

Integration & Application Network
University of Maryland Center for Environmental Science

STRATEGIC PLAN 2017-2022



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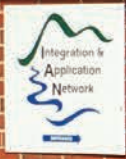
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INTRODUCTION

The Integration and Application Network (IAN) has evolved into a regionally, nationally, and internationally prominent entity within the University of Maryland Center for Environmental Science (UMCES).

UMCES faculty have provided leadership in coastal and estuarine science and discovery since 1925. In 2000, UMCES expanded their scholarship to augment discovery with integration, application, and teaching. As part of this scholarly expansion, IAN was launched in 2002 to specifically address integration and application of science.

IAN's vision is a world where science is used to make smart environmental choices.

At IAN, we believe that sound science can be used to make the world a better place. Bold new ideas usher in change. Throughout history, thought revolutions have occurred when the work of scientists allowed people a new perspective on the world, and their role in it. In the past, the biggest philosophical questions included: "what is our place in the world?", "what are we made of?" and, "where do we come from?" Today there is a new philosophical question - "how do we live on our rapidly changing planet in a sustainable manner?" We believe that bold new thinking by scientists, accompanied by effective communication with the public, is necessary to answer this new, pertinent question and begin a sustainability revolution.

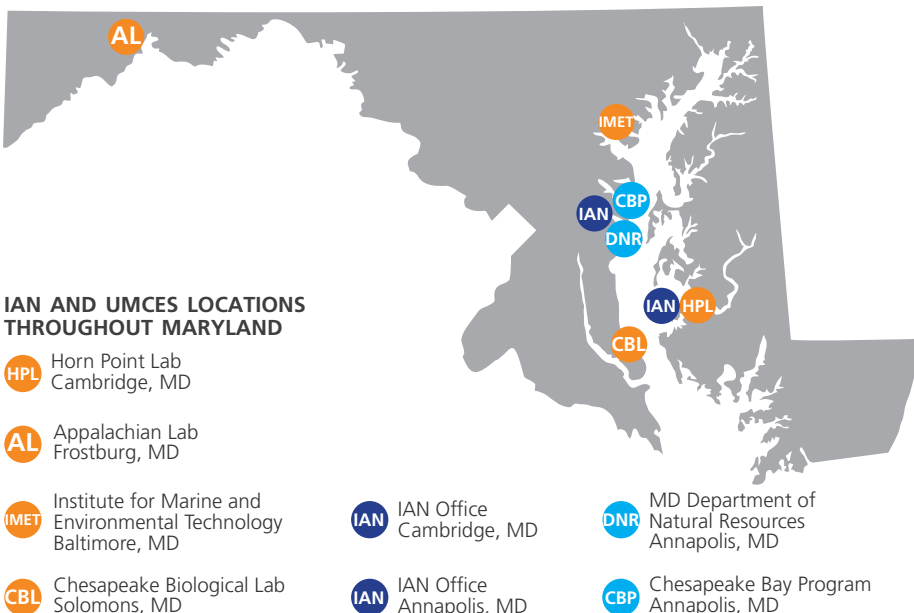
IAN has grown and developed by seizing new opportunities, always improving on existing capabilities, and recruiting and retaining the best people to tackle the complex environmental issues. IAN has a bright future and plans to keep growing and make a positive impact on the world. With recent changes in UMCES leadership, the formation of an IAN External Advisory Committee, and the establishment of an evaluation program to assess IAN's social impact, ecological outcomes, and partnership satisfaction, it is time to look ahead and plan our future. In response to this need, we have developed this IAN Strategic Plan.



Dr. Bill Dennison, Vice President for Science Applications at the University of Maryland Center for Environmental Science. Dr. Dennison's primary mission within UMCES is to coordinate the Integration and Application Network.



IAN is an initiative of UMCES. From a network of laboratories across the state of Maryland, UMCES scientists provide sound advice to help state and national leaders manage the environment and prepare future scientists in order to meet the global challenges of the 21st century. IAN fosters partnerships with a variety of organizations and agencies, both regionally and globally, and has staff physically located in Annapolis, on the Horn Point Laboratory campus, at the Chesapeake Bay Program office, and in the Maryland Department of Natural Resources Building.



OUR MISSION

IAN's mission is to accomplish positive environmental change through scientific synthesis, engagement, and communication.

Within our overall mission, IAN strives to achieve the following:

- Create positive environmental change both locally and globally,
- Insert science into management and decision-making,
- Make scientific information available to broad audiences,
- Improve environmental literacy,
- Increase engagement of stakeholders in environmental decision-making.

One of IAN's strengths is our ability to combine science visualizations with engaging narratives to produce compelling science communication products in both print and electronic formats. We achieve this through facilitation and engagement so we can produce products with scientists from different academic disciplines and with people from diverse backgrounds. We thrive in this role, and recognize the importance of continued learning in order to expand our capabilities and continually improve our ability to achieve our mission.



IAN staff organize, promote, and participate in local press release events for science communication materials and eco-health report cards.



