1315/500/1/012021>

Irsadi, A., Kariada Tri Martuti, N., & Budi Nugraha, S. (2017). Estimasi Stok Karbon Mangrove di Dukuh Tapak Kelurahan Tugurejo Kota Semarang. *Sainteknol: Jurnal Sains Dan Teknologi*, 15(2).

Jaya, L. M. G., Christopher, D., Masse, A., & Saleh, F. (2019). Studi Cadangan Karbon Vegetasi Mangrove Dalam Taman Nasional Rawa Aopa Watumohai Sulawesi Tenggara. *Physical and Social Geography Research Journal*, 1(1), 45–52.



Jensen, J. R. (2014). *Remote sensing of the environment: an earth resource perspective* (2nd ed.). Pearson.

Jin, X., Li, Z., Feng, H., Ren, Z., & Li, S. (2020). Deep neural network algorithm for estimating maize biomass based on simulated Sentinel 2A vegetation indices and leaf area index. *Crop Journal*, 8(1), 87–97. <https://doi.org/10.1016/j.cj.2019.06.005>

Jones, I. L., DeWalt, S. J., Lopez, O. R., Bunnefeld, L., Pattison, Z., & Dent, D. H. (2019). Above- and belowground carbon stocks are decoupled in secondary tropical forests and are positively related to forest age and soil nutrients respectively. *Science of the Total Environment*, 697. <https://doi.org/10.1016/j.scitotenv.2019.133987>

Kaasalainen, S., Holopainen, M., Karjalainen, M., Vastaranta, M., Kankare, V., Karila, K., & Osmanoglu, B. (2015). Combining lidar and synthetic aperture radar data to estimate forest biomass: Status and prospects. In *Forests* (Vol. 6, Issue 1, pp. 252–270). MDPI AG. <https://doi.org/10.3390/f6010252>

Kamal, M., Hartono, H., Wicaksono, P., Adi, N. S., & Arjasakusuma, S. (2016). Assessment of Mangrove Forest Degradation Through Canopy Fractional Cover in Karimunjawa Island, Central Java, Indonesia. *Geoplanning: Journal of Geomatics and Planning*, 3(2), 107. <https://doi.org/10.14710/geoplanning.3.2.107-116>

Kamal, M., Kanekaputra, T., Hermayani, R., Utari, D., & anggota, K. (2019). Pengaruh Distribusi Spasial Sampel Pemodelan Terhadap Akurasi Estimasi Leaf Area Index (LAI) Mangrove. *Jurnal Penginderaan Jauh Dan Pengolahan Data Citra Digital*, 17(2). <https://doi.org/10.30536/j.pjpdcd.2019.v16.a3069>

Kauffman, J. B., & Donato, D. C. (2012). *Protocols for the measurement, monitoring and reporting of structure, biomass and carbon stocks in mangrove forests*.

Kaufman, Y. J., & Tanre, D. (1992). Atmospherically Resistant Vegetation Index (ARVI) for EOS-MODIS. *IEEE Transactions on Geoscience and Remote Sensing*, 30(2).

Khoerunnisa, Y. D. (2021). *Perbandingan Metode Backward Elimination, Forward Selection, dan Stepwise Regression dalam Pemilihan Model Regresi Linier Berganda Terbaik*. Universitas Lampung.

Komiyama, A., Poungparn, S., & Kato, S. (2005). Common allometric equations for estimating the tree weight of mangroves. *Journal of Tropical Ecology*, 21(4), 471–477. <https://doi.org/10.1017/S0266467405002476>

Kovacs, J. M., Jiao, X., Flores-de-Santiago, F., Zhang, C., & Flores-Verdugo, F. (2013). Assessing relationships between Radarsat-2 C-band and structural



