

# Stanford

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## Peter Vitousek

Clifford G. Morrison Professor of Population and Resource Studies, Professor of Earth System Science, Senior Fellow at the Woods Institute for the Environment and Professor, by courtesy, of Biology

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### Bio

#### ACADEMIC APPOINTMENTS

- Professor, Biology
- Professor, Earth System Science
- Senior Fellow, Stanford Woods Institute for the Environment
- Professor, Biology
- Senior Fellow, Stanford Woods Institute for the Environment

#### PROGRAM AFFILIATIONS

- Center for East Asian Studies
- Center for Latin American Studies

#### LINKS

- My Lab Site: <https://web.stanford.edu/group/Vitousek/>

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### Research & Scholarship

#### CURRENT RESEARCH AND SCHOLARLY INTERESTS

Please see 'Short research description.'

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### Teaching

#### COURSES

##### 2023-24

- Island Ecology: ESS 16N (Aut)

##### 2022-23

- Biology and Global Change: BIO 117, EARTHSYS 111, EARTHSYS 217, ESS 111 (Win)
- Ecology of the Hawaiian Islands: BIO 116, SUSTAIN 116 (Aut)

##### 2021-22

- Biology and Global Change: BIO 117, EARTHSYS 111, EARTHSYS 217, ESS 111 (Win)
- Ecosystem Ecology and Biogeochemistry: BIO 147, BIO 240, EARTHSYS 147, EARTHSYS 247 (Aut)

##### 2020-21

- Biology and Global Change: BIO 117, EARTHSYS 111, EARTHSYS 217, ESS 111 (Win)
- Island Ecology: BIO 16N (Aut)

## GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biology (School of Humanities and Sciences) (PhD Program)

## Publications

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### PUBLICATIONS

- **Evidence for a historic change occurring in China** *Environmental Science and Technology*  
Liu, X., Vitousek, P., Chang, Y., Zhang, W., Matson, P., Zhang, F.  
2016; 50: 505-506
- **The global nitrogen cycle in the twenty-first century** *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*  
Fowler, D., Coyle, M., Skiba, U., Sutton, M. A., Cape, J. N., Reis, S., Sheppard, L. J., Jenkins, A., Grizzetti, B., Galloway, J. N., Vitousek, P., Leach, A., Bouwman, et al  
2013; 368 (1621)
- **Long-term effects of agriculture on soil carbon pools and carbon chemistry along a Hawaiian environmental gradient** *4th Conference on the Mechanisms of Organic Matter Stabilization and Destabilization (SOM) - Organic Matter Stabilization and Ecosystem Functions*  
Cusack, D. F., Chadwick, O. A., Ladefoged, T., Vitousek, P. M.  
SPRINGER.2013: 229-43
- **Irrigated taro (*Colocasia esculenta*) farming in North Kohala, Hawai'i sedimentology and soil nutrient analyses** *JOURNAL OF ARCHAEOLOGICAL SCIENCE*  
McCoy, M. D., Ribeiro, A. T., Graves, M. W., Chadwick, O. A., Vitousek, P. M.  
2013; 40 (3): 1528-1538
- **Enhanced nitrogen deposition over China** *NATURE*  
Liu, X., Zhang, Y., Han, W., Tang, A., Shen, J., Cui, Z., Vitousek, P., Erisman, J. W., Goulding, K., Christie, P., Fangmeier, A., Zhang, F.  
2013; 494 (7438): 459-462
- **Biological nitrogen fixation: rates, patterns and ecological controls in terrestrial ecosystems.** *Philosophical transactions of the Royal Society of London. Series B, Biological sciences*  
Vitousek, P. M., Menge, D. N., Reed, S. C., Cleveland, C. C.  
2013; 368 (1621): 20130119-?
- **Fungal endophyte communities reflect environmental structuring across a Hawaiian landscape** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Zimmerman, N. B., Vitousek, P. M.  
2012; 109 (32): 13022-13027
- **Long-term carbon storage through retention of dissolved aromatic acids by reactive particles in soil** *GLOBAL CHANGE BIOLOGY*  
Kramer, M. G., Sanderman, J., Chadwick, O. A., Chorover, J., Vitousek, P. M.  
2012; 18 (8): 2594-2605
- **Mineralogical controls on soil black carbon preservation** *GLOBAL BIOGEOCHEMICAL CYCLES*  
Cusack, D. F., Chadwick, O. A., Hockaday, W. C., Vitousek, P. M.  
2012; 26
- **The Ahupua'a of Puanui: A Resource for Understanding Hawaiian Rain-Fed Agriculture** *PACIFIC SCIENCE*  
Kagawa, A. K., Vitousek, P. M.  
2012; 66 (2): 161-172
- **The Climate Benefits of Better Nitrogen and Phosphorus Management** *ISSUES IN SCIENCE AND TECHNOLOGY*  
Townsend, A. R., Vitousek, P. M., Houlton, B. Z.  
2012; 28 (2): 85-91

