

University of Notre Dame

Strategic Academic Planning Committee

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PROPOSAL COVER SHEET

Proposal Type: Full Grant ___x___ Seed Grant _____

Proposal Title: ND Environmental Change Initiative (ND-ECI)

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ND Environmental Change Initiative (ND-ECI)

David M. Lodge, P.I.

A. Abstract

The Notre Dame Environmental Change Initiative (ND-ECI) will provide new intellectual capital and infrastructure for interdisciplinary teams spearheading innovative research to solve complex environmental problems identified as “Grand Challenges” by the National Academy of Sciences. In particular, ND-ECI will tackle the **interrelated problems of invasive species, land use, and climate change, focusing on their synergistic impacts on water resources**. To date, research at Notre Dame in these separate areas has been published in the most-cited peer-reviewed journals *and* has been the foundation for new local, state, and federal legislation; but we can do much more. Further progress in solving complex environmental challenges will require that these interacting issues be addressed simultaneously; put into appropriate cultural, social, and religious context; and developed with partners in industry, government, and nongovernmental organizations (NGOs). ND-ECI will expand the existing nexus of interdisciplinary collaborations, fill critical gaps with new faculty hires to further integrate ND research across colleges, create new core infrastructure, and develop new external partnerships. **ND-ECI will thus create a preeminent reputation in environmental problem-solving, distinguished by identifying solutions that produce the greatest gains in environmental health *and* social welfare.**

ND-ECI we will tackle four related research questions, with illustrative research projects highlighted here. **1) How can technical and policy tools be combined to prevent future introductions of invasive species while enhancing global trade and economic development?** Novel collaborations will drive dynamic network analyses of organism spread under alternative climate change scenarios; bioeconomic modeling incorporating trade and environmental impacts; new genetic-based technologies to detect species; experiments testing impacts of species; and analyses of feedbacks between environmental change and human responses. **2) How can land use practices like agriculture be managed to reduce the harmful effects of excess nutrients on aquatic ecosystems while meeting human needs for food and energy production?** We will create unique embedded sensor networks to measure nutrient run-off from field scale experiments in real-time for the first time anywhere. Better nutrient measurements will allow more accurate modeling of fluxes, tests of more practical mitigation strategies, and evaluation and design of adaptive policies that protect water quality. **3) How do environmental patterns and processes, and the performance of our new tools to measure them, differ across regions?** We will use the new National Ecological Observatory Network (NEON) as a test bed for using new technology to answer large-scale questions. **4) How will the translation of scientific and technological research change if real-time technology assessment is built into the research process?** Humanists, social scientists, and risk analysts will conduct real-time technology assessment to prevent the naïve and potentially harmful application of technology in an inappropriate time or place, considering both the developed and developing world.

The goal of ND-ECI is to provide solutions that minimize the trade-offs between human welfare and environmental health where trade-offs are unavoidable, and to discover win-win solutions where they are possible. ND-ECI will embody the vision of “science serving society,” in which scientists, engineers, social scientists, humanists, and policy experts contribute objective analysis motivated by a passionate commitment to translational research that serves nature *and* humans.