- parameters of a degraded mangrove forest. *International Journal of Remote Sensing*, 34(20), 7002–7019. <https://doi.org/10.1080/01431161.2013.813090>
- Kristensen, T., Næsset, E., Ohlson, M., Bolstad, P. V., & Kolka, R. (2015). Mapping above- and below-ground carbon pools in boreal forests: The case for airborne lidar. *PLoS ONE*, 10(10). <https://doi.org/10.1371/journal.pone.0138450>
- Kumar, L., Schmidt, K., Dury, S., & Skidmore, A. (2001). Review of hyperspectral remote sensing and vegetation science. In F. D. van der Meer & S. M. De Jong (Eds.), *Imaging spectrometry: Basic principles and prospective applications* (pp. 111–155). Springer.
- Kustandiyo, H., Muljo, B. S., & Parwati, E. (2014). Studi Tingkat Kerapatan Mangrove Menggunakan Indeks Vegetasi. *Geoid*.
- Laurin, G. V., Balling, J., Corona, P., Mattioli, W., Papale, D., Puletti, N., Rizzo, M., Truckenbrodt, J., & Urban, M. (2018a). Above-ground biomass prediction by Sentinel-1 multitemporal data in central Italy with integration of ALOS2 and Sentinel-2 data. *Journal of Applied Remote Sensing*, 12(01), 1. <https://doi.org/10.1117/1.JRS.12.016008>
- Laurin, G. V., Balling, J., Corona, P., Mattioli, W., Papale, D., Puletti, N., Rizzo, M., Truckenbrodt, J., & Urban, M. (2018b). Above-ground biomass prediction by Sentinel-1 multitemporal data in central Italy with integration of ALOS2 and Sentinel-2 data. *Journal of Applied Remote Sensing*, 12(01), 1. <https://doi.org/10.1117/1.JRS.12.016008>
- Lee, J. S., Jurkevich, I., Dewaele, P., Wambacq, P., & Oosterlinck, A. (1994). Speckle filtering of synthetic aperture radar images: a review. *Remote Sensing Reviews*, 8(4), 313–340. <https://doi.org/10.1080/02757259409532206>
- Lillesand, T., Kiefer, R. W., & Chipman, J. (2004). *Remote Sensing and Image Interpretation (Fifth Edition)* (5th ed.). John Wiley & Sons.
- Lubis, A. I. M., Prasetyo, Y., & Sasmito, B. (2020). Pemodelan Dan Pemetaan Biomassa Atas Permukaan (Aboveground Biomass) Tanaman Karet (Hevea Brasiliensis) Dengan L-Band Berdasarkan Pengamatan ALOS PALSAR-2 (Studi Kasus: Afdeling Setro, Kab. Semarang). *Jurnal Geodesi Undip*, 9(2), 122–131. [https://doi.org/https://doi.org/10.14710/jgundip.2020.27173](https://doi.org/10.14710/jgundip.2020.27173)
- Lukito, M., & Rohmatiah, A. (2013). Estimasi Biomassa dan Karbon Tanaman Jati Umur 5 Tahun (Kasus Kawasan Hutan Tanaman Jati Unggul Nusantara (JUN) Desa Krowe, Kecamatan Lembeyan Kabupaten Magetan). *Agri-Tek*, 4(1).
- Mahrooghy, M., Aanstoos, J., Hasan, K., Prasad, S., & Younan, N. H. (2011). Effect of vegetation height and volume scattering on soil moisture classification using synthetic aperture radar (SAR) images. *2011 IEEE Applied Imagery Pattern Recognition Workshop (AIPR)*, 1–5. <https://doi.org/10.1109/AIPR.2011.6176375>



