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AREAS OF PROFESSIONAL WORK

Project Management; Stormwater Management; Water Quality; Wetland Identification and Mitigation; Floodplain Management; Dams and Reservoirs; Watershed Modeling – Hydrology and Hydraulics; Water Quality Modeling; Water Resources Planning; Irrigation; Field Studies; Erosion and Sediment; Bridge Hydraulics; Scour Evaluation Studies; GIS/Remote Sensing/Computer Programming; Environmental Impact Assessment, Environmental Site Assessment/NEPA Reporting; Other Environmental Projects; and Groundwater Modeling.

SUMMARY OF EXPERIENCE

I have over 28 (twenty-eight) years of in-depth experience (including over seven years at the South Florida Water Management District) in environmental and water resources planning and engineering projects and programs. My project work included surface and ground water hydrology and hydraulics, stormwater management, wetland, water quality, GIS, and extensive use of various hydrology, hydraulic and water quality computer models. I have worked on several assessments and evaluations, site investigations, feasibility studies, cost estimates, conceptual plans and designs, preliminary and final designs. In addition, I had prepared several environmental impact statements, NEPA environmental assessment, Expert in obtaining various environmental and Clean Water Act related permits from various local, State, and Federal government agencies. I have been teaching graduate classes at the universities and technical short courses to the in-house staff and in professional organization (ASCE). My project management experience includes budgeting, scheduling, and performing work-within budget and on time, QA/QC, and supervision of staff.

EDUCATION, TRAINING & LICENSES

Ph.D., Major: Agricultural Engineering; Minor: Civil Engineering,
Oklahoma State University, Stillwater, OK, 1983
M.S., Water Resources Engineering, Asian Institute of Technology, Bangkok, Thailand, 1978
B.Tech., Engineering, J.N.A. University., Jabalpur, India, 1976

Graduate Studies, Engineering Management, University of Virginia, Falls Church, VA, 1987

Registered Professional Engineer (Civil Engineering): Florida, Maryland, and Pennsylvania

PROFESSIONAL EXPERIENCE

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

- Technical lead and editor for a technical publication on "Hydrologic Monitoring Network in South Florida Water Management District". This publication was prepared by a group of engineers (March 2008).
- Co-author of the Chapter 2 – Hydrology for South Florida Environmental Report - 2008, (May 2006– on going).
- Project Manager for "Acquisition of NEXRAD Data for the District". The District is receiving the NEXRAD data from an external vendor (Vieux and Associates, Inc.). The data are received at 15-minute intervals for the entire District jurisdictional area. The vendor provides two types of data. First data type is near-real time (NRT) and second data type is end-of-month (EOM). Both data type use the District provided rain gage data to the vendor for their incorporation into the vendor's deliverables.
- Provide technical support to internal and external customers on NEXRAD database and Data Retrieval Application. (August 2002 to current).
- Team member as Subject Matter Specialist for the ArcHydro Geo-database Development Team. (April 2004 – on going).
- Project Manager for "In-Filling Missing Historical Daily Rainfall Data from the Long Term Rain Gauge Stations in Central and South Florida" The project is being performed by Dr. Upmanu Lal of Columbia University, New York, NY (May 2006 – December 2007).
- Project Manager for a contractual project on "Stage Monitoring Network Design for Everglades Areas" (April 2006 – December 2007).
- Project Manager for development of MIKE FLOOD model (2-D hydraulic model) for STA-2 for improvement of operations of the several gated water control structures (constructed wetlands with three cells with each cell approximately 2200 acres) (October 2005 – June 2007)
- Project Manager for "Rain Gage Network Optimization Study". This project was performed by Vieux and Associates, Inc. (June 2006).
- Project Manager for "Satellite Based Estimation of Potential Evapotranspiration and Reference Evapotranspiration for Florida". The project is a three year work effort that began in February 2005 and being performed by USGS in cooperation with three Water Management Districts. (March 2004 – June 2008).
- Project Manager for a contract to develop and implement software for NEXRAD data storage and retrieval from District Corporate Database DBHYDRO including GUI development for the end users. (October 2002)
- Project Manager for the STRIVE (Structure Information Verification) Project to improve the flow data quality for 200 structures by using recently field acquired topographic data. (September 2002)
- Worked on a pilot program within the Operations Control Center (OCC) for eight months. Worked weekdays (about 3 to 4 hours a day) under the guidance of Ron Mierau and George Hwa and learned day to day operations of the water control structures. (June 2005 to January 2006).

- Working with technical team meetings on Water Quality Network Optimization Study and provided technical input to the team and to the Contractor (Battelle, Inc.). (June 2006).
- Completed a project as a Project Manager on "Work Plan and Level of Efforts Development for Flow and Stage Network Optimization for the SFWMD". The project was performed with Taylor Engineering Inc. (September 2005).
- Completed a project as a Project Manager on "Pilot Study for Flow and Stage Network Optimization". The project was performed with Taylor Engineering Inc. and Dr. David Maidment. (July 2005).
- Completed a project as a Project Manager on "Enhancement of Stage Network for Everglades Wetland Area – Pilot Study" The project was performed with Taylor Engineering Inc. (July 2005).
- Technical lead on developing "rainfall by watershed" ArcHydro tool, by the GIS Division of the IT Department, for extracting NEXRAD rainfall data. The tool is under testing phase now. This tool was the first tool developed approximately two years ago (2003) using ArcHydro schema. This tool will be enhanced and integrated with AHED database. (June 2006)
- Developed and managed budgets for multiple projects in Hydrology and Hydraulics Division for FY03, FY04, FY05, FY06, FY07, FY08 and FY09.
- Co-author of the Chapter 2 – Hydrology for South Florida Environmental Report - 2007, responsible for "water management" portion of the chapter (September 2006).
- Presented technical presentation on "Rainfall Monitoring Using NEXRAD Data for Water Management in South Florida" during First Florida Radar Rainfall User Workshop" on November 15, 2005 at University of Central Florida, Orlando, Florida.
- Mentoring Mr. Philip Chanen, Undergraduate Intern, University of Florida, work effort involves Climate Changes in Central and South Florida. (May 2006 – August 2006)
- Thesis Advisor for Ms. Courtney Skinner, Graduate Student, Florida Atlantic University. Her thesis title is "Investigation of the Correlation between Rain Gage Measurements and NEXRAD Generated Rainfall Values in South Florida". (December 2005 – October 2006)
- Review and approve Weekly Shark River Slough Reports that are used by the District and US Army Corps of Engineers for Water Control Operations of S12A, S12B, S12C, S12D and S333 structures. Also, provide external customer support on the technical aspect of the project data when requested (Continually on-going).
- Worked with Acceler8 – STA Expansion Projects that included STA 6 - Sec.2; STA2 –Cell 4; and STA 5 – Flowway 3. Work included attending project meetings and providing technical input and review comments to the team and the Contractors for BODR and 60 % and 90% Design. (June 2006)
- Completed "Evaluating and Improving Flow Data Quality Using STRIVE Data at Water Control Structures" a Technical Publication # 428 – July 2005.
- Completed development of ArcIMS based web enabled application for NEXRAD data retrieval. The application provides varied spatially and temporally aggregated datasets in tabular and image formats. (December 2004).
- Coordinated with H. Ehmke on field survey for flow structures. Approximately 40 water control structures were field surveyed by Survey Contractors under STRIVE project. (June 2003 to June 2004).