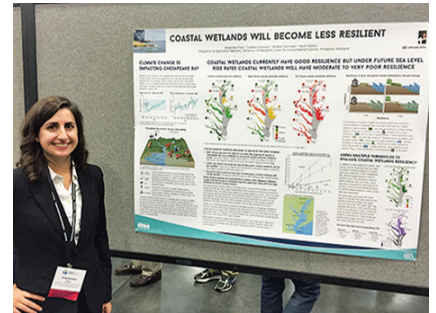
The IAN symbol libraries currently contain 2932 custom made vector symbols designed specifically for enhancing science communication products with diagrammatic representations of complex processes. Our aim is to develop a global symbol language for scientists, resource managers, community groups, and environmentalists worldwide. The symbol libraries are freely available on our website, and have been downloaded by over 90,000 users in 244 countries and all 50 U.S. states.

OUR CORE VALUES

IAN staff look forward to new challenges, learning, and innovation. We enjoy the immersive education achieved from traveling to new locations, meeting experts, and going on field trips and site visits. We seek to foster good partnerships that support these activities. But the value that really motivates and sustains us is applying our abilities to help our partners with their science synthesis and communication challenges. We value co-producing great products in a timely and cost-effective manner with a diversity of partners. In addition to the intensity and focus that we bring to our partnerships, we also strive for some lightheartedness so that we and our partners have fun in the process.

Core IAN values are the following:

- Commitment to science integration and application that epitomizes our institutional responsibility to serve society.
- Adherence to the highest standards of academic rigor, accuracy, and honesty in the development of science applications.
- Engagement in translational science in partnership with UMCES scientific colleagues, other units in the University System of Maryland, and the State of Maryland for the wise stewardship of Maryland resources.
- Responsiveness to the needs of colleagues, partners, sponsors, governments, and stakeholders.
- Development of an atmosphere of fairness, openness and inclusion, enhancing shared governance and a commitment to diversity.



IAN staff participate annually in several international and regional scientific conferences, and contribute to peer-reviewed publications. Below: Group photo from the annual IAN retreat, a day in which IAN staff from all three IAN institutions (IAN, CBP, and MD-DNR) discuss future goals and strategic plans for IAN.



IAN HISTORY

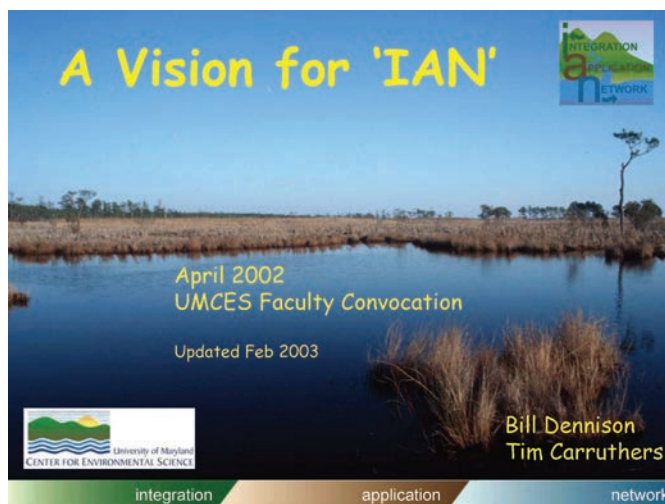
The IAN concept was conceived in the 2000 UMCES Strategic Plan. UMCES President Don Boesch presented the concept to the Maryland General Assembly and obtained the operating funds. In 2002, the position of Vice President for Science Application was created, along with the name 'Integration and Application Network.' The IAN acronym commemorates the charismatic scientist Ian Morris, head of UMCES from 1981-1988, known for his passionate commitment to conducting sound and relevant science.

The original IAN statement of purpose was "to advance effective science and stimulate the communication of this science to managers, non-governmental organizations, educational institutions, and the public." Since its inception in 2002, IAN has gone through several distinct phases of development, described in the timeline below.

PHASE I: 2002 - 2004

IAN INITIATION PHASE

Dr. William Dennison became the director of IAN in 2002. IAN developed initial partnerships in Chesapeake Bay and the Maryland Coastal Bays. The IAN website was launched, and the first round of symbols were posted in the symbol library. IAN promoted the concept of the Chesapeake Bay report card, and established the EcoCheck partnership with NOAA at the Oxford Cooperative Laboratory. Also, IAN initiated science communication courses and began publishing science communication products. At this point, all IAN staff were accommodated within the UMCES Horn Point Laboratory in Cambridge, MD.



At the April 2002 Faculty Convocation, Dr. Bill Dennison, and former IAN employee Dr. Tim Carruthers presented the vision for IAN, a new initiative of UMCES.

PHASE II: 2005 - 2009

IAN PARTNERSHIP PHASE

IAN developed strategic partnerships with federal agencies (National Park Service and NOAA), international organizations (Land-Ocean Interactions in the Coastal Zone and The International Geophysical Biological Programme), educational programs (The Centers for Ocean Sciences Education Excellence Coastal Trends, The National Science Foundation and The Erasmus Mundas program in Europe), and regional management programs (Chesapeake Bay Program and the Maryland Coastal Bays Program). IAN Press began with the publication of *Shifting Sands: Environmental and Cultural Change in Maryland's Coastal Bays*. Science communication training was expanded, the Annapolis Synthesis Center was created in historic downtown Annapolis, and the increased IAN staff size was accommodated in a newly renovated IAN building on the Horn Point Laboratory campus.