- Malik, A., Sideng, U., & Jaelani. (2022). Biomass Carbon Stock Assessment of Mangrove Ecosystem in Pannikiang Island South Sulawesi Indonesia. *Indonesian Journal of Geography*, 54(1), 11–19.
- Moore, P. D., & Chapman, S. B. (1986). *Methods in Plant Ecology* (2nd ed.). Blackwell Science Inc.
- Muchsin, F., Fibriawati, L., Rahayu, I., Pradhono, K. A., Teknologi, P., Data, D., & Jauh, P. (2019). Koreksi Atmosfer Data Landsat-8 Menggunakan Parameter Atmosfer Dari Data MODIS (Atmospheric Correction Of Landsat-8 Using Atmospheric Parameters of MODIS Data). *Jurnal Penginderaan Jauh Dan Pengolahan Data Citra Digital*, 16(2). <https://doi.org/10.30536/j.pjpdcd.2019.v16.a3054>
- Munthe, C. R., & Sulistiyono, N. (2023). Above Ground Carbon Estimation Using Sentinel-1B RADAR Satellite Imagery. *Journal of Physics: Conference Series*, 2421(1). <https://doi.org/10.1088/1742-6596/2421/1/012037>
- Mutanga, O., Adam, E., & Cho, M. A. (2012). High density biomass estimation for wetland vegetation using worldview-2 imagery and random forest regression algorithm. *International Journal of Applied Earth Observation and Geoinformation*, 18(1), 399–406. <https://doi.org/10.1016/j.jag.2012.03.012>
- Mutanga, O., Masenyama, A., & Sibanda, M. (2023). Spectral saturation in the remote sensing of high-density vegetation traits: A systematic review of progress, challenges, and prospects. In *ISPRS Journal of Photogrammetry and Remote Sensing* (Vol. 198, pp. 297–309). Elsevier B.V. <https://doi.org/10.1016/j.isprsjprs.2023.03.010>
- Nanlohy, L. H., & Masniar, M. (2020). Manfaat Ekosistem Mangrove Dalam Meningkatkan Kualitas Lingkungan Masyarakat Pesisir. *Abdimas: Papua Journal of Community Service*, 2(1), 1–4. <https://doi.org/10.33506/pjcs.v2i1.804>
- Nasirzadehdizaji, R., Sanli, F. B., Abdikan, S., Cakir, Z., Sekertekin, A., & Ustuner, M. (2019). Sensitivity analysis of multi-temporal Sentinel-1 SAR parameters to crop height and canopy coverage. *Applied Sciences (Switzerland)*, 9(4). <https://doi.org/10.3390/app9040655>
- Neka, W. (2019). Analisis Potensi Hutan Mangrove di Teluk Panggang Banyuwangi Dalam Pengembangan Ekonomi Masyarakat Pesisir. *Jurnal TECHNO-FISH*, 3(1).
- Nellemann, C., Duarte, C. M., DeYoung, C., Grimsditch, G. D., Corcoran, E., Valdes, L., & Fonseca, L. (2009). *Blue Carbon. A Rapid Response Assessment*. (C. Nellemann & E. Corcoran, Eds.). UNEP/Earthprint.
- Nesha, M. K., Hussin, Y. A., van Leeuwen, L. M., & Sulistioadi, Y. B. (2020). Modeling and mapping aboveground biomass of the restored mangroves using



ALOS-2 PALSAR-2 in East Kalimantan, Indonesia. *International Journal of Applied Earth Observation and Geoinformation*, 91. <https://doi.org/10.1016/j.jag.2020.102158>

Nuraini, R. A. T., Pringgenies, D., Suryono, C. A., & Adhari, V. H. (2021). Stok Karbon Pada Tegakan Vegetasi Mangrove Di Pulau Karimunjawa. *Buletin Oseanografi Marina*, 10(2), 180–188. <https://doi.org/10.14710/buloma.v10i2.31616>

Park, J. W., Korosov, A. A., Babiker, M., Sandven, S., & Won, J. S. (2018). Efficient Thermal Noise Removal for Sentinel-1 TOPSAR Cross-Polarization Channel. *IEEE Transactions on Geoscience and Remote Sensing*, 56(3), 1555–1565. <https://doi.org/10.1109/TGRS.2017.2765248>

Pham, T. D., Xia, J., Thang Ha, N., Tien Bui, D., Nhu Le, N., & Tekeuchi, W. (2019). A review of remote sensing approaches for monitoring blue carbon ecosystems: Mangroves, sea grasses and salt marshes during 2010–2018. *Sensors (Switzerland)*, 19(8). <https://doi.org/10.3390/s19081933>

