

Selected findings from the IPBES Global Assessment on Biodiversity and Ecosystem Services

House Committee on Space, Science and Technology
Nature in Crisis: Biodiversity Loss and its Causes, June 4 2019

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I would like to thank the House Committee on Science, Space and Technology for the opportunity to provide a testimony based on the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). This testimony complements that provided by Sir Robert Watson.

In response to the request of the Committee, this testimony addresses: 1) major findings of the IPBES report related to trends in ecosystems services and how they are affected by the drivers of biodiversity loss, 2) issues of biodiversity in agriculture and ecosystem service benefits provided by non-marine ecosystems, 3) potential solutions identified in the IPBES Global Assessment, and 4) research gaps related to ecosystem services.

1) Trends in ecosystems services and how they are affected by the drivers of biodiversity loss

Since 1970, trends in agricultural production, fish harvest, bioenergy production and harvest of materials have increased, but 14 of the 18 categories of contributions of nature that were assessed, mostly regulating and non-material contributions, have declined. The value of agricultural crop production (\$2.6 trillion in 2016) has increased approximately threefold since 1970, and raw timber harvest has increased by 45 per cent, reaching some 4 billion cubic meters in 2017, with the forestry industry providing about 13.2 million jobs. However, indicators of regulating contributions, such as soil organic carbon and pollinator diversity, have declined, indicating that gains in material contributions are often not sustainable. Currently, land degradation has reduced productivity in 23 per cent of the global terrestrial area, and between \$235 billion and \$577 billion in annual global crop output is at risk as a result of pollinator loss. Moreover, loss of coastal habitats and coral reefs reduces coastal protection, which increases the risk from floods and hurricanes to life and property for the 100 million–300 million people living within coastal 100-year flood zones.

Nature's contributions to people are often distributed unequally across space and time and among different segments of society. There are often trade-offs in the production and use of nature's contributions. Benefits and burdens associated with co-production and use of nature's contributions are distributed and experienced differently among social groups, countries and regions. Giving priority to one of nature's contributions to people, such as food production, can result in ecological changes that reduce other contributions. Some of these changes may benefit some people at the expense of others, particularly the most vulnerable, as may changes in technological and institutional arrangements. For example, although food production today is sufficient to satisfy global needs, approximately 11 per cent of the world's population is undernourished, and diet-related disease drives 20 per cent of premature mortality, related both to undernourishment and to obesity. The great expansion in the production of food, feed, fiber and bioenergy has occurred at the cost of many other contributions of nature to quality of life, including regulation of air and water quality, climate regulation and habitat provision. Synergies also exist, such as sustainable agricultural practices that enhance soil quality, thereby improving productivity and other ecosystem functions and services such as carbon sequestration and water quality regulation.



Figure 1. Global trends in the capacity of nature to sustain contributions to good quality of life from 1970 to the present, which show a decline for 14 of the 18 categories of nature's contributions to people analyzed. Data supporting global trends and regional variations come from a systematic review of over 2,000 studies {2.3.5.1}. Indicators were selected on the basis of availability of global data, prior use in assessments and alignment with 18 categories. For many categories of nature's contributions, two indicators are included that show different aspects of nature's capacity to contribute to human well-being within that category. Indicators are defined so that an increase in the indicator is associated with an improvement in nature's contributions.

The rate of global change in nature during the past 50 years and the related impact on ecosystem services is unprecedented in human history. The direct drivers of change in nature with the largest global impact have been (starting with those with most impact): changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasion of alien species. Those five direct drivers result from an array of underlying causes – the indirect drivers of change – which are in turn underpinned by societal values and behaviors that include production and consumption patterns, human population dynamics and trends, trade, technological innovations and local through global governance. The rate of change in the direct and indirect drivers differs among regions and countries.

The average per capita consumption of materials (e.g., plants, animals, fossil fuels, ores, construction material) rose by 15 per cent since 1980. This activity has generated unprecedented impacts: since 1980, greenhouse gas emissions doubled, raising average global temperatures by at least 0.7 degrees Celsius, while plastic pollution in oceans has increased tenfold. Over 80 per cent of global wastewater is being discharged back into the environment without treatment, while 300–400 million tons of heavy metals, solvents, toxic sludge and other wastes from industrial facilities are dumped into the world's waters each year. Excessive or inappropriate application of fertilizer can lead to run off from fields and enter freshwater and coastal ecosystems, producing more than 400 hypoxic zones which affect a total area of more than 245,000 km² as early as 2008.

2) Biodiversity in agriculture and ecosystem services provided by non-marine ecosystems

Nature plays a critical role in providing food and feed, energy, medicines and genetic resources and a variety of materials fundamental for people's physical well-being and for maintaining culture. For example, more than 2 billion people rely on wood fuel to meet their primary energy needs, an estimated 4 billion people rely primarily on natural medicines for their health care and some 70 per cent of drugs used for cancer are natural or are synthetic products inspired by nature. Nature, through its ecological and evolutionary processes, sustains the quality of the air, fresh water and soils on which humanity depends, distributes fresh water, regulates the climate, provides pollination and pest control and reduces the impact of natural hazards. For example, more than 75 per cent of global food crop types, including fruits and vegetables and some of the most important cash crops such as coffee, cocoa and almonds, rely on animal pollination. Marine and terrestrial ecosystems are the sole sinks for anthropogenic carbon emissions, with a gross sequestration of 5.6 gigatons of carbon per year (the equivalent of some 60 per cent of global anthropogenic emissions). Nature underpins all dimensions of human health and contributes to non-material aspects of quality of life – inspiration and learning, physical and psychological experiences, and supporting identities – that are central to quality of life and cultural integrity, even if their aggregated value is difficult to quantify. Most of nature's contributions are co-produced with people, but while anthropogenic assets – knowledge and institutions, technology infrastructure and financial capital – can enhance or partially replace some of those contributions, some are irreplaceable. The diversity of nature maintains humanity's ability to choose alternatives in the face of an uncertain future.

Biodiversity is particularly important for agriculture. Globally, local varieties and breeds of domesticated plants and animals are disappearing. This loss of diversity, including genetic diversity, poses a serious risk to global food security by undermining the resilience of many agricultural systems to threats such as pests, pathogens and climate change. Fewer and fewer varieties and breeds of plants and animals are being cultivated, raised, traded and maintained around the world, despite many local efforts, which include those by indigenous peoples and local communities. By 2016, 559 of the 6,190 domesticated breeds of mammals used for food and agriculture (over 9 per cent) had become extinct and at least 1,000 more are threatened. In addition, many crop wild relatives that are important for long-term food security lack effective

protection, and the conservation status of wild relatives of domesticated mammals and birds is worsening. Reductions in the diversity of cultivated crops, crop wild relatives and domesticated breeds mean that agroecosystems are less resilient against future climate change, pests and pathogens.

Many of nature's contributions to people are essential for human health and their decline thus threatens a good quality of life. Nature provides a broad diversity of nutritious foods, medicines and clean water, can help to regulate climate, reduce levels of certain air pollutants, and improve mental and physical health through exposure to natural areas, among other contributions. Nature is the origin of most infectious diseases (negative impact), but also the source of medicines and antibiotics for treatment (positive contribution). Zoonotic diseases are significant threats to human health, with vector-borne diseases accounting for approximately 17 per cent of all infectious diseases and causing an estimated 700,000 deaths globally per annum. The deterioration of biodiversity and ecosystem functions, and the consequent disruption of benefits to people, has both direct and indirect implications for public health. Emerging infectious diseases in wildlife, domestic animals, plants or people can be exacerbated by human activities such as land clearing and habitat fragmentation or the overuse of antibiotics driving rapid evolution of antibiotic resistance in many bacterial pathogens. The deterioration of nature and consequent disruption of benefits to people has both direct and indirect implications for public health and can exacerbate existing inequalities in access to health care or healthy diets. Shifting diets towards a diversity of foods, including fish, fruit, nuts and vegetables, significantly reduces the risk of certain preventable non-communicable diseases, which are currently responsible for 20% of premature mortality globally.

Most of nature's contributions are not fully replaceable, yet some contributions of nature are irreplaceable. Loss of diversity, such as phylogenetic and functional diversity, can permanently reduce future options, such as wild species that might be domesticated as new crops and be used for genetic improvement. People have created substitutes for some other contributions of nature, but many of them are imperfect or financially prohibitive. For example, high-quality drinking water can be achieved either through ecosystems that filter pollutants or through human-engineered water treatment facilities. Similarly, coastal flooding from storm surges can be reduced either by coastal mangroves or by dikes and sea walls. In both cases, however, built infrastructure can be extremely expensive, incur high future costs and fail to provide synergistic benefits such as nursery habitats for edible fish or recreational opportunities. More generally, human-made replacements often do not provide the full range of benefits provided by nature.

3) Potential solutions.

