

Hydro-powered water pump

A new Hope for more Greenery and better Livelihoods in Badakhshan

Badakhshan falls in dry temperate ecological zone where rainfall is scanty, the annual precipitation is less than 400 mm and majority of this precipitation is in the form of snow in winters. The communities by and large depend of subsistence agriculture and livestock rearing for their livelihoods. The irrigated cultivable land in Badakhshan is limited, majority of the farmers also practice rain-fed agriculture traditionally in mountain slopes for their sustenance. However, because of extreme aridity and unpredictable climatic conditions the poor farmers often do not obtain enough food grains to meet the family needs for 6 months despite hard labor work in the field.

NRM department AKF Badakhshan is working with rural farmers to increase their incomes through enhancing agriculture productivity by a number of means including introduction of improved high yielding varieties of cereal/legume seeds, vegetables, deciduous fruit varieties, fodder and a number of new and innovative technologies suitable to local environment.

Hydro-powered water pump is one of the new and promising technologies, which has recently been introduced from Northern Pakistan and successfully demonstrated in Baharak and Ishkashim area of Badakhshan to bring sloppy and marginal land under irrigation. The hydro-powered water pump is a tested, proven environment friendly technology for lifting water. Under this system water is used as a source of mechanical energy and is coupled with a pump which lifts water from a lower altitude to higher altitude. Thus there is no more need of electricity, diesel or petrol to pump up water up to 50 meters above irrigation channel. The water flow in an irrigation channel is the source of energy for lifting the required water to irrigate the land.

This is a very simple and replicable technology in which a water lifting system is fixed at an existing irrigation channel just below the available land and this location is called pumping station. The water from irrigation channel is passed through a device directly by creating some fall (10-20 meters) which turns the runner of the device and creates mechanical power. This power operates the pump and lifts water up to 50-60 meters above irrigation channel and more than 100 meters from the pumping station.

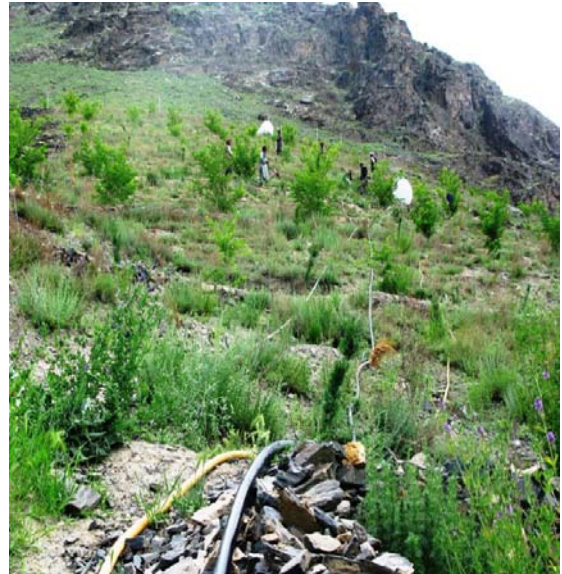
The system delivers 15 gallons of water per minute from the pumping station to the storage tank in the uphill side which is sufficient to irrigate one hectare of land above the channel.

A storage tank with a capacity of 3994 gallons of water, takes five hours to fill the tank. The farmer irrigates one hectare of land in two days on the basis of five hours operation of the system per day. If the farmer operates 10 hours per day then one hectare land can be irrigated per day. For 24 hours, this system can lift 21,600 gallons of water and could be used according to the type of crop grown and its requirements.

In this hydro powered water pumping device the water lifting efficiency varies from location to location depending upon the discharge available, difference of height between the pumping station to the potential land to be irrigated and design of the machine. The system is more useful for the areas where there are gravity based irrigation channels and above the channels there are barren lands - either slopes or flat land. Other potential sites could be barren lands above the river beds and streams which are still undeveloped and un-irrigated. The community at such location can irrigate and cultivate their barren

lands by lifting irrigation water through this technology without paying electricity bills, no diesel/petrol charges.

Secondly those farmers who have already developed piece of land and are using diesel/petrol or electric motor for pumping water can also replace their conventional pumping system with this technology provided the sites fits into the feasibility conditions for this technology.



Hydro-powered Water Pump at pumping station below the irrigation channel

The device has a very simple operation and maintenance system. It requires cleaning and checking nut bolts and greasing bearings at few days interval. Secondly, it requires replacing the springs and washers of the pump every few weeks. The spare parts i.e. nut bolts, bearings, springs, washers and belts etc are easily available from local hardware shops at cheaper rates in Pakistan.

This new technology has successfully been demonstrated in Badakhshan and this system is more suitable to bring marginal sloppy land under irrigation to increase agriculture productivity. Through wider replication of this device more sloppy and marginal lands can be brought under cultivation to address the increasing community needs for more food, fuelwood, timber and fodder for livestock.

Furthermore, through this simple technology more barren and marginal land can be brought under vegetation cover, which ultimately controls rapid land degradation, soil erosion and the flash floods – common phenomena in Badakhshan, besides supporting increased biodiversity and ameliorating local environment.

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