- **Cyanolichens: a link between the phosphorus and nitrogen cycles in a Hawaiian montane forest** *JOURNAL OF TROPICAL ECOLOGY*  
Benner, J. W., Vitousek, P. M.  
2012; 28: 73-81
- **Agricultural potential and actualized development in Hawai'i: an airborne LiDAR survey of the leeward Kohala field system (Hawai'i Island)** *JOURNAL OF ARCHAEOLOGICAL SCIENCE*  
Ladefoged, T. N., Mccoy, M. D., Asner, G. P., Kirch, P. V., Puleston, C. O., Chadwick, O. A., Vitousek, P. M.  
2011; 38 (12): 3605-3619
- **Are patterns in nutrient limitation belowground consistent with those aboveground: results from a 4 million year chronosequence** *BIOGEOCHEMISTRY*  
Reed, S. C., Vitousek, P. M., Cleveland, C. C.  
2011; 106 (3): 323-336
- **Dependence of Forest Structure and Dynamics on Substrate Age and Ecosystem Development** *ECOSYSTEMS*  
Kellner, J. R., Asner, G. P., Vitousek, P. M., Tweiten, M. A., Hotchkiss, S., Chadwick, O. A.  
2011; 14 (7): 1156-1167
- **Integrated soil-crop system management for food security** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Chen, X., Cui, Z., Vitousek, P. M., Cassman, K. G., Matson, P. A., Bai, J., Meng, Q., Hou, P., Yue, S., Roemheld, V., Zhang, F.  
2011; 108 (16): 6399-6404
- **Vegetation Effects on Soil Organic Matter Chemistry of Aggregate Fractions in a Hawaiian Forest** *ECOSYSTEMS*  
Stewart, C. E., Neff, J. C., Amatangelo, K. L., Vitousek, P. M.  
2011; 14 (3): 382-397
- **Cellulose delta O-18 is an index of leaf-to-air vapor pressure difference (VPD) in tropical plants** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Kahmen, A., Sachse, D., Arndt, S. K., Tu, K. P., Farrington, H., Vitousek, P. M., Dawson, T. E.  
2011; 108 (5): 1981-1986
- **Agriculture in Brazil: impacts, costs, and opportunities for a sustainable future** *CURRENT OPINION IN ENVIRONMENTAL SUSTAINABILITY*  
Martinelli, L. A., Naylor, R., Vitousek, P. M., Moutinho, P.  
2010; 2 (5-6): 431-438
- **Erosion, Geological History, and Indigenous Agriculture: A Tale of Two Valleys** *ECOSYSTEMS*  
Vitousek, P. M., Chadwick, O. A., Hilley, G., Kirch, P. V., Ladefoged, T. N.  
2010; 13 (5): 782-793
- **Soil nutrient analysis of Rapa Nui gardening** *ARCHAEOLOGY IN OCEANIA*  
Ladefoged, T. N., Stevenson, C. M., Haoa, S., Mulrooney, M., Puleston, C., Vitousek, P. M., Chadwick, O. A.  
2010; 45 (2): 80-85
- **Top-Down Analysis of Forest Structure and Biogeochemistry across Hawaiian Landscapes** *PACIFIC SCIENCE*  
Vitousek, P. M., Tweiten, M. A., Kellner, J., Hotchkiss, S. C., Chadwick, O. A., Asner, G. P.  
2010; 64 (3): 359-366
- **Significant Acidification in Major Chinese Croplands** *SCIENCE*  
Guo, J. H., Liu, X. J., Zhang, Y., Shen, J. L., Han, W. X., Zhang, W. F., Christie, P., Goulding, K. W., Vitousek, P. M., Zhang, F. S.  
2010; 327 (5968): 1008-1010
- **Terrestrial phosphorus limitation: mechanisms, implications, and nitrogen-phosphorus interactions** *ECOLOGICAL APPLICATIONS*  
Vitousek, P. M., Porder, S., Houlton, B. Z., Chadwick, O. A.  
2010; 20 (1): 5-15
- **Prevalence of Tree Regeneration by Sprouting and Seeding Along a Rainfall Gradient in Hawai'i** *BIOTROPICA*  
Busby, P. E., Vitousek, P., Dirzo, R.  
2010; 42 (1): 80-86
- **Landscape-level variation in forest structure and biogeochemistry across a substrate age gradient in Hawaii** *ECOLOGY*