IAN Press is committed to producing practical, user-centered communications that foster a better understanding of science and enable readers to pursue new opportunities in research, education, and environmental problem-solving.

PHASE III: 2010 - 2014

IAN ENGAGEMENT PHASE

IAN increased partner engagement, focusing especially on the facilitation of scientific syntheses and development of ecosystem health report cards using indicators and thresholds derived from stakeholder workshops. IAN continued to co-produce various written and online science communication products. The Annapolis Synthesis Center was transformed into the National Socio-Environmental Synthesis Center (SESYNC), supported by the National Science Foundation, and IAN staff were co-located with SESYNC.

PHASE IV: 2015 - PRESENT

IAN GLOBALIZATION PHASE

IAN expanded its global impact by partnering with the World Wildlife Fund to form Healthy Rivers for All, to develop report cards for river basins globally. IAN also partnered with Future Earth Coasts to facilitate dissemination of the IAN approach to more locations globally. IAN staff became more involved with graduate teaching and professional development courses, including creating an IAN graduate student program. The UMCES Annapolis Office relocated to account for expanding space requirements in 2017.

In 2015, IAN and WWF established the Healthy Rivers for All Partnership. This initiative aims to empower stakeholders to create science-based report cards in their own basins so they can better manage resources for the protection of fresh water they depend upon.



SCIENCE VISUALIZATION INTEGRATION AND APPLICATION NETWORK



In Fall 2015, IAN taught its first semester-long course in science visualization. Since then, IAN has taught several graduate level courses, with future plans to include a certificate in science communication.

PHASE V: FUTURE

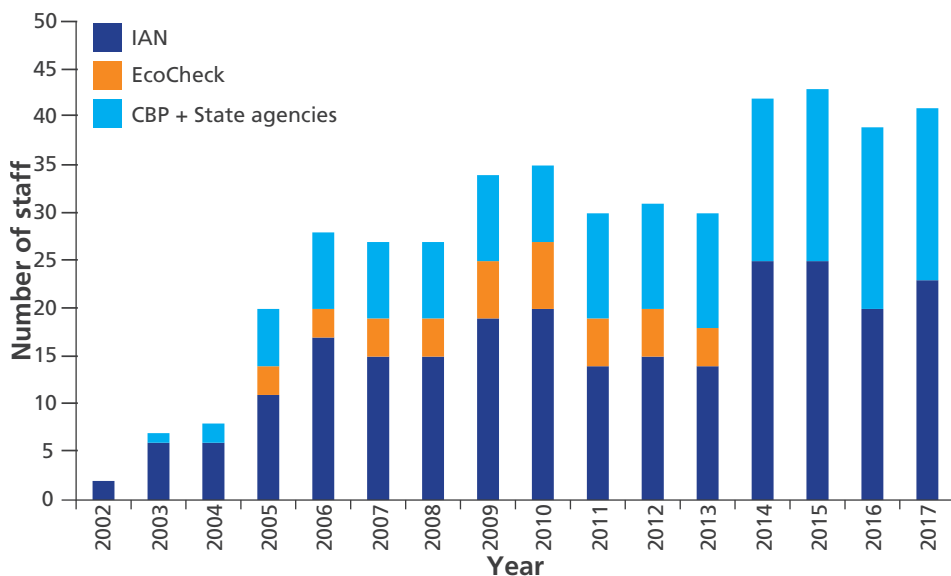
IAN intends to expand into the social sciences, improve their evaluation processes, diversify science communication approaches, and increase peer reviewed publications. IAN wants to add more classes and create certificate programs. Efforts will be made to follow up the IAN report cards with "Raise the Grade" activities in order to catalyze positive ecological outcomes. Furthermore, IAN will continue to emphasize Chesapeake Bay restoration through expanded stakeholder number and engagement.

OUR STAFF

The greatest IAN resource is not IAN's products or web tools, but the talented IAN science communicators, integrators, analysts, students and interns. IAN staff have led the application and integration of science to ecosystem restoration and sustainability in the Chesapeake Bay region. Through its network of partners, IAN has leveraged the expertise of UMCES faculty and the experience gained in the Chesapeake Bay region to advance the application of science to management in iconic ecosystems around the world, including Asia, Africa, South America, North America, and Europe.

Currently, there are about three dozen people on IAN staff. They can be grouped into the following general categories:

- **Science Integrators** have training as research scientists. They have developed synthesis skills and they work closely with various partners to apply scientific results.
- **Science Communicators** have training in research and have developed graphical design and layout skills.
- **Data Analysts** have a diversity of technical training. They work in simulation modeling, data interpretation, geographic information science, web production and design, and statistical data analysis.
- **Administrative support** staff have training in financial accounting and project management support. They provide information technology, financial accounting, and travel arrangements for IAN staff.
- **Interns** are recent graduates with Bachelor degrees that spend one or two semesters mentored by Science Communicators.



