



*"If the lesser Mount Hymettus, which is called the Dry Hill, has a cloud in its hollows, it is a sign of rain: so also is it, if the greater Hymettus has clouds in summer on the top and on the side, or if the Dry Hymettus has white clouds on the top and on the sides..."*

*(Theophrastes, 4<sup>th</sup> century B.C.)*

Theophrastes, the "Father of Botany", was an astute observer of nature as these weather observations in the hills near Athens show. He collected the type of data that we use today when planning fog collection projects. His cloud touching various levels of the mountains is the fog that now produces water in our projects.

## FOG COLLECTION IN NEPAL - NEW POSSIBILITY

Submitted by: Mohan Bahadur Karkee

For some time now, FogQuest has been assisting Canadian and Nepalese groups with fog collection projects in Danda Bazaar and elsewhere in Nepal (see the web site). Mohan Bahadur Karkee of the Department of Water Supply and Sewerage, visited the Tinjure area in Nepal in September 2002, during the preparation of his thesis, and offers these thoughts on the possibility of a new project there.

"Tinjure Bazaar is a very small settlement located at an elevation of 2854 m msl on the east-west oriented ridgeline. It is at the very top edge such that about 20 houses (all of them tea stalls) fit with difficulty. The houses lie in Tehrathum District, whereas the present fog collector site lies in Sankhuwasabha District. It falls on a trekking route to Kanchenjunga (second highest peak in the world) base camp. It is very beautiful and is surrounded by a jungle of rhododendron. The forest is marked as protected flora species by IUCN, Nepal. Water is so scarce here that



Girl carrying water on her back, Tinjure, Nepal.

a canister of 16 liters costs NRs. 40.00 (US\$ 0.5) and two hours time of fetching. One cannot get water until one dines or dwells. It can be noticed in the picture that a girl is carrying a water can in a bamboo basket traditionally known as a "Doko". This place is always shrouded in moving fog. Some SFC panels were installed by Nepal Water for Health (NEWAH) with Canadian assistance a few years back.



Mohan Karkee beside an SFC, Tinjure, Nepal.

Mohan Karkee

Now the people are desperately awaiting a fog project. They even demonstrated quite a good amount of willingness to contribute to it as per the prevailing practices. A fog project would really help minimize the burden on women and children since they are generally engaged in transporting water for their families."

## FOG COLLECTION IN LANZAROTE (Canary Islands)

David Riebold (FQ member 2003) has just received confirmation of funding for an initial fog collection evaluation in the Haria district of Lanzarote. The goal is to establish whether fog water can support a proposed reforestation program. The field work will begin later this year with participation by FogQuest. Lanzarote is the easternmost and most arid of the Canary Islands (Spain). It is at a latitude of 30° N and the site of interest is on the northern tip of the island. The island is well known for the innovative agricultural approaches that have been made over the years, to allow the cultivation of plants in an arid environment, with about 100 mm per year precipitation.



Editor

Dr. Robert Schemenauer

Contributions of short articles, news items and photographs for upcoming issues of the Newsletter are welcome. They should be sent to: FogQuest@rogers.com or to the address at the end of this Newsletter.

The Newsletter's primary purpose is to be a means of exchanging information with our members. We hope that it will also promote better communications between those working on water projects using fog, rainfall and dew collection, and those studying the many scientific aspects related to these atmospheric water sources. The Newsletter is sent three times a year to members of FogQuest: sustainable water solutions. The current issue is available on the web site [www.FogQuest.org](http://www.FogQuest.org). Information on membership can also be obtained on the web site.

# MEET THE STAFF



Marc Couture  
Financial Manager

Mark has a degree in physics, is a certified meteorologist, and has a masters degree in atmospheric sciences. He has spent 16 years with the Cloud Physics Research Division of Environment Canada. When he joined FogQuest in 2002, Mark saw the opportunity to expand his interest in financial matters by looking after the accounting database.

