Mini Pond: A Way for Supplementary Irrigation in Drought Prone Areas


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Mini pond is a popular adaptation option to climate change in drought prone area in north-western part of Bangladesh. Irrigating with the water harvested in the mini pond, farmers can save ripen T. Aman rice in October and in addition, can produce vegetables on the bank of the pond, make culture of quick growing fish and rear duck in pond water. Excavating mini pond of size 10 m X 10m X 2.5 m at a lower level corner of about 1 acre crop land, a suitable drainage system is developed for run-off of rain water to the pond. With low lift pump/ dawn/sauti, irrigating water from mini pond to adjacent rice crop land through plastic pipe for reducing water loss, farmer can increase rice yield at the rate of 338 kg/acre. Besides, farmers can bath in the pond, cattle can drink water during season; toad and vermi can get environment to multiply resulting in increasing biodiversity.

1. **Introduction:** In Barind Tract, highly prone to drought, farmers who have 3-4 bigha of cropped land plot and adopted the mini pond adaptation option have become successful to increase productivity, bio-diversity and income earning. For reducing impacts of intermittent dry spells in drought-prone areas of north-western Bangladesh, surface water irrigation from mini pond excavated and stored with rain water is also a popular adaptation option to drought condition. With the irrigation from this harvested rain water and stored in mini pond, farmer can save ripen T. Aman rice crop during Oct. through Nov and also increase yield, and then in Rabi seasonal with mini pond water, same farmer can produce chickpea/mustard/vegetables in same land which once remain fallow. Thus, farmer can increase their income and biodiversity also. In mini pond water fish culture and duck rearing can also be done, and on the bank of the mini pond, different vegetables can also be produced year round. Therefore, such adaptation option on rainwater harvesting, recycling and conservation are key to managing seasonal droughts through supplemental irrigation. The excavation and re-excavation of mini ponds is one of the feasible climate change adaptation options in Barind area. In farmlands with no irrigation source, rainwater harvesting was done through the excavation of mini-ponds for supplemental irrigation for T. Aman rice during drought spells in the early monsoon season. On the other hand, farmers of saline prone area in coastal belt could successfully apply for increasing productivity and income during drought spells in the early monsoon season.

Geographical coverage: A demonstration trial on mini pond excavation for supplementary irrigation in drought-prone areas was conducted at Saroil village in Godagari Upazila of Rajshahi district of Northwest Bangladesh. The western part of Bangladesh bordersWest Bengal, India. Disaster and Climate Risk Management in Agriculture Project under Department of Agricultural Extension

Provided support for arranging the demonstration. After successful testing, the option was replicated in different crop fields of 12 villages of Tanore and Godagari upazilas of Rajshahi district and Nachole and Gomostapur upazilas of Chapai Nawabganj district of Bangladesh.