- Managed a Contract with PHS Engineering and reviewed work performed by the contractor (PHS Engineering) on flow data quality improvement using STRIVE data project. Flow data for approximately 250 structures were evaluated by considering accurate topographic survey of structures that were obtained under STRIVE project. (March 2003 to May 2005).
- Coordinated with IT Department staff (Sue Denman and Sara Stanton) on STRIVE Database development and implementation. (June 2004 to May 2005).
- Reviewed the flow rating reports for flow structures for STA2 – G332, G334, G329, G331, G333 and G330. (May 2003 to May 2004).
- Developed a status reports for all the flow structures in STA2 Scheduled field surveys for flow structures. Developed tactical plan for stream gagging for STA2 flow structures. (August 2002 to August 2004)
- Developed a "White paper on Evapotranspiration (ET) Monitoring and Studies in the District" that included comprehensive issues on ET at the District. (March 2004).
- Developed a draft SOW for Rain-gage Network (with over 300 rain gages) Optimization Study within the District by using ArcGIS and spatial analysis of the network. (January 2004)
- Developed an implementation plan for computing Potential Evapotranspiration (ET) for the 18 stations in the District and Coordinate ET monitoring projects with Office of Modeling and Resource Assessment Division. (January 2004)
- Develop a "White Paper on Water Quality Modeling Issues for CERP Projects" and presented to RECOVER Water Quality Team. (October 2003)
- Provided technical information to GIS Division and Weather Group in Operation Control Room at the District regarding NEXRAD database, data mining scripts and web user interface. (April 2003)
- Prepared SOW for revision of NEXRAD data uploading script to database and enhancement of web user interface. (November 2003)
- Developed tactical plans for streamgaging for various flow control structures at STA2 and prepared revisions of flow rating curves for G330, G332, G334, G329, G331 and G333 structures. (January 2003 to current)
- Developed a SOW for Enhancement of Stage Monitoring Network for Greater Everglades Wetlands Area. Managing SESS contract with Taylor Engineering, Inc. to perform the study. (August 2003 to current)
- Developed SOW for Stage and Flow Network Optimization Study. Managed SESS contract with Taylor Engineering, Inc. to perform the study. (August 2003)
- Developed SOW for a work order on flow data quality improvement using STRIVE data. Negotiated with the SESS contract on the work order. Supervising Consultant to perform Task 1 and 2 of the SOW for a work order on flow data quality improvement using STRIVE data. (January 2003 to current)
- Provided support to Project Manager (Pete Kwiatkowski and Richard Nevulis) in developing SOW for water quality data analysis and developing water quality sampling triggers based on storm events for CERP- Regional ASR Project. Reviewing water quality report produced by PBS&J (December 2002 to May 2003)
- Team Leader for Water Quality Subteam of PDT for CERP- C43 BSR Project. Presented several presentations on water quality issues to PDT. Provided support to Project Manager (Agnes Ramsey) in reviewing work products from Stanley Consultants. (October 2001 to current)

- Team Leader for Water Quality Modeling Subteam of PDT for CERP- EAA SR Project. Presented several presentations on water quality issues to PDT Provided support to Project Manager (Angela Prymus) in developing SOW for water quality data analysis and reviewing work products from Kimley-Horn & Associates, Inc. Provided technical support to Dr. Robert Knight (of Wetland Solutions, Inc.) on water quality issues in EAA(October 2001 to current)
- Attended several RECOVER – Water Quality Team meetings. Presented a presentation on water quality modeling issues to RECOVER Team. Organized and chaired several water quality modeling sub-team meetings.
- Provided project management support to the Project Manager (John Raymond) for four months on HSM Data Request Project. (October 2002 to January 2003)
- Performed QA/QC for flow data for the 30-year period-of-record for 12 flow structures. (October 2002 to January 2003)
- Providing technical support to streamgaging crew on updating the flow equations for twenty flow structures located within Stormwater Treatment Area 2 (STA2). (September 2002)
- Member of a selection committee for Flow Monitoring Assistance Contract with Hydrology and Hydraulics Division. Eight contractors were awarded $3 million contract for a period of three years. Participated in contract negotiations with the selected contractors as a member of negotiation team (August 2002).
- Contractor selection committee member for supporting C-43 Basin Storage Reservoir Project. The contractor was awarded $3.5 million contract for a period of three years. Also, participated in contract negotiations with the selected contractor as a member of negotiation team (July 2002).
- Project Delivery Team (PDT) member for C-43 Basin Storage Reservoir Project (a CERP project) (2001-2002).
- Organized a one-day meeting “Lesson Learned from Stormwater Treatment Areas”. This meeting included several disciplines that included water quality. The meeting was participated by District’s about 40 multi-discipline scientists and engineers. (August 2002).
- Performed evaluation and assessment of surface water quality models (i.e. DMSTA, PSTA and SAV Models) for various biological water treatment processes used in Stormwater Treatment Areas (STAs) (2001-2002).
- Performed water quality data review that was collected for PSTA and SAV treatment technologies research from several test cells of STA1W and STA2 (2001-2002).
- Reviewed contractor’s (CH_2MHill, Inc.) several water quality reports on PSTA treatment technology (2001-2002).
- Reviewed contractor’s (DeBusk Env. Consultant, Inc.) water quality report on SAV treatment technology (2001-2002).
- Participated in several external scientific advisory committee meetings on PSTA and SAV treatment technologies (2001-2002).
- Participated in several “STA Design Review” monthly meetings organized by Dr. Gary Goforth and Ms. Tracey Piccone (2001-2002)..
- Supported contractors (CH_2MHill and DeBusk Env. Consultant) on water quality modeling tasks on PSTA and SAV treatment technologies (2001-2002).
- Made several site visits to test cells to view performance of the PSTA and SAV biological water treatment processes (2001-2002).