Nature and the benefits it provides can be conserved, restored and used sustainably while simultaneously meeting other global societal goals. Feeding humanity and enhancing the conservation and sustainable use of nature are complementary and closely interdependent goals that can be advanced through sustainable agricultural, aquacultural and livestock systems, the safeguarding of native species, varieties, breeds and habitats, and ecological restoration. Specific actions include promoting sustainable agricultural practices, such as good agricultural and agroecological practices, among others, multifunctional landscape planning and cross-sectoral integrated management, that support the conservation of genetic diversity and associated agricultural biodiversity. Further actions to simultaneously achieve food security, biodiversity protection and sustainable use are context-appropriate climate change mitigation and adaptation, incorporating knowledge from various systems, including the sciences and sustainable indigenous and local practices, avoiding food waste, empowering producers and consumers to transform supply chains and facilitating sustainable and healthy dietary choices. As part of integrated landscape planning and management, prompt ecological restoration emphasizing the use of native

species can offset current degradation and save many endangered species but is less effective if delayed.

Conservation actions, including protected areas, efforts to manage unsustainable use and address illegal taking and trade of species, translocations and invasive species eradications, among others, have been successful in preventing the extinction of some species. Although still few and spatially localized, documented examples show that with prompt and appropriate action, it is possible to reduce human-induced extinction rates. There are, however, few other counterfactual studies assessing how trends in the state of nature or pressures upon nature would have been different in the absence of conservation efforts.

Five main interventions (“levers”) can generate transformative change by tackling the underlying indirect drivers of nature deterioration: (1) incentives and capacity-building; (2) cross-sectoral cooperation; (3) pre-emptive action; (4) decision-making in the context of resilience and uncertainty; and (5) environmental law and implementation. Employing these levers involves the following, in turn: (1) developing incentives and widespread capacity for environmental responsibility and eliminating perverse incentives; (2) reforming sectoral and segmented decision-making to promote integration across sectors and jurisdictions; (3) taking pre-emptive and precautionary actions in regulatory and management institutions and businesses to avoid, mitigate and remedy the deterioration of nature, and monitoring their outcomes; (4) managing for resilient social and ecological systems in the face of uncertainty and complexity to deliver decisions that are robust in a wide range of scenarios; and (5) strengthening environmental laws and policies and their implementation, and the rule of law more generally. All five levers may require new resources, particularly in low-capacity contexts such as in many developing countries.

Transformations towards sustainability are more likely when efforts are directed at the following key leverage points, where efforts yield exceptionally large effects: (1) visions of a good life; (2) total consumption and waste; (3) values and action; (4) inequalities; (5) justice and inclusion in conservation; (6) externalities and telecouplings; (7) technology, innovation and investment; and (8) education and knowledge generation and sharing. Specifically, the following changes are mutually reinforcing: (1) enabling visions of a good quality of life that do not entail ever-increasing material consumption; (2) lowering total consumption and waste, including by addressing both population growth and per capita consumption differently in different contexts; (3) unleashing existing widely held values of responsibility to effect new social norms for sustainability, especially by extending notions of responsibility to include impacts associated with consumption; (4) addressing inequalities, especially regarding income and gender, which undermine capacity for sustainability; (5) ensuring inclusive decision-making, fair and equitable sharing of benefits arising from the use of and adherence to human rights in conservation decisions; (6) accounting for nature deterioration from local economic activities and socioeconomic-environmental interactions over distances (telecouplings), including, for example, international trade; (7) ensuring environmentally friendly technological and social innovation, taking into account potential rebound effects and investment regimes; and (8) promoting education, knowledge generation and maintenance of different knowledge systems, including the sciences and indigenous and local knowledge regarding nature, conservation and its sustainable use.

Recognizing the knowledge, innovations and practices, institutions and values of indigenous peoples and local communities and their inclusion and participation in environmental governance often enhances their quality of life, as well as nature conservation, restoration and sustainable use, which is relevant to broader society. Governance, including customary institutions and management systems, and co-management regimes involving indigenous peoples and local

communities, can be an effective way to safeguard nature and its contributions to people, incorporating locally attuned management systems and indigenous and local knowledge. The positive contributions of indigenous peoples and local communities to sustainability can be facilitated through national recognition of land tenure, access and resource rights in accordance with national legislation, the application of free, prior and informed consent, and improved collaboration, fair and equitable sharing of benefits arising from the use, and co-management arrangements with local communities.

4) Research gaps in ecosystem services research

Since the Millennium Ecosystem Assessment was published in 2005, substantial data have been collected on biodiversity, ecosystems, ecosystem services and more generally on the co-production and impact of social, environmental, and climate change upon them. Despite this progress, however, large information gaps remain in assessing the status and trends of nature's contributions to people, and particularly their implications to the quality of life of different groups of people.

The extent of nature's contribution to good quality of life is not well understood for some of nature's contributions to people. The lack of understanding arises for several reasons. First, it is often hard to disentangle nature's contributions from other contributions. For example, though we have good data on status and trends of air quality across major cities in the world, how changes in vegetation impact air quality in cities is less well understood and is currently a frontier of scientific investigation. Second, understanding of key links between nature and impacts on good quality of life may be missing. For example, though we often have a good understanding of how changes in exposure affect disease incidence and impacts on human health, how changes in nature influence exposure is often complex and is poorly understood for some diseases. Exposure for vector-borne diseases depends on populations of vectors as well as how these vectors overlap with vulnerable populations of humans. Vector populations can depend on complex ecosystem interactions that give rise to unpredictable increases or decreases in populations as a function of anthropogenic induced changes to ecosystems. Exposure also depends on human behavior and public health measures designed to reduce the vulnerability of human populations to disease.

Even where the extent of nature's contribution to good quality of life is well understood, there is often a lack of systematic data collection, or systematic documentation, on which to base a comprehensive global assessment. Much of the literature on non-material contributions to people involves detailed case studies of specific groups. This literature provides a wealth of information but studies typically differ in focus and methodology, and there is uneven coverage across regions, which makes it difficult to combine results into a systematic global assessment. For most ecosystem services we lack systematic reporting on impacts of nature on good quality of life. Much of the natural science literature focuses on changes in ecosystems and biodiversity but does not report how these changes affects good quality of life. Much of the systematic data reporting on various aspects of good quality of life (such as income, livelihoods, health, and education) does not disentangle the impacts of nature on good quality of life from other impacts. It would be ideal to report quantitative measures of nature's contributions in terms readily understood by various decision-makers and the general public. While we have some measures of nature's contributions to people reported in monetary terms, health terms, or other measures related to good quality of life, we lack systematic indicators that can be reported in a variety of easily understood metrics for many of nature's contributions.

A general issue in doing a comprehensive global assessment is the existing fragmented state of knowledge with lack of integration between social and natural sciences, and between western science and ILK. This assessment has emphasized the importance of including multiple viewpoints

and sources of knowledge but this has not been matched with an ability to effectively integrate multiple sources of knowledge into a systematic assessment. Different world views are hard to integrate in substantive ways. Doing so will require increased dialog across communities and agreement on how to be more systematic in knowledge generation and data collection.

Measuring trends in nature's contributions requires having a time series of data measured in a consistent fashion. Consistent time series data exists for some aspects of some of nature's contributions but is lacking for many aspects of most of nature's contributions. For some environmental measures it is now possible to get consistent global data via remote sensing. However, many remote sensing data series begin with the satellite era, so that many of these time series are of fairly short duration. In contrast, measures of impact on good quality of life often require direct observation or survey work. Time series data exists for income, health and other measures of human well-being but typically does not report on the impact that nature has on good quality of life.

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Education & Employment

Stanford University, Stanford, CA Ph.D. 2010
Emmett Interdisciplinary Program in Environment and Resources
Emphasis in Hydrologic Ecosystem Services

Natural Resources Defense Council, New York, NY 2001 - 2004
Membership and Public Education Senior Associate
Developed NRDC's Public Education program to complement a new focus on online activism as membership grew to 550,000.

Columbia University, New York, NY B.A. 2000
Independent Major in Science and Religion
Honors: Summa Cum Laude, Phi Beta Kappa

Research Focus

Managing water wisely in an era of limited supply requires creative assessments of both patterns and drivers of water use. My research program addresses issues of water scarcity, water productivity, and land use effects on water resources. With a focus on biophysical interactions at the land-water interface, my questions are motivated by human needs for both functional landscapes and safe, plentiful water supplies. My research includes field-based work, modeling, and analysis of existing large data sets. This methodological breadth provides insight on a global scale about pressing problems and solution levers while providing important ground truth data and understanding from local interactions.