Although core IAN staff make up the majority of personnel, the IAN network includes partnerships with federal and state agencies. The Chesapeake Bay Program (CBP) is a partnership run by the Environmental Protection Agency, and includes federal agencies and academic partners. IAN also partners with The Maryland Department of Natural Resources to work on climate change related projects. EcoCheck was a partnership with NOAA active from 2005-2013 that focused on the integration of detailed assessments and forecasts of Chesapeake Bay ecosystem health. It has since grown to a global focus, and merged with the core IAN group in 2013.

OUR STRATEGIC PRIORITIES



Partner engagement is important to IAN because: 1) IAN staff enjoy working with talented, motivated, and capable people, 2) Happy partners recommend IAN to their colleagues, which helps keep IAN financially solvent, and 3) IAN aspires to build capacity with partners so that they can help multiply impacts of IAN activities.

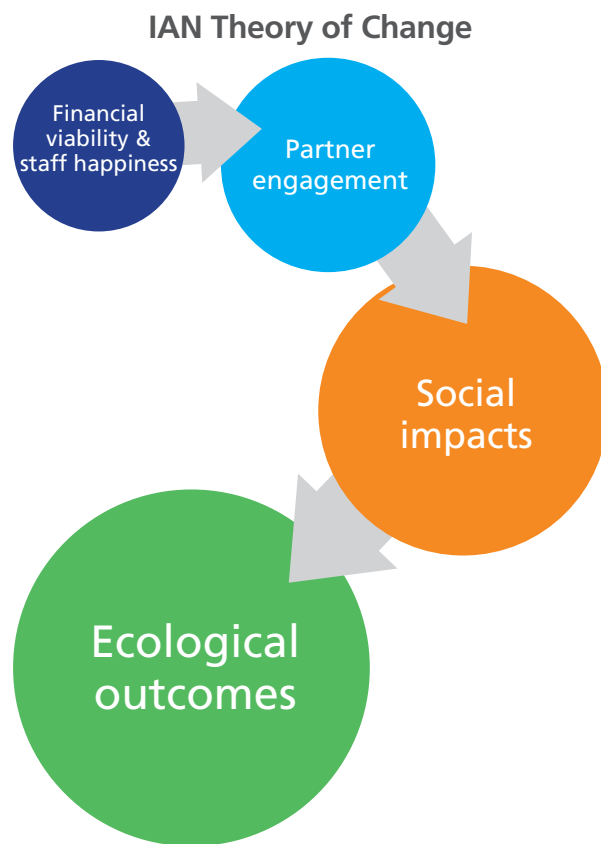


Social impacts are important to IAN because: 1) broad dissemination of IAN products aids the ability of IAN and partners to effect positive environmental change, 2) the total reach that IAN products have in the world helps insert science into decision-making and 3) teaching and training by IAN can empower more people to create more effective science applications.



Ecological outcomes are important to IAN because: 1) the ultimate goal of IAN activities is to achieve positive ecological outcomes, 2) IAN has a longstanding involvement and impact in Chesapeake Bay and the Maryland Coastal Bays and aspires to catalyze positive ecological progress in these regions, and 3) the global ecological status assessments can help other groups use this tool to create positive ecological outcomes.

The ultimate motivation for IAN is to create positive ecological outcomes. In order to achieve these outcomes, we recognize that we need to have an impact on society, largely through effective engagement with key people and organizations. To achieve this societal impact, we need to work with key partners who can help spread our messages and provide resources and expertise. But all of these activities are not possible without IAN's financial viability and staff happiness. To recognize these needs, we have developed the IAN Theory of Change, in which our internal financial viability and staff happiness allows us the opportunity to develop productive working relationships with key partners. By helping these partners achieve their various scientific and environmental missions, we can leverage our social impacts and ultimately achieve positive ecological outcomes.



PRIORITY I: PARTNER ENGAGEMENT



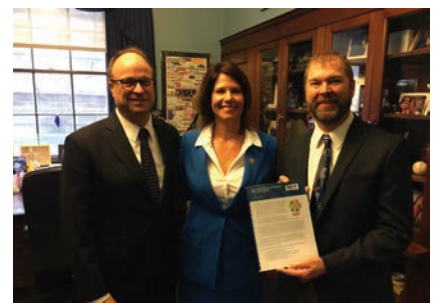
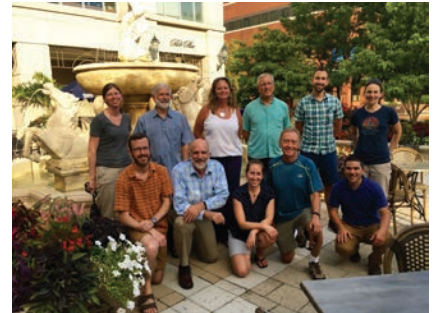
IAN staff work closely with a variety of stakeholders on each project to synthesize knowledge and co-produce science communication products. IAN's strength in the quantitative natural sciences is an important tool, but in order to increase engagement with stakeholders we need more expertise in qualitative approaches. IAN is developing more skills and partnerships within the social science realm.