- Vitousek, P., Asner, G. P., Chadwick, O. A., Hotchkiss, S.  
2009; 90 (11): 3074-3086
- **Opportunities and constraints for intensive agriculture in the Hawaiian archipelago prior to European contact** *JOURNAL OF ARCHAEOLOGICAL SCIENCE*  
Ladefoged, T. N., Kirch, P. V., Gon, S. M., Chadwick, O. A., Hartshorn, A. S., Vitousek, P. M.  
2009; 36 (10): 2374-2383
  - **Changing sources of strontium to soils and ecosystems across the Hawaiian Islands** *Annual Fall American-Geophysical-Union Meeting*  
Chadwick, O. A., Derry, L. A., Bern, C. R., Vitousek, P. M.  
ELSEVIER SCIENCE BV.2009: 64-76
  - **Sources of nutrients to windward agricultural systems in pre-contact Hawai'i** *ECOLOGICAL APPLICATIONS*  
Palmer, M. A., Graves, M., Ladefoged, T. N., Chadwick, O. A., Duarte, T. K., Porder, S., Vitousek, P. M.  
2009; 19 (6): 1444-1453
  - **Agriculture. Nutrient imbalances in agricultural development.** *Science*  
Vitousek, P. M., Naylor, R., Crews, T., David, M. B., Drinkwater, L. E., Holland, E., Johnes, P. J., KATZENBERGER, J., Martinelli, L. A., Matson, P. A., Nziguheba, G., Ojima, D., Palm, et al  
2009; 324 (5934): 1519-1520
  - **Contrasting Predictors of Fern versus Angiosperm Decomposition in a Common Garden** *BIOTROPICA*  
Amatangelo, K. L., Vitousek, P. M.  
2009; 41 (2): 154-161
  - **Nitrogen in Agriculture: Balancing the Cost of an Essential Resource** *ANNUAL REVIEW OF ENVIRONMENT AND RESOURCES*  
Robertson, G. P., Vitousek, P. M.  
2009; 34: 97-125
  - **Stoichiometry of ferns in Hawaii: implications for nutrient cycling** *OECOLOGIA*  
Amatangelo, K. L., Vitousek, P. M.  
2008; 157 (4): 619-627
  - **A unifying framework for dinitrogen fixation in the terrestrial biosphere** *NATURE*  
Houlton, B. Z., Wang, Y., Vitousek, P. M., Field, C. B.  
2008; 454 (7202): 327-U34
  - **Invasive plants transform the three-dimensional structure of rain forests** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Asner, G. P., Hughes, R. F., Vitousek, P. M., Knapp, D. E., Kennedy-Bowdoin, T., Boardman, J., Martin, R. E., Eastwood, M., Green, R. O.  
2008; 105 (11): 4519-4523
  - **Amplified temperature dependence in ecosystems developing on the lava flows of Mauna Loa, Hawai'i** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Anderson-Teixeira, K. J., Vitousek, P. M., Brown, J. H.  
2008; 105 (1): 228-233
  - **Morella cerifera invasion and nitrogen cycling on a lowland Hawaiian lava flow** *BIOLOGICAL INVASIONS*  
Kurten, E. L., Snyder, C. P., Iwata, T., Vitousek, P. M.  
2008; 10 (1): 19-24
  - **Development of a diverse epiphyte community in response to phosphorus fertilization** *ECOLOGY LETTERS*  
Benner, J. W., Vitousek, P. M.  
2007; 10 (7): 628-636
  - **Soil phosphorus and agricultural development in the leeward Kohala Field System, Island of Hawai'i** *PACIFIC SCIENCE*  
Meyer, M., Ladefoged, T. N., Vitousek, P. M.  
2007; 61 (3): 347-353
  - **Resource-use efficiency and plant invasion in low-resource systems** *NATURE*  
Funk, J. L., Vitousek, P. M.

