Fog harvesting

Challenge: Too little water **Adaptation response:** Alternative water sources

Description

Fog harvesting provides an alternative source of freshwater through a technique used to capture water from wind-driven fog. Fog harvesting systems are typically installed in areas where the presence of fog is naturally high, typically coastal and mountainous regions. The systems are usually constructed in the form of a mesh net, stabilized between two posts that are spread out at an angle perpendicular to the prevailing wind carrying the fog. As the wind passes through the mesh, drops of freshwater form and drip into an underlying gutter, from which pipes lead the water into a storage tank.

Implementation

Fog harvesting systems are best installed in open locations with a fairly high elevation that are exposed to wind flow. Meteorological and climatic information such as predominant wind-flow direction might have to be gathered to identify optimal placement. After technical setup, training may also be necessary to introduce the system and its maintenance requirements to the local community.

Thick fog, high wind speeds, and tighter mesh material can all improve the efficiency of the harvesting system. The water-harvesting rate ranges between 5.3 litres per m^2/day and 13.4 litres per m^2/day depending on the season, location and type (material used) of the harvesting system (Organization of American States, n.d.). Water collected from fog harvesters can be used for a wide range of purposes, including potable water, irrigation, and other domestic applications.

The mesh, typically nylon, polyethylene or polypropylene netting, is tightly spread between two firmly planted posts, usually wooden poles. The size of a fog harvesting system can vary greatly, with the smallest being around 1 m^2 unit, and the largest spanning up to 1600 m^2 (Dar SI Hmad, n.d.). An underlying gutter collects the water drops that fall from the mesh. The drops are diverted to a separate water storage tank where the water can be collected and used. Maintenance includes routine check-ups and cleaning of mesh nets, pipes and tanks to remove dust, algae, bacteria, etc. to ensure maximum efficiency and maintain water quality.

Environmental Benefits

- Does not require energy to operate.
- Decreases pressure on local freshwater reservoirs in low water availability periods.

Socioeconomic Benefits

- Provides an additional source of freshwater in dry coastal and mountainous regions, thus increasing quality of life in communities.
- Provides generally clean water that can be used immediately after harvesting.
- Minimizes costs and the need to transport freshwater into the area, which is difficult to reach.

Opportunities and Barriers

Opportunities:

- Relatively simple technology. Once established, it can be run by the community and little maintenance is required
- Cheaper source of freshwater compared to some other non-conventional sources of water supply, such as desalination
- Diversification of freshwater resources in areas where freshwater access is limited increases climate resilience
- Materials for system components can often be sourced locally, creating local business opportunities

Barriers:

- Harvested volume can be difficult to predict, particularly in long term, as it depends on the presence of fog, wind speed, etc.
- In some coastal regions the quality harvested fog water for drinking is inferior due to high concentrations of chlorine, nitrate and minerals
- Large fog harvesting constructions may damage or impede flora and fauna
- Harsh weather conditions such as very strong winds and snowfall can damage harvesting systems

Implementation considerations*

Technological maturity:	4-5
Initial investment:	1-3
Operational costs:	1-2
Implementation timeframe:	1-2

* This adaptation technology brief includes a general assessment of four dimensions relating to implementation of the technology. It represents an indicative assessment scale of 1-5 as follows:
Technological maturity: 1 - in early stages of research and development, to 5 – fully mature and widely used
Initial investment: 1 – very low cost, to 5 – very high cost investment needed to implement technology
Operational costs: 1 – very low/no cost, to 5 – very high costs of operation and maintenance
Implementation timeframe: 1 – very quick to implement and reach desired capacity, to 5 – significant time investments needed to establish and/or reach full capacity
This assessment is to be used as an indication only and is to be seen as relative to the other technologies included in this guide. More specific costs and timelines are to be identified as relevant for the specific technology and geography.

Sources and further information

Cho, R. (2011). The Fog Collectors: Harvesting Water From Thin Air. Earth Institute, Columbia University. Available at: http://blogs.ei.columbia.edu/2011/03/07/the-fog-collectors-harvesting-water-from-thin-air/

Dar Si Hmad (n.d.) Fog-Harvesting. Darsihmad.org. Available at: http://www.darsihmad.org/fog-harvesting/

Gur, E. and Spuhler, D. (n.d.) Fog Drip. Sustainable Sanitation and Water Management (SSWM). Available at: http://www.sswm.info/content/fog-drip

OAS (n.d.) 1.3 Fog Harvesting. Organization of American States. Available at: http://www.oas.org/dsd/publications/unit/oea59e/ch12.htm

Quezada, A., Haggar, J., Torres, J. and Clements, R. (n.d.) Fog Harvesting. ClimateTechWiki. Available at: http://www.climatetechwiki.org/content/fog-harvesting

Wikipedia (2016). Fog Collection. Wikimedia Foundation. Available at: https://en.wikipedia.org/wiki/Fog_collection