

*Supplementary Information*

# **Diversifying Water Sources with Atmospheric Water Harvesting to Enhance Water Supply Resilience**

**Mengbo Zhang, Ranbin Liu \* and Yaxuan Li**

Sino-Dutch R&D Centre for Future Wastewater Treatment Technologies/Key Laboratory of Urban Stormwater System and Water Environment (Ministry of Education), Beijing University of Civil Engineering & Architecture, Beijing 100044, China; zmb11211324@163.com (M.Z.); fank812@hotmail.com (Y.L.)

\* Correspondence: ranbin\_liu@hotmail.com

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**Table S1.** Summary of studies or practices of atmospheric water harvesting

Location/Test conditions	Mesh type/ modification	Fog collection rate L/(m <sup>2</sup> ·day)	Reference
Iberian	Raschel mesh	3.9	[1]
Morocco	Raschel mesh	10.5	[2]
Guatemala	/	6	[3]
Chile	Raschel mesh	7.8	[4]
Peru	/	11.8	[3]
V=0.19 m/s, T=25°C, RH=40%	Raschel mesh with electrospun polyvinylidene fluoride fibers	15.36	[5]
T=23°C, RH=90%	Polymer filament with hydrophilic-hydrophobic coating	6.90	[6]
T=25°C, RH=85-90%	Stable hybrid superhydrophilic-superhydrophobic surface	410.4	[7]
v=30-50 cm/s, RH=50-60%	Unique layered structure of bi- onic wheat awn	1416	[8]
T=11.8 ± 1.2°C, RH=29 ± 2.5%	Superhydrophilic surfaces with hierarchical groove structure of wire electrical	172.8	[9]
T=11.8 ± 1.2°C, RH=29 ± 2.5%	Superhydrophobic aluminum alloy surfaces with parallel hierarchical ribbed structure	69.12	[10]
T=20°C, RH=80%	Slippery-superhydrophilic surfaces with the wedge structure	502.8-536.88	[11]
T=20°C, RH=80%	Magnetically transformable microcilia surface	235.2	[12]

**Table S2.** Summary of desiccants explored and developed in various studies

Desiccant	Experimental conditions	Adsorption capacity g/g	Reference
Silica gel LiCl-PVP	T=20°C, RH=70%	0.43	[13]
LiCl/MgSO <sub>4</sub> /ACF	RH=35%	0.92	[14]
Nano-vapor adsorbent	RH=60%	1.6	[15]
LiCl@MIL-101(Cr)	RH=30%	0.77	[16]

Super moisture-absorbent gels (SMAG)	RH=90%	6.7	[17]
MOF-801	RH=20%	2.8	[18]
MOF-801	RH=5-40%	0.1	[19]
MOF-303	RH=5-40%	0.233	[19]
waste-derived moisture-absorber	RH=20-80%	0.46-1.84	[20]

**Table S3.** Summary of atmospheric water harvesting machines on the market

Company	Generation type	Generation capacity L/day	Water price \$/m <sup>3</sup>	Energy efficiency kWh/m <sup>3</sup>	Infrastructure cost \$/unit	Reference
Watergen	Condensation	6000	90	200 (Heat exchange)	100000	[21]
Drinkable air	Condensation	150,000	60	-	-	[22]
WEDEW	Condensation	2,000	20	(biomass)	-	[23]
Drupps	Liquid absorption	200,000	20	30-130 (Thermal or electric energy)	-	[24]
AquaBoy Pro II	Condensation	10-20	-	-	1700	[25]
GEN-M	Condensation	16	20	10 (Solar energy)	5000-8000	[26]
SOURCE	Absorption	2-5	-	Solar energy	2750-3250	[27]
CloudFisher	Fog-harvesting	1100	2.5-3.0	0	8000-13000	[28]



(a)



(b)



(c)



(d)



(e)



(f)

**Figure S1.** Summary of atmospheric water harvesting technologies in practical application. (a) Wattergen's [26], installed at the Rocky Ridge Gas and Market, can produce up to 800 liters of water extracted from air for the community. It has been implemented in countries such as Asia, the Middle East, Latin America, Africa, and the United States to meet the needs of small villages, parks, residential buildings, farms, schools; (b) Residents use the new device [23] that can use biomass fuel such as the byproducts of agriculture, forestry, and natural disasters to collect clean drinking after a hurricane in Manila, a rural village in Zimbabwe; (c) CloudFisher in South Africa [28]. The fog collector is suitable for areas with frequent fog throughout the year. These areas are usually located at coastal regions and/or mountainous areas such as Chile, Mexico, Oman, South Africa and Morocco. These countries usually have poor economy, and lack or have no pipe network and power facilities; (d) Drupps sells to Thailand [29], A mobile demo version of Drupps System which use the liquid desiccant to extract 800 liters water from the atmosphere with the aim of recycling waste heat from other processes. The energy efficiency starts at 50 kWh/m<sup>3</sup>; (e) The new type of soil made of adsorbent hydrogel is used for self-irrigation technology, which can extract water from the air and distribute it to plants. Depending on the crop, about 0.1-1 kg of soil can provide enough water to irrigate about one square meter of farmland [30]; (f) By laying a mesh overhead the farmland, farmers on-site artificially hit the mesh to irrigate the crops.

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