



# Building low-cost decentralized wildlife disease surveillance networks in Peru, Rwanda and Vietnam



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## Background

Many of the world’s most biodiverse areas have the fewest resources for monitoring human-wildlife interactions. This not only threatens their survival, it elevates disease risks shared by humans and other animals. Globalization and climate change, both fueled by human actions, exacerbate these shared risks, and our challenges are too complex for a single group of nations or states to address. In 2021, the In Situ Laboratory Initiative (ISL) was established by Field Projects International along with five other collaborating institutions: the Gordon and Betty Moore Foundation, Amazon Conservation Association, San Diego Zoo Wildlife Alliance, Washington University in St. Louis, and Conservación Amazónica. ISL represents a movement towards a **decentralized** and **locally-run** One Health laboratory network. The goal is straight-forward: to empower local scientists and community leaders with modern wildlife population monitoring and pathogen surveillance tools. **At the 2-year mark, we have set-up Hub I in the Peruvian Amazon and are soon establishing Hubs II and III in Rwanda and Vietnam, respectively. Here we share a snapshot of our basic approach, progress, some challenges and highlights.**

## APPROACH

### STEP 1 - DETERMINE GEOGRAPHIC TARGETS

- Rainforest habitat
- Species richness
- Proximity of research infrastructure
- Status of local economy

### STEP 2 - AREA EVALUATION

- In-country research infrastructure
- Wildlife & disease surveillance efforts
- Environmental and wildlife threats

### STEP 3 - IDENTIFY LOCAL STAKEHOLDERS

- Research & conservation orgs.
- Universities
- Wildlife rescue centers/sanctuaries
- Government agencies

### STEP 4 - SELECT KEY LOCAL PARTNER(S)

- Relevance of mission & aims
- Composition & experience of staff
- Sources of funding
- Partner network
- Community access