- Developed review comments on water quality and permit related issues for various CERP Project Management Plans (PMPs) and CERP Permitting documents (December 2001).
- Familiar with IOP/ISOP/CSOP and Modified Water Deliveries related with WCA Discharges to Everglades National Park (2001).
- Revised Visual Basic computer program based on Interim Structural and Operation Plan (ISOP 2001 dated Nov 1, 2000) for WCA3A Rainfall Based Management Plan to compute weekly target flows for S12A, S12B, S12C, S12D and S333 structures. (December 2001)
- Responsible for providing weekly target flows for S12A, S12B, S12C, S12D and S333 structures to internal (District) and external (Corps of Engineers and Everglades National Park) customers (from March 2001 to August 2001).
- Developed automated system for reporting the weekly target flows for S12A, S12B, S12C, S12D and S333 structures on World Wide Web (March 2001 – August 2001). (http://www.sfwmd.gov/org/ema/reports/sharkriver/index.html)
- Developed Visual Basic computer program for WCA3A Rainfall Based Management Plan to compute weekly target flows for S12A, S12B, S12C, S12D and S333 structures (March 2001– August 2001).
- Completed "Frequency of Daily Rainfall Maxima in Central and South Florida – Technical Publication 390 – January 2001 ".
- Application of ArcView and Surfer software in Rain Gage Selection and Spatial Analysis for Rainfall Frequency Analysis (1999-2000).
- Best Management Practice (BMP) Water Makeup Model for EAA:
  -Attended a inter-divisional meeting on data revision for year 2000 model run
  -Reviewed the rainfall and flow data used in BMP model
  -Revised the rainfall and flow data in BMP model
  -Compared the results of the model due to data revision in the model
  -Completed model runs for year 1999-2000
  -Prepared memorandum to Operation and Maintenance Division
  on the model results for year 1999-2000 run
  -Organized inter-divisional meeting for updating EAA runoff equations used in the BMP model
  -Presented the updated EAA runoff equations in a Public Meeting on July 21, 2000 at Belle Glades, FL .
- Prepared Monthly and Weekly Hydrologic Conditions Reports (to Governing Board) for Water Shortage Conditions within the District (from November 2000 to September 2001).
- Hydrologic data quarterly QA/QC for Everglades Agricultural Area (EAA) for over two years [1999 to 2001] (includes ten rain gage sites and fifteen flow structures).
- QA/QC of flow data for STA2 structures. (1999-2000)
- Contributed to the "SOP for Flow Data Changes in the DBHYDRO Database Report". (1999-2000)
- Stormwater Treatment Area (STA) 3 & 4 Obtained available information and report. Reviewed the feasibility report and information. (1999-2000)
- Monthly Hydrologic Projection Model run to forecast Lake Okeechobee stages for next six months (model run from August 1999 to May 2000).
- Field Visited the Following Structures and Sites in the District : (1999-2000)

-S2,S3,S5A,S6,S7,S8,S352,S150,G352D,G600,G606,G607,G301,G302, G325,
-STA 1E, 1W, 2, 5 and 6
-S72, S65E, S193,S154,S133,S127,G208, Fish Eating Creek, Taylor Creek

- Reviewed several District Publications related to the Hydro-meteorological Data Collection System and Hydrologic Data Analysis and Reporting. (1999-2000)
- Data Access, Data Retrieval and Data Loading from DBHYDRO and USGS database using PL/SQL and ODBS interface. (1999-2000).
- Peer reviewed several Division and Department Publications. (1999-2005)
- Selection committee member for Expert Assistance Committee for the District (2001).
- Selection committee member for Senior Engineering Associate position in the Division (2001).
- Selection committee member for Senior System Analyst/Programmer position in the Department (2000).
- Selected Formal Training includes: (1999-2005)
  - Essentials of Communicating with Diplomacy and Professionalism
  - Time Management
  - Managing Contractors
  - Presentation to Governing Board
  - Tapping Star Quality
  - Performance Management
  - People Mapping
  - Communication Skills for Engineers
  - ArcGIS8.1
  - Project Management Plan Preparation for Comprehensive Everglades Restoration Plan (CERP)
  - Mastering PL/SQL
  - Visual Basic for ACCESS and EXCEL
  - ArcView Spatial Analyst
  - USGS Streamgaging Workshop
  - Damage Assessment Team Training
  - CPR Training

CONSULTING FIRMS, INSTITUTIONS AND UNIVERSITIES

PROJECT MANAGEMENT

Broad Creek Wastewater Pumping Station, WSSC, Prince Georges County, MD. Project involved survey, civil, site and various environmental permits for the design of the facility (1991).

Wheaton Pumping and Storage Facilities, WSSC, Montgomery County, MD. Project involved survey, civil, site and various permits for design of the project (1992).

Seneca Wastewater Pump Stations No. 1 and 2,_WSSC, Montgomery County, MD. Project involved feasibility study for expansion and upgrade of the facility (1993).

Wetland Identification, Delineation and Mapping, Open-end Contract with Environmental Division of Maryland State Highway Administration, Baltimore, MD (contract from 1990 to 1993).

Hydrologic and Hydraulics Studies & Design, Open-end Contract for Bridge Design Division of Maryland State Highway Administration, Baltimore, MD (contract from 1989 to 1993).

Team Leader for development of "Criteria and Guidelines for Project Management of Large Projects" (including environmental restoration and waste management projects) for the Office of Engineering and Cost Management, Office of Environmental Management, DOE Headquarters (1994 to1995).

Team Leader for developing historical cost database of remedial activities of federal environmental restoration projects using HCAS (Historical Cost Analysis System) software for the Office of Engineering and Management, Office of Environmental Management, DOE Headquarters (1994 to1995).

STORMWATER MANAGEMENT

Stormwater Management Study, Fort Detrick, Frederick County, MD, for the U.S. Army Corps of Engineers, Baltimore District. Project Manager for development of a detailed stormwater management master plan in accordance with applicable Federal, State and local rules and regulations.

