CLIMARICE II: Report on the Selection of Pilot Areas, Andhra Pradesh

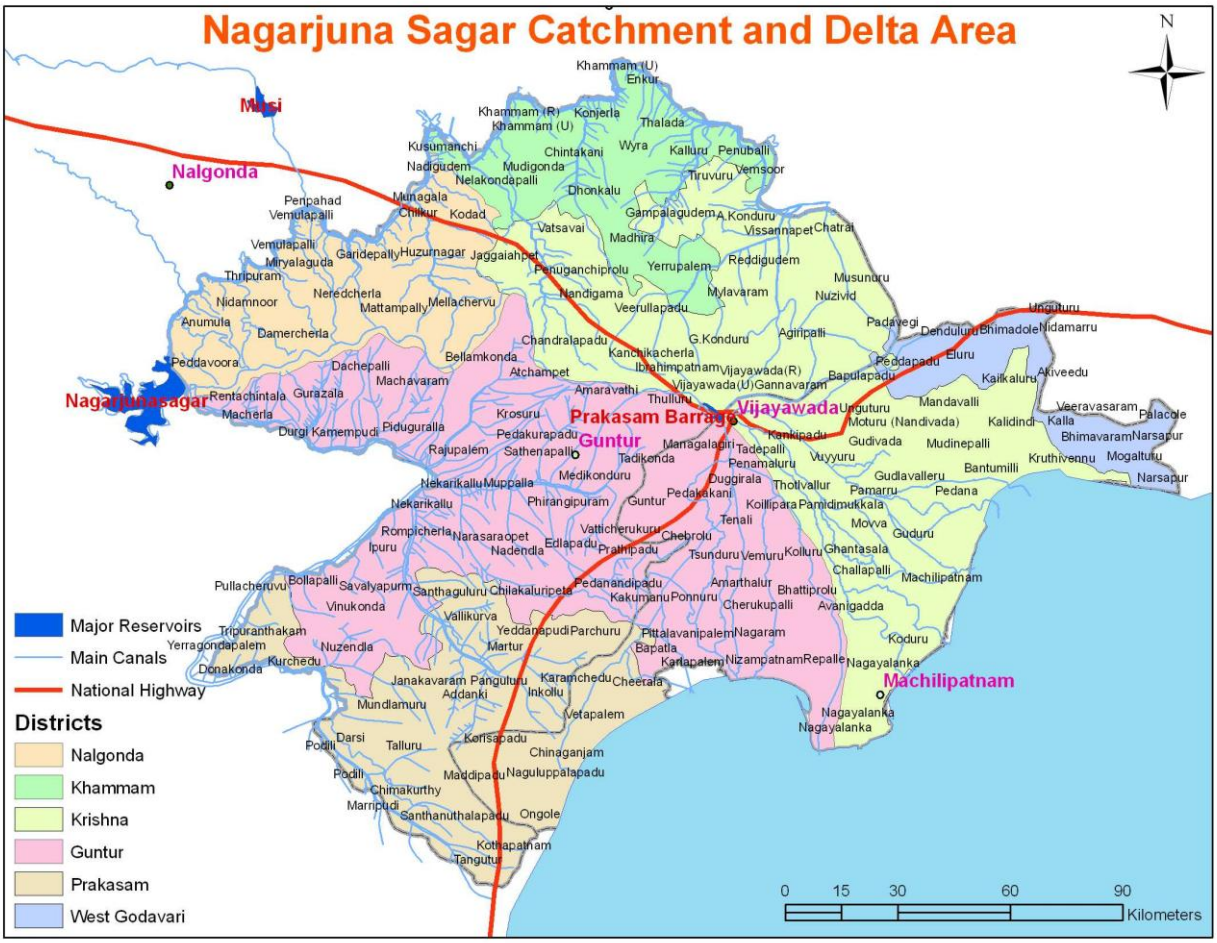
Krishna basin broadly covers the states of Karnataka (311,271 km^2), Andhra Pradesh (76,252 km^2) and Maharashtra (69,425 km^2). As a first step in the selection process, Andhra Pradesh was selected as the study area due to the higher irrigated area under paddy with 3.845 million ha during 2005-06. Where, Karnataka and Maharashtra states covered an area of 1.12 and 0.43 million ha respectively under irrigated paddy (CWC, 2008).

