Partnership for Action on Conservation Technology (PACT) 2019: Workshop Summary

12 June 2019

Washington, DC

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Executive summary

The Partnership for Action on Conservation Technology (PACT) 2019 was a workshop held on 12 June 2019 at Defenders of Wildlife in Washington, DC. Leaders in conservation technology from 16 non-governmental organizations and technology companies came together to accomplish three main goals:

1. Understand the landscape of conservation technology today in the conservation community;
2. Discuss future directions and needs for conservation technology; and
3. Identify challenges, such as resource limitations, that need to be addressed to enable conservation technology to achieve conservation goals.

Over the course of the day, participants heard from a discussion panel of end-users of conservation technology; presented lightning talks on the technology work of their organizations; then worked in three sessions to refine the scope of needs for conservation technology now and in the coming years. The results of the workshop included new connections among organizations; lists and discussion of top needs; and discrete action items in six areas, to be advanced by participants in the coming weeks and months:

1. Conservation technology registry;
2. Conservation technology standards;
3. Social and legal challenges of conservation technology;
4. Sustainable funding for conservation technology;
5. Collective bargaining for conservation technology; and
6. PACT 2020.

This summary was compiled by Defenders of Wildlife from the work of all of the PACT participants. Please cite as:

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Introduction

The Partnership for Action on Conservation Technology (PACT) 2019 brought together conservation technology leaders from 16 non-governmental organizations and the technology industry to:

1. Understand the landscape of conservation technology today in the conservation community;
2. Discuss future directions and needs for conservation technology; and
3. Identify challenges, such as resource limitations, that need to be addressed to enable conservation technology to achieve conservation goals.

The workshop opened with brief background on the goals of the meeting and the day's plan, then introductions from participants[1], including:

Person	Organization	Person	Organization
Jacob Malcom	*Defenders of Wildlife*	Hugh Possingham	*The Nature Conservancy*
Shelly Grow	*Assn. Zoos and Aquariums*	Jim Palardy	*The Pew Charitable Trusts*
Sherri Hammons	*The Nature Conservancy*	Nasser Olwero	*World Wildlife Fund*
Janet Ranganathan	*World Resources Institute*	Lori Scott	*NatureServe*
John Amos	*SkyTruth*	Jonathan Palmer	*Wildlife Conservation Society*
Steven Hamburg	*Environmental Defense Fund*	Bonnie Lei	*Microsoft AI for Earth*
Ry Covington	*SkyTruth*	Jay Sullivan	*Conservation X Labs*
Lauren Stovall	*Amazon Web Services*	Marko Cemovic	*Amazon Web Services*

Panel discussion

The opening panel discussion included non tech-focused leaders from government (Gary Frazer, U.S. Fish and Wildlife Service), the non-governmental sector (Claudia Sobrevila, World Bank), and the press (Stephen Lee, Bloomberg Environment) who talked about their jobs and their use of conservation technology or its outputs. Gary spoke about the need for transparent, science-based decision making, which can be facilitated with conservation technology

[1] The guests were joined by four members of the Center for Conservation Innovation at Defenders, whose work has a large technology component: Michael Evans [Senior Conservation Data Scientist], Lindsay Rosa [Conservation GIS Scientist], Mae Lacey [GIS and Technical Computing Associate], and Sasha Patsel [Application Developer].

developments. Claudia spoke about her team's focus on combatting wildlife trade, which means providing technical assistance—often data and technology—to empower nations and communities to do more. Stephen spoke about the importance of verifiable data for reporting and how government data was often considered the gold standard in the past but is no longer.

The first several questions in the Q&A session were directed to Stephen Lee. John Amos asked about whether it is the job of reporters to "analyze" competing data to determine which should be trusted; Stephen replied that it was not, that it was his job to present available data, then segued into the need to make the complex data / situations simple for readers. Steve Hamburg followed on that to ask about the risk of oversimplification. Stephen articulated that he was often concerned for the degree of oversimplification, but his audience was readers who do not follow the details. Other questions and discussion focused on the balance between the status quo and risking failure; the art and science of managing animals and technologies that might bridge the two; and the importance of social sciences and behavioral change with technology.

Presentations

After the panel discussion, the participants presented on the conservation technology work of their organizations, including past, present, and future work.

World Resources Institute - Janet Ranganathan

Janet highlighted Resource Watch, which is WRI's platform for working with data providers to make data publicly available and useable. She showed examples of data layers available, blog posts highlighting the stories of the data, and on-the-ground examples.