Awards

- 2018 AAAS. **Leshner Leadership Institute Public Engagement Fellow**. Washington, DC. 2018-2019.
- 2018 UMN **Institute on the Environment Fellow**
- 2017 **National Academies Keck Futures Initiative NAKFI**. Beyond Boundaries. Selected to attend NAKFI's final conference and to give a keynote talk. Irvine, CA. 8-11 November.
- 2017 **Impact Design Hub**. "Twin Cities Wheel: An Infographic of Impact Design" 6 April. https://impactdesignhub.org/wp-content/uploads/2017/04/IDH_City-Series_update_410.pdf
- 2015 Center for the Study of Politics and Government, University of Minnesota. **Policy Fellow**. Minneapolis, MN. 2015-2016.
- 2014 Future Earth Young Scientists Networking Conference on Ecosystems and human wellbeing in the green economy. **Future Earth Fellow**. Villa Vigoni, IT. 26-30 May.
- 2012 Planet Under Pressure. **Best Early Career Researcher Poster**. "Water Wise: Are we getting enough crop per drop?" London, UK. 18-22 March.
- 2011 Dissertations Initiative for the Advancement of Climate Change Research (DISCCRS) IV **Scholar**. Colorado Springs, CO. 23-29 October.

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- 2011 Gordon Research Conference on Catchment Science: **Gordon Research Seminar Rising Star**. “Changing Land Use and Changing Climate: effects on ecosystem services provided by tropical watersheds.” Lewiston, ME. 9-15 July.
- 2010 Latsis International Symposium on Ecohydrology: **Outstanding Poster Presentation**. “Water as a Link between Land Cover and Human Wellbeing: A Hydrologic Ecosystem Services Case Study in Hawai’i.” Lausanne, Switzerland. 17-20 October.
- 2007 American Geophysical Union: **Outstanding Student Presentation**. Poster: “The Value of Forest and Pasture to Water Supply in Kona, HI.” San Francisco, CA. 10-14 December.

Grants, Fellowships, Scholarships

- 2018 **The Nature Conservancy California** “Identifying, Measuring, and Mapping Ecosystem Services from Groundwater Dependent Ecosystems in California.” \$40,650 (Lead-PI)
- 2017 **NASA/Earth Science Applications: Ecological Forecasting** “Workshops to connect ecosystem services model developers with earth observation producers.” \$264,173 (Lead-PI)
- 2017 **USDA/AFRI** “Understanding and building capacity to address changing water availability in the upper Corn Belt.” \$494,707 (Co-PI)
- 2017 Legislative-Citizen Commission on Minnesota Resources **2017 Environment and Natural Resources Trust Fund**. “Minnesota Water Stories Told in Digital Planetariums” \$622,000 (co-PI)
- 2017 University of Minnesota Institute on the Environment **MiniGrant**. “One Water Connections” \$3,000 (Lead-PI)
- 2016 **Belmont Forum/NSF** “ClimateWise: Climate-Smart Watershed Investments in Montane Tropics of South America.” €998,000 (Lead-PI)
- 2016 University of Minnesota **On the Horizon** “The Food/Energy/Water Nexus in Large Lake Systems.” \$28,500 (co-PI)
- 2016 University of Minnesota Institute on the Environment **MiniGrant**. “Community Water Workshops with Water Bar” \$3,000 (Lead-PI)
- 2016 University of Minnesota Institute on the Environment **MiniGrant**. “Quantifying Water Savings from Drip Irrigation” \$1,275 (Lead-PI)
- 2015 Legislative-Citizen Commission on Minnesota Resources **2015 Environment and Natural Resources Trust Fund**. “Informed Water Management: Mapping Scarcity, Threats, and Values.” \$234,936 (co-PI)
- 2015 Rockefeller Foundation **Freshwater Competition**. “Re-Allocating Water: A Prototype Proposal to the Rockefeller Foundation.” (Collaborating Scientist)
- 2015 CGIAR Research Program on Water, Land and Ecosystems **INNOV Innovation Fund Grant**. “Targeting agricultural innovation and ecosystem service management in the Northern Volta.” \$1,913,819 (Collaborating Scientist)
- 2015 University of Minnesota Institute on the Environment **MiniGrant**. “Does smallholder use of improved irrigation save water?” \$3,000 (Lead PI)
- 2013 University of Minnesota Institute on the Environment **MiniGrant**. “Twin Cities Tropical Environments Network” \$3,000 (Co-PI)
- 2012 National Academies Keck Futures Initiative (NAKFI) **Ecosystem Services Grant**. “Healthy ecosystems and healthy people: Bridging disciplines to understand health impacts of environmental change.” \$100,000 (Lead PI)
- 2012 University of Minnesota Institute on the Environment **MiniGrant**. “Web Interactive Water Quality Valuation Resource” \$1,665 (Lead PI)
- 2009 Stanford University Mel Lane **Student Program Grant** from the Woods Institute for the Environment for the Bay Area Tropical Forest Network (Lead PI)
- 2006-08 Stanford University IPER Rudolf **Summer Research Grant** (Lead PI)
- 2005/06 Stanford University McGee School of Earth Sciences **Research Grant** (Lead PI)
- 2007-09 William and Jeanne Landreth IPER **Graduate Fellowship**
- 2004-07 David and Lucille Packard Stanford **Graduate Fellowship**
- 2004-07 National Science Foundation **Graduate Research Fellowship**

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Publications

Peer reviewed

- C Ramirez-Reyes, **KA Brauman***, R Chaplin-Kramer, GL Galford, SB Adamo, CB Anderson, C Anderson, GRH Allington, KJ Bagstad, MT Coe, AF Cord, LE. Dee, RK Gould, M Jain, VA Kowal, F Muller-Karger, J Norriss, P Potapov, J Qiu, JT Rieb, BE Robinson, LH Samberg, N Singh, SH Szeto, BVoigt, K Watson, and TM Wright. 2019. "Reimagining the Potential of Earth Observations for Ecosystem Services Assessments." *Science of the Total Environment*.
<https://doi.org/10.1016/j.scitotenv.2019.02.150>
- Keeler, BL, P Hamel, T McPhearson, MH Hamann, ML Donahue, K Meza Prado, K Arkema, GN Bratman, **KA Brauman**, JC. Finlay, AD Guerry, SE Hobbie, JA Johnson, GK MacDonald, RI McDonald, N Neverisky, SA Wood. 2019. "Social-ecological and technical factors moderate the value of urban nature." *Nature Sustainability*. 2(1): 29-38. DOI: 10.1038/s41893-018-0202-1
- Smith, WK, E Nelson, JA Johnson, S Polasky, JC Milder, JS Gerber, PC West, S Siebert, **KA Brauman**, KM Carlson, M Arbutnot, JP Rozza, DN Pennington. 2019. "Voluntary sustainability standards could significantly reduce global impacts of global agriculture." *Proceedings of the National Academy of Sciences*. DOI: 10.1073/pnas.1707812116
- Bremer LL, **KA Brauman**, S Nelson, K Meza Prado, ACO Fiorini, E Wilburn. 2018. " Relational values in evaluations of upstream social outcomes of watershed Payment for Ecosystem Services: a review." *Current Opinion in Environment and Sustainability*. 35: 116-123.
<https://doi.org/10.1016/j.cosust.2018.10.024>
- Zuo L, Z Zhang, KM Carlson, GK MacDonald, **KA Brauman**, Y Liu, W Zhang, H Zhang, W Wu, X Zhao, X Wang, B Liu, L Yi, Q Wen, F Liu, J Xu, S Hu, JS Gerber, PC West. 2018. "Progress towards sustainable intensification in China challenged by land-use change" *Nature Sustainability*. 1(6): 304-313. DOI: 10.1038/s41893-018-0076-2
- Tallis HM, P Hawthorne, S Polasky, JP Reid, MW Beck, **K Brauman**, JM Bielicki, S Binder, M Burgess, E Cassidy, A Clark, C Costello, J Fargione, ET Game, J Gerber, F Isbell, J Kiesecker, R McDonald, JL Molnar, N Mueller, D Ovando, T Boucher, B McPeck. 2018. "An Attainable Global Vision for Conservation and Human Well-Being" *Frontiers in Ecology and the Environment*. 16(10): 563-570. DOI: 10.1002/fee.1965
- Díaz S, U Pascual, M Stenseke, B Martín-López, RT Watson, Z Molnár, R Hill, KMA Chan, I Baste, **KA Brauman**, S Polasky, A Church, M Lonsdale, APE van Oudenhoven, Fvd Plaat, M Schröter, Y Aumeeruddy-Thomas, E Bukvareva, K Davies, G Erpul, P Failler, CA Guerra, CL Hewitt, H Keune, A Larigauderie, S Lavorel, PW Leadley, S Lindley, S Demissew, Y Shirayama. 2018. "Assessing nature's contributions to people." *Science*. 359(6373). DOI: 10.1126/science.aap8826
- Wood, SLR, SK Jones, JA Johnson, **KA Brauman**, R Chaplin-Kramer, A Fremier, E Girvitz, L Gordon, C Kappel, L Mandle, M Mulligan, P O'Farrell, WK Smith, L Willemen, W Zhang, and FA DeClerck. 2017. "Distilling the role of ecosystem services in the Sustainable Development Goals" *Ecosystem Services* 29A. <https://doi.org/10.1016/j.ecoser.2017.10.010>
- AD Steinman, BJ Cardinale, WR Munns Jr, ME Ogdahl, JD Allan, T Angadi, S Bartlett, **K Brauman**, M Byappanahall, M Doss, D Dupont, A Johns, D Kashian, F Lupi, P McIntyre, T Miller, M Moore, RL Muenich, R Poudel, J Price, B Provencher, A Rea, J Read, S Renzetti, B Sohngen, E Washburn. 2017. "Ecosystem services in the Great Lakes." *Journal of Great Lakes Research* 43(3): 161-168. DOI: 10.1016/j.jglr.2017.02.004

