Reinventing or De-inventing Agriculture?

- Siddharth Panda

The International Council on Climate Change (IPCC) has predicted that by 2050 the world may reach the threshold of global warming and the current agricultural practices cannot timely support large scale increase in demand. Current supply chains around the world are not designed to adapt to any disruption making it less flexible and vulnerable to any sort of change. Addressing this challenge will define how we tackle the problem when environmental concerns, population density and public health issues intensify.

The following tweet shared by chef Jose Andres during the COVID-19 pandemic emphasizes the nature and intensity of the challenges facing supply chains in America. This tweet perfectly sums up a component of the crisis prevalent in the agriculture sector in India.

Source of the picture: Twitter (@chefjoseandres)

The tweet goes on to explain the two pictures which were taken at the same time. He says: "*The first picture is from Idaho. Huge mountains of potatoes without any buyers because so many of the forms in which we eat them - stadiums, cafeterias, restaurants - are shut down for safety and low demand, and so too are the processing plants. Next, thousands of cars in line for a food bank...in San Antonio but could be anywhere in the country right now. With millions out of work and many visiting food banks for the first time, the system is totally overwhelmed, and people are going hungry*."

It is to be noted that the pictures are from a country which is considered to be at the pinnacle of technological advancements in all fields. The United States of America has one of the biggest markets in the world accommodating a diverse range of agricultural products. However, the current pandemic highlighted the flaw in the agricultural system when it was not able to adapt and cater to an unprecedented shift in demand and supply. The pandemic had a similar impact on India's agricultural sector the country saw its *mandis* or local markets abruptly closing. This meant neither farmers nor customers could sell and/or buy produces. In some cases, the farmers were forced to throw away their harvest due to no access to market with willing buyers.

Indian vegetable vendors chat as they wait for customers during lockdown to control the spread of the new coronavirus, on the outskirts of New Delhi, India, Tuesday, April 7, 2020.

Source of the picture: VoA News

The good news is farmers, academicians and entrepreneurs are trying to rethink the national and global food systems at the ground level and slowly pushing towards a policy change or amendment. An example of this is marrying principles of agroecology and state of the art technology while simultaneously taking a systems approach to better understand the problem at hand. Regenerative agriculture is an important step towards driving the need to look at all the diverse components of the agri-ecosystem as inter-twined sections that influence each other significantly.

Regenerative agriculture shifts the focus from the conventional thinking of how much we grow and when we grow, to what we grow and how we grow. Although the exact definition of regenerative agriculture is contested upon, in principle it is a set of agricultural practices that ensures to rehabilitate and enhance a local ecosystem by considering better soil health while paying attention to the water management, fertilizer use, and more. Concepts like minimum tillage, crop diversity, improving micronutrients, etc. are some of the practices under the regenerative agriculture model. By shifting the focus, it will ensure the sustainability of not only harvest quality but also of the farmer's land, without leading to further depletion of resources. Hence, to tackle the supply chain issue mentioned earlier, approaching agriculture through the lens of regenerative agriculture in part helps the problem in hand, by sustainably enhancing the quality of harvest from the market's point of view.

PRADAN has recently introduced farming interventions based on the principles of regenerative agriculture across five blocks in Jharkhand; namely, Gola, Raidih, Torpa, Shikaripara and Poraiyahat). This study aims to synthesize the changes in farming practices and approaches of farmers in these 5 blocks and introduce geospatial technology as a method to understand what the merits and demerits for such an approach are. The initial steps for this approach are to define the study area and create initial sets of data unique to a farmer's land. The uniqueness of farmers' plot will be merged with existing geo-spatial data and a combination of both will be used to create village level data sets of various biophysical characteristics like precipitation, temperature, land use and geomorphology using ArcGIS.

To create an initial baseline of data unique to each farmer, we have started collecting soil samples from 7 villages in the 5 blocks while also selecting suitable control patches to compare these treatment villages. The soil sampling locations are pre-determined on the cadastral map of the region and are selected based on elevation differences in each treatment village. Samples from each point are collected and labelled with the help of local CRPs who assist us in reaching to these desired points on the map. In terms of soil sampling it is to be noted that a large amount of the organic carbon in soil is in the 0–10cm layer and this is often where differences are seen. However, sampling at a depth of 30cm provides information on changes in the organic carbon of the soil and helps explain changes under different management practices (if any). Measuring samples below the top 3cm appears to effectively reduce variance. However, measuring below 7.5cm for a steeply sloped farmland may reduce too much variability and no longer be representative of plant available Phosphate (P), and therefore misrepresenting the overall variability of soil P across a farm land. So 10cm below the top layer of soil is a preferred depth at which soil is collected which minimizes the variance of soil properties.

Picture: Combining farmer's knowledge while collecting soil samples in Gola

Keeping these things in mind, we have collected a total of 121 sample points across the 5 blocks. The preparation of a database comprising of soil sample data, names of

farmers and geo-location of each point is underway and will be completed after we receive the results of the soil sample. Methods adopted to communicate the study findings with the farmers will then be fashioned. Currently, questionnaires are being tested on the field to get some initial information about the farmers that would determine how to approach further.

The blog explores the approach proposed in the beginning, around synthesising local knowledge with relatively modern technology, and relates it to the experiences from an ongoing project on Regenerative agriculture. For instance, maps unique to a farmer's land instead of being at a block scale is a direct manifestation of such a synthesis. Plot wise data on soil quality parameters like organic carbon, nitrogen, phosphorous and potassium becomes important datasets to monitor the changes from regenerative agriculture interventions. Thus, this research provides a space for various stakeholders like the study farmers, PRADAN executives, community resource persons, scientists and researchers to collaboratively monitor this attempt to adopt sustainable farming practices.

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