### STEP 5 - REVIEW CAPACITY OF KEY PARTNERS

- Biological sampling
- Laboratory analysis
- Data management/analysis

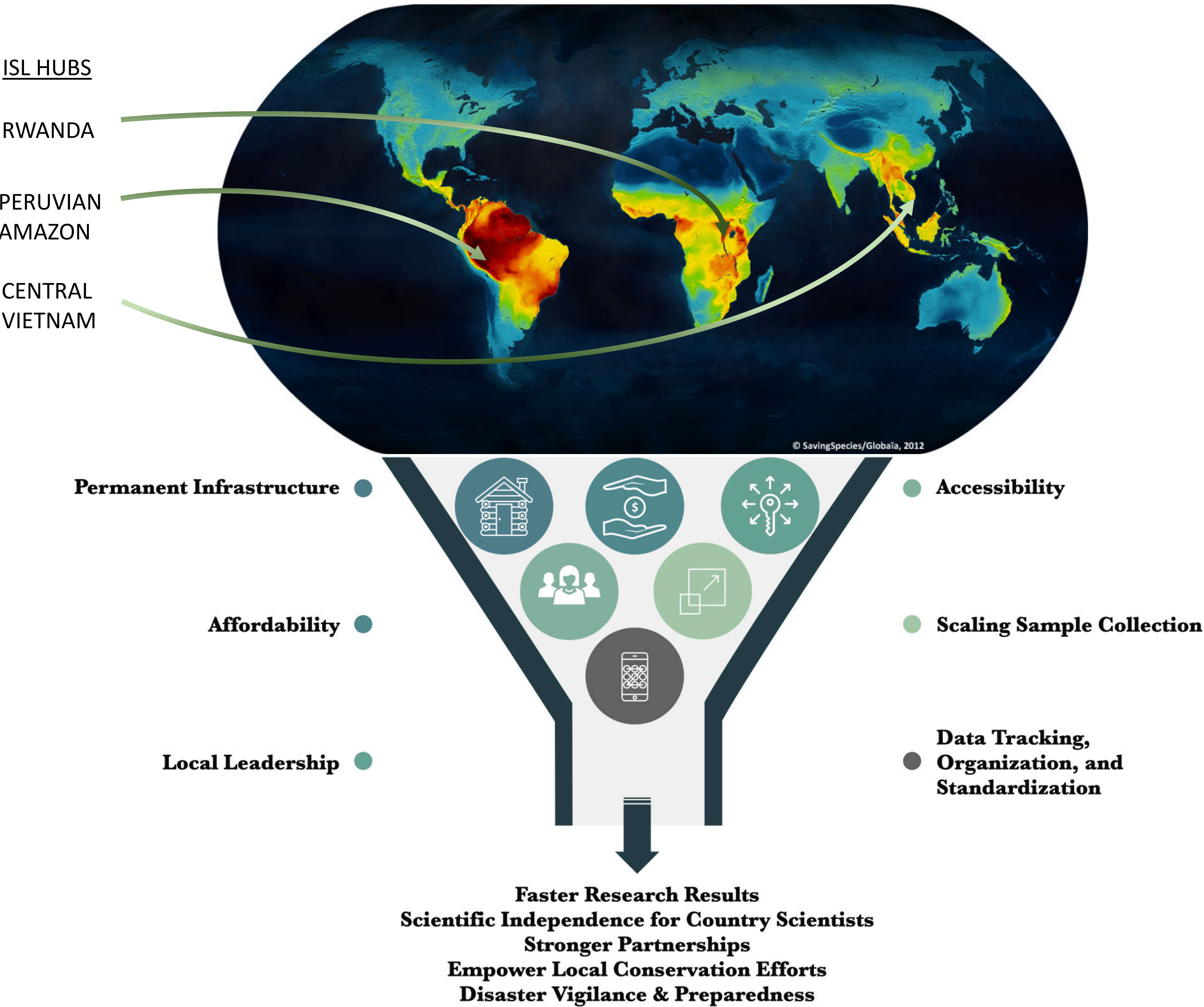
### STEP 6 - DETERMINE SURVEILLANCE STRATEGY

- Taxonomic & geographic scope
- Pathogen & parasite scope
- Animal health measures
- Laboratory scope
- Environmental measures



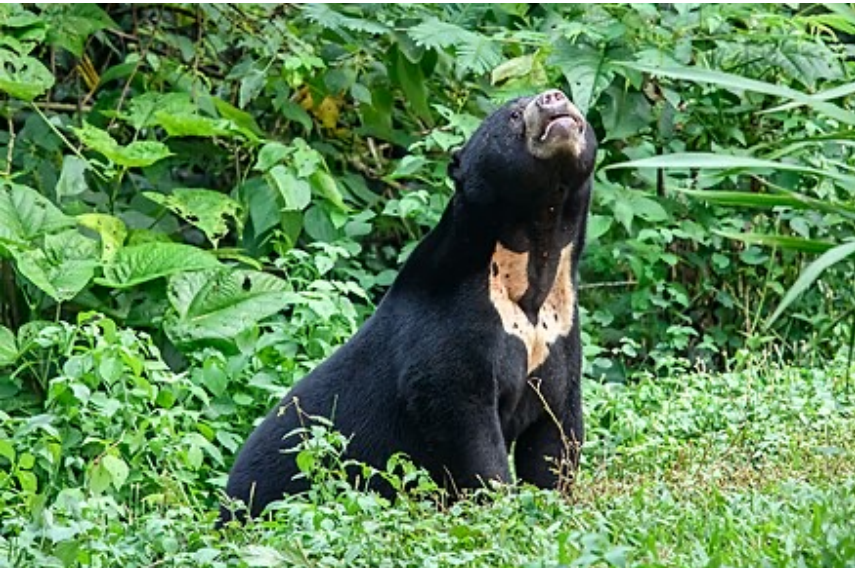
### STEP 7 - MULTI-YEAR IMPLEMENTATION PLAN

**Fig 1: Combined bird, mammal, and amphibian species richness**

Map credit: Jenkins, Clinton N., Stuart L. Pimm, and Lucas N. Joppa. "Global patterns of terrestrial vertebrate diversity and conservation." *Proceedings of the National Academy of Sciences* 110.28 (2013): E2602-E2610.