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- Cord AF, **KA Brauman**, R Chaplin-Kramer, A Huth, W Turner, G Ziv, R Seppelt. 2017. "Priorities to advance monitoring of ecosystem services using satellite Earth observation" *Trends in Ecology and Evolution*. 32(6): 416-428. DOI: 10.1016/j.tree.2017.03.003
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- Brett R Bayles, **KA Brauman**, J Adkins, B Allan, C Golden, A Ellis, T Goldberg, DS Grigsby, S Myers, S Osofsky, T Ricketts, J Ristaino. 2016. "Ecosystem services connect environmental change to human health outcomes." *EcoHealth* 13(3). DOI: 10.1007/s10393-016-1137-5
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- Carlson, Kimberly M, LM Curran, A Ponette-González, D Ratnasari, P Ruspita, N Lisnawati, Y Purwanto, **KA Brauman**, PA Raymond. 2014. "Watershed-climate interactions influence stream temperature, sediment yield, and metabolism along a land-use intensity gradient in Indonesian Borneo" *Journal of Geophysical Research: Biogeosciences*, 119(6): 1110-1128, DOI:10.1002/2013JG002516
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- Brauman, KA**, S Seibert, JA Foley. 2013. "Improving crop water productivity increases water sustainability and food security—a global analysis." *Environmental Research Letters* 8(2): 024030. DOI: 10.1088/1748-9326/8/2/024030
- Richter BD, D Abell, E Bacha, **KA Brauman**, S Calos, A Cohn, C Disla, S Friedlander O'Brien, D Hodges, S Kaiser, M Loughran, C Mestre, M Reardon, and E Siegfried. 2013. "Tapped Out: How can cities secure their water future?" *Water Policy Journal* 15(3): 335-363 DOI: 10.2166/wp.2013.105
- Keeler, B, S Polasky, **KA Brauman**, K Johnson, J Finlay, A O'Neill, K Kovacs, B Dalzel. 2012. "Linking water quality and well-being for improved assessment and valuation of ecosystem services." *Proceedings of the National Academy of Sciences*. 109(45): 18619-18624. DOI: 10.1073/pnas.1215991109
- Brauman, KA**, DL Freyberg, GC Daily. 2012. "Land Cover Effects on Groundwater in the Tropics: Ecohydrologic Mechanisms." *Ecohydrology*. 5: 435-444 (published online June 2011). DOI: 10.1002/eco.236
- Brauman, KA**, DL Freyberg, GC Daily. 2012. "Potential Evapotranspiration from Forest and Pasture in the Tropics: A Case Study in Kona, Hawai'i." *Journal of Hydrology*. 440-441: 52-61. DOI: 10.1016/j.jhydrol.2012.03.014
- Staudt, A, AK Leidner, J Howard, **KA Brauman**, J Dukes, L Hansen, C Paukert, J Sabo, LA Solórzano, K Johnson. 2012 "Chapter 5: Climate Change Effects on Already Stressed Biodiversity, Ecosystems, and Ecosystem Services" in *Climate Change Impacts on Biodiversity, Ecosystems, and Ecosystem Services: Technical Input to the National Climate Assessment*. Eds. S Carter, FS Chapin III, N Grimm, P Kareiva, M Ruckelshaus, M Staudinger, A Staudt, B Stein. USGS: Reston, VA.
- Foley, Jonathan A, N Ramankutty, **KA Brauman**, et al. 2011. "Solutions for a Cultivated Planet" *Nature*. 478(7369): 337-342. DOI: 10.1038/nature10452
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- Brauman, KA**, DL Freyberg, GC Daily. 2010. "Forest structure influences on rainfall partitioning and cloud interception: A comparison of native forest sites in Kona, Hawai'i." *Agricultural and Forest Meteorology*. 150(2): 265-275. DOI: 10.1016/j.agrformet.2009.11.011
- Brauman, KA**, GC Daily, TK Duarte, and HR Mooney. 2007 "The Nature and Value of Ecosystem Services: A focus on hydrology." *Annual Review of Environment and Resources*. 32:67-98. DOI: 10.1146/annurev.energy.32.031306.102758

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Book chapters, reports, reviews, other academic writing

- Brauman, KA** .(in press). "Rethinking water on a hungry planet" in *Population, Agriculture, and Biodiversity*. P Guatafson, P Raven, P Ehrlich, eds. University of Missouri Press
- Brauman, KA**, R Benner, S Benitez, L Bremer, K Vigerstol. (in press). "Water Funds" in *Green Growth that Works: Natural Capital Policy and Finance Mechanisms around the World*. L Mandle, GC Daily, J Salzman, eds. Earthscan.
- Brauman, KA**, R Benner, S Benitez, L Bremer, K Vigerstol. (2018). "Water Funds: Coordinating Resources and Action for Watershed Improvement" in *International Case Studies on Mainstreaming the Value of Natural Capital into Policy and Finance*. GC Daily, J Salzman, eds. Chinese National Development and Reform Commission (NDRC) (in Mandarin)
- Hails, RS, R Chaplin-Kramer, E Bennett, BE Robinson, GC Daily, **KA Brauman**, PC West. 2018. "Determining the value of ecosystem services in agriculture" in *Agricultural resilience: perspectives from ecology and economics*. R Hails, S Ramsden, S Gardner, eds. Ecological Reviews (in press)
- Apitz, S *et al.* 2015. "Environmental policy recommendations for the new US President (editorial)." *Integrated Environmental Assessment and Management* 13(1):7
- Brauman, KA**. 2016. "Global Water Data: We'll Show You the World, Sort Of." *Open Rivers: Rethinking The Mississippi 2*: <http://editions.lib.umn.edu/openrivers/article/global-water-data-well-show-you-the-world-sort-of/>
- Brauman, KA**. 2016. "Freshwater." In *Routledge Handbook on Ecosystem Services*. M Potschin, R Haines-Young, R Fish, RK Turner, eds. Routledge: London and New York, pp 374-382. ISBN 978-1-138-02508-0
- Brauman, KA**. 2015. "Water Availability" in *Oxford Bibliographies in Environmental Science*. Ed. Ellen Wohl. New York: Oxford University Press
- Brauman, KA**, S Fury, H Kulkarni, H Manthritilake, M McCartney, S Verma and Karen G. Villholth. 2015. Groundwater and ecosystem services: a framework for managing smallholder groundwater- dependent agrarian socio-ecologies - applying an ecosystem services and resilience approach. Colombo, Sri Lanka: *International Water Management Institute (IWMI)*. *CGIAR Research Program on Water, Land and Ecosystems (WLE)*. 25p. doi: 10.5337/2015.208
- Brauman, KA**. 2015. "Get on the Ecosystem Services Bandwagon (editorial)." *Integrated Environmental Assessment and Management* 11(3):343:344
- Brauman, KA**, N Viart. The development of a regionally-sensitive water-usage indicator to identify sustainable practices for sugarcane growers. (conference presentation at Sugar Industry Technologist Presentations and Technical Papers – Toronto – 2014)
- Brauman, KA** and GC Daily. 2014 (update). "Ecosystem Services." In *Reference Module in Earth Systems and Environmental Sciences*. SA Elias ed. Oxford, UK: Elsevier. doi.org/10.1016/B978-0-12-409548-9.09453-7
- Brauman, KA**, S van der Meulen and J Brils. 2014. "Ecosystem Services and River Basin Management." In *Towards Risk-Based Management of River Basins*. W Brack, J Brils, D Muller, P Negrel, J Vermaat, eds. Handbook of Environmental Chemistry, Springer. Heidelberg, Germany.
- Brauman, KA** 2008. "Book Review: The Promise and Perils of Ecosystem Service Case Studies." *Ecology*. 89(9):2667-2668
- Brauman, KA**. and GC Daily. 2008. "Human Ecology: Ecosystem Services." In *Encyclopedia of Ecology*, ed. S.E. Jorgensen and Brian Fath. Oxford, UK: Elsevier. ISBN: 0-444-52033-3

