

## Protective Irrigation-- Raising Hope

A farmer's livelihood and life are invariably linked with rain, particularly in drought-prone arid district of Anantapur. In regions where there is irrigation, farmers prosper; but in districts like Anantapur, where there is no assured irrigation and which receives the second lowest rainfall in all of India, a farmer is always at the mercy of the rain gods.

Anantapur is the largest district in the state of Andhra Pradesh. According to 2011 census, Anantapur has a population of 41 lakhs, out of which 30 lakhs population or 7.5 lakh households live in the rural areas and their main occupation is agriculture. Out of 7 lakhs farmers in the district, 90% are small and marginal farmers. They are entirely dependent on rain for their agriculture and livelihoods. Low and erratic rainfall causing consecutive droughts is the biggest challenge faced by a farmer here. Out of 11 lakhs ha being cultivated in Anantapur, only 10% is under irrigation and the rest of 90% is entirely rain-fed cultivation. The rain-fed cultivated area of Anantapur district alone is  $\frac{1}{4}$  of the entire rain-fed area in all the 13 districts of Andhra Pradesh. On an average the district used to experience 7 drought years out of every 10 years. But in the last two decades there were only two good crop years and the rest of 18 years are affected by different degrees of drought, thanks to climate change! The magnitude and severity of drought is such that it affects 25 – 30 lakhs of population every year. Due to high debt, poverty and lack of secure livelihoods resulting from drought many farmer families migrate to other cities such as Bengaluru, or Chennai in search of employment. When they return home during the agricultural season, they renew the Bank loans, invest their earnings from migration in agriculture hoping for a better return. Unfortunately if there is no rain, they not only lose their hard-earned as well as borrowed investment but further pushed down into debt and poverty. There are no easy solutions to this perpetual problem of water scarcity and drought.

Over the last few years, Accion Fraternal (AF) has been developing and demonstrating practices and techniques to mitigate moisture stress in order to save the crops. Studies have shown that more than 50% droughts occur due to loss of just one rain i.e., one dry spell of 20 to 30 days. Prolonged dry spells during crop season cause moisture stress and crops fail. About 80% of the crop failures (droughts) can be saved if 2 protective irrigations can be given during such dry spells, particularly at the crucial periods of plant growth.

Protective irrigation to crops during dry spells can be provided from: 1) Farm ponds constructed on farmers' own fields. This is the easiest and most efficient source of irrigation; 2) Bore well water. This can be transported to the field by using a tractor drawn tanker or through pipes in case a bore well is available nearby; 3) Tanks in the village. When the water is available in the tank or at any public source, it can be transported to the fields by laying down pipes from the tank to nearby fields and pumping to provide

protective irrigation. Water can also be transported by a tanker to too far away crops and protective irrigation can be given.

Cement-lined farm ponds were tried by AF for providing protective irrigation and found that it could be one potential, easier source of water in saving the crop from drought. They can be constructed on the farm to harvest and store rain water which can be used for protective irrigation during dry spells. Water can be retained for 2 to 3 weeks in farm ponds without cement lining, but in cement lined farm ponds it can be retained up to 4 to 6 weeks. This technique has proved to be very successful and the results showed a 20% -60% increase in yield in 2015 season. AF has been advocating farm ponds on a large scale and demonstrations were made to 23,600 farmers in the last 4 years. Consequently the Government has taken up construction of farm ponds on a large scale under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). It is the most inexpensive method and the farmer has much more control over it. Enthused by its success, many farmers are doing it on their own now. This method can be easily replicated in other drought-prone regions also.

Using bore well water is another way to provide protective irrigation to crops at crucial times. Farmers in Sanapa village have successfully provided protective irrigation to their crops using bore well water. Some of the bore well owners shared water with their neighbours for free. AF has been promoting mutual cooperation, where one farmer provides water from his bore well or farm pond and in return the farmer receiving the water works in the field of water provider. Farmers can also purchase water from bore well owners because the cost of crop failure is a lot higher than the cost of water. A water tanker can cost from Rs. 500 to Rs. 800 and many farmers are willing to pay for the water to save their crop. In Sanapa village about 50 -70 acres were irrigated by sharing bore well water. Here most farmers seemed to have given protective irrigation to redgram crop. Papparayudu elaborates, *"My neighbour gave protective irrigation only once to redgram and the crop survived. AF had supplied 100 pipes and an oil engine for facilitating protective irrigation and farmers immensely benefited from it. We were able to irrigate even far off fields with these pipes. Some people had given irrigation to redgram crop twice by transporting the water with the tanker. We want more pipes this year."* Farmers are willing to share water here but they need more pipes to transport water.

Sirimajjanapalli village is another example where farmers had given protective irrigation to their crops. When AF proposed the idea of providing protective irrigation from the tank to farmers' fields using pipes, farmers were skeptical about the idea. They did not think it was possible until it was actually implemented and they experienced the results. Tank water was drawn using an oil engine and pipes and supplied to fields. Sprinklers were attached to pipes to provide widespread protective irrigation. This method was very

successful in providing right amount of irrigation to crops. AF provided pumps, sprinklers and pipes. Some farmers also managed to mobilize pipes from government.

