

Table 4.18 Characteristics of water lifting devices.

Water Source		Power Source		Use
St = Stream, river, canal	La = Lake, pond, tank	H = Human	A = Animal	Do = Domestic
Dw = Dug well	Bh = Bore-hole	W = Wind	IC = Diesel, Petrol	L = Livestock
		E = Electrical	Es = Solar-electric	Ir = Irrigation
				Dr = Land Drainage

*Other*

Var. = Variable, FD = Free discharge, DL = Delivery lift

TYPE OF EQUIPMENT	WATER SOURCE				LIFT Approx. range m	OUTPUT Average m <sup>3</sup> /h	POWER SOURCE						USE			
	St	La	Dw	Bh			H	A	W	IC	E	Es	Do	L	Ir	Dr
<b>Buckets and Scoops</b>																
Swing basket	*	*			0.1-0.6	5	*								*	*
Scoop	*	*			0.1-1.0	8	*								*	*
Counterpoise lift (shadouf)	*	*	*		1.5-2.5	5	*						*	*	*	*
Rope and bucket	*	*	*		1.5-10	1	*						*	*	*	*
Rope and bucket (mohte)	*	*	*		4-9	12	*	*					*	*	*	*
Water ladder	*	*			0.75-3.5	5	*						*	*	*	*
Chain and washer pump	*	*	*		1.5-6	18	*						*	*	*	*
Persian wheel, saqia	*	*			1.5-9	14	*	*					*	*	*	*
Noria	*	*			0.3-1.8	90	*	*					*	*	*	*
Noria	*	*			0.3-1.8	var.	*			*	*		*	*	*	*
Water wheel	*				3-7	var.	*			*			*	*	*	*
<b>Positive Displacement Pumps</b>																
Reciprocating, barrel above ground—Shallow well, FD	*	*	*		up to 6	var.	*		*	*			*	*	*	*
—Shallow well, DL	*	*	*		var.	var.	*		*	*			*	*	*	*
Reciprocating, barrel below ground—Deep well, FD				*	var.	var.	*		*	*	*		*	*	*	*
—Deep well, DL				*	var.	var.	*		*	*	*		*	*	*	*
Semi-rotary	*	*	*		var.	var.	*						*	*	*	*
Archimedean screw	*	*			0.25-0.75	22	*						*	*	*	*
Archimedean screw	*	*			3-10	var.	*			*	*		*	*	*	*
Helical rotor ('Mono')	*	*		*	var.	var.	*			*	*		*	*	*	*
Diaphragm	*	*	*		var.	var.	*			*	*		*	*	*	*
<b>Rotodynamic Pumps</b>																
Centrifugal, single stage	*	*	*		up to 100	var.	*			*	*	*	*	*	*	*
Centrifugal, multi-stage	*	*	*		100-1000	var.	*			*	*	*	*	*	*	*
Vertical spindle				*	var.	var.	*			*	*		*	*	*	*
Propeller or axial flow	*	*			up to 30	var.	*			*	*		*	*	*	*
Submersible				*	up to 1000	var.	*			*	*		*	*	*	*
<b>Miscellaneous</b>																
Hydraulic ram	*				up to 200	var.	*			*			*	*	*	*
Air lift				*	var.	var.	*			*	*		*	*	*	*

Sources: James Goodman, 'A Study of the use, efficiency and performance of simple water lifting devices used for irrigation'. National College of Agricultural Engineering, Silsoe, UK., 1977.  
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