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Publications in Preparation

- Bayles, BR, **KA Brauman**, BF Allan. "The Ecological and Epidemiological Cascade of Anthropogenic Landscape Change for Human Incidence of Ehrlichiosis." (*in revision*)
- Brauman**, KA, AL Goodkind, T Kim, R Pelton, J Schmitt, T Smith . "The water fingerprint of meat and ethanol: accounting for the local impact of feed production in supply chains." (*in review*)
- Chaplin-Kramer R, RP Sharp, C Weil, EM Bennett, U Pascual, AL Vogl, KK Arkema, **KA Brauman**, BP Bryant, AD Guerry, NM Haddad, P Hamel, M Hamann, JA Johnson, L Mandle, H Pereira, S Polasky, M Ruckelshaus, MR Shaw, JM Silver, GC Daily. "A Global Assessment of Nature's Contributions to People and Humanity's Need for Nature." (*in review*)
- Dooley K, **KA Brauman**, M Rohde, and H Howard. "Ecosystem services of groundwater dependent ecosystems: A framework and case study in California" (*in review*)
- Gleeson T, LW Erlandsson, SC Zipper, M Porkka, F Jaramillo, D Gerten, I Fetzer, S Cornell, L Piemontese, L Gordon, J Rockström, T Oki, M Sivapalan, Y Wada, **KA Brauman**, M Flörke, MFP Bierkens, B Lehner, P Keys, M Kummu, T Wagener, S Dadson, T Troy, W Steffen, M Falkenmark, JFamiglietti. "The water planetary boundary: a roadmap to illuminate water cycle modifications in the Anthropocene" (*in review*)
- Nelson S, LL Bremer, K Meza Prado, **KA Brauman**. Producing infrastructural nature: Water funds and alterative histories of Payments for Ecosystem Services in Valle del Cauca, Columbia (*in review*)
- Ristaino J, P Anderson, **KA Brauman**, N Cunniffe, N Federoff, KA Garrett, C Gilligan, T Holmes, M Martin, GK MacDonald, P Neenan, A Record, D Schmale, L Tateosian, R Vatsavai. "The Continued Threat of Emerging Plant Diseases to Global Food Security." (*in revision*)
- Rocha JC, K Malmborg, L Gordon, **KA Brauman**, F DeClerck. "Mapping Social Ecological Systems Archetypes" (*in revision*)

Teaching, Advising, and Curriculum Development

- 2015-16 **Developer and Instructor, GCC 3009: Rivers and Cities**, U. Minnesota
Grand Challenge Course – Co-Instructors: Patrick Nunnally, Jennifer Gunn, Jay Bell
Co-designed seminar and led hydrology portions of hydrology and history of river cities.
- 2012 **Associate Teacher, HSEM 3039: Sustainability and Planning on the Great River**, U. Minnesota
Honors Seminar – Instructor: Patrick Nunnally
Designed and led science portions of science, policy, and engagement on the Mississippi River course.
- 2007 **Teaching Assistant, CEE 166A/266A: Wetlands and Watersheds**, Stanford University, CA
Dept of Civil & Environmental Engineering – Instructor: David Freyberg
Taught weekly discussion sections focused on understanding and applying concepts from this senior-level undergraduate and masters-level course in basic hydrology. Developed and graded exam questions.
- 2005-06 **Course Development & Teaching Assistant, GeoPhys 104: The Water Course**, Stanford University, CA
Dept of Geophysics – Instructor: Rosemary Knight
Gave three lectures, designed and ran computer lab sections, held office hours, and designed and graded reports for an interdisciplinary, watershed-focused undergraduate class targeted at non-science majors.
- 2006 **Student Organizer, IPER/CEE 333: California Water Policy Colloquium**, Stanford University, CA
Co-organized an entirely student-run weekly invited speaker series with an enrollment of 35 students and an average attendance of 50. Designed curriculum, identified outside speakers, handled logistics.

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Guest Lectures

- 2019 **Environmental Science 351: Hydrology**, Colorado College. "Water and Ecosystem Services"
2019 **Chemistry 4094: Chemistry in the Field: Environmental Impact & Water Analysis** UMN. "Water in Latin America"
2018 **Sustainability 3003: Sustainable People, Sustainable Planet**, UMN. "Global Water"
2018 **Veterinary Medicine 38050W: Health and Biodiversity**, UMN. "Ecosystem Services"
2018 **Apparel Design 4215: Product Development: Softlines**, UMN. "Water in textile production"
2018 **Ecology Evolution and Behavior 3603: Science, Protection, and Management of Aquatic Environment**, UMN.
2016/17 **Environmental Science 320: Watershed Biogeochemistry**, Colorado College. "Water and Agriculture"
2016 **Environment 211: Human Impact on Biogeochemical Cycles**, Colorado College. "Crop per Drop"
2016 **Geography 441: Introduction to Watershed Systems**, University of North Carolina. "Global Water"
2016 **Sustainable Systems Management 3301: Global Water Sustainability**, UMN. "Water Scarcity"
2016 **Environment 211: Human Impact on Biogeochemical Cycles**, Colorado College. "Crop per Drop"
2015 **Political Science 3317: Food Politics**, UMN. "Agriculture, Water, and the Environment"
2014/15 **Ecology 5146: Science and Policy of Global Environmental Change**, UMN. "Water Sustainability"
2014/15 **Integrated Leadership**, Boreas Leadership Program, UMN IonE. Grand Challenges Presenter
2013/14 **Building Better Presentations**, Boreas Leadership Program, UMN IonE. Presenter
2014 **Environmental Studies 381B: Environmental Modeling**, St Olaf College. "Modeling Ecosystem Services"
2012 **Veterinary Population Medicine 2850: Health and Biodiversity**, UMN. "Ecosystem Services"
2012 **Environmental Studies 137: Intro to Environmental Studies**, St Olaf College. "Water use, water abuse"
2012 **Ecology and Evolutionary Behavior 3001: Ecology and Society**, UMN. "Ecosystem Services in Action"
2006 **Environmental Science 15: Restoration Ecology**. Santa Clara University. "Dams and Dam Removal"

Advising:

- 2019 Examiner, PhD Thesis, The University of Queensland
2018-19 Postdoctoral advisor to Carlos Ramirez Reyes, PhD
2017-19 Mentor to IPBES fellow Uttam Shrestha, PhD
2017 Examiner, PhD Thesis, McGill University
2016-17 Co-supervisor to Stockholm Resilience Center MS student Julius Froehlich
2016 Examiner, PhD Thesis, Stellenbosch University, South Africa
2015-16 Advisor to MyRain research assistants Rachel Brown (undergraduate), Adam Iverson (MS)
2015 Supervisor to Brazilian Scientific Mobility Program undergraduate Luiza Nascimento Dias Torres
2015 Supervisor to visiting MS student Marie-Theres Wandl (University of Vienna)
2014 Supervisor to visiting postdoctoral fellow Tuck Fatt Siew, PhD (University of Frankfurt)
2012-14 Postdoctoral supervisor to Brett R. Bayles, PhD, MHP

Development:

- 2012-13 **Participant**, Course Development Workshop, Center for Teaching and Learning, U. Minnesota
2005-10 **Student Representative to the University iEarth Committee**, Stanford University, CA
2006-07 **Participant, Interdisciplinary Working Group for Program and Curriculum**, Stanford University, CA
2006-08 **Student advisor for IPER First-Year doctoral students**, Stanford University, CA

Academic Service

- 2016-19 **Coordinating Lead Author for the Global Assessment**, Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES)
2015-21 **Senior Editor**, Integrated Environmental Assessment and Management (SETAC)
2014/16 **Convener and Chair**, American Geophysical Union Session: Ecosystem Services.
2013 **Convener and Moderator**, Ecological Society of America Symposium: Agroecology Across Scales.
2013 **Reviewer**, DISCCRS VIII Symposium
2011-13 **Chair**, Gordon Research Seminar on Catchment Science, 2013.
2012 **Convener and Chair**, American Geophysical Union Session: Hydrologic Ecosystem Services.
2012 **Convener and Chair**, American Geophysical Union Session: Environmental Hotspots.
2011-12 **Working Group Member**, 2012 United States National Climate Assessment Ecosystems and Ecosystem Services Working Group.
2011-12 **Convener and Chair**, American Geophysical Union Session: Ecosystem Services.

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- 2010 **Postdoctoral Representative**, Selection Committee, UMN Global Environmental Leadership Postdoctoral Fellows.
- 2009 **Student Leaders Forum** with Stanford President Hennessey at *Leading Matters* (SF).
- 2007-08 **Student Representative** to the Stanford Ecohydrology Faculty Hiring Committee.
- 2006-07 **Student Representative** to the Executive Committee for IPER.
- 2007-10 **Student Organizer, Ecohydrology Working Group**, Stanford University, CA
- 2006 **Student Representative** to the IPER Associate Director hiring committee.