As we achieve positive environmental change, we find ourselves increasingly involved in collaborations with a widening diversity of stakeholders. This stakeholder engagement is very place-based and focused, which makes it difficult to scale up to create global impacts. To address this issue, IAN is developing strategic partnerships which allow us to work in iconic ecosystems and develop training programs and materials that teach other groups to emulate or adapt the IAN approach throughout the world.

Throughout the duration of a project, IAN strives to develop regular communication with partner organizations. In an effort to maintain open communication channels, and ensure effective partner relationships, future projects will include additional time budgeted for project management. IAN will also conduct regular partner surveys to obtain constructive feedback, enabling us to more effectively align resources. As a result of IAN's wide repertoire of partners, and completion of hundreds of projects, the development of clear expectations and timelines should be easily communicated to partners throughout the term of a project.

"Working with IAN is transformative. Their team of science communicators and integrators help you tackle environmental challenges head-on, using thoughtful and innovative approaches. IAN's engaging approach to science communication and translation can shape knowledge into action. I know, because I have seen their products effectively used by researchers and managers alike."

*Shawn Carter
U.S. Geological Survey*



PRIORITY II: SOCIAL IMPACTS

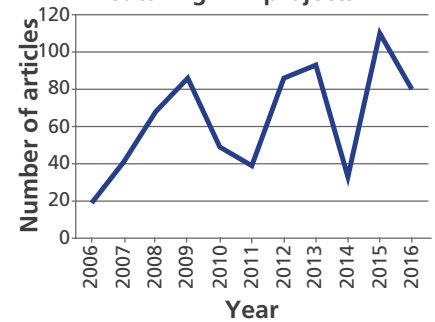


The variety of IAN publications, online tools, and scientific communication training is an important part of what makes IAN unique and impactful. IAN's strength has traditionally been in producing high-quality printed materials that integrate text and graphical elements. As modes of communication shift to digital and mobile resources, including interactive websites, mobile applications, social media, and videos, IAN plans expand its science communication materials to digital platforms.

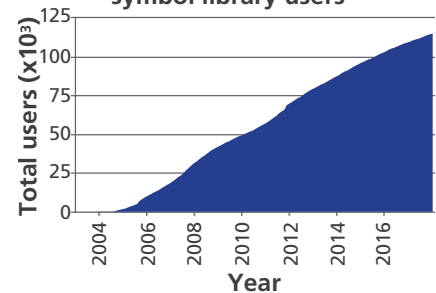
To coincide with the shift from print to multimedia platforms, IAN has begun to contract media relations groups to assist in report card releases. In addition, a concerted effort to develop more online resources has been made, as well as an active blog presence, regular social media postings, and more videos. IAN has developed a considerable amount of content across multiple platforms, but the IAN web presence has been fragmented and is badly in need of updating and streamlining. Hence, a major strategic direction will be to expand and update the IAN websites, incorporating more interactive technology to engage broader audiences.

IAN has had a longstanding role in teaching and training, particularly regarding IAN's unique science communication suite of tools and techniques. Until recently, teaching and training efforts have not been strategic or consistent. Capitalizing on the high demand for quality training in the fields of science communication and integrated assessment, IAN intends to develop a teaching strategy for graduate level courses offered through the University of Maryland Marine, Estuarine, and Environmental Science program, as well as a certificate program. In addition, IAN will continue to promote courses targeting partners in the agency and NGO sphere, advancing the network of science communication professionals.

Traditional media outlet articles featuring IAN projects



Cumulative IAN image and symbol library users



IAN continues to increase its presence in traditional and online media outlets. A concerted effort has been made to develop more digital resources and content.



IAN staff discussing the Orinoco River Report Card on a local radio station in Colombia, South America.