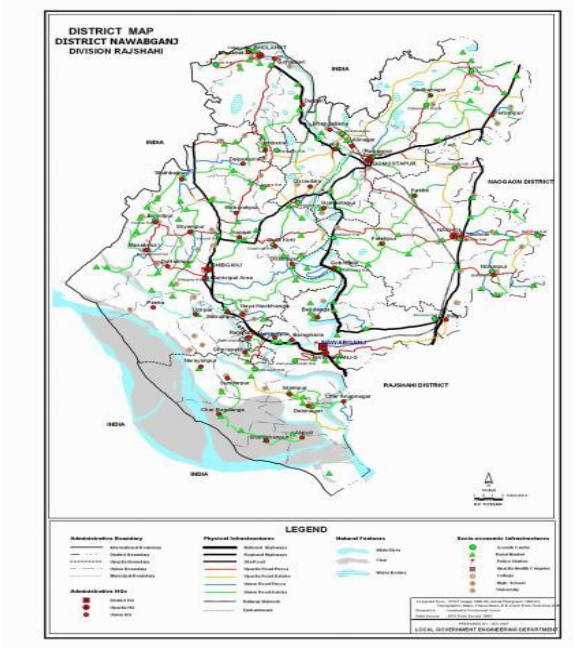

Fig.1. Chapai Nawabgonj District

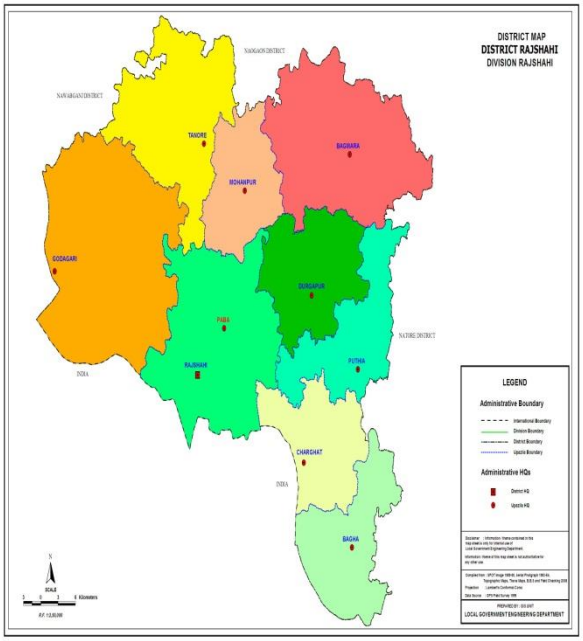

Fig.2. Rajshahi District

Target beneficiaries: In crop fields of 61 male farmers aged range from 30 to 50 years under Climate Field School s of Rajshahi and Chapai Nawabganj districts of Bangladesh, the trial and replication of the option were conducted, for educating and disseminating the technology among neighboring farmers.

Context: Agriculture is a key economic sector in Bangladesh. It has considerable influence on food security, rural livelihoods and thus, the overall growth of the country. Yet, the sector is extremely vulnerable to disaster and climate induced risks. Drought is one of the major setbacks for the agriculture and its development in Bangladesh. Drought and its variability also pose great risk and negative impacts on productivity. Thus, drought management in agriculture is a major challenge for Bangladesh in achieving sustainable development. The impact of drought on Bangladesh is potentially devastating. The increased frequency and severity of drought, will lead to increased mortality and loss of assets and livelihoods. It is also likely to undermine macro-economic growth and turn back efforts to make the country self-sufficient in food.

Drought prone areas are mainly located in the north-western and northern regions of Bangladesh and spread over an area of 5.46 million ha in the districts of Chapai Nawabganj, Naogaon, Rajshahi, Natore, Rangpur, Dinajpur, Joypurjhat, Pabna and Bogra. Among the regions north-western Barind tract is specially drought prone. Droughts are associated with the late arrival or an early withdrawal of monsoon rains and also due to intermittent dry spells coinciding with critical stages of T. Aman rice. Droughts in May and June destroy broadcast Aman, Aus and jute. Inadequate rains in July delay transplantation of Aman in high Barind areas, while droughts in September and October reduce yields of both broadcast and transplanted Aman and delay the sowing of pulses and potatoes. Boro, wheat and other crops grown in the dry season are also periodically affected by drought. Severe droughts occurred in 1966, 1969, 1973, 1978, 1979, 1981, 1982, 1989, 1992, 1994, 1995, 1998 and 2000, 2006 and 2009 causing substantial reduction in food production. The consecutive droughts of 1978 and 1979 directly affected 42% of cultivated land and reduced rice production by an estimated 2 million tons. Rice production losses due to drought in 1982 were about 50% more than losses due to floods in

the same year. The 1997 drought caused a reduction of around 1 million tons of food grain, of which about 0.6 million tons is transplanted Aman, entailing a loss of around US$ 500 million.

To reduce impacts of intermittent dry spells in the drought-prone areas of north-western Bangladesh, surface water stored from the previous rainfall needs to be used before rice maturity stage. Yet often high intensity rainfall is wasted, due to non-availability of proper water storage structures. Therefore adaptation options on rainwater harvesting, recycling and conservation are key to managing seasonal droughts through supplemental irrigation. The excavation of mini ponds is one of the feasible climate change adaptation options in the barind area. In farmlands with no irrigation source, rainwater harvesting was done through the excavation of mini-ponds for supplemental irrigation for T. Aman rice during drought spells in the early monsoon season. So at a corner of cropped land, a mini pond of size 10m x 10m x 2.5 m will be excavated for harvesting rain water. Rain water will go to the pond through prepared drains to the pond and preserved for irrigation. From mini pond excavated, suitable drain will also be prepared for supplying water by using low lift pump/ dawn/sauti. Water will poured on the drain on high level and thus water will run off the lower level and will be spreaded to the whole cropped land. It may be used fita pipe while pump will be operated for irrigating water to reduce run off loss. Kharif-I/March – July is suitable period for excavation of mini pond.