Grant Review:

- 2018 Inter-American Institute for Global Change Research
- 2017 National Academy of Science Gulf Research Program
- 2017 NASA Applied Sciences
- 2017/18 NSF Hydrology
- 2017 USDA ARS Water Availability & Watershed Management National Program
- 2016/17 Swiss National Science Foundation (SNSF)
- 2015 German-Israeli Foundation for Scientific Research and Development (GIF)
- 2014 Centres of Research Excellence (CoREs) Fund, Royal Society of New Zealand
- 2013 NASA Interdisciplinary Research in Earth Science (IDS) Climate Extremes: Drought and Flooding
- 2012 Inter-American Institute for Global Change Research (IAI), Third Collaborative Research Network (CRN3), Integrated Research on Ecosystem Services
- 2012 COST (*European Co-operation in the Field of Science and Technology*), EURO-AGRIWAT Action ES1106: Assessment of European Agriculture Water use and trade under climate change
- 2012 NSF Science, Engineering, and Education for Sustainability (NSF SEES) Fellows program

Journal Peer Review:

Agricultural and Forest Meteorology, Applied Geography, Earth System Dynamics, Ecological Economics, Ecological Processes, Ecology, Ecology and Society, Ecosystem Services, Ecosystems, Environmental Management, Environmental Monitoring and Assessment, Environmental Research Letters, Frontiers in Ecology and the Environment, Global Environmental Change, Integrated Environmental Assessment and Management, Land, Landscape and Urban Planning, Mitigation and Adaptation of Strategies for Global Change, Nature, Nature Communications, New Phytologist, Proceedings of the National Academy of Sciences, Science, Science of the Total Environment

Employment History

- 2014 - **Lead Scientist, Global Water Assessment, Institute on the Environment**
University of Minnesota, Twin Cities
- 2010-14 **Global Landscapes Initiative Postdoctoral Fellow, Institute on the Environment**
University of Minnesota, Twin Cities
- 2004-10 **PhD Student, Emmett Interdisciplinary Program in Environment and Resources**
Stanford University, Stanford, CA
- 2001-04 **Membership and Public Education Senior Associate**
Natural Resources Defense Council, New York, NY
Developed NRDC's Public Education program to complement a new focus on online activism as membership grew to 550,000. Fielded questions about NRDC and BioGems campaigns. Supervised interns and volunteers.
- 2000 **Genetics Laboratory Assistant, Biology Department**
Columbia University, New York, NY – Advisor: Martin Chalfie
- 1999-00 **Research Assistant, Center for the Study of Science and Religion**
Columbia University, New York, NY – Advisor: Robert Pollack

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Outreach

-
- 2019 Featured in the **WWF IPBES** package: WWF IPBES package:
<https://www.youtube.com/watch?v=VIWorLv0cS0>
- 2018-19 Steering Committee Member, **Source Water Protection Consortum** MN Department of Health and Environmental Initiative. St Paul, MN
- 2017 Irrigation presentation to **Somali Agribusiness Professionals** USAID group. St Paul, MN
- 2016 **Expert Resource**, MinneMUDAC **Dive Into Water Data** competition. St Paul, MN
- 2016 **Technical Advisor, WWF Water Risk Filter**. WWF German, Berlin
- 2016 **Judge, World of 7 Billion video contest**. Population Connection, Washington, DC
- 2014 **City Arts Collaboratory STEM Fellow**. Public Art St Paul.
- 2013-14 **Founding Member, Twin Cities Tropical Environments Network**, Minneapolis, MN
- 2009-10 **Board of Directors, Bay Area Tropical Forest Network**, Stanford, CA

Press Appearances

- 2019 Multiple international press appearances related to the IPBES Global Assessment, including:
BBC News (7 outlets, including TV, radio, and print): <https://www.bbc.com/news/science-environment-48169783>
France24 –The Debate: <https://twitter.com/F24Debate/status/1125782420182261763>
Sky News - <https://twitter.com/SkyNews/status/1125365349891887105>
Twin Cities Public Television, Almanac: <https://www.tpt.org/almanac/video/challenging-united-nations-biodiversity-report-35384/>, <https://www.tpt.org/almanac/video/the-wrap-kate-brauman-35392/>
Democracy Now!:
https://www.democracynow.org/2019/5/9/shocking_un_report_warns_up_to
Sound of Ideas, **Cleveland Public Radio**: <https://www.ideastream.org/programs/sound-of-ideas/1m-species-facing-extinction-cleveland-baseball-book>
KCRW To the Point Climate Change Update: <https://www.kcrw.com/news/shows/to-the-point/climate-change-and-species-extinction>
Minneapolis Star Tribune (Sunday cover): <http://www.startribune.com/people-really-do-care-says-minnesota-researcher-who-helped-write-u-n-report-on-species-extinction/509801932/>
MinnPost: <https://www.minnpost.com/environment/2019/05/amid-a-million-coming-extinctions-some-reasons-for-hope-a-qa-with-the-u-of-ms-kate-brauman/>
Also: the Paul Ross Show on talkRADIO London, Swiss Public Radio, Fox 5 News NY, Daily Mail UK, UK's Geographical Magazine WCMU Michigan Public Radio
- 2019 **American Geophysical Union 3rd Pod from the Sun**: “Hawaii’s Volcano’s, Water, and... Vog.” 22 March. <https://thirdpodfromthesun.com/2019/03/22/special-release-hawaiis-volcanoes-water-andvog/>
- 2019 **Wisconsin Public Radio** “Route 51: Ecology and Economy of our Lakes.” 15 March. <https://www.wpr.org/shows/march-14-ecology-and-economy-our-lakes>
- 2019 **J. Selby’s Podcast**. “Animal Agriculture and Water.” 23 Feb. <https://itunes.apple.com/us/podcast/id1452366031>
- 2018 **Minnesota Public Radio**. “Peter Gleick on ‘The World’s Freshwater: From Conflict to Peace.’” 10 Oct. https://www.mprnews.org/story/2018/10/10/water_and_world_peace
- 2018 **The Minnesota Daily**. “New exhibit at UMN highlights impact of water in Minnesota.” 19 Oct
- 2017 **The Minneapolis Star Tribune**. “Ecolab has tool to help companies conserve water, meet environmental goals.” 17 June. <http://www.startribune.com/ecolab-has-tool-to-help-companies-conserve-water-meet-environmental-goals/428932123/>
- 2016 **The Matt Townsend Show on BYU Radio**. “We are not running out of water” 15 Sept. <http://byuradiostage.byu.edu/episode/c91d2801-27e3-46b7-ae3e-4ead7d25e7c3/the-matt-townsend-show-measuring-water-scarcity-emotional-agility-rescuing-relationships?playhead=953&autoplay=true>
- 2016 **The Roadhouse on WTIP North Shore Community Radio**. “Water shortages” 2 Sept. <http://www.wtip.org/earth-really-running-out-water-better-way-measure-water-scarcity>

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- 2016 **deVerdieping Trouw**. “De Mississippi als het afvoerputje van de VS (The Mississippi is an ugly drain pipe)” 12 Aug. (in Dutch). <https://www.trouw.nl/home/de-mississippi-als-het-afvoerputje-van-de-vs~ae6b818c/>
- 2016 **Minnesota Daily**. “Researchers release new water conservation tool” 2 Feb
- 2015 **The Bat of Minerva with Peter Shea**
- 2015 **Almanac: At the Capitol on Twin Cities Public Television (TPT)**. St Paul, MN 6 May. Segment on water quality in Minnesota. <http://z.umn.edu/tptmnwg>
- 2013 **The Western Producer**. “Experts focus on water use.” 4 October
- 2013 **Environmental Research Web**. “Boosting ‘crop per drop’ could cut water usage.” 22 Aug
- 2013 **Minnesota Daily**. “U research measures ‘crop per drop’” 12 June
- 2013 **AgWeb**. “Which Crops are the thirstiest?” 3 June
- 2013 **Yale Environment 360**. “Getting more ‘crop per drop’ in driest agricultural regions.” 31 May
- 2011 **Momentum Magazine (now Ensia)**. “Making the Most of Water”

Public Lectures:

