

**Mosquito Alert Project:  
Proof of concept pilot communication strategy**

July 5, 2022

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## Background

### ***Problem statement***

The threat of mosquito-borne diseases in Missouri has varied over time, with the advent of emergent infectious diseases like Zika and West Nile virus; the threat is likely to increase with climate change.

A critical responsibility of public health agencies and professionals is to surveil and control the threat of mosquitoes and mosquito-borne disease, and prevent the spread of potential illness to humans. We seek to apply ecological and educational best practices to identify and monitor disease vectors like mosquitoes, and control disease-bearing mosquito populations through a range of control strategies. Climate change presents a novel challenge: monitoring for disease-bearing mosquitoes that may migrate to local environments.

Public perception continues to support broad-based chemical applications as a primary mosquito control strategy, due in part to lack of ecological understanding. Conventions of chemical usage pose critical threats to pollinator and other insect populations already at risk from a variety of factors. At the same time, ecologically aware public health agencies have modified vector control services to significantly limit fogging and focus on measures that minimize ecological harm. But community relationships can be strained when conflicts arise between pollinator advocates and individuals who want the chemical “silver bullet.”

Local health departments in St. Louis have active programs for mosquito surveillance and control. Community residents have an important role to play, for example in reporting mosquito activity. Such participation can be extended further to amplify the success of Health Department activities. Our project seeks to leverage civic participation in vector control using a unique new mobile application and promotion of public participation in research, a.k.a. citizen science.

### ***Opportunity***

New opportunities for surveillance and monitoring efforts have arisen with the advent of new media applications. Developed by a team of faculty at Pompeu Fabra University in Barcelona, Spain, the Mosquito Alert Application (MAA) for smartphones allows community members to photograph mosquitoes and submit them for identification by entomologists. This “citizen science” approach has the potential to extend the sampling and monitoring of mosquito populations in local communities. At the same time it provides the opportunity to educate community members and mobilize social



networks to enact and support mosquito control efforts within a broader appreciation of ecological and biodiversity initiatives.

## ***Purpose***

This document outlines ideas for the design and assessment of a communication strategy aiming to encourage downloading and use of the MA App by residents of two St. Louis, Missouri neighborhoods: Tuxedo Park in Webster Groves, St. Louis County, and College Hill in North St. Louis City. We present target beliefs intended to lead to effective adoption and use of the App by residents, including heightened ecological awareness among community residents and organizations. Next we describe inputs and activities contributing to the effective implementation of the strategy. These elements are displayed in the logic model that informs the strategy (see Figure 1).

## ***Proof of concept***

Our project seeks to show proof of concept of the MAA initiative in the St. Louis region. The App has been adopted in countries across the world, and collaborators in Barcelona and elsewhere have established an evidence-base launching the App as an effective technology and methodology contributing to effective mosquito surveillance. Our project seeks to address additional questions, namely, how we can successfully promote effective use of the App, in the context of citizen science and heightened ecological awareness among residents of communities in the US. Ours is the second application of the App in the United States, and the first study of a communication strategy to promote its use.

As a proof of concept project this entails two parallel activities: one programmatic (the implementation of the project) and the other evaluative (effective documentation and evaluation that the project took place as planned, and achieved proposed effects). This small-scale pilot project seeks to provide preliminary evidence to inform a proposal for external grant funding to implement the project on a larger, regional, scale.

