

Gina Marano

Forest ecologist & forest modeller

Postdoctoral researcher, Swiss Federal Institute for Forest, Snow and Landscape Research WSL

Lecturer, ETH Zurich, D-USYS

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Research interests

Assessing the impacts of abiotic disturbances — mainly drought and climate extremes — and biotic disturbances — pests and management — on the dynamics of temperate forests, with a focus on growth and mortality processes at the stand and individual-tree scale. My work combines process-based and empirical forest models with long-term observational datasets, and pays close attention to the practical value of model output for forest practitioners.

Positions

2025 – present	Postdoctoral Researcher (100%) Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland Research Unit Forest Resources and Management — Resource Analysis group, Swiss National Forest Inventory. Project ReForMASSIMO : improving the modelling of Swiss forest development under relevant climate scenarios with the MASSIMO model. Supervisors: Dr. Golo Stadelmann, Dr. Esther Thürig.
2026 – present	University Lecturer (33%) ETH Zurich, Department of Environmental Systems Science (D-USYS), Switzerland Master course <i>Quantitative Vegetation Dynamics</i> .
2022 – 2023	Teaching Assistant & Research Support (20%) ETH Zurich, D-USYS, Switzerland Master courses <i>Quantitative Vegetation Dynamics</i> and <i>Forest Mountain Ecology and Management</i> .
2018 – 2020	Research Fellow (100%) University of Naples Federico II, Italy Horizon 2020 project LANDSUPPORT . Group leader of the forestry group in WP3 (high-performance models); development of geospatial decision support tools for forest practice in the Campania Region at NUTS-2 and NUTS-3 level.

Education

2021 – 2025	PhD in Forest Ecology ETH Zurich, Switzerland Thesis: <i>Unraveling the death spiral — drivers and ecological responses of temperate forests to drought stress</i> . Supervisor: Prof. Dr. Harald Bugmann, Stand and Landscape Dynamics group. Funded by SNSF grant 188882, <i>Embracing structural uncertainty in models of forest dynamics</i> . Developed and validated process-based forest gap models (ForClim v4.1–4.2) against long-term observational datasets; released open-source model code and reproducible workflows.
2015 – 2018	MSc Forest Sciences (110/110 cum laude) University of Padua, Italy Thesis: <i>Physico-chemical characterization of woody by-products for energetic purposes</i> .

2011 – 2014	BSc Forest Sciences (110/110 cum laude)
	University of Naples Federico II, Italy
	Thesis: <i>Characterization of forest soils – a multiscale approach.</i>
2007 – 2011	Matura, European Classical Gymnasium (100/100)
	Convitto Nazionale Vittorio Emanuele II, Naples, Italy

Grants & projects

2025 – 2028	ReForMASSIMO
	WSL · Federal Office for the Environment (BAFU) · CHF 500,000 · Role: non-PI (postdoc) Improving the modelling of forest development in Switzerland for relevant climate scenarios with the MASSIMO model.
2021 – 2025	Embracing structural uncertainty in models of forest dynamics
	ETH Zurich · Swiss National Science Foundation · CHF 959,036 · Role: non-PI (PhD) SNSF Division I–III, grant 188882.
2018 – 2022	LANDSUPPORT
	University of Naples Federico II · European Union (H2020, 774234) · €6,999,771 total, €1,351,583 institutional · Role: non-PI (research fellow) Development of an integrated web-based land decision support system for the implementation of agricultural and environmental policies. Geospatial infrastructure tools supporting sustainable forest management at EU, national and regional scale.

Teaching

2026 – present	Quantitative Vegetation Dynamics (MSc)
	ETH Zurich, D-USYS · University Lecturer (33%)
2021 – 2024	Quantitative Vegetation Dynamics (MSc)
	ETH Zurich, D-USYS · Teaching assistant (20%) Supporting students in setting up and interpreting simulations with the forest gap model ForClim.
2023 – 2024	Ökologie und Management von Gebirgswäldern (MSc)
	ETH Zurich, D-USYS · Teaching assistant (20%) Also listed as <i>Forest Mountain Ecology and Management</i> .

Supervision of theses

Master	2024: Livia Gysel (ETH Zurich) — modelling support; main supervisor Dr. Mathieu Levesque.
	2023: Francesca Eccher (Free University of Bolzano) — modelling support; main supervisor Dr. Marco Mina, Eurac Research.
	2022–2023: Laurin Hillebrand (University of Innsbruck) — modelling support; main supervisor Dr. Marco Mina.
	2021: Alessandro Aquino (University of Naples Federico II) — co-supervisor; main supervisor Prof. Fabio Terribile.
Bachelor	2024: Raphael Schmid (ETH Zurich) — co-supervisor; main supervisor Prof. Dr. Harald Bugmann.
	2023: Lara Wüthrich (ETH Zurich) — modelling support; main supervisor Prof. Dr. Harald Bugmann.
	2022: Samuel Zweifel (ETH Zurich) — modelling support; main supervisor Dr. Ulrike Hiltner.