Storm Drainage System Development, Wallops Island, Accomack County, VA, for the U.S. Naval Facilities Command. Project Manager. Providing conceptual design and cost estimates for a storm drainage system for a proposed 60-acre parcel including offices and residences.

SWMM Modeling Study, City of Tetouan, Morocco. A SWMM model was developed as a part of Master Plan Study. The model was developed for detailed continuous simulation of a selected time period. The objective of the modeling was to establish load and concentration of the selected pollutants from the existing and proposed land use conditions.

Combined Sewer Overflow Study, City of Enid, Oklahoma. The project involved development of SWMM model. A combined overflow sewer network was identified and data was developed for the SWMM model. The model was calibrated for the observed flows. The model results were analyzed. The sewer rehabilitation and improvements were identified and recommended.

WATER QUALITY

Stormwater Quality, Fort Detrick, Frederick County, MD, for the U.S. Army Corps of Engineers, Baltimore District. Project Manager for a study conducted to determine the effects of the proposed stormwater management plan on water quality. The study was performed to obtain permits from Federal, State and local agencies.

Nonpoint Source Pollution (NPS) Modeling, Central OK. Evaluated the CREAMS computer model for nitrogen, phosphorus, and agricultural pesticides. Analyzed the model's performance based on available three-year observed data from a U.S. Department of Agriculture (USDA) grassland watershed. Used the CREAMS computer model to evaluate grassland watersheds for NPS pollution.

Water Quality Model for Zarqa River, Zarqa River Basin, Amman, Jordan, US Agency for International Development (USAID). Task Leader/ Senior Engineer. Developed EPA QUAL-2E model. The model was calibrated based on five years of water quality data. The model was used in assessing the impact of wastewater effluent from the existing and proposed municipal wastewater treatment facility.

WETLAND IDENTIFICATION AND MITIGATION

Middleton Golf Course, Prince George's County, MD for the Middleton Properties. Project Manager. Conceptual plans were prepared for the wetland mitigation. The plans included conceptual design of wet ponds with aquatic bench, newly created wetland areas for the proposed golf course.

Wetland Identification and Mapping, Andrews Air Forces Base, Maryland

Several Wetland Identification, Flagging and Mapping Projects using the US Army Corps of Engineers Manual.

WATERSHED MODELING - HYDROLOGY AND HYDRAULICS

Cattail Watershed Modeling, Department of Public Works, Howard County, MD. A Hydrologic model using SCS TR-20 for 120 square miles of watershed was developed. Also, developed HEC-2 models for the main stream and 22 tributaries. The project included calibration of TR-20 and HEC-2 models.

Choptank River Watershed Modeling, Maryland State Highway Administration. The project included development of peak runoff discharges for various frequencies. Three different methods were used in developing these discharges.

Various other watershed models were developed. Various hydrologic computer programs such as TR-20, HEC-1, SWMM and others were used in developing the watershed models.

FLOODPLAIN MANAGEMENT

Real Time Flood Warning and Response System for Paxton Creek, City of Harrisburg, Dauphin County, PA, for the U.S. Army Corps of Engineers, Baltimore District. Project Manager. The project included the flood stage inundation mapping and improvements to the existing flood warning and response system for Paxton Creek. The system consists of one rain gage and one combination rain-stream gage, which is networked with a microcomputer through the telemetry. The system is operated by the River Forecast Center of tile National Weather Service. The recommendations for improvement included the hydrologic forecast modeling using the Sierra Misco enhanced ALERT/IFLOW software.

National Flood Insurance Program, Washington, D.C., for the Federal Emergency Management Agency (FEMA). Performed Hydrologic and Hydraulic reviews for Flood Insurance Studies (FIS) and Flood Boundary and Floodway Maps (FBFM) for FEMA Regions 8, 9, and 10. Prepared project reports for FIS revisions.

Flood Insurance Studies, for the U.S. Army Corps of Engineers, Tulsa and Little Rock Districts. Developed Hydrologic and Hydraulic models, and floodplain maps in accordance wine FEMA standards for the following counties and communities:

Reno County, KS: Arkansas River and its tributaries;
Clay County, AR: All 3 rivers and 52 streams;
City of Bald Knob, AR: All 12 streams

Flood Control Appraisal Studies (Section 205), AR, for the U.S. Army Corps of Engineers, Little Rock District. Project Manager for several small studies in Arkansas.

Backwater Hydraulic Model, Caney River, Tulsa, OK, for the U.S. Army Corps of Engineers, Tulsa District. Developed HEC-2 hydraulic model for backwater studies.

DAMS AND RESERVOIRS

Risk Analysis, Table Rock Dam, Table Rock, AR, for the U.S. Army Corps of Engineers, Little Rock District. Conducted a risk analysis of the Dam.

Water Control Manual, Bardwell Reservoir, Waxahachie, TX, for the U.S. Army Corps of Engineers, Galveston District. Prepared the water control manual for the reservoir.

Water Control Manual, Hulah Reservoir, Copan, OK, for the U.S. Army Corps of Engineers, Tulsa District. Prepared the water control manual for the reservoir.

Dam Site Analyses, Ta Chia River Basin, Taiwan**,** for the Taiwan Power Company. Performed analyses of feasible alternative sites for new dams.

Reservoir Operations Management, Ta Chia River, Taiwan, for the Taiwan Power Company. Determined optimal operation of reservoirs, which were in series on the Ta Chia River.

Spillway Design, Northwest AR, for the Arkansas Soil and Water Conservation Commission. Designed spillways for the Dardanelle and Fayetteville Reservoirs.

Dam Breach Analyses and Flood Inundation Studies, Little Rock and Fort Smith, AR, for the Arkansas Soil and Water Conservation Commission. Performed analyses and studies for Foreman and Shadow Lakes.

WATER RESOURCES PLANNING

Amman-Zarqa Wastewater Master Plan and Feasibility Study for the US Agency of International Development (USAID) and the Government of Jordan, Amman, Jordan. Task Leader/Senior Engineer. Wastewater effluent quality and reuse were studied as a part of the Master Plan. Water quality models (EPA- QUAL-2E and COE –QUAL2LR) for the Zarqa River and King Talal Reservoir were constructed, calibrated and used. The major portion of the flow in the river is wastewater effluent. Wastewater effluent quality was considered for reuse purposes under existing and future (for next 25 years) conditions.