Andhra Pradesh state has various irrigation projects in Krishna basin such as Osmansagar, Himayastsagar, Musi, Jurala, Srisailam, Nagarjuna Sagar and Prakasam barriage (Krishna delta). From these projects, Nagarjuna Sagar and Krishna delta areas were selected purposefully for the study. Nagarjuna sagar is a multi purpose river valley, which creates a reservoir storage capacity of 11, 472 million cubic meters and has the hydro-electric project. The Nagarjuna Sagar Project (NSP) was constructed near the Nandikonda village, Peddavoora mandal, Nalgonda district with a catchment area of 215,000 Sq. km. NSP comprises of a dam across river Krishna with two main canals taking off one to the right and the other to the left covering 5 districts. The Nagarjunasagar Right Canal (NSRC) creates irrigation potential in an extent of 4.75 lakh hectare in Guntur and Praksam districts, where as the Nagarjunasagar Left Canal (NSLC) create irrigation potential in an ara of 4.20 lakh hectare in Nalgonda, Khammam and Krishna districts. From the five districts under NSRC and NSLC, Guntur district has the highest command area of 2.84 lakh hectare (see table 1) covering 39 mandals in the district (table 2; also refer the NSRC map for the locations). Hence, NSRC was selected for the study

Table 1: NSP: Details of irrigation potential

Canal/District	Ayacut Contemplated (ha)	Area Localised (ha)	Irrigation potential created by1999 (ha)
NSRC			
Guntur	**2,84,365**	**2,72,000**	
Prakasam	1,91,100	1,81,000	
Total of NSRC	**4,75,465**	**4,53,000**	**4,49,132**
NSLC			
Nalgonda	1,50,951	1,50,951	
Khammam	92,675	92,675	
Krishna	1,52,975	1,52,975	
Total of NSLC	**4,20,073***	**3,96,601**	**3,60,583**
Total	**8,95,538**	**8,49,601**	**8,09,715**

*** 23,472 ha unauthorized area to be identified**



On the other hand Krishna delta is located at the tail end of the river basin. The Krishna delta has a total command area of 1.3 million acres, which is divided into eastern, central and western regions and served by two main canals: Krishna eastern canal and Krishna western canal. The Krishna delta covers Guntur, Krishna and parts of Prakasam and West Godavari districts. The command area is covered by 148 WUAs, which are grouped under 19 DCs. The soil is mostly black cotton soil and the main crops grown in the delta are paddy and sugarcane in kharif (June – October) and paddy, sugarcane, pulses, groundnut, chillies and vegetables in rabi (November-March). The Krishna delta system command areas are designed for wet crop cultivation. Based on the availability of water inflows in the system, the extent of the command and crop seasons are decided. The area is highly influenced to floods.

The pilot area selection was taken under NSRC and Krishna western and eastern deltas during the month of January with the scientific support from Andhra Pradesh Water Management Project, Bapatla and Regional agricultural research station, Lam, Guntur. Nonetheless, both the research stations come under the control of Acharya N. G Ranga Agricultural University, Ragendranagar, Hyderabad. During the selection of pilot area various mandals and villages were visited from Krishna and Guntur districts. The details of the visited villages are as follows:

Talluru village, pedda kurapadu mandal, **Guntur district** was visited with the support of RARS, LAM and had discussions with the local farmers. The village is in the tail end of the Amaravathi Major, which falls under the Nagarjuna sagar right canal. But due to the unavailability of water from Amaravathi major, lift irrigation from Kampasagram (Krishna canal) was initiated from 2006. The lift irrigation scheme (with 5 lifting motors) covers 5 villages with a command area of 5000 acres. The major crops cultivated under the command area are paddy, cotton, chillies and turmeric. The Talluru village is in the middle portion of the lift irrigation scheme. It is informed that paddy is cultivated in 10 % of the area where the rest of the command area is under commercial crops like cotton and chillies. Before the initiation of lift irrigation majority of the farmers cultivated pulses with a little extent of commercial crops. But with the availability of water from lift irrigation farmers shifted their cultivation to the commercial crops with a little extent to paddy.