2007; 446 (7139): 1079-1081

- **Risky business: Temporal and spatial variation in preindustrial dryland agriculture** *HUMAN ECOLOGY*  
Lee, C. T., Tuljapurkar, S., Vitousek, P. M.  
2006; 34 (6): 739-763
- **Interactive effects of fire, elevated carbon dioxide, nitrogen deposition, and precipitation on a California annual grassland** *ECOSYSTEMS*  
Henry, H. A., Chiariello, N. R., Vitousek, P. M., Mooney, H. A., Field, C. B.  
2006; 9 (7): 1066-1075
- **Prehistoric agricultural depletion of soil nutrients in Hawai'i** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Hartshorn, A. S., Chadwick, O. A., Vitousek, P. M., Kirch, P. V.  
2006; 103 (29): 11092-11097
- **Business strategies for conservation on private lands: Koa forestry as a case study** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Goldstein, J. H., Daily, G. C., Friday, J. B., Matson, P. A., Naylor, R. A.  
2006; 103 (26): 10140-10145
- **Agricultural intensification: Will land spared from farming be land spared for nature?** *CONSERVATION BIOLOGY*  
Matson, P. A., Vitousek, P. M.  
2006; 20 (3): 709-710
- **Persistence of rock-derived nutrients in the wet tropical forests of La Selva, Costa Rica** *ECOLOGY*  
Porder, S., Clark, D. A., Vitousek, P. M.  
2006; 87 (3): 594-602
- **Interactive effects of elevated CO<sub>2</sub>, N deposition and climate change on extracellular enzyme activity and soil density fractionation in a California annual grassland** *GLOBAL CHANGE BIOLOGY*  
Henry, H. A., Juarez, J. D., Field, C. B., Vitousek, P. M.  
2005; 11 (10): 1808-1815
- **Ground-based and remotely sensed nutrient availability across a tropical landscape** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Porder, S., Asner, G. P., Vitousek, P. M.  
2005; 102 (31): 10909-10912
- **Ca cycling and isotopic fluxes in forested ecosystems in Hawaii** *GEOPHYSICAL RESEARCH LETTERS*  
Wiegand, B. A., Chadwick, O. A., Vitousek, P. M., Wooden, J. L.  
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- **Remote analysis of biological invasion and biogeochemical change** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Asner, G. P., Vitousek, P. M.  
2005; 102 (12): 4383-4386
- **Erosion and landscape development affect plant nutrient status in the Hawaiian Islands** *OECOLOGIA*  
Porder, S., Paytan, A., Vitousek, P. M.  
2005; 142 (3): 440-449
- **Interactive effects of elevated CO<sub>2</sub>, N deposition and climate change on plant litter quality in a California annual grassland** *OECOLOGIA*  
Henry, H. A., Cleland, E. E., Field, C. B., Vitousek, P. M.  
2005; 142 (3): 465-473
- **Imaging spectroscopy studies of Hawaiian ecosystems, carbon properties, and disturbance** *Conference on Image Processing and Pattern Recognition in Remote Sensing II*  
Asner, G. P., Vitousek, P. M.  
SPIE-INT SOC OPTICAL ENGINEERING.2005: 1-8
- **Rapid nutrient cycling in leaf litter from invasive plants in Hawai'i** *OECOLOGIA*