Objectives

To create opportunity of Small and marginal farmers to provide supplementary irrigation in their rain fed *T. Aman* rice field in case of scarcity of moisture

2. Methodology

Approach/Process: The impact of climate change in Rajshahi district is highly identical as compare to other districts in the Rajshahi division. Considering the climate change and its impact in crop agriculture, an integrated effort was taken in Godagari Upazila of Rajshashi district during a four years project implemented by Department of Agricultural Extension, namely Disaster and Climate Risk Management Project- DAE Part (DCRMA- DAE Part) supported by Comprehensive Disaster Management Project Phase-2. The option was replicated in different villages of four upazlias namely, Godagari, Tanore of rajshshi district and Nachole and Gomostapur upazilas of Chapai Nawabgonj district.The project was implemented by the guidance of Dr. Abu Wali Raghib Hassan, Project Director, DCRMA while Mr. Dwipendra Chandra Sarker, Project Monitoring Officer, and DCRMA Project worked Rajshahi and Chapai Nawabgonj districts. The following approach was adopted to mitigate as well as adaptation to climate change in 2010 and support provided to farmers was continued up to April, 2014.

Farmers' selection: Small and marginal farmers being interested to receive training, contribute to demonstration and willing to work to aware other farmers about climate change impact and mitigation and adaptation options. 30 farmers (both male and female) per village were selected in project area.

Farmer Field School (CFS) Approach: The Project established three Climate Field Schools consisting of 30 farmers each at three Villages or more villages. In between Bianobona and Saroil villages under Godagari Upazila of Rajshahi district a climate field school was established in 2010 for demonstrating adaptation to climate change. As these villages are prone to drought, 02 (two) mini ponds were excavated in Saroil village to demonstrate adaptation to climate change.

Training: All 30 member farmers (students) of the climate field school were provided season long training on adaptation to climate change and mini pond management for supplementary irrigation.

Weekly Meeting: Farmers of each CFS participated in weekly meeting at CFS premise to exchange their experience and get necessary suggestion from concerned SAAO (Sub-Assistant Agriculture) and training facilitator.

Demonstrations: Under each climate field school, different demonstrations like mini pond excavation for supplementary irrigation, mixed fruit garden, cultivation of avoiding rice variety namely BINA dhan-7 in Aman season etc were established at different farmers crop field of the climate field school.

Exchange visit: Exchange visit was also arranged among the demonstration spots of two or more upazilas like farmers of CFS of Godagari paid visit to mini pond demonstration of Nachole upazila of Chapai Nawabgonj district where similar demonstrations and CFS were established.

Field Days: For each demonstration, during harvest of crop, field day was arranged inviting neighboring farmers including students of CFS.

MINI POND

Mini pond is required to be excavated at a corner of lower level of cropped land. Rain water will go to the pond through previously prepared drains to the pond and preserved for irrigation. From mini pond excavated, suitable drain will also be prepared for supplying water by using low lift pump/ dawn/sauti. Water will be poured on the drain located at higher level from mini pond and thus water will run off the lower level and will be made spread to the whole cropped land. It may be used fita pipe while pump will be operated for irrigating water to reduce run off loss.

In Barind Tract, two crops- T. Aman rice in Kharif-II season and chickpea/mustard/ wheat/vegetables in Rabi season are suitable to be cultivated for increasing productivity utilizing harvested rain water. During October- November while drought occurs, two supplementary irrigations at 10 days interval can increase yield about 20%. In Rabi season 2-3 times of irrigation are required at 15 days interval for the cultivation of the crops mentioned above. One mini pond can be excavated to harvest & preserve rainwater for irrigating crop land of 3-4 bigha effectively during Kharif-II and Rabi seasons. Md. Ariful Islam, father- Late Abdul Khaleque living at Sarhoil village under Dewpara Union of Godagari upazila of Rajshahi District of Bangladesh excavated a mini pond of size 10 m X 10 m X 2.5 m at a corner of his about 04 bigha of agricultural land for rain water harvest with the support of Disaster and Climate Risk Management in Agriculture (DCRMA) project under the Department of Agricultural Extension (DAE). His main interest is to reduce impacts of intermittent dry spells in his drought-prone areas of Godagari upazila, by applying surface water stored from the previous rainfall in the excavated mini pond before rice maturity stage. He was successful to increase yield of T. Aman rice applying supplementary irrigation during drought condition.

Partners/Stakeholders: United Nations Development Program, Austrailian Aid, Uk Aid, SIDA, and European Union were the key partners for financial assistance.

3. Key Findings/Results

For getting significant benefit, size of mini pond and also that of cropped land adjacent to the mini pond to be excavated is very important. From different test/trial, it has been found that 10 mX 10 m X 2.5 m size of pond is suitable for irrigating 3-4 bighas of short period cropped land.