Pham, T. D., Yokoya, N., Bui, D. T., Yoshino, K., & Friess, D. A. (2019). Remote sensing approaches for monitoring mangrove species, structure, and biomass: Opportunities and challenges. In *Remote Sensing* (Vol. 11, Issue 3). MDPI AG. <https://doi.org/10.3390/rs11030230>

Phan, S. M., Nguyen, H. T. T., Nguyen, T. K., & Lovelock, C. (2019). Modelling above ground biomass accumulation of mangrove plantations in Vietnam. *Forest Ecology and Management*, 432, 376–386. <https://doi.org/10.1016/j.foreco.2018.09.028>

Pohl, C., & Loong, C. K. (2016). In-situ data collection for oil palm tree height determination using synthetic aperture radar. *IOP Conference Series: Earth and Environmental Science*, 34(1). <https://doi.org/10.1088/1755-1315/34/1/012027>

Prakash, A. J., Behera, M. D., Ghosh, S. M., Das, A., & Mishra, D. R. (2022). A new synergistic approach for Sentinel-1 and PALSAR-2 in a machine learning framework to predict aboveground biomass of a dense mangrove forest. *Ecological Informatics*, 72. <https://doi.org/10.1016/j.ecoinf.2022.101900>

Proisy, C., Mougin, E., Fromard, F., Trichon, V., & Karam, M. A. (2002). On the influence of canopy structure on the radar backscattering of mangrove forests. *International Journal of Remote Sensing*, 23(20), 4197–4210. <https://doi.org/10.1080/01431160110107725>

Purnamasari, E. (2021). *Komparasi Citra Multiresolusi Spasial untuk Estimasi Stok karbon di Atas Permukaan (Aboveground Carbon) pada Hutan Mangrove di Kawasan Mangrove Bedul, Kabupaten Banyuwangi* [Tesis]. Universitas Gadjah Mada.



Purnobasuki, H. (2005). *Tinjauan Perspektif Hutan Mangrove*. Airlangga University Press.

Pusat Hidro-Oseanografi TNI Angkatan Laut. (2023). *Tabel Pasang Surut Kepulauan Indonesia 2023*. Pusat Hidro-Oseanografi TNI Angkatan Laut.

Putri, E. S., Widiasari, A., Karim, R. A., Somantri, L., & Ridwana, R. (2021). Pemanfaatan Citra Sentinel-2 Untuk Analisis Vegetasi Di Wilayah Gunung Manglayang. *Jurnal Pendidikan Geografi Undiksha*, 9(2), 133–143. <https://doi.org/10.23887/jjpg.v9i2.35357>

Qi, J., Chehbouni, A., Huete, A. R., Kerr, Y. H., & Sorooshian, S. (1994). A Modified Soil Adjusted Vegetation Index. *Remote Sensing of Environment*, 48, 119–126.

Quang, N. H., Quinn, C. H., Carrie, R., Stringer, L. C., Hue, L. T. Van, Hackney, C. R., & Tan, D. Van. (2022). Comparisons of regression and machine learning methods for estimating mangrove above-ground biomass using multiple remote sensing data in the red River Estuaries of Vietnam. *Remote Sensing Applications: Society and Environment*, 26. <https://doi.org/10.1016/j.rsase.2022.100725>

Raharja, A. B., Widigdo, B., & Sutrisno, D. (2014). *Kajian potensi kawasan mangrove di kawasan pesisir Teluk Pangpang, Banyuwangi Study on the potency of mangrove ecosystem in the coastal area of Gulf Pangpang, Banyuwangi*.