The farming sector is suffering from higher labour charges (Rs 130 per day) and farmers are predicting higher labour problem in future.

One of the farmer reported that a loan of Rs 30,000 per acre for chilli cultivation was taken from which 10 % was deducted as insurance during the process. But the farmers are not aware on what basis the insurance can be claimed until the government authorities declare that the mandal is drought or flood affected.

Farmers from the village reported that paddy yields are about 35 bags (75kg/bag) and mostly prefer BPT variety. In case of chillies they receive 40 qt/acre (Rs 5000/qt).

Atmakuru Village, Mangalagiri Mandal, Guntur district

Atmakuru Village is 5-10 km from Managalagiri. It has about 900 acres of land under canal irrigation. In Kharif (Salva in local language) season paddy is grown and in Rabi (Dalva in local language) season Maize, Greengram (Moong Dal/Pessarlu) and sunhemp for cattle.

In paddy BPT is the major variety grown by about 90% farmers and PL – 1100 variety in low lying patches (10 %). The villagers did not use machinery for farming. Direct Sowing (Broadcasting) is not practiced so far. The source of irrigation is from Guntur channel (picture 1). The village is located in the head region of the Guntur canal. The water in the channel is supplied for drinking purpose to the town and the left over water is used for irrigation. SRI method is never practiced in the village because of ignorance and lack of guidance.

There are about 500 farmers, with an average field size of 0.5 Acre to 2 Acres. 90 percent of the villagers have less than 2 Acres, 9 % more than 2 acres and about 3 farmers have 10 Acres of land. There are 12 members in Water Users Association and 8 members are from this village. Vadlapudi Village is adjacent to Atmakur village and in the border areas of these villages' farmers has borewells (about 25), the depth of the bore wells is about 27 to 30 ft and vegetables are grown in these areas.

Picture 1: Guntur Canal coming for Krishna Barrage

Atmakur Village has labour problem, farmers are looking out for new techniques to solve this problem. There is no water problem so far in the village, except delays in water release. The soils in the village also slightly effected with salinity.

There is increase in Real Estate business in this village because of Telangana issue in the state. This year they may loose upto 100 acres agriculture land to this business.

Farmers of the Village are using combined methods both manual and machinery for harvesting. Cost of labour for cutting is Rs. 2,500 /acre; machinery cutting is about 2200 per hour. A loan of about Rs 10,000 per acre for paddy is given by Bank of India Vadlapudi and 5 percent is collected for crop insurance.

The cost of cultivation for paddy is about 15 to 16 thousands rupees per acre. Every year the paddy yield is more than 30 bags about 35 to 36 bags per Acre. Each bag of rice contains 75 Kg of Rice. The returns are about Rs 1000 to 1200 for each bag of 75kg rice.

Paddy BPT Variety is 140 days crop, which needs 4 to 5 wettings. The nursery stage (15 days) requires 4 inches depth of water. The Command area in Atmakur has 2 sluices (1 big and 1 small). The bigger sluice stream runs about 3 km length and the smaller one is about 1 km in length. The canals are regularly managed by WUA. Farmers expressed there willingness to go for the direct sowings to reduce the labour problem which could also reduce the water utilization. Water measurements were not taken place so far in the village.

Kothareddipalem hamlet, Nuthuki Village, Mangalagiri Mandal, Guntur district

The village area is about 500 Acres with 60 families. The village also has 90 acres of dry area used for commercial crops. Nearly 60 percent (300 acres) of the village farmers grow paddy. The water source is KWD (Krishna Western Delta).

Direct sowing started by one farmer this year (2009), the farmer observed that this method is easy (Picture 2). Farmers reported that 20 % of them will be practicing the direct sowing method in the next kharif season, 2010. It is also reported that transplanting method cost about 15000 Rs/acre and direct sowing cost 10000 Rs/acre only.