Hillsboro Canal Project, Palm Beach and Broward Counties, FL, for the South Florida Water Management District. Project Manager/Senior Engineer. Conducted a study of Hillsboro Canal basin identifying key issues regarding management of surface water. Gathered hydrologic and hydraulic data and developed TR-20 hydrologic and DWOPER hydrodynamic models for the basin. Estimated existing and future flooding elevations in the basin and developed basin rule for surface water management.

Stormwater Master Plan, for the City of Little Rock, AR. Hydrologic Engineer, Developed several HEC-1 hydrologic models for various urban watersheds and HEC-2 hydraulic models for several streams. Recommendations were made for locating regional stormwater detention basins to the city. Five regional stormwater detention basins (wet and extended) were conceptually planned and designed.

Hillsboro Canal Project, Palm Beach and Broward Counties, FL, for the South Florida Water Management District. Project Manager/Senior Engineer. Conducted a study of Hillsboro Canal basin identifying key issues regarding management of surface water. Gathered hydrologic and hydraulic data and developed TR-20 hydrologic and DWOPER hydrodynamic models for the basin. Estimated existing and future flooding elevations in the basin and developed basin rule for surface water management.

IRRIGATION

Prepared Report on Irrigation Potential in Jordan Valley, Zarqa River Basin, Amman, Jordan, US Agency for International Development (USAID). Task Leader/ Senior Engineer. Developed irrigation potential from wastewater effluent for next 25 years. Studied water quality issues for irrigation and its impact on existing cropping pattern. Recommended future cropping pattern for a portion of Jordan Valley that could be using wastewater effluent. Developed economic losses due to increased salinity of irrigation water.

Irrigation Scheduling, Bangkok, Thailand, for the Asian Institute of Technology. Developed a computer model to develop irrigation schedules for part of northeast Thailand.

FIELD STUDIES

Hydrologic Data Collection, Central OK. Supervised operation and maintenance of five rain gages and five runoff gages located on five large USDA grassland watersheds.

Micro-climatological Data Collection, Bangkok, Thailand, for the Asian Institute of Technology. Used various instruments to determine soil moisture and evapo-transpiration in situ to evaluate efficiency of different field irrigation techniques.

EROSION AND SEDIMENT

Channel Aggredation and Degradation of Salt River, Pima County, AZ. Project Reviewer. Reviewed tile Salt River aggredation and degradation study. The study utilized HEC-2 and HEC-6 models. The study was used for design of 400 feet span bridge over Salt River in Pima County, AZ.

Erosion and Sediment Control Study, Fort Detrick, Frederick County, MD, for the U.S. Army Corps of Engineers, Baltimore District. Project Manager for a study conducted to determine the effects of proposed development presented in comprehensive development plans. The study performed to obtain permits from Federal, State and local government agencies and also included the development of mitigation alternatives.

Sediment Pond Design, OK and AR. Used SEDIMOT and CREAMS computer models to design ponds for control of sediment from strip coal mines.

BRIDGE HYDRAULICS

Minnesota Avenue Bridge over Watts Branch**,** Department of Public Works, Washington, DC. The project involved hydraulic design to establish opening size of the proposed bridge.

Maryland Route 550 Bridge over Owens Creek, Maryland State Highway Administration. The project involved hydraulic design as per MDOT standards.

Several other bridges and culverts were hydraulically designed.

SCOUR EVALUATION STUDIES

Minnesota Avenue Bridge over Watts Branch, for Department of Public Works, Washington DC. The evaluation was performed using HEC- 18 for the proposed new bridge. The proposed abutment footings and foundations were analyzed against estimated potential scour depths.

Parkwood Street Bridge over Beaverdam Creek, for Department of Public Works, Prince George's County. The study involved estimating maximum potential scour depths using procedures outlined in HEC-18 for the proposed new bridge. Also, recommendations were made to reduce scour consistent with HEC-20.

Maryland Route 25 Bridge over Georges Run, for Maryland State Highway Administration. The study was performed to estimate potential scour depths for the existing bridge. Recommendations were made for strengthening the foundations and reducing the scour.

Bridge Scour Analysis for Brock- Bridge over Little Patuxent River, for Anne Arundel County, MD, Department of Public Works. Project Manager. The analysis was based on precepts set forth in FHWA Technical Advisory T5140.20 entitled "Interim Procedures for Evaluating Scour at Bridges" published in September 1988 and updated November 1988.

Bridge Scour Analysis for Proposed Bridge over Northeast Branch**,** for Prince George's County, MD, ACF Properties. Project Manager. The analysis was performed using FHWA Technical Advisory. The design of abutment footings and foundations were analyzed against estimated potential scour depths.

GIS / REMOTE SENSING / COMPUTER APPLICATIONS

Developed Databases for Sewer Network for GIS , Amman City/Metropolitan Area, Jordan, US Agency for International Development (USAID). Task Leader/ Senior Engineer. Developed Graphic Vectors (using Autocad) and RDBMS (using Oracle) for ARC/INFO based GIS for sanitary sewer network. The sanitary sewer network consisted of pipes ranging from 6 to 48 inch in size and was approximately 250 miles long. Also, both the databases were interfaced with HASEN Sewer Information System. HASEN System is used for emergency and preventive maintenance of the sanitary sewer network.

GIS Application for Watershed Study, Flat Branch Creek. Prince William County, VA. Project Manager for application of GIS to develop hydrologic parameters for hydrologic modeling of the Flat Branch Creek watershed and for evaluation of the impacts of different urban land use conditions on hydrology of the watershed.

Remote Sensing Applications for Surface Water Hydrology, Stillwater, OK, for the Oklahoma State University. Researched and wrote special project report on "Application of Remote Sensing Techniques to Surface Water Hydrology."

Statistical Analysis, Stillwater, OK. Performed statistical analysis using the SAS package for 20-year gauged rainfall and runoff data for five large USDA grassland watersheds.

Computer Programming, Developed computer programs for compilation, processing, reduction, storage and statistical analyses of hydrologic data for five large USDA grassland watersheds. The programs used FORTRAN, PL/I and SAS languages.

Mathematical Modeling of Contaminated Groundwater using MOC, MODFLOW and others. GIS applications in data management and interfacing of groundwater quality models.

