

VII edición

Premios Fundación BBVA Fronteras del Conocimiento

BBVA Foundation Frontiers of Knowledge Awards

7th edition

David Tilman takes the BBVA Foundation Frontiers of Knowledge Award for scientifically demonstrating how biodiversity makes ecosystems stabler, more productive and more resilient

- Through long-term experiments he has described the services supplied by biodiversity and its overriding importance for the stability, productivity and carbon balance of ecosystems
- Building on his foundational research, Tilman's work addresses the management of natural resources in domains like biofuel production and conservation alternatives based on sustainable agriculture

Madrid, February 3, 2015.- The BBVA Foundation Frontiers of Knowledge Award in the Ecology and Conservation Biology category goes in this seventh edition to David Tilman, professor at the University of Minnesota, for scientifically establishing the value of biodiversity, quantifying, for the first time, how it contributes to make ecosystems “more productive, more resilient to invasions, and more stable in the face of perturbations such as drought,” in the words of the jury's citation.

Tilman (Illinois, United States, 1949) has provided a firm scientific foundation for the need to conserve our planet's biodiversity. His paradigm-challenging findings were written up in one of the most cited papers in modern ecology, published in *Nature* in 1994.

Looking back at that time, he recalls: “It was a real surprise, because until then everyone thought that ecosystem functioning was controlled by a few dominant species, and the rest didn't matter. Ecosystems should be conserved, certainly, but for moral rather than scientific reasons. Our discovery that less diverse systems were also less stable sparked a major discussion, with many saying that our work must be flawed.” It was then that he set up “the world's first biodiversity experiment in the field,” because “there was simply no data available to resolve the debate.”

"Surprised and totally delighted," Tilman described his feelings on hearing of the award, before launching into an impassioned defense of the value of biodiversity: "It is incredibly important. We have to understand this because we are living in a time when humans are taking high-diversity natural systems and making them very simple, with very low diversity. Our work has shown that this severe decline has significant long-term impacts on the quality of these ecosystems and how they function, which mean they can no longer provide us with the services we want from them, such as clean water or the storage of carbon."

Tilman's research and teaching career has unfolded at the University of Minnesota, which he joined in 1976, rising to a professorship in 1984. Since 1992, he has headed the university's Cedar Creek Ecosystem Science Reserve, a 5,400-acre research station where he set up the experimental systems for long-term study that led him to his fundamental contributions.

The new laureate has also described the mechanisms of biodiversity maintenance. The jury, specifically, singles out his efforts to unravel one of the oldest mysteries in ecological science, dating from the times of Charles Darwin: How can so many species coexist within a single ecosystem? To find the answer, Tilman factored into his theoretical models the idea that each species specializes in what it does best at the expense of other possible uses of its energy, and concluded that it is this trade-off (between, for instance, greater competitive vs. dispersal ability) that permits the coexistence of multiple species.

He takes time to explain the links between biodiversity and his findings in this area: "These trade-offs are the central reason why biodiversity matters, because the ecosystem operates as a network of abilities, and the greater the variety of abilities, the better it works." And goes on to draw a parallel with human society, where we have people who are journalists, teachers and so on. People doing what they do best is what makes society function.

The jury also highlights the "significant implications" of Tilman's work "in the realm of conservation and global land use" as well as in practical issues of immediate concern. One such issue is the production of biofuels, which he has shown can only be environmentally advantageous if it is biodiversity enhancing and makes use of species not for human consumption. The jury's citation expands on this point: "He has shown that mixtures of native perennial grasses provide more net energy per acre than corn grain ethanol." Traditional biofuels, as such, would generate far higher carbon emissions than the carbon storage they would supposedly provide.

"Biofuels are not the solution to our problem of greenhouse gas emissions," Tilman contends. To start with, "there are very few ways to make a biofuel that is environmentally beneficial," and those that exist involve growing plants not used for human consumption with techniques that foster biodiversity. Even so, "biofuels can only replace around 10% of our diesel and gasoline use, so they will never be a solution to the whole emissions problem. It matters much more to develop efficient forms of transport."

Finally, the jury refers to Tilman's finding that the relationship between the degree of ecosystem destruction and the impact on the species it harbors is more complex than might first appear, to the extent that we can talk about what he refers to as an "extinction debt", whereby "the effects of habitat destruction on species extinctions may occur generations after the disturbance."

Tilman is content nonetheless to call himself an optimist: "Because we have so many humans consuming so many resources, we are having impacts that the Earth has never seen before. But if you look back across human history, we have had many, many problems that we have been able to find solutions to, even if we don't find them until the problems get serious. On the environment, we know how to solve the problems, what we haven't done is implement the solutions."

He is currently working on ways to boost agricultural productivity without simultaneously increasing its environmental impact: "The world uses about five billion hectares of land for agriculture. We have massive amounts of land in the poor nations of the world devoted to agriculture that has very poor yields. But if this land were managed better it could fully meet the population's food needs now and in the future, in an environmentally friendly way. What we need to do is go there and teach people to farm more efficiently. If we did that, there would be no pressure on them to clear more land for food production."