Farmers are using more chemicals because of global warming (farmer perception). They are using BPT – 5204 for Paddy cultivation. They observed that economically it is good in using harvesters for paddy cutting as it is saving about Rs 8,000 /acre. Zero tillage is practiced for maize cultivation in Rabi season.

Farmers in the village also tried with SRI method but due to the problems in leveling the fields (as they are not flat) couldn't succeed in adopting the method. There are as many as one borewell per each acre. The depth of each borewell is about 4 to 20 feet. Most of them use 3HP capacity motors. To create 4 inches depth in the field for irrigation it takes about 10 hours using bore wells and it takes 20 hours by canal.

The village receives water from Peddakonduru high level canal irrigating about 3000 acres running about 7 km in length (Picture 3). Farmers also grow Banana and Turmeric in the village under irrigated dry areas.

Ramachandra Puram, Mangalagiri Mandal, Guntur district

The village is at the tail end of konduru high level canal and has 200 acres under it. In total the village has 4700 acres of which 2500 is under paddy cultivation followed by blackgram and maize. In dry areas also farmers cultivate rice under bore wells. In rabi season also they opted for paddy and not maize because of diseases.

In case of paddy farmers are preferring to have machinery transplanters to reduce the labour costs (Picture 4). In once case farmer has done broadcasting with 15kg seed per acre by seeing the success stories (Picture 5). Generally, the investment per acre of paddy in Kharif (salva) is Rs 13,000/- and Rabi (Dalva) is Rs 15,000/-. The cost of transplantation per acre is Rs 4000 /-. In average farmers are getting 35 bags of yield with a price ranging from 1050 to 1200 rs/bag.

There are about 350 Bores with a depth of 40-120 feet. The canal is available but not in a condition for irrigation, it is to be repaired. Very few farmers who hold more than 5 acres of land use 5HP and 7HP motors and most of them have less than 5 acres and they use 3 HP motors. Stem bore disease is more rampant here. None of the farmer is the member of WUA in the village but konduru canal has WUA and collects Rs 200 per acre.

Insurance system is poor and the bankers were taking signatures from farmers that no insurance is required. But when flooding take place, government is paying the damage cost of 1200 to 1500 rs/acre.

Picture 2: Machinery transplanted filed under borewell irrigation in Ramchandrapuram village

Picture 3: Broadcasting method in paddy fields of Ramachandrapuram village

Picture 4: Farmers explaining about the paddy cultivation methods and boundaries of the village during the IWMI team field visit

Kuragallu Village, Mangalagiri Mandal, Guntur district:

The village is covered under Konda veeti vagu (covering 10,000 acres from 4 villages) and it has a lift irrigation scheme named as Neerukonda lift irrigation. The villagers sow 800 to 1000 bundles per acre during transplantation. Tobacco is also grown here. The village has 2200 acres of land and influenced by flood every year but this year (2009) there was not much problem. A compensation of Rs 1800 per acre is paid for loss when flooded.

Neerukonda Lift Irrigation Scheme: 1800 acres of land is covered under this scheme. For Paddy crop Rs 600 is paid as a fee to Water User Association and it is Rs 500/- for cotton. Every year about 10,000 acres of the land is flooded out of which 1000 acres of this village is drown in floods. Labour cost is around Rs 120 to 180. The cost of cultivation for paddy is Rs 10,000 per acre with an additional rental value of 8000 rs/acre. The average paddy yields are 30 bags with 75 kg/bag.

The lift irrigation has 3 pumps with 90 hp motors, of which 2 works continuously. The lands are not flat in the village and has problem with water stagnations. The lift irrigation has 4 subpoints to deliver the water to the respective blocks (Picture 7). 3 points supply water to the paddy fields and one to the 4^{th} one for commercial crops like cotton and maize.