## Status Chart

	Hub	Location	Infrastructure	Surveillance Targets	Core Partners	Challenges	Highlights & Opportunities
 Photo: Jorge Luis Mendoza	I: Peru	<ul style="list-style-type: none"><li>• Surveillance limited to the partner network in Southeastern Peru</li><li>• Based at Estación Biológica Los Amigos</li><li>• Madre de Dios, Peru</li></ul>	<ul style="list-style-type: none"><li>• 1000 ha of natural forest adjacent to 300K ha conservancy</li><li>• Developed trail system</li><li>• BSL-II genetics laboratory with automation</li><li>• 24hr energy (solar)</li></ul>	<ul style="list-style-type: none"><li>• Amphibians</li><li>• Reptiles</li><li>• Nonhuman primates</li><li>• Bats</li><li>• Birds</li><li>• Small rodents</li><li>• Marsupials</li><li>• Meso-carnivores</li><li>• Methylmercury bioaccumulation</li></ul>	<ul style="list-style-type: none"><li>• Conservacion Amazonica (local)</li><li>• Amazon Shelter (local)</li><li>• Reserva Taricaya (local)</li><li>• Field Projects International (foreign)</li><li>• Sand Diego Zoo Wildlife Alliance (foreign)</li></ul>	<ul style="list-style-type: none"><li>• Constant importation of reagents and laboratory supplies to keep costs down</li><li>• Solar energy malfunctions</li><li>• ISL staff retention (trainees winning scholarships and acceptance to graduate programs)</li><li>• Equipment repair and replacement from a remote location</li><li>• Constant humidity</li><li>• Transitioning leadership/management responsibilities to local partners</li><li>• Internet, data import/export</li><li>• Developing field laboratory culture</li></ul>	<ul style="list-style-type: none"><li>• ~ 2000 nonlethal wildlife samples collected in 2 years (5 months of sampling effort)</li><li>• Complete mitochondria genome assembly on-site</li><li>• Multiplexing &gt; 900 samples on ONT flowcell</li><li>• 2 trained researchers accepted to graduate programs</li><li>• 1 molecular laboratory job placement</li><li>• On-site detection and sequencing of RNA virus, Mtb, malarial parasites, etc.</li><li>• 2 applied conservation genetics training courses (total 28 participants)</li><li>• Regular diagnostics from 2 centers receiving wildlife from conflicts with humans</li></ul>
 Photo: RWCA	II: Rwanda	<ul style="list-style-type: none"><li>• Surveillance throughout Rwanda</li><li>• Based at Umusambi Village</li><li>• Kigali, Rwanda</li></ul>	<ul style="list-style-type: none"><li>• 21 ha marshland area with trails</li><li>• Ecotourism center</li><li>• Wildlife veterinary clinic</li><li>• Wildlife disease genetics laboratory (in progress)</li></ul>	<ul style="list-style-type: none"><li>• Cranes</li><li>• Bats</li></ul>	<ul style="list-style-type: none"><li>• Rwanda Wildlife Conservation Association (local)</li><li>• Rwanda Development Board (local)</li><li>• Field Projects International (Foreign)</li><li>• US Forest Service (Foreign)</li></ul>	<ul style="list-style-type: none"><li>• Importation of reagents &amp; supplies</li></ul>	<ul style="list-style-type: none"><li>• Adding genetic research tools to an established grey-crowned crane monitoring program (ongoing since 2013)</li><li>• Adding genetic research tools to an established bat monitoring program</li><li>• Establishing pathogen diagnostic capacity at wildlife sanctuary in Rwanda</li><li>• Developing wildlife disease screening for projects in Akagera National Park</li></ul>
 Sun bear by Rushenb licensed CC BY-SA 4.0	II: Vietnam	<ul style="list-style-type: none"><li>• Laboratory in Vinh</li><li>• Laboratory in Nha Trang</li><li>• Community surveillance throughout central highlands</li></ul>	Research spaces associated with local universities. BSL-1 (CERD), BSL-II and BSL-III (IVRD)	<ul style="list-style-type: none"><li>- Domestic animals along borders of protected areas (cats, dogs, cows, pigs)</li><li>- Wildlife pets</li></ul>	<ul style="list-style-type: none"><li>• Center for Environment and Rural Development (CERD), Vinh University (local)</li><li>• Institute for Veterinary Research and Development (IVRD), Nha Trang (local)</li><li>• Field Projects International</li><li>• US Forest Service (foreign)</li></ul>	<ul style="list-style-type: none"><li>• Identifying local partners</li><li>• Language barrier</li><li>• Integrating ISL concepts with university partner</li></ul>	<ul style="list-style-type: none"><li>• Established research relationships with communities throughout central highlands</li><li>• Active Asian bear monitoring program</li><li>• Creating partnerships between veterinary research institute and ecology team</li><li>• Developing field-friendly pathogen tests for OIE ‘pathogens of interest’ with support</li></ul>