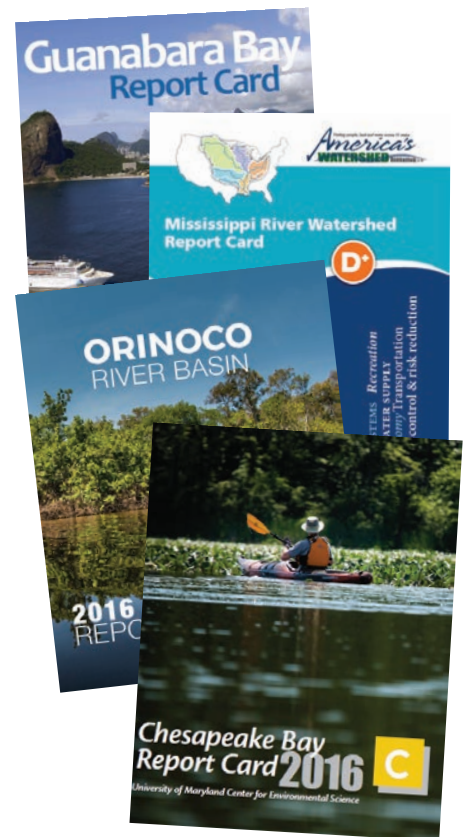
PRIORITY III: ECOLOGICAL OUTCOMES



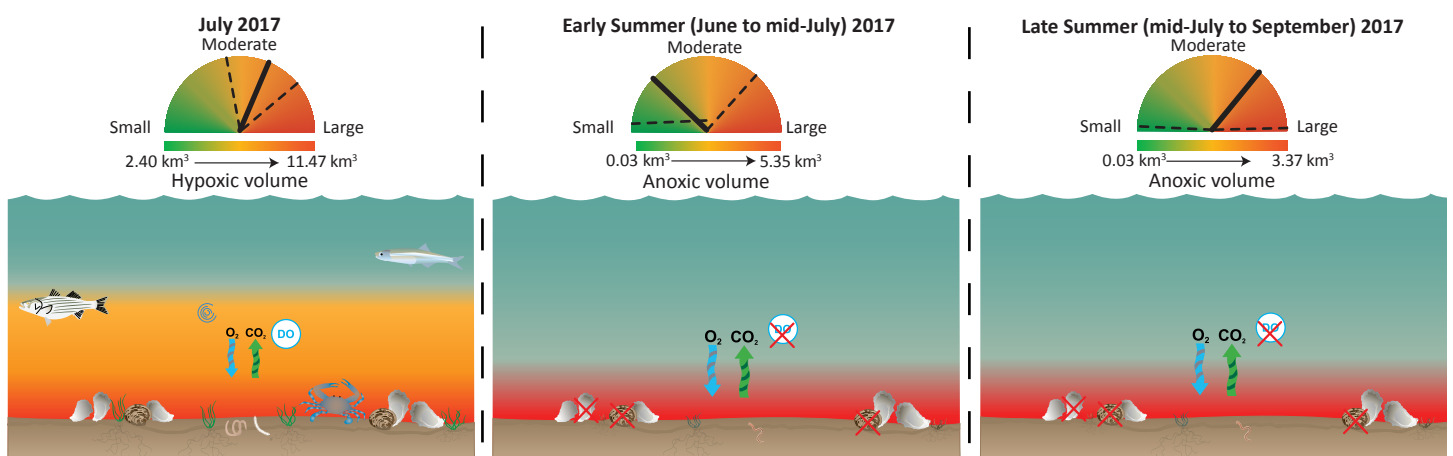
Achieving ecological outcomes is both the most challenging and the most rewarding aspect of the IAN strategic plan. The staff at IAN strive to make a positive difference in the ecological status of our region and in the world. We feel that we have a responsibility to achieve positive ecological outcomes, particularly in two local regions of longstanding involvement: the Chesapeake Bay and the Maryland Coastal Bays.

In Chesapeake Bay and the Maryland Coastal Bays, there has been considerable progress in reducing nutrient loads associated with sewage treatment effluent and atmospheric emissions, but stormwater runoff has not been curtailed. Therefore, we need to extend our reach to promote best management practices for urban and rural stormwater runoff. To do this, we need to find ways to directly engage with the development and agricultural communities. One approach will be to expand these report card efforts to include social and economic indicators. In addition, we need to follow up report cards with 'raise the grade' conversations to focus attention on the societal changes needed to achieve positive ecological outcomes.

To increase our influence on global ecological outcomes, IAN needs to continue partnering with international foundations and non-governmental organizations, including World Wildlife Fund, The Nature Conservancy, and the Belmont Foundation. With these partners, we envision "training the trainers," developing handbooks and online training materials to aid in report card dissemination, increase translation of IAN materials into different languages, and travel to strategic and sometimes distant locations to maximize our impact.



Environmental report cards synthesize data into an image-rich format that is easily accessible to a wide audience, and help catalyze improvements in ecosystem health, guide restoration efforts, and stimulate research. .



Since 2010, Chesapeake Bay scientists have collaborated with IAN to forecast Chesapeake Bay summer dissolved oxygen conditions. Ecological forecasts provide resource managers with information that can be used to guide restoration, enable proactive communication of Bay conditions, and help direct research activities.

EVALUATION

IAN staff regularly work with a broad range of partners and stakeholders to produce report cards and assessments for regions around the world. IAN scientists have developed a rigorous process for environmental assessment, with which we turned inward in order to assess our own status. The effort to create self-reflective IAN Report Cards has helped IAN define our priorities as a team. As such, the process of developing the report card has already proved invaluable.

Two IAN report cards have been produced thus far: 1) an external report card based on the foundation of our three strategic priorities: partner engagement, social impacts, and ecological outcomes, and an introspective report card founded on a survey of IAN staff, which identifies important aspects of IAN work culture.

IAN External Report Card

IAN has established numerical goals for each of the nine indicators in the three strategic goal areas: partner engagement, social impacts and ecological outcomes. The first IAN report card was released in 2017, and was based on 2015 data. A more timely reporting schedule will be implemented in the future. Progress towards these goals will be assessed on an annual basis and the results will be shared widely. In the future we will improve the metrics used for assessing the progress, but more importantly, we will work to improve the scores.