Microsoft AI for Earth – Bonnie Lei

At Microsoft's AI for Earth, Bonnie works at the intersection of environmental science and computer and data science, focused on agriculture, water, biodiversity, and climate change. Her presentation explained the AI for Earth's vision related to data, infrastructure, algorithms, APIs, and apps, and the partnerships, such as Wild Me, that leverage citizen science and Microsoft's technological capacity.

Association of Zoos & Aquariums—Shelly Grow

Shelly enumerated the three main areas where conservation tech is used throughout AZA; conservation monitoring, bio-security and animal care, and member services. Within AZA, technology is valuable for tracking disease through populations in less invasive ways, real-time monitoring for poaching and

illegal activity, and for capturing institutional knowledge that used to be erased every week from whiteboards and other documents.

World Wildlife Fund—Nasser Olwero

WWF is focused on six global goals or "Practices" to help people live in harmony with nature and rely on various partnerships, platforms, and programs to achieve these goals such as PandaSat, Wildlife Insights, OpenSC, MERMAID, and Wildlabs. WWF sees technology as offering opportunities for wildlife monitoring, anti-poaching, tracking, communication, and collaboration.

The Pew Charitable Trusts – Jim Palardy

In discussing Pew's conservation technology partnerships, Jim cautioned that although technology is part of the solution it is not the entire solution. Projects such as tracking illegal fishing using Oversea Ocean Monitor, mapping subtidal biodiversity through Global Airborne Observatory, and utilizing citizen science data still require people to address non-technological challenges related to local infrastructure, cultural context, management needs, data standards, and unintended consequences.

The Nature Conservancy—Sherri Hammons and Hugh Possingham

Both Hugh and Sherri note the need to use technology to maximize efficiency, eliminate redundancy, and leverage collaborative research to tackle the ecological crisis. By publishing AI models TNC is allowing crowdsourcing to help users adapt AIs to specific local needs, and by utilizing technology such as satellite imagery to count trees, TNC can expand their work to areas where they do not have scientists on the ground.

SkyTruth—John Amos

With the proliferation of cheap satellites and the advent of cloud computing, John Amos explains we are now able to observe the Earth in new ways and in real time to further conservation agendas. For example, while SkyTruth has used crowd-sourced with volunteers to map drilling sites, machine learning allows this process to be scaled, requiring less QA/QC and labor.

Wildlife Conservation Society—Jonathan Palmer

WCS's conservation technology profile includes PA management focused collaborations, project specific technology, conservation innovations, GIS services, web apps and databases, and publications and curation. Jonathan explained Spatial Monitoring and Reporting Tool (SMART) PA management platform, which is a suite of modules and services that can be implemented locally, adopted nationally, and scaled globally to protect wildlife and fight poachers.

Conservation X Labs—Jay Sullivan

Through a four pillared strategy focused on directed innovation, harnessing open innovation, scaling solutions, and building the tribe, Conservation X Labs are targeting the underlying drivers of extinction, not the symptoms. An example of their innovation includes the DNA Barcode Identification Tool (DNA BIT), a low-cost, hand-held and field ready tool to identify wildlife.

Environmental Defense Fund—Steve Hamburg

EDF is using new technology, such as MethaneSAT, which collects methane data, to improve environmental outcomes. Steve also noted that he hoped PACT discussions would include intellectual property, business plans, data handling, and planning for long-term funding of technology.

NatureServe—Lori Scott

NatureServe's Lori Scott identified several technology challenges including scaling tracking data, validating, storing and identifying organisms, data gaps from areas not yet surveyed, and the pace of conservation status assessments. Potential technological solutions include validation and storage tools to manage species relationships, the creation of a dynamic library of species distribution models, and the use of AI to speed up the species assessment process.

Amazon Web Services—Lauren Stovall

AWS regularly facilitates and enhances conservation partnerships by providing the computing resources to assist in the innovation process for organizations such as the Koala Genome Consortium, International Rice Research Institute, MAXAR Technologies, Ocean Conservancy, and Explore.org.

Defenders of Wildlife—Jacob Malcom

Jacob introduced the Center for Conservation Innovation (CCI), which he leads in work at the intersection of policy, science, and technology to promote positive conservation outcomes particularly focused on the Endangered Species Act. CCI is developing tools to monitor environmental changes including fire, hurricanes, and deforestation, and is now looking to the future—how to predict expected changes on different time and spatial scales to guide proactive conservation.