Rangareddy palem, Narasaraopet Mandal, Guntur District

The village is the hamlet of Jonnalagadda Panchayati. Most of the farmers have changed the paddy variety from BPT which was 90% last year to NLR-34449 about 70 percent of them. Only 10 percent of them have sown BPT – 5204 this year due to delay in water supply. Neck blast disease was noticed in the village due to the delayed rainfall. The yield is about 40 bags per acre in normal conditions and 30 bags in the present year and worst conditions they get 20 bags/acre. The total area of the village is 7575 acres. The source of water in the village is Turlapadu Major, which flows from Golapadu of Mupala Mandal to Chilakaluripeta (Picture 8). This village is near the head end, the canal flows upto 7 to 8 Kms. There are 5 sub canals

or streams in the village and 50 % is under the middle one. The village has 400 acres under the canal with paddy crop and other 100 acres under Jonnalagadda Vagu, where the drain water is collected.

The village has received water in last week of September and they started sowing in first week of October. The insurance rules are not good and not useful for farmers. Farmers are paying insurance for chilies a premium amount of Rs 2200 for Rs 50,000 loan for one acre to the insurance India, New Delhi.

Picture 5: Turlupadu Major near to the Rangareddi palem village

Paddy insurance is calculated with 5 years average yield. An investment of around 16000 is needed per acre of paddy field. Harvesting cost is about 1400 per acre. No one has used the broadcasting methods. 5 years back the SRI system of farming is a failure in the village, with SRI system in Kharif they got only 30 bags. They observed that investment is more now it may cost around Rs 20,000/-. BPT is not good for late plantations. For Chillies with an investment of Rs 16000/- they got 70,000/-.The water flow in to the paddy field is stopped and stagnant water removed to spray the medicine. There are no bores here.

In 30 percent of the land the sown pigeonpea was destroyed to sow paddy, because of delay in releasing the water. Villagers asked for individual field based insurance as it is in the case of health insurance of a person. They said insurance should not be based on the assessment of a group of fields. Cost of each bag is about Rs 950 which was 1150 /- for BPT in December. There are 200 farmers most of which about 150 hold less than 5 acres. The village has Water Users Association out of the 12 members 2 are from this village. A fee of about Rs 200/- is collected per acre of the paddy field.

Machavaram Village, Rompicherla Mandal, Guntur district:

There are 2 sources of irrigation in this village 600 Acres in the south of the village from Reddipalem Tank and 1200 Acres in the North from Guntur sub canal.

The source to Reddipalem tank is from Adanki branch canal which is flowing further towards Bapatla.

Gravel type of soil is more on north side.

The village has 1800 acres of which paddy is in 1500 Acres, Chillies in 200 Acres and cotton, pigeonpea, Redgram, and Tobacco in the remaining 100 Acres of the land.

There are about 750 farmers, in which most of them about 600 farmers hold less than 2 acres of land, 150 farmers with land holding between 2 acres to 5 acres and 50 farmers with land holding more than 5 acres.

This year water was delayed for a month, pigeonpea was sowed with wrong information from agriculture department and later on when water was released pigeonpea crop was destroyed.

Agriculture department was not sure of the water release and the politicians were assuring of water release.

Labour cost is more about Rs 100 to Rs 150. SRI method is never tried in this village because water is sufficient and they opined that SRI method is useful in water scarce areas. The total investment is more than Rs 15000/-. The villagers are using harvesters but they observed loss of fodder to cattle if harvesters are used. So for some part of the field harvesters are used and for the remaining field labour is employed for cutting the crop. LRG 40 and LRG 41 variety seeds trial is intended in atleast 10 Acres of land.

Insurance is collected for chillies around 2000 per acre in dry land and Rs 3000 per acre for irrigated area.

Two farmers of this village are members of water users association.

Broadcasting is not practiced so far in the village.

Paddy yields range between 30 to 35 bags. The cost of each bag is about Rs 1300/- to Rs 1400/-.

Major canals numbered 1 to 10 are definitely released. 11, 12 etc, are released if there is no water shortage. The sub canals are marked as 10a, 10b, 10c, 10d etc. the sub canal numbered 10d flows into this village.

