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SSA & CNFA
Using GIS to Increase Agricultural Productivity in Bangladesh

Background

Spatial Systems and CNFA (Citizen's Network for Foreign Affairs) have built a strong working relationship centered around the application of GIS field collection and web server technology to United States Agency for International Development (USAID) agricultural and supply chain development projects.

CNFA is implementing the USAID-funded Agro-Inputs Program (AIP) in Bangladesh. This five-year, $14 million cooperative agreement aims to increase agricultural productivity, reduce rural poverty and improve food security in the southern delta of Bangladesh.

airn|MIS
Market Information System

The main focus of the AIP intervention is the creation of a sustainable Agro Input Retailers Network. This Network will deliver training, improved inputs (seed, fertilizer and pesticides), and related services to an expanding network of at least 3,000 agro input retailers, serving over 1 million smallholders, impacting more than 5 million individuals across 20 southern districts and generating more than $100 million in annual sales.

Spatial Systems Associates, Inc. (SSA) is tasked with providing geographic information system (GIS) and mapping services for the AIP, which requires visual representation of: agricultural input distribution networks, transportation infrastructure, client concentrations, cropping patterns, product and price trends, and other information. The GIS system will capture information related to input retailers and demonstration plots, public and private advisory centers, and other points of interest to both smallholders and agricultural input retailers. In addition, the GIS system will serve as an important tool for monitoring AIP activities and evaluating progress towards achieving program objectives.

The Challenge

The AIP requires very complex information modeling for Monitoring & Evaluation (M&E) purposes to keep track of an intricate supply chain network with particular spatial and locational attributes. The modeling of this data ultimately requires a relational database management system (RDBMS) to provide storage and linkage capacity, and timely and accurate querying and reporting. Traditional M&E systems, like spreadsheets and simple geodatabase structures, would not suffice to model complex relationships between small holders, retailers, supply companies and their distribution centers.

Labor intensive field verification and extensive information gathering for over 3000 retailers requires efficient and accurate field collection methods. Integration with several systems is required to catalog location information, grants, historical attributes, credit history, input supply inventories, financial records and transactions. A large focus area with difficult transportation challenges adds to the resources

required to maintain consistent, timely, and accurate measurements in the field.

The Solution

SSA is implementing a solution built on Esri's cloud server technology and mobile applications for the Android operating system. This lightweight hosting solution provides flexibility for a global operations team, and provides a scalable environment for eventual sustainable delivery of the back end to the Retailer Network or associated organizations that will be incorporated through AIP's intervention plan. Mobile apps built with Esri technology for smart phones and tablets provide streamlined data collection processes scalable for staff augmentations. The solution design aims for minimal field programing and customization to reduce expenses and time to develop and train users. SSA is utilizing locally available GPS-equipped Android-based devices to allow multiple CNFA staff to collect both location and

attribute data regarding both existing and proposed retail locations. The data is collected in the field and transmitted in near real time via the locally available cellular network to a web-based map service. The resulting data is therefore immediately available to the CNFA project offices in Dhaka, Kuhlna and Washington, DC, as well as to the USAID offices in both Dhaka and Washington, DC.

This ability to visualize data as it is being created in the field via a worldwide network is important to the success of the project. An additional advantage to the system is the ability to allow CNFA field staff to be tracked while collecting data and to make requests for assistance if required by security concerns. Integration with traditional spreadsheet programs will allow the GIS database to underpin Monitoring and Evaluation programs and reports, as well as provide input to a proposed Market Information System, which will report quarterly input price trends and outlooks.

The Implementation

As part of USAID's Feed the Future (FTF) program, the AIP is committed to supporting the broad goals of the projects under

the FTF umbrella. The solutions developed for AIP are modular and cross cutting on many indicators related to agriculture, supply chains, and nutrition. GIS will provide a solid foundation on which intervention programs can begin to synthesize large amounts of information to assess questions of increasing the production and consumption of healthy food for all populations.

SSA is committed to providing flexibility by leveraging our experience with different solutions and technologies. The system created for AIP is easily replicable, and any customization efforts will be focused on a database schema that will allow efficient data capture and information modeling specific to any program.

A broader vision of the use of GIS technology for FTF initiatives involves development of an analytical tool to assess:

- The location and size of the regional population
- The amount and type of foods currently being produced in the region
- The nutritional content of that food
- The nutritional requirements of the regional population
- The amount and location of land available for food production
- The types of crops that are suitable for growing within the region, the production potential, and the resulting nutritional content
- The likelihood that the nutritional requirements of the current population can be met, and
- The ability of the existing retail channel to provide the necessary inputs and training to regional farmers to attempt to satisfy the needs of the population

SSA is working with USAID and other NGO sources to develop this capability in conjunction with the AIP project.