ENVIRONMENTAL IMPACT STATEMENTS, ENVIRONMENTAL ASSESSMENTS, AND NEPA REPORTS

Several Environmental Impact Statements for various Land Parcels for Residential and Commercial Buildings, Roadways and Bridges, and Wastewater Treatment Facilities Projects.

Several Floodplain Studies for various Commercial and Industrial Properties

Several Wetland Impact Assessments for various Construction Projects

Several Environmental Site Assessment Phase I and II Studies for various Commercial, industrial and Communication Sites

Several Underground Storage Tank Leakage Studies for Commercial and Industrial Sites.

Several Environmental Assessment Reports to comply with **NEPA** for number of wireless telecommunication sites.

OTHER ENVIRONMENTAL PROJECTS

Provided technical support on "Strategic Assessment of Clean Up Alternatives for Environmental Restoration Projects" to the Office of Engineering and Cost Management (EM-24), Office of Environmental Management, DOE Headquarters.

Prepared a plan for developing historical cost database of remedial activities of federal environmental restoration projects using HCAS (Historical Cost Analysis System) software for the Office of Engineering and Management, Office of Environmental Management, DOE Headquarters.

Team Leader for development of "Criteria and Guidelines for Project Management of Large Projects" (including environmental restoration and waste management projects) for the Office of Engineering and Cost Management, Office of Environmental Management, DOE Headquarters.

Prepared Toxic Chemical Release Inventory Reports (Tier I and Tier II reports; and annual TRI Form-R under Section 313 of EPCRA/Title II of SARA) for Dryden Flight Research Center, NASA, California.

Conducted Amman-Zarqa Wastewater Master Plan and Feasibility Study for the US Agency of International Development (USAID) and the Government of Jordan, Amman, Jordan. Wastewater effluent quality and reuse were studied as a part of the study. Water quality models (EPA- QUAL-2E) for the Zarqa River were constructed and calibrated. The major portion of the flow in the river is wastewater effluent. Wastewater effluent quality was considered for reuse purposes under existing and future (for next 25 years) conditions.

Developed a "Pollution Prevention Plan" for Dryden Flight Research Center, NASA, California.

Performed Preliminary Assessment and Site Investigations for six hazardous waste sites in EPA Region II. The projects were located in the State of New Jersey and New York. The work was performed under ARCS-II contract. Project work also included use of Hazardous Ranking System (HRS) using EPA Software PAScore.

Developed standard plans and specifications for removal of twenty five (25) underground storage tanks at the Washington Navy Yard for Department of Public Works, Department of the Navy.

GROUNDWATER

Groundwater Contaminant Transport Modeling, OK and AR. Used US Geological Survey 2-dimensional groundwater- models to evaluate groundwater contamination from existing and proposed strip coal mines.

Performed mathematical modeling of groundwater quality (using MOC and MODFLOW groundwater quality models) to assess the migration of contaminants in groundwater for the plume studies.

Designed active and passive systems and developed operation and maintenance plans for recovery of free petroleum product from groundwater wells for Marine Corps Air Station, Cherry Point, North Carolina.

ABSTRACTS SUBMITTED (Work in-progress)

Pathak, C. S., Onderlinde, M. and Fuelberg, H. 2009. Use of NEXRAD Rainfall Data to Develop Climatologically Homogenous Rain Areas for Central and South Florida. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 17-21, 2009. Kansas City, Missouri. Abstract Submitted for Presentation and Proceedings.

Pathak, C. S., and Huebner, R.S. 2009. Understanding Uncertainties in Water Budget for Large Constructed Wetlands. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 17-21, 2009. Kansas City, Missouri. Abstract Submitted for Presentation and Proceedings.

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Aly, A. , **Pathak, C.S**., Teegavarapu, R.S., Ahlquist, J., Fuelberg, H., and Hood, J. 2009. Evaluation of Improvised Spatial Interpolation Methods for Infilling Missing Precipitation Records. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 17-21, 2009. Kansas City, Missouri. Abstract Submitted for Presentation and Proceedings.

Teegavarapu, R.S. Meskele, T. and **Pathak, C.S**. 2009. Evaluation of Spatial Weighting Methods for Transformation of Multi-Sensor Precipitation Estimates. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 17-21, 2009. Kansas City, Missouri. Abstract Submitted for Presentation and Proceedings.

Meskele, T., Teegavarapu, R.S. and **Pathak, C.S**. 2009. Comparison of NEXRAD and TRMM Satellite based Precipitation Estimates and Rain Gage Measurements in South Florida. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 17-21, 2009. Kansas City, Missouri. Abstract Submitted for Presentation and Proceedings.

Henschke, A., Habib, E., and **Pathak, C.S**. 2009. Evaluation of the Radar Rain Z-R Relationship for Real-Time Use in South Florida. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 17-21, 2009. Kansas City, Missouri. Abstract Submitted for Presentation and Proceedings.

SELECTED PUBLICATIONS (Peer Reviewed)

Skinner, C., Bloetscher, F. and **Pathak, C. S.** 2008. Comparison of NEXRAD and Rain Gauge Precipitation Measurements in South Florida. Accepted for Publication in *Journal of Hydrologic Engineering* (date of printing to be determined by ASCE/EWRI publisher).

Pathak, C.S. (Ed.) 2008. Chapter 2 - Appendix 2-1: Hydrologic Monitoring Network of South Florida Water Management District. Redfield, G., Ed. In: *South Florida Environmental Report.* South Florida Water Management District. West Palm Beach, Florida.
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Abtew, W., **Pathak, C. S.,** Huebner, R. and Ciuca, V. 2008. Chapter 2: Hydrology of the South Florida Environment. Redfield, G., Ed. In: *South Florida Environmental Report.* South Florida Water Management District. West Palm Beach, Florida.
https://my.sfwmd.gov/pls/portal/docs/PAGE/PG_GRP_SFWMD_SFER/PORTLET_SFER/TAB2236041/VOLUME1/chapters/v1_ch_2.pdf

Pathak, C. S. and Vieux, B. E. 2008. Improvement of NEXRAD Rainfall Data Quality for Central and South Florida. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 13-16, 2008. Honolulu, Hawaii. Proceedings.

Pathak, C. S. and Vieux, B. E. 2008. Geo-Spatial Comparison of Rain Gauge and NEXRAD Data for Central and South Florida. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 13-16, 2008. Honolulu, Hawaii. Proceedings.