- Allison, S. D., Vitousek, P. M.  
2004; 141 (4): 612-619
- **Environment, agriculture, and settlement patterns in a marginal Polynesian landscape** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Kirch, P. V., Hartshorn, A. S., Chadwick, O. A., Vitousek, P. M., Sherrod, D. R., Coil, J., Holm, L., Sharp, W. D.  
2004; 101 (26): 9936-9941
  - **Soils, agriculture, and society in precontact Hawaii** *SCIENCE*  
Vitousek, P. M., Ladefoged, T. N., Kirch, P. V., Hartshorn, A. S., Graves, M. W., Hotchkiss, S. C., Tuljapurkar, S., Chadwick, O. A.  
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  - **Erosion and the rejuvenation of weathering-derived nutrient supply in an old tropical landscape** *ECOSYSTEMS*  
Vitousek, P., Chadwick, O., Matson, P., Allison, S., Derry, L., Kettley, L., Luers, A., Mecking, E., Monastra, V., Porder, S.  
2003; 6 (8): 762-772
  - **Polyphenols in litter from tropical montane forests across a wide range in soil fertility** *BIOGEOCHEMISTRY*  
Hattenschwiler, S., Hagerman, A. E., Vitousek, P. M.  
2003; 64 (1): 129-148
  - **Nitrogen fixation in bryophytes, lichens, and decaying wood along a soil-age gradient in Hawaiian montane rain forest** *BIOTROPICA*  
Matzek, V., Vitousek, P.  
2003; 35 (1): 12-19
  - **An unexpected nitrate decline in New Hampshire streams** *ECOSYSTEMS*  
Goodale, C. L., Aber, J. D., Vitousek, P. M.  
2003; 6 (1): 75-86
  - **Stoichiometry and flexibility in the Hawaiian model system** *Conference on Element Interactions*  
Vitousek, P. M.  
ISLAND PRESS.2003: 117-133
  - **Interactions of climate change with biological invasions and land use in the Hawaiian Islands: Modeling the fate of endemic birds using a geographic information system** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Benning, T. L., Lapointe, D., Atkinson, C. T., Vitousek, P. M.  
2002; 99 (22): 14246-14249
  - **Soil phosphorus fractions and symbiotic nitrogen fixation across a substrate-age gradient in Hawaii** *ECOSYSTEMS*  
Pearson, H. L., Vitousek, P. M.  
2002; 5 (6): 587-596
  - **Towards an ecological understanding of biological nitrogen fixation** *BIOGEOCHEMISTRY*  
Vitousek, P. M., Cassman, K., Cleveland, C., Crews, T., Field, C. B., Grimm, N. B., Howarth, R. W., Marino, R., Martinelli, L., Rastetter, E. B., SPRENT, J. I.  
2002; 57 (1): 1-45
  - **Nitrogen and nature** *2nd International Nitrogen Conference*  
Vitousek, P. M., Hattenschwiler, S., Olander, L., Allison, S.  
ROYAL SWEDISH ACAD SCIENCES.2002: 97-101
  - **Stand dynamics, nitrogen accumulation, and symbiotic nitrogen fixation in regenerating stands of Acacia koa** *ECOLOGICAL APPLICATIONS*  
Pearson, H. L., Vitousek, P. M.  
2001; 11 (5): 1381-1394
  - **Resource optimization and symbiotic nitrogen fixation** *ECOSYSTEMS*  
Rastetter, E. B., Vitousek, P. M., Field, C., Shaver, G. R., Herbert, D., AGREN, G. I.  
2001; 4 (4): 369-388
  - **Organic matter and nitrogen accumulation and nitrogen fixation during early ecosystem development in Hawaii** *BIOGEOCHEMISTRY*  
Crews, T. E., Kurina, L. M., Vitousek, P. M.  
2001; 52 (3): 259-279