*"For me, FogQuest has been a real opportunity to pay back some of the good will shown to me by people I've encountered throughout my lifetime. The catchment of fog and rain for use as potable water, is both low-tech and stunningly ingenious. I hope that in the upcoming years that FogQuest will get the opportunity to show the cost effectiveness of fog collection when applied on a grand scale."*



## WHAT IS FogQuest?

FogQuest is an innovative, international, non-governmental, non-profit organization, which implements and promotes the environmentally appropriate, socially beneficial and economically viable use of fog, rain and dew as sustainable water resources for people in arid regions of developing countries.

## ETHIOPIA

Michael Kesterton's column in the Globe and Mail on 5 June 2003 had this poignant piece:

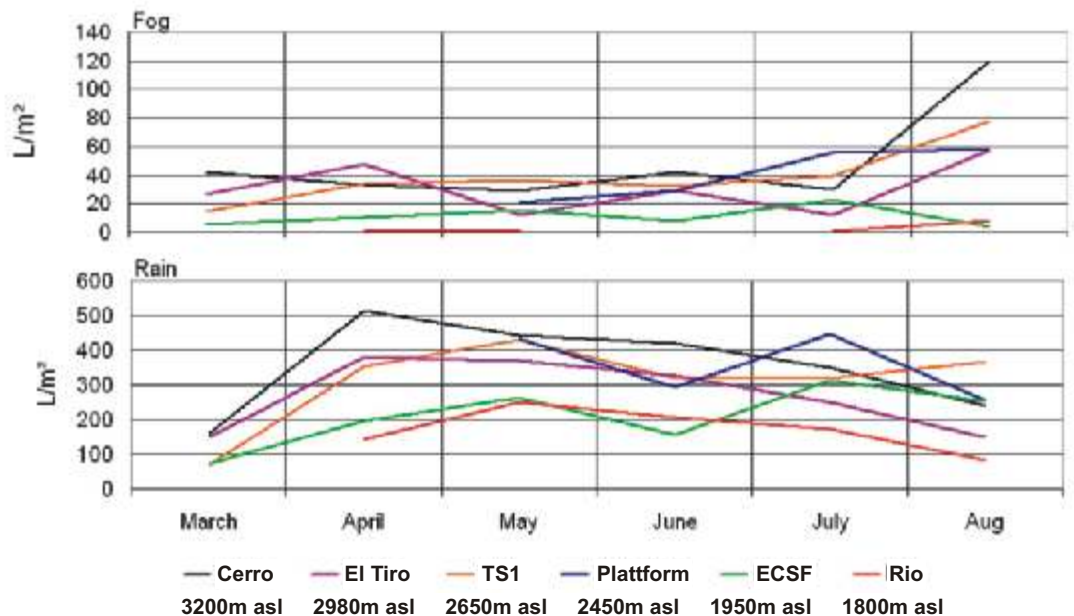
*"...Such debates may seem a million miles from the lives of those like Sema Kedir, the mother of three found hanging from a tree near her home in central Ethiopia. The only clue to her fate lay in the shattered remains of a clay pot nearby. She had collapsed on the final leg of the 12-mile hike from the nearest water well and spilled the precious liquid that would have kept her children alive for another day or two. Already in debt to a neighbour, she could not afford to raise money for a new pot: There seemed no way out."*

FogQuest has prepared a proposal, with the cooperation of two groups in Ethiopia, for a fog and rain collection project at sites both north and south of Addis Ababa. The country is gripped in drought, with severe crop failures. As the words above illustrate so clearly, water is life.

## HOW CAN YOU HELP?

Please consider taking out a membership in FogQuest. A solid network of members will be our means of spreading information on fog collection and generating support that is vital to our operations. The annual membership fee of \$35.00 Canadian, or \$25.00 US for those outside of Canada, can be paid by check or by credit card. We accept VISA or MasterCard. Students receive a \$5.00 discount on their membership fee. Donations from both individuals and institutions are encouraged and can be directed for general support or to our projects in Haiti, Chile, Yemen and Nepal.