- 2019 **Metropolitan Council: Water and Ecosystem Services** (with Bonnie Keeler). St Paul, MN. 22 May
- 2019 **Committee on Foreign Relations Minnesota**. *Invited speaker: The Global Geopolitics of Water: Are we running out, and who’s fighting for it?*. Edina, MN. 27 February.
- 2019 **MN Department of Natural Resources Stakeholder Roundtable**. *Invited speaker: Alternative financing for conservation*. Bloomington, MN. 11 January.
- 2018 **Environmental Initiative: Collaborating on Source Water Protection, featured speaker: Economics and the value of water protection**. Plymouth, MN. 18 December.
- 2018 **Minnesota Council for Economic Education EconFest, keynote: Ecosystem Services: Nature’s Contributions to People**. St Paul, MN. 26 October.
- 2018 **Nobel Peace Prize Forum, panelist: The World’s Freshwater: From Conflict to Peace**. Minneapolis, MN. 15 September.
- 2018 **Climate Connections, Center for Changing Landscapes, speaker: The Mississippi in St Paul: Climate change impacts on planning and community engagement**. St Paul, MN. 20 September.
- 2017 **College of St Scholastica College of Science Seminar, inaugural speaker**. Duluth, MN. 7 March. “Global Water Matters”
- 2017 **Uponor North America Sustainability Series Kick-Off keynote**. Apple Valley, MN. 2 March. “Are We Running out of Water?: Trends in Water Scarcity and What We Can Do About It”
- 2016 **Mississippi Water Forum**. St Paul, MN. 14 October. “Putting people and land into water management” Featured speaker
- 2016 **YES! Youth Energy Summit**. Collegeville, MN. 12 October. “Water and Energy” Keynote speaker
- 2016 **MN Water Technology Summit**. Minneapolis, MN. 20 Sept. “Local water, global context”
- 2016 **Senior College of West Central Minnesota Fall Season Kick-Off keynote**. Alexandria, MN. 8 Sept. “Global Water Matters: Trends in Water Scarcity and What We Can Do About It”
- 2016 **MSU Fate of the Earth Symposium**. East Lansing, MI. 6 April. “Water Matters: Scarcity, Productivity, and Management in a Changing World”
- 2016 **Minnesota Pollution Control Agency**. St Paul, MN 11 Feb. “Hydrologic Ecosystem Services: Not just a fancy new name for water management”
- 2015 **Mindstretch**. St Paul, MN 28 October. “Food, Water, and the Future: Feeding a warming planet”
- 2015 **Frontiers in the Environment: Big Questions**. University of Minnesota, MN. 4 March. “Is drawing down our aquifers really so bad?” Convener and panelist.
- 2015 **The New Century Club**. St Paul, MN 3 February. “Five Steps to Feed the World: Where Will we Find Enough Food for 9 Billion?”
- 2014 **The World Wildlife Foundation’s Fuller Symposium: Whole Planet, Full Plate**. Washington, DC 12 November. Rethinking Food Panelist.
- 2014 **The Nature Conservancy’s Global Water Summit**. Chicago, IL 18-20 November. “Water Supply, Demand, and Risk.”
- 2014 **Minnesota Zoo Our World Speaker Series**. Apple Valley, MN 15 October. Agriculture and Water Panelist.
- 2014 **Great Decisions Speakers Bureau**, Minnesota International Center. Food and Climate.

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- 2013 **The 6th Annual Great Decisions Conference on Global Food Security.** Minneapolis, MN 11 Oct. Minnesota International Center. Speaker on Sustainable Agriculture and Water Security.
- 2013 **Live Q&A: Water in agriculture.** The Guardian UK Global Development Professionals Network. Panelist. gu.com/p/3tnym/tw
- 2013 Panel discussant for **The Freshwater Society.** Minneapolis, MN 12 Feb. The Moos Family lecture series featuring Sandra Postel.
- 2012 **Sip of Science.** National Center for Earth Surface Dynamics, Minneapolis, MN 14 Nov. "Hawai'i to Hurricane Sandy: Can Ecosystem Management Affect Water Resources?"
- 2012 **Frontiers in the Environment.** University of Minnesota, MN. 22 Feb. "Are we getting enough crop per Drop? Global Trends in Agricultural Water Use"
- 2008 **Kona Water Roundtable.** Kailua-Kona, HI, 3 Nov. "Land Management and Groundwater Resources in Kona, HI."
- 2008 **First Nations Futures Institute.** Stanford, CA. 16 October. "Assessing and Valuing Land Cover Change in Kona, HI."
- 2008 **Breath! California Biannual Statewide Conference.** Tiburon, CA. 3 May. "Global Warming and Water Resources in California."

Presentations and Publications:

- Brauman, Kate A. 2019. "Dispatch from Paris: A global assessment of biodiversity and ecosystem services, three years in the making." **IonE News.** Published online. <http://environment.umn.edu/news/dispatch-from-paris-a-global-assessment-of-biodiversity-and-ecosystem-services-three-years-in-the-making/>
- Brauman, Kate A. 2016. "We're (not) running out of water – a better way to measure water scarcity." **The Conversation.** Published online: <https://theconversation.com/were-not-running-out-of-water-a-better-way-to-measure-water-scarcity-58699>
- Brauman, Kate A. 2015. "Investing in Watersheds: Back to Basics." **IonE News.** Published online: <http://environment.umn.edu/water/investing-in-watersheds-back-to-basics/>
- "Eating Water." Narrator and collaborative writer for a **Science Museum of Minnesota** Science on a Sphere movie. Available at: <http://sos.noaa.gov/Datasets/dataset.php?id=481>
- Brauman, Kate A. "DIY Video Abstracts: Lessons from an Ultimately Successful Experience" (poster) 2013. **American Geophysical Union.** San Francisco, CA
- Cynthia Barnett. 2013 "Groundwater Wake-Up." **Ensia.** <http://ensia.com/features/groundwater-wake-up/>
KAB developed groundwater map design
- Brauman, Kate A, GC Daily, DL Freyberg. 2009. "Synergies and tradeoffs: Managing land to improve water supply in Kona, Hawai'i." Video for *Water-Ecosystem Services, Drought, and Environmental Justice: the First Millennium Conference of the Ecological Society of America.* Published online: <http://www.youtube.com/watch?v=EMN5iSoK-hI>
- Brauman, Kate A. 2006. "Napa River Flood Project Put to the Test." **The Katoomba Group's Ecosystem Marketplace.** 3 February. www.ecosystemmarketplace.com
- Brauman, Kate. "Poster: Light Switches." 1998. **This Old House Magazine.** 23 (November)
- Brauman, Kate. "On the Ball." 1998. **This Old House Magazine.** 16 (February)

Workshops/Education:

- 2015 Co-Creator and Presenter, **Water, Health, and the World's Cities,** K-College educators UMN Institute for Global Studies, MN
- 2014 Presenter, **Food! In a Global Classroom,** K-College educators (invited), UMN Institute for Global Studies, MN
- 2009 Presenter, **Geoscape Bay Area** for 6th Grade Earth Science Teachers (invited), Stanford University, CA
- 2008 Presenter/Workshop Leader, **Sally Ride Science Festival** (invited), NASA Ames Research Center, CA

Invited Talks

- 2018 **The Nature Conservancy NatureNet Symposium.** St Paul, MN. 26 Oct. "ClimateWise: illuminating landscape hydrology in the montane tropics in partnership with Water Funds"
- 2018 **World Water Week.** Stockholm, Sweden. 30 Aug. "ClimateWise: Assessing program needs and