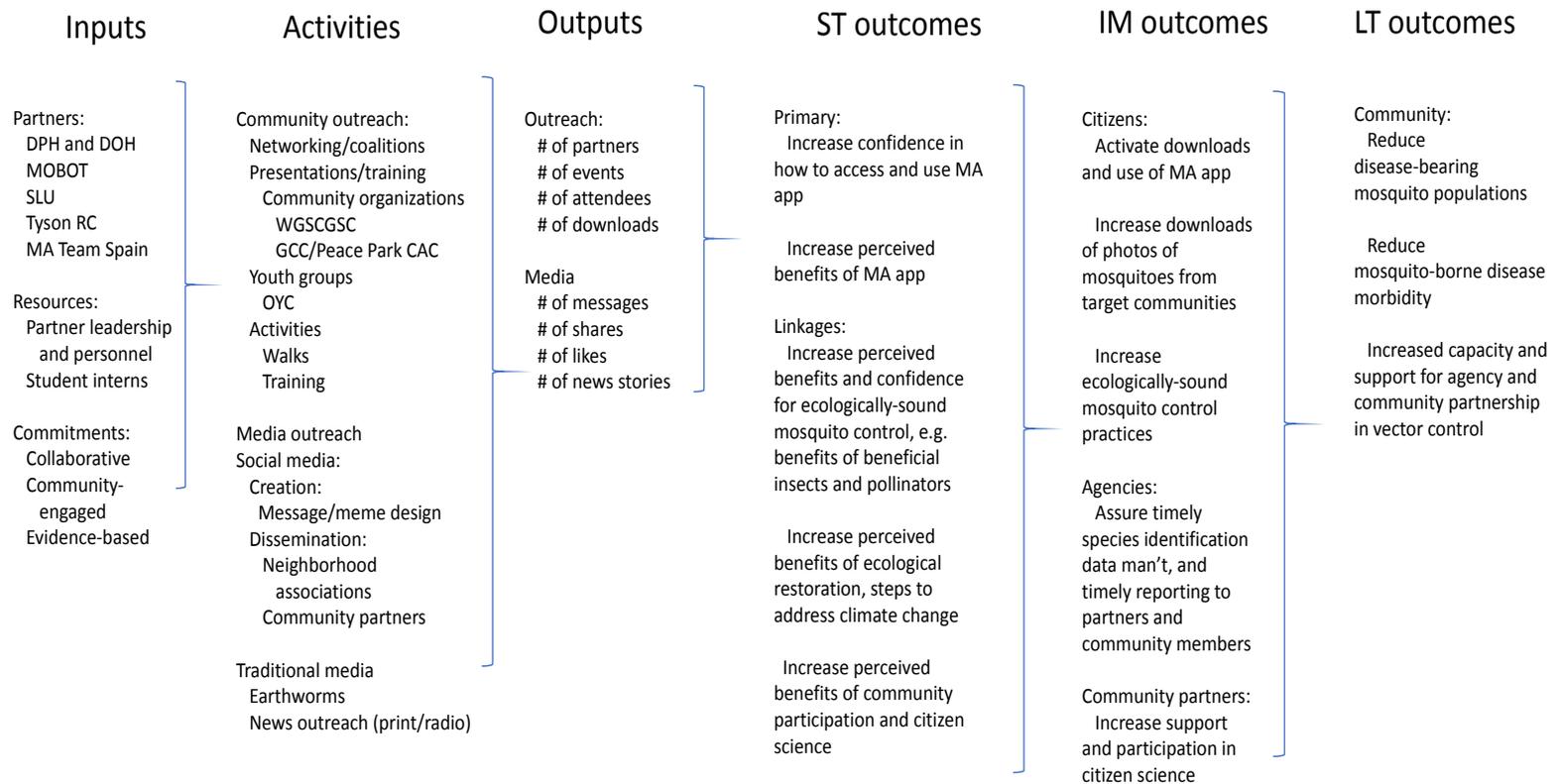
The evaluation invokes an implementation science approach that seeks to understand how to effectively promote adoption and use of the App. In this way we seek to understand the contingencies and requirements of the successful replication of the existing Mosquito Alert Project, translated from European usage to an American setting, and assessed to inform a possible scaled-up program for regional use.

## **Goals**

Objectives and goals of the strategy are presented in the right half of the logic model in Figure 1.



**FIGURE 1. MOSQUITO ALERT PROJECT**  
Communication plan logic model



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## ***Long-term goals***

The long-term goals of this project are to contribute to the science and practice of community-engaged and citizen-informed surveillance to reduce potentially disease-bearing mosquito populations and mosquito-borne morbidity. Enhancing capacity and support of agencies and community partners, we seek to bolster the capability of vector control professionals in local St. Louis health departments to identify and manage mosquito populations using ecologically-sound practices.

## ***Intermediate objectives***

To achieve those long-term goals, specific individual and institutional actions are required. First we seek to encourage residents of Tuxedo Park and College Hill to download and use the application. To work effectively, these residents will photograph mosquitoes and potential breeding sites they encounter with their smartphones and upload photos into Mosquito Alert, which transmits the photos to agency vector control professionals to be identified, interpreted and aggregated. Through our messaging we also aim to encourage citizens to adopt ecologically sound mosquito control practices, supporting biodiversity and pollinator proliferation.