### Fog and Rain input Southern Ecuador - (March - August 2002)



Fog and rain collection data for different altitudes in southern Ecuador.

# FOG IN A TROPICAL RAIN FOREST OF SOUTHERN ECUADOR

Submitted by: Sigrid Dengel (FQ Member 2003)  
Ruetger Rollenbeck, Germany

The project "Investigation of nutrient input by different precipitation types in tropical mountain forests" started in 2001 and is carried out by the Technical University Munich and Philipps University Marburg (Germany). It is financed by the German Research Council and is part of the research program "Functionality in a tropical mountain forest of southern Ecuador: Diversity, dynamic processes and potentials of use under the ecosystem aspect". The project is carried out in the provinces of Loja and Zamora-Chinchi, about 500 km south of Quito. The main sampling sites are within the research area of the Estación Científica San Francisco (ECSF) at the northern limit of the "Parque Nacional Podocarpus".

The aim of the thesis was the development of methods to quantify fog entering this valuable ecosystem and validation of the sampling setups used. To do so, sites were chosen to determine an altitudinal gradient, starting at 1800 m asl, at the river banks of the Rio San Francisco up to 3200 m asl, the Aerro de Consuelo. Further sampling sites were chosen to determine a spatial gradient. Each site is equipped with passive collectors and/or other active measuring setups. The instruments used are an active fog collector (NES210, impactor) connected to the ONED 250 fog detector and a present weather sensor (BIRAL - VPF-730, Scatterometer). In addition NOAA/AVHRR images were used, as well as data recorded by automatic weather stations within the entire research area. The passive collectors used in this work were modified standard fog collectors (SFC, Schemenauer & Cereceda 1994) and passive rain collectors. A sample of the weekly collected water was brought to a lab in Loja to measure the ion concentrations. The first results show significant altitudinal variations in the temporal and spatial domain. Two condensation levels could be distinguished. Also, the onset of the rainy season with an increase of advective fog types in the higher sites was observed. Total atmospheric water supply by fog is estimated to comprise from 5% (1800 m) to 20-35% (3200 m) of conventionally measured rain. Studies will be continued at least until 2005, hopefully giving an impression of seasonal and interannual variations.

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Sigrid Dengel

The TS-1 field site in Ecuador at 2650 m, with a modified SFC and a rain gauge.

# FOG RESEARCH IN PUERTO RICO AND COSTA RICA

Submitted by: Sampurno Bruijnzeel (FQ Member 2003)

Bob Schemenauer's great conferences on Fog and Fog Collection continue to spark off new initiatives. At the St. John's meeting (2001), Sampurno Bruijnzeel (Vrije Universiteit Amsterdam) ran into Werner Eugster and Reto Burkard of the University of Bern and before long plans were made for joint work in the humid tropics. In the summer of 2002, a two-month campaign (hosted by Fred Scatena of the International Institute of Tropical Forestry, Rio Piedras) was staged to compare rates of fog deposition derived with the eddy covariance set-up of the Swiss team with the catch of various kinds of fog gauges and measurements of crown drip made by Friso Holwerda (VUA) in an elfin cloud forest setting at Pico del Este (1015 m), Puerto Rico. Also, numerous samples were taken for stable isotope analysis. Rather large discrepancies between the two approaches were obtained that probably reflect effects of wind-driven rain and fog that are included in crown drip but not in the eddy covariance measurements.

The successful cooperation was continued in spring 2003, when Reto Burkard and Swiss student Simone Schmid travelled to Monteverde, Costa Rica to team up with forest hydrologists Arnoud Frumau and Conrado Tobon (VUA) and epiphyte specialist Lars Koehler. The VUA-led FIESTA project (Fog Interception for the Enhancement of Streamflow in Tropical Areas) is funded by the Forestry Research Programme of the

Department for International Development (DFID) of the British Government. It started in February 2002 and aims to evaluate the effect on streamflow regime of converting montane cloud forest to pasture. The proper quantification of precipitation inputs at this very wet and windy site at various levels of scale (up to 100 km<sup>2</sup>) is crucial and various complementary approaches are being tested, including the role of epiphytes and mosses in intercepting rain and fog. Other partners in the project include the National University of Costa Rica (Jorge Fallas), the Technological Institute of Costa Rica (Julio Calvo) and the Universities of London, California/Monterey Bay and Alabama (Mark Mulligan, Fred Watson and Robert Lawton).