Ghantasala Palem Village, Ghantasala Mandal, Krishna District

A distributory canal from Srikakulam main branch passes (big canal) through the village. The village is located at the tail end of the canal at 12 km length (Picture 10). In Kharif paddy is grown and in Rabi pulses and black gram were grown. A well reputed farmer Uppala Prasad Rao, holding more than 100 acres of land was met during the field visits.

The farmer started experimenting on broadcasting Swarna – 75 variety about 15Kgs in 1 acre land and got 18 bags of rice in the drought year 2003-04. Next year increased the experiment with 5 acres, he used chemicals 50 percent of the weeds were controlled and 50 percent were removed manually with labour, that year he got 25 bags. Later on he increased the area to 20 acres and later on to 50 acres. He got a good yield of 38 bags per acre. He has 100 acres of land in which 30 acres receive the saline water with poor results and 70 acres sweet water with good results.

He observed that a single wetting can withstand upto 1 month without water. He also used the alternate wetting and drying method and found that tillering is done well. Dry land paddy has more weeds. He used drilling where in seeds are placed well. He tried to control the weeds within 20 to 25 days. Water use efficiency with less labour was noticed. The animal waste is used as organic manure. Other farmers in the village are also started broadcasting. The investment for crop sowing was Rs 250/-. 3 wettings were enough this year. The total investment was Rs 15,000 with broadcasting it reduced by Rs 12000 to Rs 13,000/- per acre.

The village comes under Ghantasala mandal. There is no proper crop insurance system here. There was damage due to flooding during heavy monsoon seasons.

The waste water stream Gunderu drainage running at the outskirts of the village seeps into the soil and useful for cultivation in the village. It irrigates about 1250 acres of land and 40 farmers are using the drain water by using lift engine (Diesel).

To irrigate 1 acre of land it require 10 hours with single engine. The soil in the village is black soil and has water retaining capacity. There are 2 members of the Water users association. The sub channel from srikakulam is 12.7 Km in length and the village is situated at about 9 Km to 10 Km of the channel. About 2,500 acres is cultivated in the village. In 2007 the area is flooded with water and the government has given compensation cost of Rs 10,000.

The village is 65 Km from Vijayawada and 35 Km from Machilipatnam.

Tallapalem Village, Machilipatnam Mandal, Krishna District

The village is located 15km far from Machilipatnam and located at the tail end of the Ramaraju canal. Water scarcity is severe in the village. Water that reaches nandamur drop will be lifted with 4 engines ranging from 5.5 to 6.5 hp motors. The nandamur drop is 9km ahead from the village. There is no proper way to go to the source. Water is scheduled with in the villages and water is available for 4 days in the village and the rest 3 days is dried. WUA is available for the source and elected through ballet system.

Bore water is saline hence not used for irrigation. Broadcasting is practiced from the last 10 years (Picture 11) and the paddy yields are about 40 bags in Kharif..

For Insurance 8 units are selected to asses the damage. If the yield is less than 10 bags per acre then it is considered as drought and compensation is paid.

Government paid Rs 1800 /- per acre in 2009 for floods.

The total investment is about Rs 15000/- per acre.

30kgs of paddy seed is broadcasted per acre.

MTU 101 paddy variety is grown here.

Sonal paddy seed variety of 15kgs is broadcasted in the village on experiment basis.

Water is charged at Rs 100 per acre for cleaning the canals and 1 bag of paddy for water supply.

Picture 6: Broadcasting method in Tallapalem village

Doppalapudi Village, Ponnur Mandal, Guntur district

The village is located at 10 km from Ponnur and has the water source from Ponnur canal which diverts from Kommur canal (located after crossing Chebrolu). The village also consists of Kallimara drain irrigating about 200 acres. Water is lifted from the drain by government lift irrigation scheme (130 acres) and private lift pumps (70 acres) with 7 hrs power supply. 7-8 borewells at 30 ft depth are also available and there are no water quality problems in the village. The village has 500 to 600 farming families and 80 % of them are small farmers with less than 2 acres of land.