In order for the App to effectively account for mosquito population dynamics, we have to make sure that the infrastructure in the health departments are able to accept and process the photographs, identify the species and manage and interpret the data appropriately. Mosquito identifications will be reported back to individuals who submitted the photos. In addition, the data will be aggregated and reported to relevant agency and community partners and integrated with other existing surveillance data streams. Finally, we seek to build capacity among community partners, extending collaboration with the local health departments to support and encourage residents to download and use the application.

## ***Short-term objective***

To achieve our behavioral objectives the following short-term objectives are envisioned, based on an initial review of the literature. First, it will be important for residents of the two neighborhoods to become aware of how to access and confident about how to effectively use the Mosquito Alert application. They will need to understand the potential benefits of using the application, in terms of both disease control objectives, as well as for their own personal benefit. Among other things, individuals will need to understand how identification of mosquitoes is connected to mosquito control efforts, including both municipal efforts, as well as their own personal efforts.

In addition, this broader ecological understanding of the role of different kinds of mosquitoes in the ecosystem, will be important. Wholesale fogging of neighborhoods threatens populations of other kinds of beneficial insects such as pollinators, which

contribute to the overall health of the ecosystem and neighborhoods. We hope through our communication efforts to increase this broader understanding of the benefits of ecological restoration, especially in the context of climate change. A part of this will be promoting individual action for effective mosquito control, notably the importance of removing standing water, and the effectiveness of personal insect repellent, instead of fogging. We hope through these efforts to extend community understanding of insect ecology, relative to health of humans and the environment, and to increase individual and community efficacy and agency around insect control.

Piloting use of Mosquito Alert in the St. Louis region enables an inquiry of how to promote the proposed value of ecologically informed mosquito controls in concert with ongoing and widely embraced local practices of native plant landscaping. This project will include elements evaluating how awareness of the value of native plant landscapes can “cross pollinate” with receptivity to ecological mosquito controls. Community trainings and other interactions will include affirmation of native plant landscape choices to support pollinators, and emphasize the importance of “controlling pests in ways that protect pollinators.”

Finally, we hope to enhance perceptions of the benefits of community participation in community health efforts, and the efficacy of community engagement, as well as an appreciation of citizen science, and a strengthening of science literacy among residents of these St. Louis neighborhoods.

## **Communication strategy and plan**

The following inputs, activities and outputs of the strategy are presented in the left half of the logic model in Figure 1.

### ***Inputs***

#### Institutional partners

The Mosquito Alert project initiative in St. Louis represents the partnership of a range of organizations and institutions in the region, as well as national and international collaborators. Lead partners in the project are the Saint Louis Academic Health Department (comprised of the St. Louis County Department of Public Health, the City of St. Louis Department of Health and the Saint Louis University College for Public Health and Social Justice); the Missouri Botanical Garden; Tyson Research Center of Washington University in St. Louis; and the Mosquito Alert team at the Pompeu Fabra University, in Barcelona, Spain.



In addition, the implementation of the communication strategy portion of the project will entail active engagement with neighborhood and community organizations with direct links to residents in the two neighborhoods. Primary community partners are the Green City Coalition, the Peace Park Community Advisory Committee, Webster Groves Sustainability Commission.

### Principles and commitments

Our approach represents the broader philosophical commitments of team members emphasizing collaboration, community-engagement, and a basis in sound science and evidence.

### Resources

Partner institutions bring to the project the in-kind effort of individuals with expertise in ecology and biodiversity; vector control and entomological identification; communication design, implementation and evaluation; and project management.

In addition, we anticipate that collaborating community partners will offer support by way of entrée to community events and activities, local social networks and social media dissemination, material design and production, and other necessities.

Partner institutions will also provide additional resources to advance the project, e.g. physical and technological facilities, printing and participant incentives.

The SLAHD will provide sole direct funding for a student intern to develop and lead community outreach and media design and adaptation efforts.

## **Activities**

### ***Dissemination and outreach***

#### Community engagement: Network and coalition building

The first order of business is to contact local community organizations and partners who have already expressed interest in the project, and through their referrals reach out to new ones who may also support outreach. We will build a network of individuals and organizations to implement the project, and provide a foundation of community agencies and organizations on which we can build future endeavors.