Workshop I: Broad topics

The first of the three workshop sessions for the day focused on identifying the general topics of greatest importance to conservation technology, which were then the focus of the in-depth afternoon sessions. These topics were developed in four parallel sessions of five participants each, then presented by each group before lunch (shown as presented to the group):

1. Monitoring and technology being used to track environmental change--area of duplication and conservation organizations should get together to monitor environmental change and impact of work. Discussion of needs--create platform or toolkit to do better using resources we have
2. Need in community to service tech plans, efforts, and challenges
3. Need for standards in the conservation technology domain
4. How do we know what tools and data exist, and where? How to avoid duplication?
5. Balancing between generality and specificity of tools
6. Maintaining and training and full cost accounting about problems and solutions
7. Thinking about usability of tools, “if you build it, will they come?”
8. The sociological and legal challenges to the use of tech and data
9. How do we balance (or differentiate) technological problems and political problems?
10. How do we bullet proof data for use in decision making (evidence-based standards), e.g., chain of custody?
11. Accessing data/infrastructure/capacity collective effort to contact data and tech resources--make combined ask of commercial industries
12. Licensing to provide non-commercial access to data
13. Seek efficiency while still encouraging productive competition
14. Coordination to determine who is doing what (systematic collaboration)
15. Shared APIs--making them available for others to build on and customize
16. Sustainable financing models for open service products--who’s paying and for how long? Common suite of revenue options
17. How to maintain open source products in long term
18. IP issues--can you capture IP, while similarly making things publicly available, transparent, and sustainably financing
19. Beyond philanthropy: how to translate giving more information into conservation outcomes
20. Translating information to action in a very information-dense age
21. Incorporating behavioral psychologists, behavioral economists, social scientists in determining how people respond to a product -- incorporating that information from process to product

22. How to measure return on investment?

From this set of topics, we identified eight to focus on in the two after-lunch sessions:

First detailed session

1. Avoiding duplication
2. Promoting/creating standards
3. Strategies for sustainable funding
4. Continuing community conversations

Second detailed session

1. Usability of technology and tools
2. Sociological/legal challenges
3. Collective demand/procurement
4. Measure impact ROI

Each of these two sessions ran for one hour, and workshop participants selected the topics they wanted to discuss in depth.

* Because of a combination of early departures of double-booked participants and interests, only three of the four topics in each session was discussed.

Workshop II: First detailed session

Informed duplication

The team discussing the first topic, *Avoiding duplication*, determined that it is more important to be aware of potential duplication rather than require complete avoidance of duplication. Among other reasons, (a) research replication is a key part of science and (b) constructive competition that might be seen as duplication can improve the field as whole. One possible solution is creating a central "registry" of ongoing conservation technology development, akin to clinical trials registries. Key outstanding questions include:

- Who would be responsible for developing and maintaining this resource?
- Does it include tools and data?
- How do we make the resource maximally discoverable so it isn't restricted to those already "in the know"?
- What are the standard user guidelines for adding to this registry when the types of technology are diverse?
- Can we encourage funders to require registration of projects they fund?

Promoting / creating community standards

The team focused on community standards identified the utility of data standards, including metadata requirements, as well as the need for data protection and privacy standards. There is a significant role for technology companies here: if they were to develop standards as they support community needs, NGOs would much more quickly adopt the standards. The big outstanding question focused on how other fields have developed standards, which suggests a need for a systematic review.

Sustainable funding models

One of the most common challenges workshop participants identified was finding sustainable funding for conservation technology work. The team focused on this issue preliminarily identified five models:

1. Philanthropy
2. Fees on programs
3. Conservation tech endowments
4. NGO development and hand-off to others (e.g., government) later
5. Freemium / premium services (subscription)

The larger group discussion identified both businesses who may want to engage, as well as academic programs (e.g., MBA programs) who may be able to provide guidance to our field.

Workshop III: Second detailed session

Usability of technology and tools

The team focused on usability of technology and tools emphasized the need to engage early and often with users. This means defining a user audience up-front, working with them during development of technology, and following up with training and feedback. One organization (WCS) has "user councils" that meet to determine what will be built, priorities for development, and other group-level guidance. The team referenced https://digitalprinciples.org/ as an essential resource for developers.

Social and legal challenges

The team focused on common ways technology interfaces with conservation programs and society. For example, the team recognized that we too often do not address social science or legal implications of conservation technology. Some groups have legal liability review, but certain tasks (e.g., IRB review) are typically "outsourced" to partners outside of the NGO. Explicitly incorporating lawyers and social scientists in technology development is necessary. Last, there

is a significant need for capacity-building that is related to the social challenges of conservation technology.