Rahmandhana, A. D., Kamal, M., & Wicaksono, P. (2022). Spectral Reflectance-Based Mangrove Species Mapping from WorldView-2 Imagery of Karimunjawa and Kemujan Island, Central Java Province, Indonesia. *Remote Sensing*, 14(1). <https://doi.org/10.3390/rs14010183>

Rinjani, E. K., Nurhidayah, Panbriani, S., Auliya, U., Amalina, & Artayasa, I. P. (2022). Mitigasi Bencana Abrasi Pantai Melalui Penanaman Mangrove di Desa Seriwe. *Jurnal Pengabdian Magister Pendidikan IPA*, 5(1). <https://doi.org/10.29303/jpmipi.v3i2.1419>

Rinjani, E. M., Khoffifah, A. N., Pattiasina, D. B. M. P., Annisa, F. R., Adidharma, G. B., Kamal, M., & Kartika, C. S. D. (2024). Above-ground biomass mapping of mangrove forest using WorldView-3 imagery in Gili Lawang, Nusa Tenggara Barat. *8th Geoinformation Science Symposium 2023: Geoinformation Science for Sustainable Planet*, 2023, 1–10. <https://doi.org/10.1117/12.3009661>

Risal, T., & Alexander, A. (2019). Pengaruh Persepsi Bagi Hasil, Promosi, dan Kualitasn Pelayanan Terhadap Minat Penggunaan Jasa Perbankan Syariah Tabungan Mudharabah Pada Mahasiswa Universitas Potensi Utama. *Jurnal Samudra Ekonomika*.



Rofiqoh, M. A., Kurnia, T. I. D., & Nurmasari, F. (2020). Inventarisasi Jenis Ikan Bakau di Teluk Pangpang Taman Nasional Alas Purwo Banyuwangi. *BIOSENSE*, 3(2).

Ronoud, G., Fatehi, P., Darvishsefat, A. A., Tomppo, E., Praks, J., & Schaepman, M. E. (2021). Multi-Sensor Aboveground Biomass Estimation in the Broadleaved Hyrcanian Forest of Iran. *Canadian Journal of Remote Sensing*, 47(6), 818–834. <https://doi.org/10.1080/07038992.2021.1968811>

Roscoe, J. T. (1975). *Fundamental Research Statistics for the Behavioral Sciences* (2nd ed., Vol. 2). Holt, Rinehart and Winston.

Rossi, A., Lestari, T., Setya Perdana, R., & Fauzi, M. A. (2017). Analisis Sentimen Tentang Opini Pilkada Dki 2017 Pada Dokumen Twitter Berbahasa Indonesia Menggunakan Naïve Bayes dan Pembobotan Emozi. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, 1(12), 1718–1724. <http://j-ptiik.ub.ac.id>

Rouse, J. W. (1974). *Monitoring the vernal advancement and retrogradation (green wave effect) of natural vegetation*.

Santoro, M., & Cartus, O. (2018). Research pathways of forest above-ground biomass estimation based on SAR backscatter and interferometric SAR observations. *Remote Sensing*, 10(4). <https://doi.org/10.3390/rs10040608>

Sembiring, R. K. (1995). *Analisis Regresi*. Institut Teknologi Bandung.

Septiana, B., Putra Wijaya, A., & Suprayogi, A. (2017). Analisis Perbandingan Hasil Orthorektifikasi Metode Range Doppler Terrain Correction dan Metode SAR Simulation Terrain Correction Menggunakan Data SAR Sentinel-1. *Jurnal Geodesi Undip Januari*, 6(1).

Simard, M. (2019). Radar Remote Sensing of Mangrove Forests. In *SAR Handbook Comprehensive Methodologies for Forest Monitoring and Biomass Estimation*. SERVIR Global Science.

Simarmata, N., Elyza, F., & Vatiady, R. (2019). Kajian Citra Satelit SPOT-7 Untuk Estimasi Standing Carbon Stock Hutan Mangrove Dalam Upaya Mitigasi Perubahan Iklim (Climate Changes) di Lampung Selatan. *Jurnal Penginderaan Jauh Dan Pengolahan Data Citra Digital*, 16(1). <https://doi.org/10.30536/j.pjpdcd.2019.v16.a3050>

Sims, D. A., & Gamon, J. A. (2002). Relationships between leaf pigment content and spectral reflectance across a wide range of species, leaf structures and developmental stages. *Remote Sensing of Environment*, 81(2–3), 337–354. [https://doi.org/10.1016/S0034-4257\(02\)00010-X](https://doi.org/10.1016/S0034-4257(02)00010-X)