Pathak, C.S. and Zeng, J. 2008. Application of Artificial Neural Network Models for Flow Estimation In a Large Constructed Wetlands - Stormwater Treatment Area 2 in South Florida ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 13-16, 2008. Honolulu, Hawaii. Proceedings.

Vieux, B. E., **Pathak, C.S.** and Bedient, P. B. 2008. Future Research and Application Needs of Radar Rainfall Data in Hydrology ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 13-16, 2008. Honolulu, Hawaii. Proceedings.

Teegavarapu R.S.V., and **Pathak, C. S.** 2008. Infilling of Rain Gage Records using Radar (NEXRAD) Data: Influence of Spatial and Temporal Variability of Rainfall Processes. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 13-16, 2008. Honolulu, Hawaii. Proceedings.

Sumner D. M., **Pathak, C. S.**, Mecikalski J.R., Paech, S.J., Wu, Q., Sangoyomi, T. 2008. Calibration of GOES-derived Solar Radiation Data Using a Distributed Network of Surface Measurements in Florida, USA. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 13-16, 2008. Honolulu, Hawaii. Proceedings.

Teegavarapu R.S.V., Peters, D., and **Pathak, C. S.** 2008. Evaluation of Functional Forms of Rain Gage – Radar (NEXRAD) Data Relationships. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 13-16, 2008. Honolulu, Hawaii. Proceedings.

Lima, C., Lal, U. and **Pathak, C. S.** 2008. Machine Learning Methods for Missing-Data Estimation for Daily Rainfall. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 13-16, 2008. Honolulu, Hawaii. Poster Presentation.

Pathak, C. S., et al. 2007. Hydrological Monitoring Network in Central and South Florida. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 15-19, 2007. Tampa, Florida. Proceedings.

Pathak, C. S. and Vieux, B. 2007.Geo-Spatial Analysis of NEXRAD Data for Central and South Florida. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 15-19, 2007. Tampa, Florida. Proceedings.

Vieux, B. and **Pathak, C. S.** 2007. Evaluation of Rain Gauge Network Density and NEXRAD Rainfall Accuracy. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 15-19, 2007. Tampa, Florida. Proceedings.

Anagnostou, E. and **Pathak, C. S.** 2007. Improving the Consistency of Basin-Average Radar and Rain Gauge Rainfall Datasets in Central and South. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 15-19, 2007. Tampa, Florida. Proceedings.

Skinner, C., Bloetscher, F. and **Pathak, C. S.** 2007. Developing a Relationship between Radar and Rain Gauge Datasets in Central and South Florida. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 15-19, 2007. Tampa, Florida. Proceedings.

Huebner, R., Abtew, W. and **Pathak, C. S.** 2007. Impact of Using Radar Rainfall Data in Water Budgets for South Florida Stormwater Treatment Areas. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 15-19, 2007. Tampa, Florida. Proceedings.

Martinaitis, S., Fuelberg, H., and **Pathak, C. S.** 2007. An Inter-comparison of Precipitation Values from the OneRain Corp. Algorithm and the National Weather Service Procedure. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 15-19, 2007. Tampa, Florida. Proceedings.

Abtew, W., Huebner, R. and **Pathak, C. S.** 2007. Hydrology and Hydraulics of South Florida. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 15-19, 2007. Tampa, Florida Proceedings.

Abtew, W., **Pathak, C. S.,** Huebner, R. and Ciuca, V. 2007. Chapter 2: Hydrology of the South Florida Environment. Redfield, G., Ed. In: *South Florida Environmental Report.* South Florida Water Management District. West Palm Beach, Florida.
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Pathak, C.S., and Palermo, S. 2006. Rainfall Based Management Plan for Water Conservation Area 3A in Florida Everglades. ASCE/EWRI World Water & Environmental Congress, Annual Conference, May 21-25, 2006. Omaha, Nebraska . Proceedings.

Martinez S., Merwade V., Maidment, D.**, Pathak, C.,** Carvalho, A., and Parab, R. 2006 Methodology for Optimizing Stage Monitoring Network with GIS. AWRA Spring Specialty Conference GIS and Water Resources IV, May 8-10, 2006. Houston, Texas.

Pathak, C. S., Huebner, R. S. and Swartz, E. P. 2005. Rainfall Monitoring Using NEXRAD Data for Water Management in South Florida. 1st Florida Radar Rainfall User Workshop. November 15, 2005, University of Central Florida, Orlando, Florida.

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Huebner, R.S., **Pathak, C.S.** and Hoblit, B.C. 2003. Development and use of a NEXRAD database for water management in south Florida. ASCE World Water & Environmental Resources Congress, June 2003, Philadelphia, Pennsylvania. Proceedings.

Newman, J.M., Goforth, G., Chimney, M., Jorge, J., Bechtel, T., Germain, G., Nungesser M.K., **Pathak, C.S.**, et al 2003. Process model for submerged aquatic vegetation and Periphyton-based stormwater treatment area forecast model in Chapter 4 – Stormwater Treatment Technologies. Everglades Consolidated Report 2003. Pages 4C-12 to 4C-25 and Pages 4C-34 to 4C-43. South Florida Water Management District, West Palm Beach, Florida. http://www.sfwmd.gov/org/ema/everglades/consolidated_03/ecr2003/index.html

Pathak, C.S. 2001. Frequency Analysis of Daily Rainfall Maxima for Central and South Florida. Technical Publication, EMA Report # 390. South Florida Water Management District. West Palm Beach, Florida.

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Crow, F.R., Ghermazien, T., and **Pathak, C.S.** 1983. The effect of land use parameters on runoff simulation by the USDAHL Hydrology model. Transaction of the ASAE. XXVI:I.

Pathak, C.S. 1983. Assessment and modification of the CREAMS hydrologic model for small grassland watersheds. Ph.D. Dissertation, Oklahoma State University, Stillwater, Oklahoma.

Pathak, C.S., et al. 1979. Optimum water resources utilization study, Ta Chia River Basin. Research Report No. 102, Asian Institute of Technology, Bangkok, Thailand.