## Community outreach: Trainings presentations and activities with community partners

As we establish these partnerships, we will prepare opportunities and events to provide education and training on how to find, download and use the app. We will build activities around existing events organized by community partners (e.g. neighborhood association meetings, farmers markets) where we will promote the App for use. We will solicit participation of youth groups, e.g. summer camps, to enroll kids in adopting and promoting use of the app.

### Social media

Our media outreach will be centered around local social media platforms, and social media pages of our local institutional and community partners. For these social media messages, we will adapt materials provided by our partners from the Mosquito Alert team in Barcelona and design novel materials centered on local goals and interests.

In addition, we will explore other opportunities to connect with local social groups, e.g. existing or new neighborhood social media groups to share photos, promote tips related to use of the app, as well as share outdoor, conservation and ecological restoration resources, news and activities.

### Traditional media

We will also supplement this social media work with more traditional media including small media, such as flyers available to local retail and community service partners. We will also seek to obtain news coverage of our efforts from favored local print and broadcast news sources.

### ***Materials, messaging and content***

We will design and prepare a set of unified message concepts that will inform materials for the range of dissemination approaches.

Content will be presented in a range of formats to accommodate different distribution approaches, e.g. educational and training materials for use and distribution online, and to share at community events, information sheets and slide decks.

Material design will prioritize accessibility for a range of audiences, aiming to make messages and instructions as effective as possible for participants in varying demographics and abilities.



Message design will be organized around the following tentative critical objectives and topics. This outline draws on initial audience research including published literature and guidance from partners.

Primary message concepts will:

- promote effective access, downloading and use of the App

Promotional and educational materials will aim to increase awareness and use of the App. It will be important to make sure that people know how to complete the technical aspects of using the App, including taking clear photographs with their phones, and uploading them to the app. We will anticipate a range of capabilities for smart phones among community members, and how to best take photos that will enable accurate identification by entomologists.

- emphasize arguments for benefits of using the App

Messaging will underscore personal, household, community and environmental benefits of mosquito surveillance and ecologically-sound mosquito control.

Secondary message concepts will:

- link App use to environmental and ecological awareness, and climate change

Contextual messaging factors will seek to promote a key theme for the strategy – “control pests, protect pollinators.” We will seek to support understanding insect ecology and reproduction, and how poor insect control and management can damage beneficial insect diversity.

- promote ecologically-sound insect control practices

Specific content includes best practices for control of mosquito populations, e.g. how to: identify mosquitoes and take appropriate action: use mechanical controls; understand mosquito breeding cycles and get rid of standing water. Promoting personal barriers to nuisance mosquitoes include how to: wear light colored clothing; use safer personal repellents that use plant-based chemicals; understand how repellents work by masking carbon dioxide.

Secondary messaging will emphasize the value of native plant choices to support pollinators, and correlate the importance of practicing ecological pest control in order to protect, vs. actively impair, the health of beneficial insect pollinator populations.



## Scope of work

- Community engagement: coalition building and events
  - Networking etc. (June-Aug)
  - Leveraging and scheduling based on existing partner events (June - Sept.)
  - Implementing outreach and training events (July - Sept)
  - Building membership for social media MAP groups (July - Sept)
- Material design, production and dissemination
  - Review of the literature to assess public perceptions (June - July)
  - Review of the literature and available partner resources to assess media preferences in each neighborhood (June - July)
  - Design, pre-testing, revision and production of training, informational and promotional materials to distribute online and at community events (July)
  - Design social media dissemination and sequencing strategy (June-July)
  - Implementation of media strategy (July-Sept)
  - Prepare and distribute press packet to local media contacts (July-Aug)

## Deliverables

- Partnership list, with contacts and expertise
- Web pages with links to partner agencies and materials
- Educational, promotional and training materials, slide deck, handouts, information sheets, media materials (e.g. YouTube videos demonstrating taking photographs)
- Adapted social media messages and posts

## **Evaluation design**

### ***Proof of concept and rationale***

As a proof of concept project, the final critical element is thoughtful program evaluation, encompassing preliminary process and impact assessment. Process evaluation entails documenting and monitoring program implementation. Assessment of impact on key outcomes will emphasize development of mixed methods approaches. Preliminary evidence will provide critical information to inform and strengthen a potential grant for external funding for an expanded roll-out of the project in subsequent years. Here we present our initial approach to evaluation.



