



# Implementation of Novel Vector Control Products for Arboviral Diseases

Stephanie James, PhD

GeneConvene Global Collaborative

<https://fnih.org/our-programs/geneconvene-global-collaborative/>

<https://www.geneconveni.org/>

Exposure reduction (habitat control, repellents) –  
widely available

Pesticides (chemical, microbial) – widely available

Vaccines - licensed with restrictions

Living mosquito products (*Aedes*):

- Area-wide protection
- Targeted
- Effective against multiple pathogens
- Durable

# Types of Living Mosquito Products

- Self-limiting – activity requires ongoing application
  - Suppression (reduce mosquito numbers)
    - Sterile Insect Technique (radiation), boosted SIT (+ biocide) - tested in several countries
    - GM or *Wolbachia*-based – applied in several countries
- Self-sustaining – activity maintained after initial releases
  - Replacement (inhibit pathogen development)
    - *Wolbachia*-based – applied in several countries
  - Suppression or replacement
    - GM with gene drive – early research in *Aedes*

# Practical needs for implementation of novel tools

- Technical development
  - Research: discovery, testing for efficacy/safety
  - Operationalization: scale-up production, delivery, monitoring
- Decision making
  - Governance: regulatory approval, political will
  - Authorization: engagement at multiple levels

# Operational challenges: optimization for effectiveness



## Production

Mass rearing  
Fitness  
Sex separation  
Quality management  
Transport



## Delivery

Release plan  
Container-based  
Mobile ground-based  
Aerial



## Monitoring

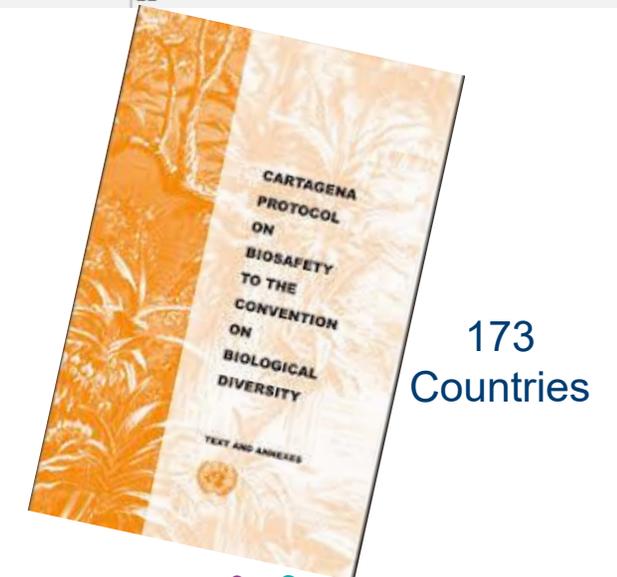
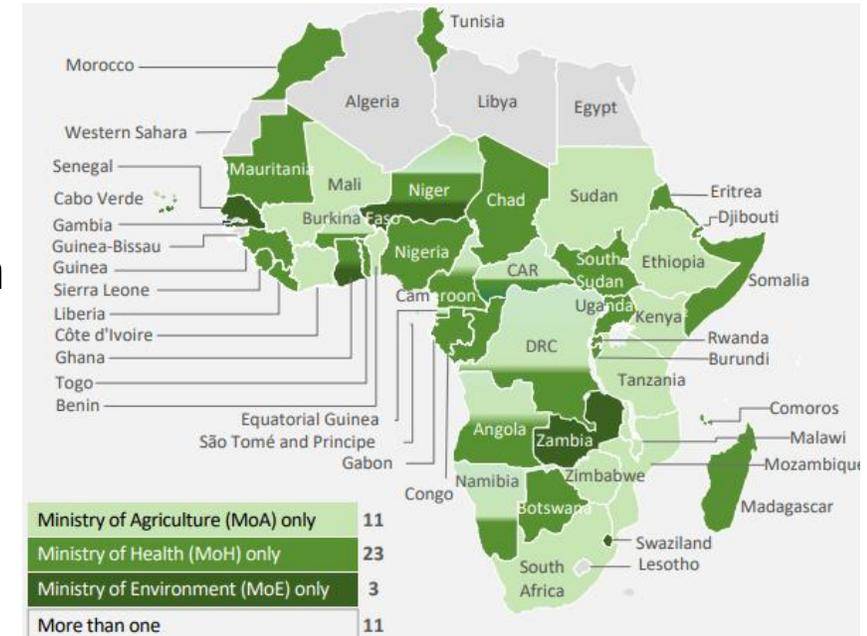
Entomological impact  
Epidemiological impact  
Environmental impact