IAN Introspective Report Card

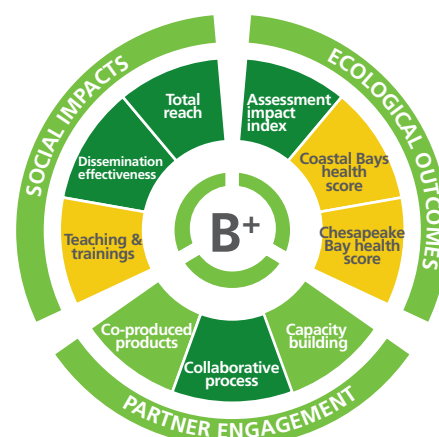
In addition to the overall strategic priorities, IAN has identified a suite of internal goals and aspirations, including financial viability, staff happiness, functionality, and capacity building. We consider each of these goals to be absolutely essential for the continued viability of IAN. IAN needs to be financially solvent with a functional organizational structure, but more importantly, needs to support overall staff happiness and continued professional growth.



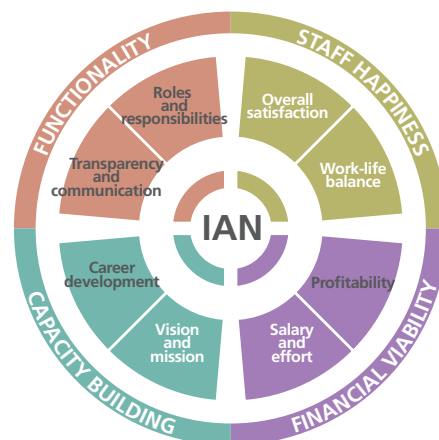
As a direct result of the IAN Introspective Report Card, IAN has begun a series of professional development activities to complement current IAN activities and promote professional growth. In September 2017, the IAN team participated in a one-day workshop on improving communication and persuasive writing.



The IAN introspective report card was founded on a survey taken by IAN staff to identify important aspects of the IAN work culture.



The IAN Report Card is focused on the strategic directions outlined in this plan. Nine indicators in three categories were assessed and communicated widely to IAN partners.



Eight indicators in four categories were assessed, and goals were developed for each indicator. This report card was produced for internal reflection by the IAN team.

FINANCIAL VIABILITY

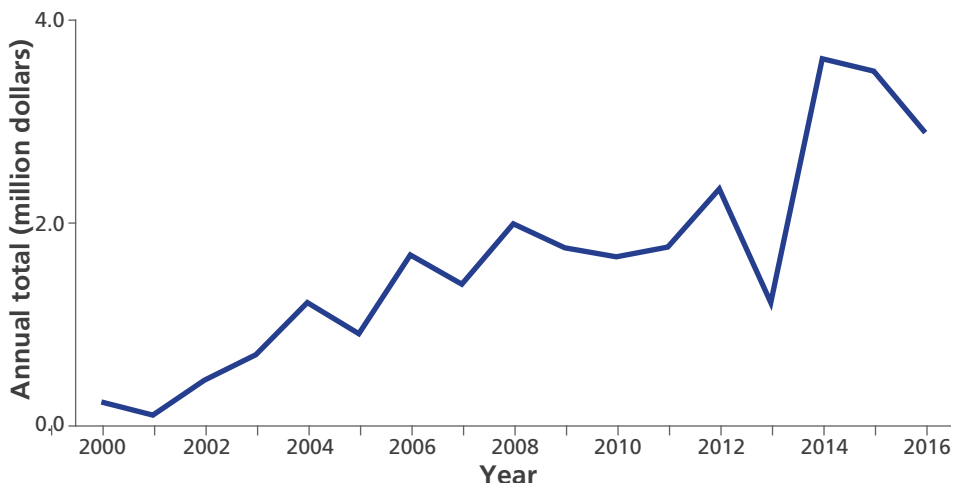
IAN partners with many different agencies, organizations, and institutions, leading to a broad diversity of partners and funding arrangements. The growing reputation and diverse funding base of IAN are both positive attributes, but they present a challenge for the financial management of the IAN enterprise. Thus, building and maintaining the administrative capacity of IAN is crucial for the continued operation of IAN.

A fundamental goal of IAN is to catalyze synthesis activities with scientists throughout the world. The key word here is *catalyze*, as IAN works with partners to conduct or facilitate synthesis activities, but also provides the tools and opportunities for groups to independently create their own path in science communication and integration. IAN aims to stimulate successful funding arrangements with foundations and agencies. We are always looking for opportunities to create productive partnerships so that we can accomplish great things with dynamic partners.

A practical goal of IAN is to develop a funding strategy that accounts for the necessary administrative support for managing funds, organizing logistics, and procuring services. As IAN has grown, maintaining the necessary administrative support has become more and more challenging. Most grants and contracts restrict the use of funds directly supporting administrative costs, and therefore a goal of IAN is to develop a funding strategy allowing for this much needed administrative support. IAN receives very little direct support from the State of Maryland, and instead relies on grants and contracts to fund its activities. As a result, IAN needs to always maintain a positive cash flow.



IAN annual grant funds received



IAN relies on grants and contracts to fund its activities. The steady increase in grant funds received is a testament to the growing reputation and influence of IAN.