Site selection of mini pond: Site selection is very important for preserving rain water in mini pond. Sandy and sandy loam soil is not suitable for this technology. Clay loam and loam soil is highly suitable for excavating mini pond, because leasing loss of preserved water becomes less than other soil texture. Mini pond should be excavated long distance from big river and canals so that leaching loss can be minimized during drought.

Irrigation with fita pipe: To reduce run-off and leaching loss of irrigation water, use of fita pipe is the best way to irrigate to crop land. It also minimizes the irrigation cost.

Utilization of fallow land: In high Barind Tract land where there is no suitable water source and remains fallow in Rabi season after T. Aman rice crop, can be taken under production excavating mini pond.

Suitability of farmers: Small and marginal farmers who have at least 3 bigha of land can be benefited from this mini pond technology in Barind and saline prone areas.

4. Impact to the community, stakeholders or practitioners

This technology is totally environment friendly and of lower cost. Farmer can protect his crop from the impact of drought and increase crop yield resulting in more income earning. It can also resist downward movement of ground water layer, which will contribute to improve the environment and enhance sustainable development. In rain fed area where irrigation water is very limited and crop lands remain fallow in Aus rice season, can be taken under production. Input suppliers/ traders and service providers can also be benefited through providing their supports.

5. Conclusion and recommendations

Benefits derived from the practice: Before excavation of mini pond, farmer could produce only 15 mond aus rice variety Swarna per bigha . But after applying this technology, he can be able to produce 18 mond/bigha. Additionally, he can produce/cultivate country bean, black gram and bottle gourd etc on the bank of the mini pond and can make duck cum fish culture on pond water. Before excavating mini pond covering 10 m X 10 m land, farmer could get 35 kg T. Aman rice from whose price is BDT 525.00 while after excavating min I pond, farmer can earn BDT 9000.00 from fish culture and BDT 2000.00 from duck rearing. Besides, farmers can bath in the pond, cattle can drink water during season, and toad and vermi can get environment to multiply resulting in increasing biodiversity. From raining season through early Rabi season, duck cum fish can be cultivated in the mini ponds. Use of fossil fuel is also reduced for irrigating water from mini pond because run-off water is properly utilized for both in harvesting and irrigating. Ultimately, green house gas emission reduces. Tree plantation on the banks of the mini ponds can be done. Therefore as a whole cropping intensity is increased and biodiversity is also increased through increasing other lives like toad, vermin, and birds etc.

Success factors: The following conditions are required for the practice to be successful.

- Loam to cay loam soil is better excavation of mini pond because such soil decreases leaching loss of water from pond.
- Mini pond should be far away from rives. If mini pond is located near river, in dry season while water level of river goes down, leaching loss of water of mini pond becomes high.
- At least 3 bidha lands size should be prioritized for mini pond excavation to minimize irrigation cost
- Use of fita (plastic) pipe for irrigation helps to decrease water loss during irrigation.
- Small and marginal farmers should be prioritized because such farmers are directly engaged in production practices.

Constraints: Long drought spell creates shortage of water to be harvested in mini pond. Primarily farmers think that they will lose cropped land for excavating mini pond, though cropping intensity and income are increased with this technology. For excavating a mini pond, it takes BDT 25,000-30,000. As most of the farmers are poor and are not able to arrange such amount of money, so dissemination of such technology is difficult as per requirement. In Barind Tract area, majority of farmers are marginal and landless, most of whom are tenant farmers of land lords. This is one of the major preseason why such mini pond adaptation option can’t be disseminated substantially in barind Tract areas.

Sustainability: This technology can be implemented in saline and drought prone areas of Bangladesh. It can also be implemented in ground water irrigated areas where flood also sometimes causes and damages crops. The farmers are now highly satisfied as they are getting good harvest from T. Aman, meeting family members intake of different vegetables and fishes. Neighboring farmers are also being interested to excavate such mini pond for supplementary irrigation before cultivating T. Aman rice. The excavation and re-excavation of mini ponds is one of the feasible climate change adaptation options in the *barind area.* In farmlands with no irrigation source, popularity of rainwater harvesting through the excavation of mini-ponds for supplemental irrigation for T. Aman rice during drought spells in the early and late monsoon season is now increasing.

Replicability and Upscaling: There is wide range of scope of replication of this practice. This practice can be replicated in saline prone area for harvesting rain water so that irrigation can be done in early Rabi crops.

Describe how the good practice can help improve AAS in the region: As the good practice has been well accepted by a large number of farmers in drought prone areas of Bangladesh and it has good impact in environment and in production practices, it can help to improve AAS in both drought and saline prone areas of Bangladesh and South Asia Region.