Nasa Obayya, a member of Sasya Mitra Group (SMG) shares his experience, *“I sowed groundnut in 3 acres near the tank after initial rains in June. I invested Rs. 30,000 on this crop. There was some rain in August but after that there was no rain. I gave protective irrigation twice during the season using the tank water. Without that my crop would not have survived. I expect to sell the crop for Rs. 36,000. I can recover my investment and earn some profit. My neighbour also sowed groundnut in 4 acres and invested Rs. 40,000. He did not give protective irrigation even once and was unable to save the crop. He had lost his entire investment. If he had given protective irrigation once or twice he could have at least recovered his investment. Now he just left his field for open grazing because it would have costed another Rs. 3,000 to clear the field.”* Another member of SMG, Kanchappa, has a different story to tell. *“I sowed groundnut in 4 ½ acres and invested about Rs. 40,000. My farm is slightly away from the tank and despite using pipes I was unsuccessful in getting water from the tank to my field. My neighbour has a bore well and he shared his water with me for providing protective irrigation. I was able to give protective irrigation only once to my field. Although my crop survived, I got very little yield, the pod is very small and the quality is not good. I hope to recover at least half of my investment when I sell the produce.”* Those who gave protective irrigation twice during the critical period were able to earn some profit or at least could recover part of their investment but those who didn't, had lost their investment. Thus the cost of inaction could be devastating to the farmer!

Last 3 years AF Ecology Centre has been researching and developing highly efficient water saving micro-irrigation drip and sprinkler technologies that farmers can use at farm level. The technologies are mobile, farmer friendly and low-cost. It has been focusing particularly on widely spaced widely sown crops like redgram and castor and closely sown crop of groundnut. The castor and redgram crops can be provided with protective irrigation with just about 10,000 litres of water per acre per protective irrigation. The groundnut crop can be provided with about 40,000 litres per acre per protective irrigation. The availability of water is the only critical factor. The rest is easy and cost-efficient.

AF has been developing and demonstrating protective irrigation methods to all the participating farmers in the project. Consequently across the project villages, many farmers are providing protective irrigation on their own to save the crops. In 2016 crop season, 8,912 rain-fed farmers saved their crops covering 9,700 acres following protective irrigation practices. Live demonstrations were made to 23,600 farmers, policy makers, including the Hon'ble Chief Minister, Agriculture Minister and other stakeholders at the District and State levels. Due to the success shown by AF in saving the crops, the state of

Andhra Pradesh has made protective irrigation a state policy and allocated Rs. 1,600 million in the budget to scale up protective irrigation measures in 2016-2017 covering entire state of AP. This could benefit 10 million acres of drought-prone land. Government will provide infrastructure, equipment and support for 2.5 million farmers in AP.

**Conjunctive Water management for combating droughts and ensuring more crop per each drop of water:**

AF has been actively advocating conjunctive water management to policy makers to overcome drought conditions in Anantapur District. It is the best way to ensure “more crop per each drop of water”. Conjunctive water management is supplementing rain water with surface water or groundwater to not only combat drought but also to assure increased yields. This could be achieved by:

- 1) Constructing farm ponds for every 3 to 5 acres for rain water harvesting and storing.
- 2) Filling up the traditional water bodies in the villages, with water from HNSS project through a canal network distribution system. It is named as Anantapur Water Grid. There are about 3,000 small and medium water bodies spread across in Anantapur District. These are common property resources of the villages. If these can be filled with HNSS project water, all farmers will have a right to use them for protective irrigation. It also recharges and stabilizes groundwater levels in bore wells, which can be used when surface water dries out. It creates a convergence between rain water, surface water and groundwater and much needed protective irrigation can be provided to every acre sown in the most efficient way. Additionally, the water in the tanks would help animals, birds, insects, trees and other living organisms benefitting the environment immensely in the district.
- 3) Providing mobile sprinkler and drip systems and other farming equipment to farmers: Flood irrigation is highly water consuming whereas drip and sprinkler irrigation systems are very efficient in providing the right amount of water to various crops. AF has developed mobile micro irrigation technology which can be easily mounted on a tractor or tanker and transported. This equipment can be custom hired to farmers on large scale by the Gram Panchayats or by Women Self Help Groups.

With conjunctive water management 1 to 3 lakh acres can be irrigated with 1 TMC of water, whereas under conventional flood irrigation only 10,000 acres can be irrigated with 1 TMC of water. Conjunctive water management system is useful not only to Anantapur but to all drought-prone regions in India. It serves two most important purposes. First it combats droughts once for all and in every acre. Second it brings a phenomenal social equity in water usage for agriculture by serving the most vulnerable and needy small & marginal farmers like SC, ST and other socially and economically

disadvantaged. This could be a game changer in drought mitigation and creating social equity.

A farmer in Anantapur does not have control over rain gods, but by practicing protective irrigation methods and adopting better technologies, he can utilize what has been bestowed upon him to the maximum extent to overcome drought. *There can be a rainbow even when there is no rain!*