- **Potential ecosystem-level effects of genetic variation among populations of *Metrosideros polymorpha* from a soil fertility gradient in Hawaii** *OECOLOGIA*  
Treseder, K. K., Vitousek, P. M.  
2001; 126 (2): 266-275
- **Morphological and physiological adjustment to N and P fertilization in nutrient-limited *Metrosideros polymorpha* canopy trees in Hawaii** *TREE PHYSIOLOGY*  
Cordell, S., Goldstein, G., Meinzer, F. C., Vitousek, P. M.  
2001; 21 (1): 43-50
- **Cattle grazing, forest loss, and fuel loading in a dry forest ecosystem at Pu'u Wa'aWa'a ranch, Hawai'i** *BIOTROPICA*  
Blackmore, M., Vitousek, P. M.  
2000; 32 (4): 625-632
- **Climate cycles, geomorphological change, and the interpretation of soil and ecosystem development** *ECOSYSTEMS*  
Hotchkiss, S., Vitousek, P. M., Chadwick, O. A., Price, J.  
2000; 3 (6): 522-533
- **Changes in asymbiotic, heterotrophic nitrogen fixation on leaf litter of *Metrosideros polymorpha* with long-term ecosystem development in Hawaii** *ECOSYSTEMS*  
Crews, T. E., Farrington, H., Vitousek, P. M.  
2000; 3 (4): 386-395
- **Nutrient limitation of decomposition in Hawaiian forests** *ECOLOGY*  
Hobbie, S. E., Vitousek, P. M.  
2000; 81 (7): 1867-1877
- **The role of polyphenols in terrestrial ecosystem nutrient cycling** *TRENDS IN ECOLOGY & EVOLUTION*  
Hattenschwiler, S., Vitousek, P. M.  
2000; 15 (6): 238-243
- **Consequences of changing biodiversity** *NATURE*  
Chapin, F. S., Zavaleta, E. S., Eviner, V. T., Naylor, R. L., Vitousek, P. M., Reynolds, H. L., Hooper, D. U., Lavorel, S., Sala, O. E., Hobbie, S. E., Mack, M. C., Diaz, S.  
2000; 405 (6783): 234-242
- **Precipitation, decomposition and litter decomposability of *Metrosideros polymorpha* in native forests on Hawai'i** *JOURNAL OF ECOLOGY*  
Austin, A. T., Vitousek, P. M.  
2000; 88 (1): 129-138
- **Global change and wilderness science** *Wilderness Science in a Time of Change Conference*  
Vitousek, P. M., Aber, J. D., Goodale, C. L., Aplet, G. H.  
US DEPT AGR, FOREST SERV ROCKY MT FOREST & RANGE EXPTL STN.2000: 5-9
- **Decomposition of *Metrosideros polymorpha* leaf litter along elevational gradients in Hawaii** *GLOBAL CHANGE BIOLOGY*  
Scowcroft, P. G., Turner, D. R., Vitousek, P. M.  
2000; 6 (1): 73-85
- **Deliberate introductions of species: Research needs - Benefits can be reaped, but risks are high** *BIOSCIENCE*  
Ewel, J. J., O'Dowd, D. J., Bergelson, J., Daehler, C. C., D'Antonio, C. M., Gomez, L. D., Gordon, D. R., Hobbs, R. J., Holt, A., Hopper, K. R., Hughes, C. E., LaHart, M., Leakey, et al  
1999; 49 (8): 619-630
- **The globalization of N deposition: ecosystem consequences in tropical environments** *BIOGEOCHEMISTRY*  
Matson, P. A., McDowell, W. H., Townsend, A. R., Vitousek, P. M.  
1999; 46 (1-3): 67-83
- **Ecosystem constraints to symbiotic nitrogen fixers: a simple model and its implications** *BIOGEOCHEMISTRY*  
Vitousek, P. M., Field, C. B.  
1999; 46 (1-3): 179-202

