

Ventura College Sabbatical Leave Proposal
PROJECT SKYWATER for Fall 2017
Submitted by Roxanne Forde, PhD
Water Science Department
October 2016

Instructor's Sabbatical Leave Status

Full-time hire date: August 2011

Previous Sabbaticals: 0

Background of this Sabbatical Project

Water is the very essence of life itself. Humans can live only three days without water. Worldwide four million people die each year due to water-borne diseases. Can you imagine never having a drink of clean water for your whole life, never able to wash your hands or your food in clean water? Water in Western Europe and the USA continues to become more polluted from industry or simply less available due to severe droughts.

California is in the 6th year of a very serious drought. The aquifers are at an all-time low and available State Water from Northern California is intermittent. Having alternative sources of water is an absolute necessity. This project develops a new source of fresh, clean water, and this technique can be used anywhere in the world to improve the quality of human life.

Qualifications of Applicant

EDUCATION & EXPERIENCE

- A. B.S. Environmental Microbiology
- B. Ph.D. Environmental Engineering
- C. Water Research Scientist – 10 years
- D. Project Manager for more than 1000 water projects in 33 countries and 46 states – 15 years
 - NASA
 - United Nations
 - Lawrence Livermore National Labs
 - European Union
- B. Professor of Environmental Engineering at Brandenburg Technical University – 5 years
- C. Professor of Water Science at Ventura College – 6 years
- D. Director of Water Board – 6 years

Components of Sabbatical Project

- Initiating
- Planning
 - Scope
- Executing
 - Resources
 - Time
- Monitoring & Controlling
 - Risks
 - Quality
- Closing & Marketing

Goals of this Sabbatical Project

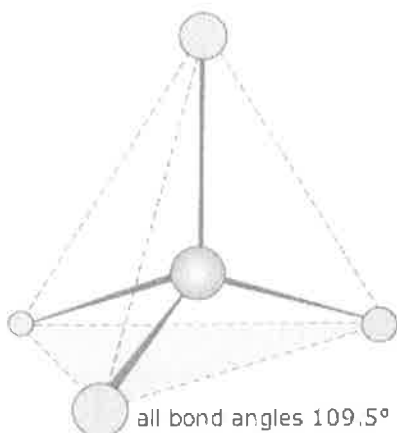
Projects are defined by the Project Management Institute as “temporary endeavors undertaken to create a unique product, service or result.”¹

PROJECT SKYWATER has several goals:

- Develop a new water source
- Provide students from multiple disciplines the opportunity have a hands-on role
- Incorporate the specialized knowledge of professors in related programs
- Establish an atmosphere of teamwork and accomplishment on campus

Scope of this Sabbatical Project

PROJECT SKYWATER will be conducted on the Ventura College campus, and involves the design and construction of two atmospheric collection structures. That water thus withdrawn from the atmosphere will be utilized for irrigation purposes. The construction will be both functional and artistic. Since life consists of water & carbon along with some trace elements, the design of these structures will somewhat replicate the carbon tetrahedron as the central unit with water molecules attached to it. In addition, there will be a wind-driven compressor on top of each unit that will extract additional water. PROJECT SKYWATER demonstrates to students that not only are solutions to the drought possible but they too can contribute. We are expecting a water delivery of 25 – 100 gallons per day/unit.



One side of each tetrahedron will support the orange-colored air extraction membrane, thus resembling ship's sail.

A second side of each tetrahedron will support a photovoltaic solar panel, which in turn, provides electricity to operate the associated water pump.

The third side of each tetrahedron might be utilized by the Art Department for various displays.

The mathematics for determining water extraction from humidity involve relative humidity is at all temperatures and pressures defined as the ratio of the water vapor pressure to the saturation water vapor pressure (over water) at the gas temperature:

$$RH = P_w/P_{ws} \cdot 100\%$$

The total pressure does not enter the definition. Above 100°C the same definition is valid.

But as the saturation vapor pressure P_{ws} is greater than 1 013 hPa (normal ambient pressure) the RH can't reach 100% in an unpressurized system. Below 0°C the definition is also valid. Here 100%R is also impossible because condensation will occur at a lower humidity than 100% (when the vapor is saturated against ice).²

¹ PMBOK Guide, Fourth Edition

² Water & Wastewater Calculations Manual, Second Edition

Parts per million values are usually given vs. the amount of dry air:

I: Volume/volume PPM_v(dry):

$$PPM_v = \frac{P_w}{P_{tot} - P_w} 10^6$$

Where

P_w = Water vapour pressure

P_{tot} = Total pressure

II: Mass/mass PPM_m(dry)

$$PPM_m = \frac{M_w P_w}{M_d (P_{tot} - P_w)} 10^6$$

$$\frac{M_w}{M_d} = 0.62199$$

Where

P_w = Water vapour pressure

P_{tot} = Total pressure

M_w = Molecular mass of water

M_d = Molecular mass of dry air

From wet air:

III: Volume/volume PPM_v(wet):

$$PPM_v = \frac{P_w}{P_{tot}} 10^6$$

Value of Sabbatical Project to VCCCD

Because this project scope is so large, it will require collaboration between Ventura College and Moorpark College. This will build bonds and friendships through teamwork on a common goal, in turn enhancing the District. Another benefit of this project involves the positive public exposure from local newspapers and television during the opening ceremony. This project will be published in the esteemed *Journal of the American Water Works Association* (the largest & oldest water agency in the world).

Value of Sabbatical Project to Ventura College

The collaboration between administrators, faculty programs and classified workers to work together will enhance the entire campus and inter-college sense of oneness. Students will learn new methodology, and faculty will find new ways of incorporating material into the classroom setting. In addition, there will be an air of creativity and accomplishment for the entire campus. Departments involved in the project will include; Water Science, Construction, Architecture, Manufacturing, Welding, Automotive, ESRM, Child Development, Art, M&O, and Moorpark Solar.

Value of Sabbatical Project to Ventura College Students

- **Water Science Students** – participating in a lead role in an actual project
- **Construction Students** – leading actual hands-on construction
- **Architecture Students** – creating the Computer Aided Design work & confirmation of materials of construction
- **Manufacturing Students** – creation of the 3-D model from 3-D printers
- **Welding Students** – building the tetrahedron framework
- **Automotive Students** – selection of air compressors
- **Art Students** – displaying large artforms
- **Solar Tech Students** – building and installing the solar panels

Value of Sabbatical Project to the Instructor

As the principal designer and project engineer, I will be able to practice my field of engineering and teach simultaneously. It will also bring awareness of environmental and water issues awareness to the entire county with the potential of dramatically increasing Water Science enrollment.

Thank you,

Roxanne Forde, Ph.D.