In one of his latest papers, published in *Nature* in November 2014, Tilman explores ways to feed the world while saving the Earth's biodiversity that are conducive to both lower greenhouse gas emissions and improved human health.

About the BBVA Foundation Frontiers of Knowledge Awards

The BBVA Foundation promotes, funds and disseminates world-class scientific research and artistic creation, in the conviction that science, culture and knowledge hold the key to building a better future for people. The Foundation implements its programs in partnership with leading scientific and cultural organizations in Spain and abroad, striving to identify and prioritize those projects with the power to move forward the frontiers of the known world.

The BBVA Foundation established its Frontiers of Knowledge Awards in 2008 to recognize the authors of outstanding contributions and radical advances in a broad range of scientific and technological areas congruent with the knowledge map of the late 20th and 21st centuries and, representing cultural creativity at its expressive height, the area of music. The Awards also reserve space for two central challenges of the present, those of climate change and development cooperation. Their **eight categories** include classical areas like *Basic Sciences (Physics, Chemistry and Mathematics)* and *Biomedicine*, and other, more recent areas characteristic of our time, ranging from *Information and Communication Technologies*, *Ecology and Conservation Biology*, *Climate Change* and *Economics, Finance and Management* to *Development Cooperation* and the innovative artistic realm of *music, both classical and of our time*.

The **juries** in each category are made up of leading international experts in their respective fields, who arrive at their decisions in a wholly independent manner, applying internationally recognized metrics of excellence. The BBVA Foundation is aided in the organization of the awards by the **Spanish National Research Council (CSIC)**, the country's premier multidisciplinary research body. As well as designating each jury chair, the CSIC is responsible for appointing the Technical Evaluation Committees that undertake an initial assessment of candidates and draw up a reasoned shortlist for the consideration of the juries.

Committee members in the Ecology and Conservation Biology category were Xavier Querol, CSIC Research Professor at the Institute of Environmental Assessment and Water Research, Daniel Oró de Rivas, CSIC Research Professor at the Mediterranean Institute for Advanced Studies (IMEDEA), a joint center of CSIC and the University of the Balearic Islands, and Fernando Valladares Ros, CSIC Research Professor in the Museo Nacional de Ciencias Naturales (MNCN).

Ecology and Conservation Biology jury

The jury in this category was chaired by **Georgina Mace**, Professor of Biodiversity and Ecosystems at University College London (United Kingdom), with **Jordi Bascompte**, Professor of Ecology in the Institute of Evolutionary Biology and Environmental Studies at the University of Zurich (Switzerland) acting as secretary. Remaining members were **Gerardo Ceballos**, professor in the Instituto de Ecología of the Universidad Nacional Autónoma de México (Mexico), **Pedro Jordano**, Research Professor in the Department of Integrative Ecology of the Estación Biológica de Doñana (CSIC) (Spain), and **Hanna Kokko**, Professor of Evolutionary Ecology at the University of Zurich (Switzerland).

Previous laureates

The award in the last edition went to entomologist **Paul R. Ehrlich**, for “contributing key conceptual advances in the science of ecology and conservation biology, with a long-standing influence in other academic disciplines.” In the fifth edition, the award was granted to American marine ecologist **Jane Lubchenco**, “for her experimental work, which has advanced understanding of coastal ecosystems and laid the scientific groundwork for the design of marine reserves,” while the winner in the fourth edition was **Daniel H. Janzen** “for his pioneering work in tropical ecology and the conservation of tropical ecosystems.” Preceding him were **Edward O. Wilson**, who took the award “for coining and popularizing the term biodiversity,” and, in the second edition, **Peter Reich** of the University of Minnesota (United States) “for work that radically improves our understanding of and ability to predict terrestrial ecosystem compositional and functional responses to global environmental change, including climate change (...) and biodiversity loss.” Finally, the award in the inaugural edition was shared by biologists **Thomas Lovejoy** and **William Laurance** of the Smithsonian Institute (United States), whose studies showed that the degradation of the Amazon rainforest is advancing much faster than predicted.

UPCOMING AWARD ANNOUNCEMENTS

CATEGORY	DATE
Contemporary Music	February 10, 2015
Economics, Finance and Management	February 17, 2015
Development Cooperation	February 24, 2015

LAUREATE'S FIRST DECLARATIONS AND IMAGES

A video recording of the new laureate's first interview on receiving news of the award is available from the Atlas FTP with the following name and coordinates:

Server: **213.0.38.61**

Username: **AgenciaAtlas4**

Password: **premios**

The name of the video is:

"PREMIO FRONTERAS DEL CONOCIMIENTO EN ECOLOGÍA"

In the event of connection difficulties, please contact Alejandro Martín at ATLAS:

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