What is your idea?

Due to its geographical location and archipelagic formation, the Philippines is one of the most vulnerable countries to climate change. A total of 274 disasters were recorded in the Philippines from 1995 to 2015 according to The United Nations Office for Disaster Risk Reduction (UNISDR). Economic sectors that largely depend on weather conditions – either directly or indirectly – most notably agriculture and fisheries are increasingly subject to the impacts of climate change (IPCC, 2012). Since 1990 until 2006, damages to agricultural production were caused by typhoons (70%), droughts (18%), and floods (5%) (CSA Country Profile, 2017). To better prepare, avoid/minimize damages, survive and rapidly recover from calamities from climate events, through better provisioning of climate information and support services to almost over nine million individual farmers and fisher folks, the Department of Agriculture (DA) has set up a multi-faceted, multi-institutional platform called the Adaptation and Mitigation Initiative in Agriculture (AMIA) program.

CIAT has been engaged in developing key metrics and an overall measurement framework for monitoring and evaluation (M&E) of climate change resilience, which will guide AMIA's planning, implementation and reporting. However collecting data indicators in this context will pose a challenge due to natural fluctuation and unpredictability of climate events. Hence there is a need for innovative methods that generate high frequency, near real time data to bolster the existing M&E framework.

In this project, we propose to use earth observation data, and leverage various farmer media and communication channels (e.g. radio, web), harness big data analytics such as artificial intelligence and Natural Language Processing (NLP) to provide high frequency, near real time data on key indicators such as shock exposure, perceived, absorptive, adaptive capacities and changes in well-being of farmers at household and community level (Figure 1). This approach will provide robust data driven monitoring of the AMIA program.

How will you pilot it?

Communication channels that facilitate interactions with and between farmers and stakeholders (e.g. extension services), offer valuable information on farmers and their capabilities to respond to a climatic event and their overall well-being. The advent of NLP's now provides the opportunity to thoroughly characterize such discourse. In this project, we propose to apply NLP's to analyze and characterize all the written online media spectrum (local and national news websites, blogs, NGOs websites), official communication channel (national and local government websites) together with radio streams. Radio is a predominant information channel in the Philippines with almost ninety-seven percent of rural households having access to it (1). We propose to apply NLP algorithms on this information stream to characterize topics, opinions and sentiments in the community, which could be used to assess the coping abilities and well-being of farmers and their communities. We propose to overlay remote sensing data of climatic events, so as to contextualize the outputs of the NLP approach under a climate stress scenario. This approach will be applied in regions that are and those that are not yet serviced by the AMIA program. Our hypothesis is that under a similar magnitude of a climatic shock (as provided by remote sensing data) experienced by the country, regions serviced by AMIA will have significantly different characteristics in their discourse in comparison to those that are not serviced by the AMIA program. By

combining this approach with standard baseline-endline surveys, we will be able to better monitor and evaluate the AMIA program.

The CGIAR's research program on Climate change, agriculture and food security, (CCAFS) had previously stitched a successful partnership with the Philippines Federation of Rural Broadcasters (PRFB), which is an umbrella organization of several radio stations, on the use of radio broadcasting as a means to propagate climate smart agricultural practices. Through this work, we aim to extend this relationship with PRFB, whose primary role will be to support the prioritization of the communication channels that should be included in the analysis and provide access to radio shows and broadcasts on which the NLP analysis will be piloted. The Decision and Policy Analysis (DAPA) group of the International Center for Tropical Agriculture (CIAT) will bring in expert skill and knowledge on climate change and data analytics.

By combining global precipitation data, land surface temperature and vegetation status, captured with remote sensing, we plan to monitor droughts, floods and storms on a national scale. We will develop a "bot" to capture relevant radio broadcast streams as well as written news articles, blogs, NGOs website and governmental website and leverage the speech and the natural language API (for Tagalog) on the Google cloud platform to perform suitable NLP analysis on the captured stream.

By monitoring both, the magnitude of climatic shocks and changes in discourse patterns on radio and other communication channels, in farming communities serviced and not yet serviced by AMIA, we aim to assess the impact of AMIA, which aims to render farming communities more resilient to adverse climate events, as resilient communities will tend to less negatively and less broadly discuss such shocks. The project will be executed in a phased manner (described in Figure 2), and the technical requirements will be sufficed by CIAT-DAPA DFS system located at CIAT headquarters. Development of open source algorithms such as Stanford CoreNLP (https://stanfordnlp.github.io/CoreNLP/), has facilitated addition of newer languages to NLP analysis. We envision that this rapid growth of languages being made amenable to NLP analysis, and the availability of expertise (e.g. IBM) on the CGIAR platform for Big data and Agriculture will enable scaling out this approach, so as to monitor and evaluate the impact of CIAT (and CGIAR) projects in other developing countries.

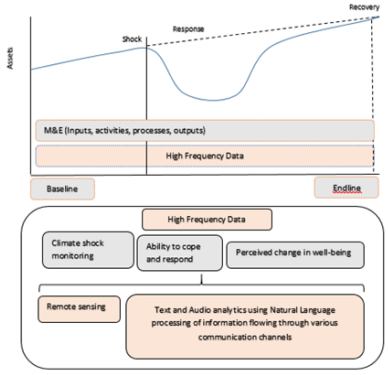

Figure 1

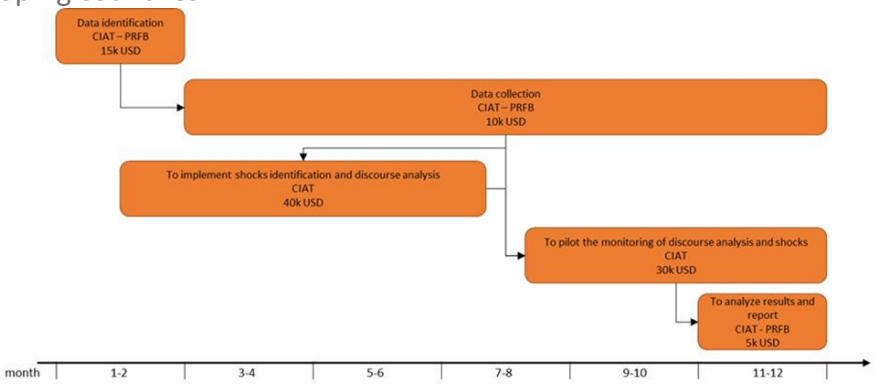

Figure 2

(1) Cruz AC, Tabing L and Navarro R. 2016. Climate change reporting for rural broadcasters: Mobilizing the Philippine media for climate change awareness. CCAFS Working Paper No. 177 Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)