Collective bargaining

The team considered ways to leverage group interest in data to reduce the cost of acquisition. SkyTruth noted their previous success organizing researchers and making an ask of large corporate providers for data at greatly reduced cost for the purpose of development. In turn, this allowed demonstration projects that can be used to raise funding to purchase the data for public production later. This boils down to a volume incentive to lower transaction cost for the buyer and the seller. A one-off demonstration would be useful now, but a platform to facilitate this kind of exchange more generally in the future may be well worth developing, if possible.

Action items

The detailed workshop sessions helped identify six main action items to be pursued in the coming weeks and months. Several are already underway as of this writing, one month after PACT:

Conservation technology registry

Challenge: There is a significant amount of duplication in developing new conservation technologies, which often means resources are being wasted rather than directed to filling gaps. Not all duplication is bad, however.

Solution: To avoid unintended duplication of conservation technology efforts, the conservation community should determine how and where to create a "registry" for conservation technology. This might be akin to clinical trials registries (e.g., clinicaltrials.gov, managed by the U.S. National Institutes of Health). Building off of an existing user base and infrastructure is expected to be the most fruitful; WILDLABS is a contender.

Action: Begin the discussion with the WILDLABS community to assess suitability, determine infrastructure needs, and plan next steps for implementing a registry.

Conservation technology standards

Challenge: The conservation technology community lacks a set of common data, software, and hardware standards to guide the development of new technologies while ensuring interoperability.

Solution: Community-wide conservation technology standards that enable and encourage interoperability. The standards could be led by or supported by technology companies.

Action: Produce a systematic review of standards development from other domains and cross-walk to conservation technology needs.

Social and legal challenges of conservation technology

Challenge: Too often, NGOs do not account for social context or legal issues when developing conservation technologies.

Solution: Community guidance on how to incorporate social context and legal dimensions into technology-enabled conservation programs.

Action: Compile a best-practices document or report to help NGOs evaluate their needs and responsibilities.

Sustainable funding for conservation technology

Challenge: Developing and maintaining new conservation technologies requires sufficient resources through time for personnel, infrastructure, and more, but sustainability is too often an afterthought.

Solution: Community guidance on models for sustainably funding conservation technology development and maintenance.

Action: Compile and publish a set of case studies of sustainable funding models used in conservation and in other fields.

Collective bargaining for conservation technology

Challenge: Certain conservation technology developers require access to cost-prohibitive data and technology for basic research and development.

Solution: Organize conservation technology researchers and developers in eNGOs and academia who need access to a particular type of data (e.g., high-resolution satellite imagery) or resource (e.g., hardware) to create an ask of providers.

Action: Build on existing networks to create a collective bargaining group for satellite imagery suitable for computer vision research and development and approach a provider to negotiate access.

PACT 2020

Challenge: PACT 2019 was highly useful according to feedback from participants but was a small and select group.

Solution: The workshop participants were in general agreement of the need for a larger, more inclusive meeting in 2020.

Action: Open a discussion on WILDLABS.NET, with the Conservation Technology Working Group of the Society for Conservation Biology, and other relevant forums to (a) gauge interest in and, if substantial interest, (b) establish a "PACT 2020" steering committee.

Lead: Jacob Malcom, Defenders of Wildlife

Timeline: Open the discussion in the next month

Post-workshop survey

We conducted a post-workshop survey to understand what worked for participants and what could improve. Among respondents, most (80%) found the workshop met their goals, with the remainder responding the workshop "somewhat met" objectives. Three out of five said they would be using what they learned or pursue partnerships from the workshop, and the remainder said they may do so. A couple of separate comments noted that there is room for very topic-focused workshops. The full survey can be found at https://forms.gle/yKK6SwmHf56cGW8dA.

Conclusion

Over the course of the day, we accomplished all three goals of PACT 2019, coming away with:

1. Understand the landscape of conservation technology today in the conservation community;
2. Discuss future directions and needs for conservation technology; and
3. Identify challenges, such as resource limitations, that need to be addressed to enable conservation technology to achieve conservation goals.

The field of conservation technology will continue to mature and expand in the coming years. We expect the connections and ideas from this workshop will help make future development more efficient and effective. Last, we believe that "PACT 2020" can be a viable option for bringing together a larger group of conservation technologists to identify new opportunities.

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