## ***Process evaluation***

### Purpose

Process evaluation seeks to assess whether a program is implemented as planned, for example tracking and documenting production and distribution of materials, and conduct of planned events and activities.

### Methods

Process evaluation requires design of processes whereby monitoring and documentation are routinized within program implementation. It is, in effect, record keeping of activities and events, and solicitation of feedback to fine-tune messaging and outreach strategies. In the logic model, the third column (“Outputs”) comprises anticipated deliverables and data points that will be collected as part of program implementation. Process evaluation seeks to show that communication and promotion activities described in this strategy to promote the App are implemented as planned.

## ***Impact evaluation***

### Purpose

Impact evaluation seeks to assess whether a program achieves the results it was designed to accomplish. Impact evaluation at its most basic seeks to answer the question: 1) Did the program lead to desired results? This entails two elements: first, that the outcomes changed in the anticipated direction, and second, that this change was a result of the program, and not some other event that occurred. In this pilot study we seek to lay the groundwork for an impact evaluation, developing study design, identifying key outcomes and developing measurement and analytic strategies.

Research questions:

- How effective is our communication strategy in promoting community adoption and use of the Mosquito Alert App?
- What are appropriate design and measurement approaches that allow us to assess effectiveness of our communication strategy?

### Methods

Impact assessment often involves assessment of outcomes (preferably before and after a program occurs), and availability of a comparison or control group. With limited resources and lead time, assessment of impact on key outcomes will emphasize



development of mixed methods approaches. Multiple measurement and design approaches can help provide some preliminary evidence of effects.

Specific outcomes include: perceptions, beliefs, adoption and use of the App; perceptions regarding ecologically sound insect pest control combined with pollinator insect protection; organizational and community capacity related to use of the App and institutional and community adoption of ecologically-sound vector control practices.

Mixed method strategies may include focus groups, in-depth interviews or brief surveys with residents who attend outreach and education events, and with individuals who download and use the app.

Inquiry with members of the public and App users will be supplemented with institutional data collection, including the number of downloads of the app that occur, and the extent to which it is used by community residents to photograph mosquitoes and send the photos to collaborating health departments.

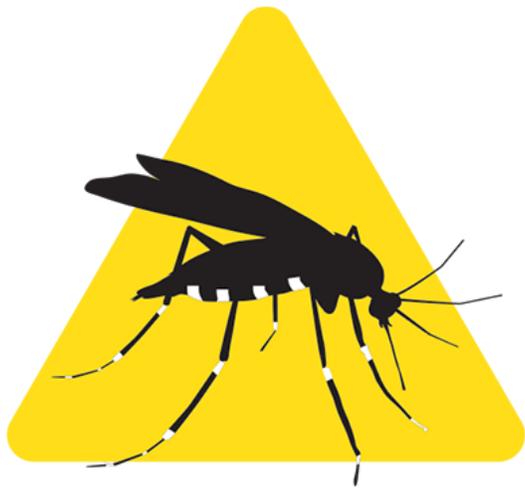
### Scope of work

- Program evaluation
  - Lit review to establish prior research and methods
  - Methods and measurement development
    - Process evaluation: instruments for monitoring events and activities, participant observation, participant feedback
    - Impact assessment: survey for MAA users; activity participant survey; comparison survey at non-MAA community events (e.g. TG farmers' market)
  - IRB protocol development and approval (by mid-July)
  - Data collection (July to Sept.)
  - Data analysis (August to Oct.)
  - Report and mss. writing (Oct. to Dec.)

### Future funding

Our pilot data will contribute to the growing body of evidence about the use and effectiveness of the MA app over time. This project seeks to address pending scientific questions regarding implementation and impact of the MA App, notably communication and marketing approaches to promote effective use of the App. We will seek to focus this inquiry in the context of a broader adoption of ecologically-sound environmental health strategies by individuals, communities and community organizations and institutions. Potential funding sources are being explored, and include the Midwest Climate Collaborative and the Taylor Geospatial Institute at SLU.





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