Part of the field project team in Puerto Rico: Werner Eugster, Arnoud Frumau, Reto Burkard.

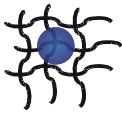


The Swiss field site in Puerto Rico.



Arnoud Frumau just before installing an automatic weather station in an emergent tree at 25 m in Costa Rica. Note the two funnels of the fog gauge separating vertical and horizontal precipitation.

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## 3<sup>rd</sup> INTERNATIONAL CONFERENCE ON FOG, FOG COLLECTION AND DEW CAPE TOWN, SOUTH AFRICA 11 - 15 October 2004

The next Conference in Cape Town is now in the active planning stages. Please note the modified title. We have now explicitly included the community of people working on dew in the new title. The Conference will be held in the Commodore Hotel on the waterfront. It will be organized by Professors Hannes Rautenbach and Jana Olivier of the University of Pretoria. For more information, please contact Professor Rautenbach at [hannes.rautenbach@up.ac.za](mailto:hannes.rautenbach@up.ac.za).

NOTE: You can still purchase copies of the Proceedings Volume of the 2001 Fog Conference through FogQuest. It is an important addition to a personal or institutional library.



Mohan Karkee

Mohan Karkee and Mingma Sherpa  
at the established fog collection site  
at Danda Bazaar, Nepal.

### NEWS

**Kirsten Moran**, who was a summer student with FogQuest last year, is doing groundwater research in Kingston, **Canada**, this year. She is interested in a Master's degree in a water field that has a component of international, social work. Any

offers? **Surender Singh** who had a paper in the 2001 Fog Conference on fog in **India**, has been awarded two gold medals by the President of India for his research work and his doctoral thesis. **Michèle Colomb** of LRPC in Clermont-Ferrand, **France**, has a facility to produce artificial fog to study visibility for driving safety issues. **Pierre Bonmarin** of CNRS has a large air/sea interaction simulation facility in Marseille, **France**. It consists of a 40 m water tank and a return air circuit with wind speeds up to 14 m s<sup>-1</sup>. The temperature of the water and air can be controlled along with the humidity. As well as many marine simulations, fog can be produced over the simulated ocean surface. If you are interested in using the facility, please contact Dr. Bonmarin at [bonmarin@irphe.univ-mrs.fr](mailto:bonmarin@irphe.univ-mrs.fr). **Anil Pokhrel** in **Nepal** reports that work is finished on a 20,000 L reservoir for the Danda Bazaar fog collection project and that



Fog arriving at Tinjure, Nepal.

they are looking at how to develop operational projects for Megma and Tinjure. **Robert Schemenauer** gave a lecture on fog collection, in June, at the Zayed International Centre in **Abu Dhabi**. **Melissa Rosato** will join FogQuest as a co-op student and work in the Toronto, **Canada**, office from September to December thanks to a grant from IDRC. **Guido Soto**, one of the partners in the original pilot project in **Chile**, is now the executive Director of the Centre of Water for Arid and Semiarid Zones of Latin America and the Caribbean (CAZALAC).

On 26 May another airplane accident occurred in **Turkey** because of fog. This accident in the northeastern part of the country killed 75 people. It followed by a few weeks a 150 vehicle traffic accident in New England (**USA**) that was also fog related. These are only but two examples of the large economic and human losses resulting from fog each year. Reports out of **India** indicate that incidences of dense fog in the winter months have been on the rise for the last six years. This last winter was particularly bad. In the Western Hemisphere, California (**USA**) has experienced consistently cooler and foggier than normal summers since 1998.

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