USING GEOGRAPHICAL INFORMATION SYSTEMS (GIS) TO ENHANCE THE FUNCTIONALITY OF MONITORING AND RESULTS MEASUREMENT SYSTEMS

Overview of MADE Programme and the technology demonstrated

Market Development (MADE) for the Niger Delta is primarily a rural and agricultural market development programme for the nine states of the Niger Delta. The programme is working in five agricultural value chains (agricultural inputs, cassava, fisheries, palm oil and household poultry), finished leather goods sector and a cross-cutting access to finance sector, addressing systemic constraints that determine poverty in these markets.

In the last year of MADE I (August 2013 – February 2018), the team began using global positioning systems (GPS) technology to capture the location of interventions across the five agricultural value chains. Descriptive data (i.e. attributes of each location of interest) were linked to the locational data to create map layers to illustrate extent of improvement in access to inputs, products, service and technologies (the programme's Output 1). In line with the programme's theory of change, improved access to inputs, products, services and technologies is a precondition for farmers' and entrepreneurs' adoption of practices and innovations, leading to increased productivity and eventual increase in income.

Questions guiding application of the technology

A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. Generic questions GIS is designed to support users respond to questions related to: a) distribution of features and phenomena, b) conditions, c) patterns, d) trends and; e) predictions of events and outcomes using appropriate datasets.

MADE's application of GIS technology, including the next phase of the programme is being guided by predetermined questions that relate to: a) how the programme's achievements by location can be used to guide decision making about increasing scale during the extension phase; b) identification of pilot and scale-up locations where partners have continued investment independent of MADE year on year; c) how best to correlate programme impact (using positive change in income and net additional income change) by location with the preconditions for the impact (i.e. adoption of innovations and practices introduced and the consequence of increased productivity that follows) and; d) how value for money can be mapped by target state and the conditions shaping the differences.

Main cost and investments required

This includes:

- GIS software – and there are a few open source (free) applications online (e.g. Quantum GIS), which is very effective and encompasses most of the functionality included in ArcGIS (a product of Environmental Systems Research Institute that needs to be purchased).
- Data collection using GPS handsets or a wide range of applications that run on android phones (e.g. Get Geo-Coordinates) for gathering geographical coordinates – a sort of "address system" (e.g. latitude and longitude) that GIS applications can recognise. Practitioners also need to collect information on attributes of interest, required for building any GIS database.
- Appropriate base maps that will give the right context. For example, a base map showing fishing clusters will justify why a programme is driving the promotion of smoking kiln technology adoption around riverine areas and creeks
- Some expertise in computer based mapping – although this can also be outsourced.

Technology application process

The following step-wise approach was adopted by MADE in the GIS mapping exercise.

Needs assessment: The project's GIS needs were established and questions to guide spatial analysis drafted

Data collection:	Use of GPS technologies and Apps on mobile phones to generate coordinates of locations of interest. Data collection included attributes of interest (e.g. fish pond demo date)
Data entry:	Data entered using MS Excel spreadsheet before importation to GIS environment. For data quality assurance, captured data were reviewed, cleaned-up and validated.
Geographical analysis:	The analysis included overlay operations and buffering around locations with improved equipment installed to identify gaps the extension phase can address.

Key benefits of using the technology

There are several benefits of using GIS technology. These include:

- Decision making support – for example, deciding where best to scale up interventions for maximum results;
- Producing maps showing results of interventions in ways that can be more compelling to stakeholders;
- Cost saving by gathering additional data (e.g. distance from the location of one feature, say equipment bought and installed to another) without any field visit and;
- Limitless capabilities that only depend on the mind of the GIS analyst

Example of GIS application in market systems development

Figure 1 below shows the output of map overlays from data showing distribution of village level dealers collaborating with Zygosis, one of our partner veterinary pharmaceutical companies. Using density of settlements as a proxy for market size as seen in the map overlay below, it is a lot easier to communicate with Zygosis about the about potential market size they are yet to penetrate and this can increase their market share. GIS is also capable of creating a chart that will show number of settlements in each state and that can be placed side by side with the map output below.

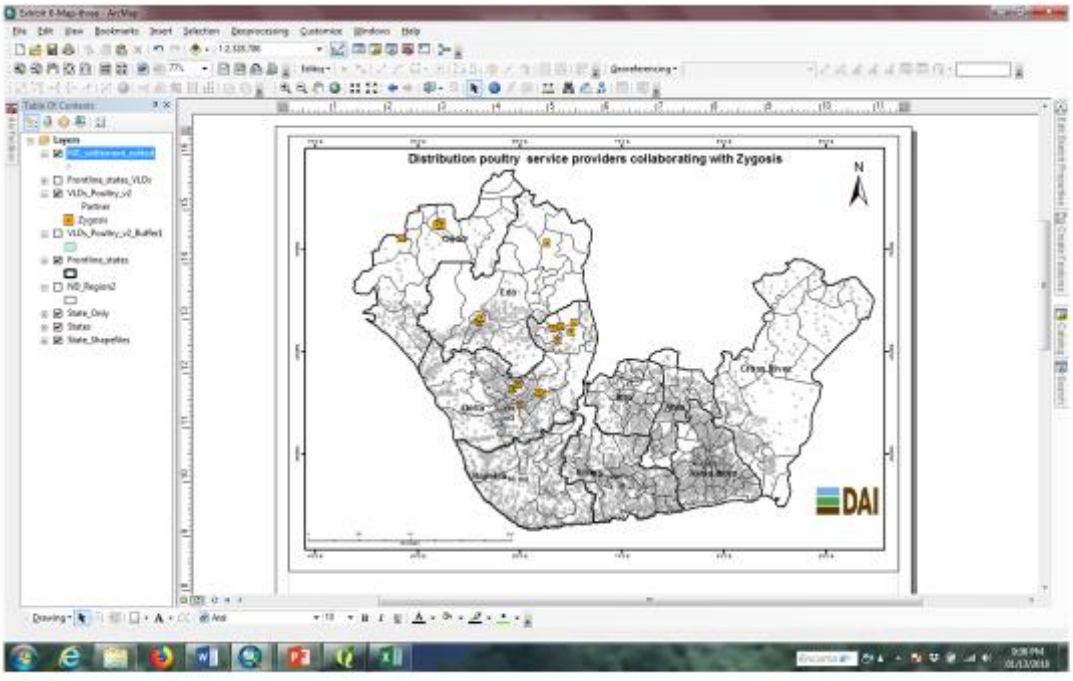

Figure 1: Distribution of poultry service providers collaborating with Zygosis

For further information, contact: Sylvanus Abua, MRM Manager, **Market Development (MADE) in the Niger Delta**, Port Harcourt, Nigeria; Email: Sylvanus_Abua@dai.com