Singh, A., & Mahajan, S. (2022). A Review of SAR Image Processing for Mangrove above Ground Biomass Estimation. *The Journal of Plant Science Research*, 38(2), 779–789. <https://doi.org/10.32381/JPSR.2022.38.02.31>



Sinha, S., Jeganathan, C., Sharma, L. K., & Nathawat, M. S. (2015). A review of radar remote sensing for biomass estimation. In *International Journal of Environmental Science and Technology* (Vol. 12, Issue 5, pp. 1779–1792). Center for Environmental and Energy Research and Studies. <https://doi.org/10.1007/s13762-015-0750-0>

Small, D. (2011). Flattening gamma: Radiometric terrain correction for SAR imagery. *IEEE Transactions on Geoscience and Remote Sensing*, 49(8), 3081–3093. <https://doi.org/10.1109/TGRS.2011.2120616>

Small, D., Miranda, N., & Meier, E. (2009). A Revised Radiometric Normalisation Standard For SAR. *IEEE International Geoscience and Remote Sensing Symposium*.

Sohrabi, H., Bakhtiarvand-Bakhtiari, S., & Ahmadi, K. (2016). Above- and below-ground biomass and carbon stocks of different tree plantations in central Iran. *Journal of Arid Land*, 8(1), 138–145. <https://doi.org/10.1007/s40333-015-0087-z>

Strabala, K. (1998). *MODIS Cloud Mask User's Guide*. Cooperative Institute for Meteorological Satellite Studies, University of Wisconsin-Madison.

Suardana, A. A. Md. A. P., Anggraini, N., Nandika, M. R., Aziz, K., As-syakur, Abd. R., Ulfa, A., Wijaya, A. D., Prasetio, W., Winarso, G., & Dewanti, R. (2023). Estimation and Mapping Above-Ground Mangrove Carbon Stock Using Sentinel-2 Data Derived Vegetation Indices in Benoa Bay of Bali Province, Indonesia. *Forest and Society*, 7(1), 116–134. <https://doi.org/10.24259/fs.v7i1.22062>

Susilowati, Y. (1998). *Penginderaan Jauh RADAR*. BAKOSURTANAL.

Sutikno, M. A. F., Julpa, I. S., Rahmadani, A. N. L., Pamungkas, U. R., Fariz, T. R., & Amalia, A. V. (2023). Estimasi Tutupan Kanopi Mangrove Dengan Metode Hemispherical Photography di Desa Tambakrejo, Kota Semarang. *Seminar Nasional IPA XIII “Kecemerlangan Pendidikan IPA Untuk Konservasi Sumber Daya Alam.”*

Syah, A. F. (2020). Penanaman Mangrove sebagai Upaya Pencegahan Abrasi di Desa Socah. *Jurnal Ilmiah Pangabdhi*, 6(1), 13–16. <https://doi.org/10.21107/pangabdhi.v6i1.6909>

Taufik, V. V., Sukmono, A., & Firdaus, H. S. (2021). Estimasi Produktivitas Kelapa Sawit Menggunakan Metode NDVI (Normalized Vegetation Index) dan ARVI (Atmospherically Resistant Vegetation Index) Dengan Citra Sentinel-2A (Studi Kasus : Beberapa Wilayah di Provinsi Riau). *Jurnal Geodesi Undip*, 10(1), 153–162.

Tian, L., Wu, X., Tao, Y., Li, M., Qian, C., Liao, L., & Fu, W. (2023). Review of Remote Sensing-Based Methods for Forest Aboveground Biomass Estimation:



Progress, Challenges, and Prospects. In *Forests* (Vol. 14, Issue 6). Multidisciplinary Digital Publishing Institute (MDPI). <https://doi.org/10.3390/f14061086>

Tim Dosen PAMU. (2019). *Metode Statistik Nonparametrik: Uji Korelasi*.

Utami, G. (2024). *Pengaruh Ukuran Plot Sampel dan Piksel Citra Terhadap Akurasi Estimasi Biomassa Atas Permukaan Mangrove* [Skripsi]. Universitas Gadjah Mada.