-----Strategies, methods, personnel-----

# Governance challenges: lack of international alignment

- Regulatory pathways for a single product type can vary between countries - e.g., public health pesticides in Africa
- Products with similar activities can be regulated differently
  - Pesticide (mosquito control)
  - Health product (disease control)
  - Biosafety (GMOs - products of modern biotechnology)
    - *Cartagena Protocol on Biosafety* requires national framework for protection of conservation and sustainable use of biodiversity, taking also into account risks to human health
    - Transboundary movement of GMOs (export/import)
    - WHO endorsement requires evidence for infection/disease prevention
- Risk assessment is important for informed decision-making
  - Identify significant risks, plan risk management (monitoring)

<https://innovationtoimpact.org/workstreams/country-registration/>



# Authorization challenges: communication and engagement

- Engagement at many levels – different ethical obligations
  - Those immediately impacted by releases (community engagement)
    - Communicate product information/objective/plans; understand perceptions/attitudes/concerns; negotiate authorization to release; provide opportunities for involvement; maintain interaction on progress and results; adjust plans
  - Those with broader interests (stakeholders, publics)
    - Use available mechanisms to widely disseminate information and monitor opinions; be clear about decision-making process, including opportunities for input and how it will be considered
  - National leaders (government officials, policy makers, faith leaders, etc.)
    - Engage and involve early; maintain active relationships and information exchange; understand and respond to concerns
- Influences on attitudes about novel products
  - Perception of benefits
  - Familiarity with product type
  - “Natural” vs. GM (precautionary principle)
  - Misinformation and disinformation

# Funding challenges

- Funding interest in international research periodically waxes and wanes
  - 1983, *Manpower Needs and Career Opportunities in the Field Aspects of Vector Biology*: “...field research in vector biology is needed (1) as an integral part of control efforts to monitor the response of vectors and devise alternate control strategies, (2) to conduct surveillance of known or potential disease vectors, and (3) to develop and test new approaches for vector control.”
  - 2003, *Microbial Threats to Health*: “The United States should seek to enhance the global capacity for response to infectious disease threats, focusing in particular on threats in the developing world.” “...develop new and expand upon current research efforts to enhance the armamentarium for vector control.”
  - 2023, *Forum on Microbial Threats: Mitigating Arboviral Threat and Strengthening Public Health Preparedness*: “...if the status quo of inaction prevails, the situation will only become worse.”



# Practical considerations for implementation

## Operationalization = “valley of death”

- Standard research funders support discovery and early phase trials, but usually not transition to market-ready products; assumption of uptake by commercial partners may not apply
- Increased reliance on philanthropic funders, international organizations, governmental programs
  - align with their priorities and emphasize cost-effective approaches

## Diverse and complex regulatory pathways inhibit innovation

- May need to be clarified, or even established for novel products
- Important to engage early to understand which authorities and regulations govern
- Capacity strengthening can be required (risk assessment)
- Increased multinational coordination would be advantageous (dossier requirements)

## Monitoring and engagement require long-term commitment

- Monitor for problems, provide regular status updates, respond to concerns
- Incorporate into national control programs
- Develop better ways to rapidly disseminate accurate information



*Thank You*