NEW DIRECTIONS

IAN will continue to catalyze and empower synthesis of scientific understanding and its application in advancing more effective environmental stewardship. In the process it will contribute to the themes of the University System of Maryland Strategic Plan, such as competitiveness in the innovation economy, transformed academic models, building and leveraging resources and national eminence, while in a manner consistent with UMCES Core Values. IAN will effectively and efficiently engage the expertise of the UMCES faculty, recognizing and respecting that science integration and application are essential elements of scholarship that extend throughout the Center's mission.

IAN staff have become effective practitioners in the art of science communication, but have not expended much effort studying the science of science communication. In addition, IAN staff have developed practical techniques for integrated assessments, but have not studied the science of assessments. Therefore, IAN has begun to accept graduate students, established a journal club to discuss scientific papers, and started to attend relevant scientific conferences to enhance the scholarship of science communication and assessment.

IAN wants to bolster its scientific credibility and reach through an increasing presence in the peer review scientific literature. The emphasis on IAN science communication products that target decision makers, resources managers and environmental advocates has led to a broad societal reach, but the lack of appreciable documentation of the IAN approach and findings in the scientific literature has meant that most scientists are unaware of the rich synthetic scientific content generated by IAN activities. Therefore, IAN will make a concerted effort to accompany their science communication products with publications in the scientific literature.



The annual IAN report card was created to enable the strategic directions outlined here by a) developing better ways to measure and track progress toward achieving the strategic goals, b) creating a regular impetus to improve upon the scores, and c) maintain a transparent accountability of IAN activities with partners, colleagues, and stakeholders.



In 2015, IAN launched a semester long course in science visualization. IAN continues to offer courses in science communication, and in 2017, will begin a short-course on the creation of river basin report cards.

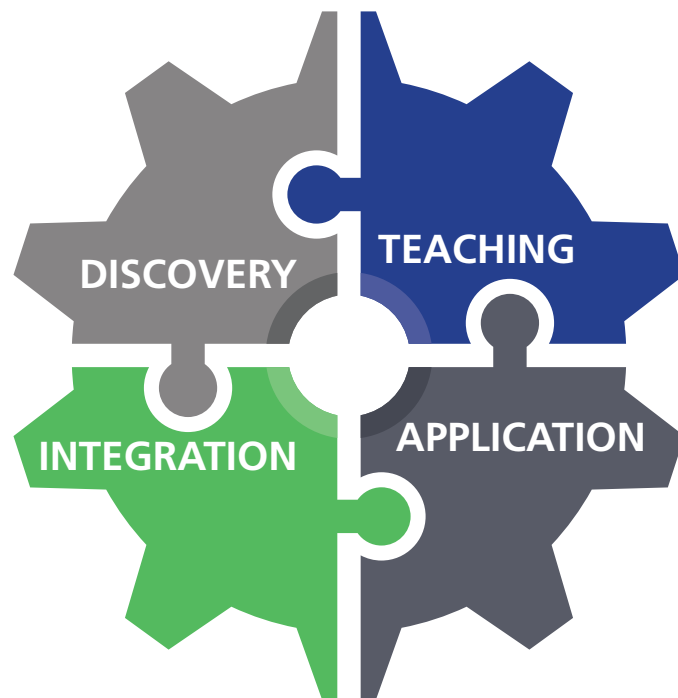
INTEGRATION AND APPLICATION NETWORK

EACH WORD IN OUR NAME IS CENTRAL TO WHO WE ARE

Integration: We synthesize scientific information and data to elucidate important gaps, emergent properties, and generalizable truths. Our work also integrates different perspectives from diverse stakeholders and brings scientific understanding to bear so that informed recommendations can be produced.

Application: Our science applications include briefings to decision makers, public report cards, and a variety of science communication products delivered to broad audiences. This involves engaging with scientists, but also with various decision makers, resource managers and key stakeholders. We aspire to have scientific results inform decision making and help solve environmental problems.

Network: We foster long standing partnerships with people in various organizations, but also seek out and engage new groups on a continual basis. We create collaborative learning environments with a broad array of people and organizations. Our network includes scientists as well as non-scientists. IAN's efforts are largely place-based, with a special emphasis on the Chesapeake Bay and its watershed; however projects currently underway span the globe. The techniques and methods learned from these global projects are used to augment and improve our regional projects.



IAN promotes scholarship in support of promoting positive environmental change. The four tenet of scholarship recognized by the University of Maryland Center for Environmental Science are discovery, teaching, application, and integration. IAN's activities focus on integration and application of science with an emphasis on synthesis, engagement, and communication.

By creating innovative ways to visually present science, we make it more accessible to managers, stakeholders, decision makers, and the general public. We can help you to communicate your message to a much wider audience than just your peers.

On the web at ian.umces.edu. Follow IAN social media and use our free symbol library.

Courses and workshops. Sign-up for an online course, or contact us to arrange onsite training.

Job opportunities. Inquire about internships and job postings.

Partner opportunities. We are always looking for new projects.



Integration & Application Network

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