Veloso, A., Mermoz, S., Bouvet, A., Le Toan, T., Planells, M., Dejoux, J. F., & Ceschia, E. (2017). Understanding the temporal behavior of crops using Sentinel-1 and Sentinel-2-like data for agricultural applications. *Remote Sensing of Environment*, 199, 415–426. <https://doi.org/10.1016/j.rse.2017.07.015>

Vreugdenhil, M., Navacchi, C., Bauer-Marschallinger, B., Hahn, S., Steele-Dunne, S., Pfeil, I., Dorigo, W., & Wagner, W. (2020). Sentinel-1 cross ratio and vegetation optical depth: A comparison over Europe. *Remote Sensing*, 12(20), 1–19. <https://doi.org/10.3390/rs12203404>

Wang, G., Singh, M., Wang, J., Xiao, L., & Guan, D. (2021). Effects of marine pollution, climate, and tidal range on biomass and sediment organic carbon in Chinese mangrove forests. *Catena*, 202. <https://doi.org/10.1016/j.catena.2021.105270>

Waycott, M., Mckenzie, L. J., Mellors, J., & Ellison, J. (2011). Vulnerability of mangroves, seagrasses and intertidal flats in the tropical Pacific to climate change. In *Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change* (pp. 297–368). Secretariat of the Pacific Community. <https://www.researchgate.net/publication/259649359>

Wiarta, R., Indrayani, Y., Mulia, F., & Astiani, D. (2019). Carbon sequestration by young Rhizophora apiculata plants in Kubu Raya district, West Kalimantan, Indonesia. *Biodiversitas*, 20(2), 311–315. <https://doi.org/10.13057/biodiv/d200202>

Wijaya, T., & Budiman, S. (2016). *Analisis Multivariat Untuk Penelitian Manajemen* (1st ed.). Pohon Cahaya. www.pohoncahaya.com

Wisudaningsi, B. A., Arofah, I., & Belang, K. A. (2019). Pengaruh Kualitas Pelayanan dan Kualitas Produk Terhadap Kepuasan Konsumen dengan Menggunakan Metode Analisis Regresi Linear Berganda. *Jurnal Statistika Dan Matematika*, 1(1), 103–117.

Yu, H., Yang, Y., Wang, C., Chen, R., Xie, Q., Liu, G., & Yin, G. (2023). Extracting Deciduous Forests Spring Phenology From Sentinel-1 Cross Ratio Index. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 16, 2841–2850. <https://doi.org/10.1109/JSTARS.2023.3247833>



UNIVERSITAS
GADJAH MADA

Perbandingan Citra Sentinel-1 dan Sentinel-2 Untuk Pemetaan Stok Karbon Atas Permukaan
(Aboveground

Carbon) Mangrove di Teluk Panggang, Kabupaten Banyuwangi, Jawa Timur

DEVANDRA BUDI MAHENDRA PUTRA PATTIASINA, Muhammad Kamal, S.Si., M.GIS., Ph.D.

Universitas Gadjah Mada, 2024 | Diunduh dari <http://etd.repository.ugm.ac.id/>

Yuvaraj, E., Dharanirajan, K., Jayakumar, S., Saravanan, & Balasubramaniam, & J. (2017). Distribution and zonation pattern of mangrove forest in Shoal Bay Creek, Andaman Islands, India. In *Indian Journal of Geo Marine Sciences* (Vol. 46, Issue 03).

Zhao, P., Lu, D., Wang, G., Liu, L., Li, D., Zhu, J., & Yu, S. (2016). Forest aboveground biomass estimation in Zhejiang Province using the integration of Landsat TM and ALOS PALSAR data. *International Journal of Applied Earth Observation and Geoinformation*, 53, 1–15. <https://doi.org/10.1016/j.jag.2016.08.007>

Zhu, Y., Liu, K., Liu, L., Wang, S., & Liu, H. (2015). Retrieval of mangrove aboveground biomass at the individual species level with worldview-2 images. *Remote Sensing*, 7(9), 12192–12214. <https://doi.org/10.3390/rs70912192>