- **Changing sources of nutrients during four million years of ecosystem development** *NATURE*  
Chadwick, O. A., Derry, L. A., Vitousek, P. M., Huebert, B. J., Hedin, L. O.  
1999; 397 (6719): 491-497
- **Microclimate change and effect on fire following forest-grass conversion in seasonally dry tropical woodland** *BIOTROPICA*  
Freifelder, R. R., Vitousek, P. M., D'Antonio, C. M.  
1998; 30 (2): 286-297
- **Nutrient dynamics on a precipitation gradient in Hawai'i** *OECOLOGIA*  
Austin, A. T., Vitousek, P. M.  
1998; 113 (4): 519-529
- **Ecosystem development on Hawaiian lava flows: biomass and species composition** *JOURNAL OF VEGETATION SCIENCE*  
Aplet, G. H., Hughes, R. F., Vitousek, P. M.  
1998; 9 (1): 17-26
- **Experimental investigation of nutrient limitation of forest growth on wet tropical mountains** *ECOLOGY*  
Tanner, E. V., Vitousek, P. M., Cuevas, E.  
1998; 79 (1): 10-22
- **The effects of plant composition and diversity on ecosystem processes** *SCIENCE*  
Hooper, D. U., Vitousek, P. M.  
1997; 277 (5330): 1302-1305
- **Human domination of Earth's ecosystems** *SCIENCE*  
Vitousek, P. M., Mooney, H. A., Lubchenco, J., Melillo, J. M.  
1997; 277 (5325): 494-499
- **After the volcano** *NATURAL HISTORY*  
Vitousek, P. M.  
1997; 106 (5): 48-53
- **On regression and residuals: Response to Knops et al.** *OECOLOGIA*  
Vitousek, P. M.  
1997; 110 (4): 557-559
- **Process modeling of controls on nitrogen trace gas emissions from soils worldwide** *JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES*  
Potter, C. S., Matson, P. A., Vitousek, P. M., Davidson, E. A.  
1996; 101 (D1): 1361-1377
- **SUCCESSIONAL DEVELOPMENT OF A HAWAIIAN MONTANE GRASSLAND** *BIOTROPICA*  
KARPA, D. M., Vitousek, P. M.  
1994; 26 (1): 2-11
- **LEAF MORPHOLOGY ALONG ENVIRONMENTAL GRADIENTS IN HAWAIIAN METROSIDEROS-POLYMORPHA** *BIOTROPICA*  
GEESKE, J., Aplet, G., Vitousek, P. M.  
1994; 26 (1): 17-22
- **FACTORS CONTROLLING ECOSYSTEM STRUCTURE AND FUNCTION** *Symposium on Factors of Soil Formation: A 50th Anniversary Retrospective, held during the 1991 Annual Meeting of the Soil-Science-Society-of-America*  
Vitousek, P. M.  
SOIL SCIENCE SOC AMER.1994: 87-97
- **TERRESTRIAL ECOSYSTEM PRODUCTION - A PROCESS MODEL-BASED ON GLOBAL SATELLITE AND SURFACE DATA** *GLOBAL BIOGEOCHEMICAL CYCLES*  
Potter, C. S., Randerson, J. T., Field, C. B., Matson, P. A., Vitousek, P. M., Mooney, H. A., Klooster, S. A.  
1993; 7 (4): 811-841
- **BARRIERS TO SHRUB REESTABLISHMENT FOLLOWING FIRE IN THE SEASONAL SUBMONTANE ZONE OF HAWAII** *OECOLOGIA*  
Hughes, F., Vitousek, P. M.



1993; 93 (4): 557-563

- **BIOLOGICAL DIVERSITY AND TERRESTRIAL ECOSYSTEM BIOGEOCHEMISTRY** *Symposium on Biodiversity and Ecosystem Function*  
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