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- potential impact of Investments in Watershed Services projects in the montane tropics of South America” in Green Landscapes for Water Security: Measuring and Modeling Hydrologic Benefits
- 2018 **UMN Water Resources Assembly and Research Symposium**. St Paul, MN. 19 Jan. “Perspectives on Water Resources Research at UMN” panelist
- 2017 **Ecological Society of America**. Portland, OR. 7 Aug. “Linking ecohydrologic processes to local watershed management and global assessment” in Symposium 1: Aquatic Ecosystem Services in a Changing World
- 2017 **Ecological Society of America**. Portland, OR. 7 Aug. “What should we measure? Remote sensing for monitoring biodiversity with Essential Biodiversity Variables” Panelist
- 2017 **AAAS Ecosystem Services Symposium**. Washington DC. 19 May. ES Tools Panel Moderator
- 2017 **North Carolina State University**. Raleigh, NC. 20 April. “Water and Food: The Inseparables”
- 2017 **Boise State University**. Boise, ID. 13 April. “Going Global? Hydrologic Ecosystem Services for Local Management and Global Assessment.”
- 2016 **Global Land Project Open Science Meeting**. Beijing. 26 Oct. “Water sustainability in sugarcane production: creating an adoptable standard ”
- 2016 **UMN Water Supply Convergence Colloquium**. Minneapolis, MN. 19 Feb. “Getting more ‘bang’ for our water ‘buck’: Water and what it can do for us”
- 2015 **ATREE Ashoka Trust for Research in Ecology and the Environment**. Bangalore, India. 4 Dec. “Hydrologic ecosystem services in Hawai’i: quantifying locally and extrapolating globally”
- 2015 **UMN Water Resources Center Seminar Series**. Minneapolis, MN 16 October. “IonE’s Global Water Initiative: Linking Research to Action”
- 2015 **UMN St. Anthony Falls Laboratory Seminar**. Minneapolis, MN 29 April. “Water at the UMN Institute on the Environment: Research to Action for Sustainability”
- 2015 **UMN Sawyer Symposium: Imagining the Mississippi in an Era of Climate Change**. Minneapolis, MN 10 April. River as Future Panelist.
- 2015 **USDA-ERS Conference on Agricultural Productivity and the Environment**. Washington, DC. 11-12 March. “Crop Water Productivity and Water Gaps – quantifying the benefits of increasing crop per drop in global agriculture”
- 2014 **American Geophysical Union**. San Francisco, CA. 16 December. “Water Depletion Threatens Agriculture”
- 2014 **CGIAR-IWMI Water, Lands and Ecosystems workshop on Managing Smallholder Groundwater-dependent Agrarian Socio-Ecologies using an Ecosystem Services and Resilience Based Approach**. Colombo, Sri Lanka. 4-7 November. “Groundwater and Ecosystem Services: Vulnerability and Resilience”
- 2014 **Emerging Infectious Plant Diseases of Africa in the Context of Ecosystem Services**. Bellagio Center, Italy. 10 April. “Ecosystem Services: A framework for linking biophysical processes to human needs”
- 2014 **Crop Sciences Bonn Departmental Seminar**. University of Bonn. 26 March. “Water Depletion and Global Agriculture: Taking stock of global water resources”
- 2014 **Center for Environmental Systems Research Departmental Seminar**. University of Kassel. 24 March. “Water Depletion and Agriculture: Taking stock of global water resources”
- 2014 **URPP Global Change and Biodiversity Seminar Series**. University of Zurich. 17 March. “Hydrologic Ecosystem Services: Managing Landscapes for Water, Nature, and People”
- 2014 **Meeting Global Food Security Challenges: Efficient Nutrients Provision, Technology & Knowledge Transfer**. Grand Water Research Institute, Technion-IIT, Haifa. 25 February. “Closing yield gaps: global benchmarks for improving water and nutrient management”
- 2013 **Agrimonde-Terra**. CIRAD, Paris. 11 November “Water cycle and availability as a driver of cropping system evolution”
- 2013 **Agricultural Society of America, Crop Science Society of America, Soil Science Society of America**. Annual Meeting, Tampa. 5 November. “Hydrologic ecosystem services in agricultural systems”
- 2013 **School for the Environment Seminar Series**. University of Massachusetts, Boston. 23 October “Getting more food bang for our water buck: putting water efficiency into water sustainability”
- 2012 **Geological Sciences Seminar**. University of Minnesota, Duluth, MN. 4 May “Water sustainability and food security: win-win solutions for a thirsty planet”

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- 2012 **Natural Resource Ecology and Management Seminar.** Iowa State University, IA. 6 April. "Assessing Watershed Ecosystem Services: Land Use Change Effects on Groundwater Recharge and Other Services in Hawai'i"
- 2011 **American Geophysical Union.** San Francisco, CA. 7 December. "Land Use Change Affects Groundwater Recharge: Hydrologic Services in Tropical Watersheds"
- 2011 **Water Resources Science Seminar.** University of Minnesota, St Paul, MN. 25 March. "Land Management Affects Water Supply: Assessing the Costs and Benefits of Delivering Hydrologic Ecosystem Services in Kona, Hawai'i"
- 2010 **Lund University Center for Sustainability Studies.** Lund, Sweden. 21 October. "Water Links Land Cover to Human Wellbeing: Investigating Hydrologic Ecosystem Services in Hawai'i"
- 2010 **Climate, People, and the Environment Program,** University of Wisconsin, Madison. 3 December. "Land Management for Water Supply: Hydrologic Ecosystem Services in Kona, HI"
- 2010 **American Association of Geographers.** Washington, DC. 14-18 April. "Montane Land Cover Effects on Water Supply in Coastal Hawai'i"
- 2009 **Final Conference RISKBASE: towards risk-based river basin management.** Belgium. 16-18 November. "Ecosystem Services as a core element in risk-based river management"
- 2009 **RISKBASE Workshop: WP5 "Risk management, preventive approaches & policies": Ecosystem Services and Adaptive Management.** Venice, Italy. 25-26 June. "Ecosystem Services for Watershed Management – A framework for connecting hydrologic science to watershed policy"
- 2007 **Stanford Hydrogeology Seminar Series.** Stanford, CA. 31 October. "The Nature and Value of Ecosystem Services: Managing Land Cover to Increase Water Supply in Hawai'i"

Selected Conference Presentations

- 2018 **American Geophysical Union.** Washington, DC. 10 December. "ClimateWise: illuminating landscape hydrology in the montane tropics through interviews, data analysis, and multi-scale modeling" (poster)
- 2016 **American Geophysical Union.** San Francisco, CA. 13 December. "Investment in Watershed Services projects: the ClimateWise project" (poster)
- 2015 **American Geophysical Union.** San Francisco, CA. 17 December. "Identifying high-value regions for hydrologic ecosystem services around the globe" (poster)
- 2014 **American Geophysical Union.** San Francisco, CA. 15 December. "Manage hydrologic fluxes instead of land cover in watershed service projects" (poster)
- 2014 **Sugar Industry Technologists 2014 Meeting.** Toronto. 20 May. "The Development of a Regionally-Sensitive Water Usage Indicator to Identify Sustainable Practices for Sugarcane Growers" (talk – presented by N Viart, conference paper)
- 2014 **Global Land Project Open Science Meeting.** Berlin. 19 March. "Water Depletion of Watersheds Worldwide: Local drivers and global connections" (talk)
- 2013 **American Geophysical Union.** San Francisco, CA. 12 December. "Food vs. water: the magnitude and range of global tradeoffs in agricultural production and impact" (talk)
- 2012 **American Geophysical Union.** San Francisco, CA. 3 December. "Where the water is: Mapping global drivers of water scarcity" (talk)
- 2012 **Planet Under Pressure.** London, UK. 18-22 March. "Solutions for a cultivated planet" (talk)
- 2012 **Planet Under Pressure.** London, UK. 18-22 March. "Water Wise: Are we getting enough crop per drop" (poster, best early career researcher poster award)
- 2011 **American Geophysical Union.** San Francisco, CA. 5 December. "Worldwide trends in agricultural water use" (talk)
- 2011 **National Academies Keck Futures Initiative: Ecosystem Services.** Irvine, CA. 11-13 November. "Hydrologic Services in Tropical Watersheds" (poster)
- 2011 **Ecological Society of America.** Austin, TX. 8-12 August. "Assessing local benefits and impacts from global patterns in agricultural water use" (talk)
- 2011 **Gordon Research Seminar and Conference.** Lewiston, ME. 9-15 July. "Changing Land Use and Changing Climate: Effects on ecosystem services provided by tropical watersheds" (talk, rising star award)

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- 2011 **American Association for the Advancement of Science.** Washington, DC. 18-21 February. "Global Distribution of Agricultural Water Use" (poster)
- 2010 **American Geophysical Union.** San Francisco. 13-17 December. "Managing Land to Enhance Water Resources: A Hydrologic Ecosystem Services Case Study in Kona, Hawai'i" (poster)
- 2010 **Latsis International Symposium on Ecohydrology.** Lasuagne, Switzerland. 17-20 October. "Water as a Link between Land Cover and Human Wellbeing: A Hydrologic Ecosystem Services Case Study in Hawai'i" (outstanding poster award)
- 2009 **2nd International Conference on Forests and Water in a Changing Environment.** Raleigh, NC. 14-16 September. "The importance of forest structure to rainfall partitioning and cloud interception: A comparison of native forest sites in Kona, Hawai'i "
- 2009 **Ecological Society of America.** Albuquerque, NM. 2-7 August. "The importance of forest structure to rainfall partitioning and cloud interception in native forest in Kona, Hawai'i "
- 2009 **Hawai'i Conservation Conference.** Honolulu, HI. 28-30 July. "The Effects of Native Forest and Working Pasture on Rainfall Partitioning and Groundwater Recharge in Kona, Hawai'i "
- 2009 **Bay Area Conservation Biology Symposium.** Stanford, CA. 31 January. "Comparative Ecohydrologic Effects of Forest and Pasture on Water Balances in Kona, HI "
- 2008 **American Geophysical Union.** San Francisco, CA. 15-19 December. "Comparative Ecohydrologic Effects of Forest and Pasture on Water Balances in Kona, HI " (poster)
- 2008 **Young Environmental Scholars Workshop.** Stanford, CA. 4-5 March. Water Panel. (moderator and presenter)
- 2007 **American Geophysical Union.** San Francisco, CA. 10-14 December. "The Value of Forest and Pasture to Water Supply in Kona, HI." (poster, Outstanding Student Presentation award)
- 2007 **Stanford School of Earth Sciences Research Review.** Stanford, CA. 11 April. "The Nature and Value of Ecosystem Services: How Land Cover Affects Water Resources in Hawai'i"

Memberships and Professional Affiliations

2005 – present	American Geophysical Union Member
2008 – present	Ecological Society of America Member
2015– present	Society of Environmental Toxicology and Chemistry (SETAC)
2009 – 2010	American Association of Geographers Member