Editorial & review service

Editorial boards	Editorial board member, <i>Current Climate Change Reports</i> (Springer). Guest Assistant Editor, <i>Forests</i> — Special Issue <i>Modeling Forest Response to Climate Change</i> .
Peer review	Nature Communications, New Phytologist (Tansley Review), Global Change Biology, Journal of Ecology, Geoscientific Model Development, Biogeosciences, Ecological Modelling, Scientific Reports, European Journal of Soil Science, Discover Sustainability, Discover Forests.
Institutions	Reviewer for the National Science Centre, Poland.

Professional affiliations

2026 – present	British Ecological Society , Forest Ecology Group — Scientific Advisor.
2026 – present	International Tree Mortality Network — Core team member, contributing expertise on dynamic vegetation forest models.
2020 – present	SISEF , Italian Society of Silviculture and Forest Ecology — Communication Officer of the Modelling Working Group.
2018 – present	CNR Forest Modelling Lab — external research associate.

Forest models — contributions

MASSIMO (Java)	Empirical, stochastic, individual-tree simulator of the Swiss National Forest Inventory. Enhancing climate sensitivity via a climate meta-model; hybridisation with process-based approaches.
ForClim v4.1–4.2 (C#, Python)	Gap model of forest dynamics. Main developer of versions 4.1 and 4.2, extending sensitivity to climate extremes. Ongoing collaborations with ETH Zurich, University of Auckland and Universidad Santiago de Chile. Open source.
3D-CMCC-FEM (C)	Process-based forest ecosystem model. Contributor as external research associate at the CNR Forest Modelling Lab; transferring the drought-mortality framework and linking predisposition to non-structural carbohydrate dynamics. Open source.
Forest Studio (Rust)	Forest growth and management model. Scientific support to development at the ETH Zurich Forest Resources Management professorship. Open source.

Selected talks

2025	Modellierung zukünftiger Baumarteneignung: Herausforderungen und stetige Weiterentwicklungen (invited) Montagskolloquium für die Praxis, ETH Zürich, 24 November 2025
2024	Predisposing and inciting stress factors leading to drought-induced mortality (invited) IUFRO World Congress, session T5.22, Stockholm, June 2024
2023	Predisposing and inciting stress factors leading to drought-induced tree mortality (best oral presentation) SwissForestLab Science Day, ETH Zurich, October 2023
2023	From dynamic forest models to decision support for forest transformation — how can synergies be achieved? (session chair) European Conference of Ecological Modelling, Leipzig, September 2023 Also presented <i>Predisposing and inciting stress factors leading to beech mortality in Switzerland</i> and a poster on dynamic forest models as decision support in Swiss mountain protection forests.
2022	Effects of drought on Swiss forest dynamics — what is the influence of soil water storage capacity? Forest Disturbances and Ecosystem Dynamics in a Changing World, Berchtesgaden National Park, Germany, September 2022

2022	Analyzing the drought–growth relationship at six low-elevation beech sites in Switzerland XIII Congresso Nazionale SISEF, Orvieto, Italy, May–June 2022
2021	How to integrate dynamic forest models in geospatial decision support systems LANDSUPPORT H2020 Round Table on Forestry

Publications — peer-reviewed

Bold indicates own name. † first or co-first author; * corresponding author.