The village is cultivating 2000 acres paddy from Ponnur canal in Kharif, followed by Maize (500 acres) or Blackgram (1400 acres) in Rabi season. Generally farmers are sowing in the month of July with BPT 5204 variety. The average yields range from 30-35 bags (75 kg/bag). The cost of cultivation reported by the farmers was 12000 Rs/acre (without rental charges).

In case of Blackgram yellow mosaic virus (picture 12) is the major concerned problem in the fields, because of this majority of the farmers diverted to maize cultivation in the previous years (2007-08).

Farmers reported that direct seeding cannot withstand in the fields due to the lack of proper scheduled water in the initial stages. Nonetheless, rotational irrigation can be tried out because of the black soil and can with stand moisture for one week.

Water charges are collected at Rs 200 per acre by WUA (Ponnur canal), but in case of drain for lift irrigation 700 Rs/acre was charged.

Farmers also reported the drought year's situation in 2002-04. It is informed that they have achieved good yields (35-40 bags) due to less pest and disease attack and less moisture in the atmosphere.

Picture 7: Blackgram affected by yellow mosaic virus in the rice follow crop

Picture 8: Ponnur canal with a diversion to Doppalapudi village

Modukuru Village, Chunduru Mandal, Guntur district

The distance to Modukuru village is 15 km from ponnur towards Guntur. The village has 3800 acres under cultivation of which most of the area is cultivated by paddy followed by blackgram and maize. The village has Tungabandra side canal (picture 14) diverted from Kommuru canal as the source of irrigation with four streams running about 3 km distance The first stream irrigates about 1200 acres with 200 beneficiaries, 2nd stream about 660 acres (240 beneficiaries), 3rd stream about 1100 acres (275 beneficiaries) and 4th with 800-900 acres (200 beneficiaries). The beneficiaries having lands in stream one also have lands in the other streams. In stream 3 small farmers are comparatively more from the rest of the streams and larger farmers are higher in stream 1. All the four streams drain into the Tenali drain at the end.

The major problems explained by the farmers are late release of canal water and lack of uniform distribution. This influences to prefer the overaged seedling during transplantation and reduces the yield. In case of stream 3 the lands are not properly elevated and cannot receive sufficient water for cultivation.

The APMWP have been working on stream 2 and collected information from the beneficiary farmers. Field demonstrations were also carried out in the field under stream 2.

Picture 9: Tungabadra side canal diverted from kommur canal

Four borewells are available in the village with 40 ft depth; beyond this salt water intrusion is the problem. Hence, farmers do not prefer to go beyond 40 ft depth in the village.

The average yields of paddy is between 28-32 bags (75 kg/bag) with a cost of cultivation Rs. 10000 and 18 bags as the rental charges.

WUA is also available in the canal and the Distribuatory committee president is from Modukuru village. Water charges are collected at Rs. 200 per acre.

Farmers report that there is problem in using machinery in the cultivation practices as the machinery struck easily in the heavy soils.

Most of the cultivation practices are done with the contract basis (for transplantation, weeding, harvesting, heaping, threshing and bagging). Farmers take loans from Andhra bank and no efficient system and awareness for the insurance.

Picture 10: Stream 2 at 0.5 km discharging from Tungabadhra side canal

Picture 11: Stream 3 tail end at 2.5 km from Tungabadhra side canal

Justification for the selection of pilot area

From all the villages visited above, it is proposed to make the pilot area into two clusters with two villages under each cluster. Cluster I will conduct the study in Rangareddypalem and Machavaram villages and Cluster II will focus on Modukuru and Dopplapudi villages.

Cluster I covers the area under Nagarjuna sagar right canal (falls in the middle region of the NSRC) and cluster II under Krishna western delta. The villages under the two clusters were selected based on their irrigation sources and the scientific support available from the local research stations. Cluster I will be investigated by the Regional Agricultural research station, Lam and cluster II will be investigated by Andhra Pradesh Water Management Project, Bapatla under the supervision of IWMI. The travel and logistics were also considered in short-listing the villages from the respective clusters. The villages in each cluster lies within 15km radius to capture the weather related parameters to develop the crop based weather index.