- 1 **Marano, G.**^{†*}, Hiltner, U., Meusburger, K., Hands, T.O., Bugmann, H. Predicting drought-induced tree mortality in Swiss beech forests. *Ecosphere*, in press, 2026. doi:10.64898/2025.12.15.694299
- 2 **Marano, G.**[†], Costa, M., Bugmann, H., Griess, V.C., Rudow, A., Díaz-Yáñez, O. Preparing for tomorrow: a protocol for tree species parameterization in dynamic vegetation models. *Ecological Modelling*, 517, 111587, 2026. doi:10.1016/j.ecolmodel.2026.111587
- 3 **Marano, G.**^{†*}, Hiltner, U., Knapp, N., Bugmann, H. Simulating the recent drought-induced mortality of European beech and Norway spruce in German forests. *Geoscientific Model Development*, 19(3), 1121–1141, 2026. doi:10.5194/gmd-19-1121-2026
- 4 Boukhris, I., Cherubini, F., Collalti, A., Dalmonech, D., Vonderach, C., **Marano, G.** et al. Long-term forest-sector mitigation and radiative forcing. *Journal of Environmental Management*, 405, 129586, 2026. doi:10.1016/j.jenvman.2026.129586
- 5 Boukhris, I., **Marano, G.**[†], Dalmonech, D., Valentini, R., Collalti, A. Modeling forest growth under current and future climate. *Current Forestry Reports*, 11(1), 17, 2025. doi:10.1007/s40725-025-00249-5
- 6 Fischer, R., Anders, T., Bugmann, H., Djahangard, M., Dressler, G., Hetzer, J., Hickler, T., Hiltner, U., **Marano, G.** et al. Perspectives for forest modeling to improve the representation of drought-related tree mortality. *Journal für Kulturpflanzen*, 77(2), 50–69, 2025. doi:10.5073/JfK.2025.02.05
- 7 **Marano, G.**[†], Dalmonech, D., Collalti, A. Modeling Forest Response to Climate Change (editorial). *Forests*, 15(7), 1194, 2024. doi:10.3390/f15071194
- 8 Dalmonech, D., Vangi, E., Chiesi, M., Chirici, G., Fibbi, L., Giannetti, F., **Marano, G.**, Massari, C. et al. Regional estimates of gross primary production: 3D-CMCC-FEM vs. remote-sensing multiple datasets. *European Journal of Remote Sensing*, 57(1), 2301657, 2024. doi:10.1080/22797254.2023.2301657
- 9 Terribile, F. et al., incl. **Marano, G.** The LANDSUPPORT geospatial decision support system (S-DSS) vision. *Land Degradation & Development*, 35(2), 813–834, 2024. doi:10.1002/ldr.4954
- 10 Vangi, E., Dalmonech, D., Ciocco, E., **Marano, G.** et al. Stand age diversity affects forests' resilience and stability, although unevenly. *Journal of Environmental Management*, 366, 121822, 2024. doi:10.1016/j.jenvman.2024.121822
- 11 **Marano, G.**[†] et al. Weshalb sind die Buchen in Mittelland-Wäldern gestorben? *Schweizerische Zeitschrift für Forstwesen*, 175(1), 2024.
- 12 Testolin, R., Dalmonech, D., **Marano, G.** et al. Simulating diverse forest management options in a changing climate on a *Pinus nigra* subsp. *laricio* plantation in Southern Italy. *Science of the Total Environment*, 857, 159361, 2023. doi:10.1016/j.scitotenv.2022.159361
- 13 Dalmonech, D., **Marano, G.**[†], Amthor, J.S., Cescatti, A., Lindner, M., Trotta, C., Collalti, A. Feasibility of enhancing carbon sequestration and stock capacity in temperate and boreal European forests via changes to management regimes. *Agricultural and Forest Meteorology*, 327, 109203, 2022. doi:10.1016/j.agrformet.2022.109203
- 14 Mahnken, M., Cailleret, M., Collalti, A. et al., incl. **Marano, G.** Accuracy, realism and general applicability of European forest models. *Global Change Biology*, 28(23), 6921–6943, 2022. doi:10.1111/gcb.16384
- 15 De Faria, B.L., **Marano, G.** et al. Model-based estimation of Amazonian forests recovery time after drought and fire events. *Forests*, 12(1), 8, 2021. doi:10.3390/f12010008
- 16 **Marano, G.**[†], Collalti, A. “Models of tree and stand dynamics”: a differential journey through forest modelling (book review). *iForest*, 13(1), 152–153, 2020. doi:10.3832/ifer0061-013
- 17 **Marano, G.**[†], Langella, G., Basile, A., Cona, F. et al. A geospatial decision support system tool for supporting integrated forest knowledge at the landscape scale. *Forests*, 10(8), 690, 2019. doi:10.3390/f10080690

Publications — edited volumes & outreach

- 1 **Marano, G.**, Dalmonech, D., Collalti, A. (eds.) Modeling Forest Response to Climate Change. MDPI Forests Special Issue reprint.

- 2 **Marano, G.** Unraveling the death spiral: drivers and ecological responses of temperate forests to drought stress. Doctoral dissertation, ETH Zurich, 2025.
- 3 **Marano, G.,** Dalmonech, D. Aumento di temperatura e sequestro di carbonio: un punto di non ritorno a breve termine per le foreste? SISEF, March 2021.
- 4 **Marano, G.,** Castello, P. Dall'università alla professione. L'esperienza del progetto PRO.PRO.FOR. *Sherwood – Foreste ed Alberi Oggi*, 232, 2018.
- 5 **Marano, G.,** Zambon, G. Uniforest. Un'impresa familiare nel grande mercato europeo. *Tecniko & Pratiko*, 129, 2017.

Technical skills

Programming	C# (advanced); C, Python, Java, JavaScript, Rust (basic)
Scripting & stats	R (advanced); SAS, SPSS, Statgraphics Centurion, MATLAB
Modelling env.	RStudio, NetLogo, Jupyter Notebook, Google Colab
Development	Microsoft Visual Studio, Eclipse; Git (GitHub, GitLab)
HPC & cloud	ETH Euler cluster (SLURM, MPI/OpenMP)
Geospatial	QGIS, ArcGIS, Google Earth Engine
Databases	PostgreSQL, Microsoft Access
Authoring	LaTeX, Quarto, Markdown, Shiny
Systems	Windows, Linux

Languages & personal

Languages	Italian (native), English (C1), German (B2), Spanish (B1), French (A2)
Personal	Born 15 March 1992 in Naples, Italy. Italian nationality. Based in the Canton of Zurich, Switzerland.