EMPLOYMENT HISTORY

Aug 2007 to Present	Principal Engineer, Operations and Hydro Data Management Division, SCADA and Data Management Department, SFWMD, West Palm Beach, FL
Aug 2002 to Aug 2007	Lead Engineer, Hydrology and Hydraulics Division, Environmental Monitoring and Assessment Department, SFWMD, West Palm Beach, FL
Aug 2001 to Aug 2002	Senior Engineer, Ecological Technologies Division, Everglades Construction Project Department, SFWMD, West Palm Beach, FL
Jul 1999 to Aug 2001	Senior Engineer, Resource Assessment Division, Environmental Monitoring and Assessment Department, SFWMD, West Palm Beach, FL
Mar 1997 to Jul 1999	Consultant, Water Res. & Env. (Self Employed), Germantown, MD
Jan 1994 to Feb 1997	Senior Project Manager, C.C. Johnson & Malhotra, P.C., Silver Spring, MD
Dec 1990 to Dec 1993	Director, Water Resources, Sheladia Associates Inc., Rockville, MD
Jan 1989 to Nov 1990	Project Manager, Greenhorne & O'Mara, Greenbelt, MD
Dec 1986 to Jan 1989	Senior Engineer, Michael Baker, Jr. Inc., Alexandria, VA
Jan 1984 to Dec 1986	Engineer, ETC Engineers Inc., Little Rock, AR
Jan 1980 to Dec 1983	Graduate Research Associate, Oklahoma State University, Stillwater, OK
May 1978 to Nov 1979	Research Associate, Asian Institute of Technology, Bangkok, Thailand

CITIZEN

UNITED STATES CITIZEN

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers
American Water Resources Association
American Water Works Association

RECOGNITION AND AWARDS

- **General Conference Chair for "3rd International Perspectives on Current and Future State of Water Resource and Environment"** conference of the ASCE/EWRI at the Indian Institute of Technology, Madras, Chennai, India, planned for January 4–6, 2010.
- **Appointed Associated Editor of Journal of Hydrologic Engineering** – publication is published by American Society of Civil Engineers. The term began from July 2006 to present.
- **Track Chair for "NEXRAD Rainfall Data Analysis and Applications" for ASCE/EWRI 2009 Congress, Kansas City, Missouri Conference** – responsible for reviewing abstracts and papers for publication in Conference Proceedings published by American Society of Civil Engineers. The term began from May 2008 and ends in May 2009.
- **Chair of WSR 88-D Doppler Radar Task Committee under the Surface Water Hydrology Technical Committee of EWRI**. Over a three-year term, providing leadership on improvement and application of this technology in civil engineering profession. June 2005–present.
- **Fellow Member of the American Society of Civil Engineers (ASCE)**, August 2007
- **Diplomate, Water Resources Engineer (D.WRE)** of American Academy of Water Resources Engineers, which is affiliated with the American Society of Civil Engineers, April 2007
- **Track Chair for "NEXRAD Rainfall Data Analysis and Applications" for ASCE/EWRI 2008 Congress, Honolulu, Hawaii Conference** – responsible for reviewing abstracts and papers for publication in Conference Proceedings published by American Society of Civil Engineers. The term began from May 2007 and ended in May 2008.
- **Track Chair for "NEXRAD Application and Data Analysis" for ASCE/EWRI 2007 Congress, Tampa, FL Conference** – responsible for reviewing 30 abstracts and papers for publication in Conference Proceedings published by American Society of Civil Engineers. The term began from May 2006 and ended in May 2007.
- **NASA Invited Member** of International Applications Advisory Pilot Group for evaluation of new technology as developed during NASA's Global Precipitation Measurement (GPM) Project, November 2002.
- **NASA Invited for Presentation** on "Water Resources Management in South and Central Florida" during Global Precipitation Measurement (GPM) Workshop, February 2002.
- **Excellence Service Award**, South Florida Water Management District, February 2001.
- **Certificate of Appreciation** for Water Shortage Management, SFWMD, March 2001.
- **Fellowship Awarded by American Geophysical Union for Hydrologic Modeling Summer Course at Colorado State University**, Fort Collins, CO, June 1982.
- **Scholarship Awarded by Government of United Kingdom** to pursue Master of Engineering Program at Asian Institute of Technology, August 1976 to April 1978.

TEACHING

Adjunct Professor, Florida Atlantic University, Civil Engineering Department, Boca Raton, FL, Teaching Graduate Courses: "**Streams, Lakes and Estuarine Pollution**" – Fall 2006; "**Dynamic Hydrology**" - Spring 2005; "**Water Resources System Engineering**" - Fall 2005 "**Engineering Geology**" - Spring 2003; "**Computer Watershed Modeling**" - Fall 2002 and "**Surface Water Hydrology**" - Spring 2000.

Adjunct Professor, Institute of Environmental Studies, Palm Beach Community College, Lake Worth, FL, As a Team Member Developed the Course Curriculum for A.S. Degree in Environmental Science Technology Program (2000-2001). Taught a course "Introduction to Water Resources" in Fall 2001. Taught a course "Ground Water Hydrology" in Fall 2003.

Adjunct Professor, Howard University, Department of Civil Engineering, Washington, D.C., Teaching Graduate Courses in Advance Surface Water Hydrology, Open Channel Hydraulics, and Water Resources Management (1987 to 1999).

Hydrology and Hydraulics (including Stormwater Management, HEC-1 and HEC-2), Taught Short Courses, Graduate Institute of Technology, University of Arkansas, Little Rock, AR. (1984 to 1986).

Guest Lecturer in Computer Modeling, of Groundwater Contaminant Transport, Graduate Institute of Technology, Little Rock, AR, 1985.

Engineering Graphics Course, University of Arkansas, Little Rock, AR, 1984.

Watershed Hydrology Course, Oklahoma State University, Stillwater, OK, 1983.

Chandra S. Pathak, Ph.D., P.E., D.WRE., F.ASCE

Statement on Teaching and Philosophy

I love and enjoy teaching. I have been involved in teaching since my high school years. I come from family of teachers. I believe that educating young minds is noble work. I have been told that my teaching methods are exceptional and they are loved by my students.

Summary of Teaching Experience

Over the past nine years, I have been adjunct professor at the Florida Atlantic University (FAU) in Civil Engineering Department and taught the following courses in the water resources engineering:

EES 6357 Stream, Lake and Estuarine Pollution
http://home.fau.edu/cpathak/web/EES6357/EES6357.html

CWR 6525 Dynamic Hydrology
http://home.fau.edu/cpathak/web/CWR6525/CWR6525.html

CWR 6818 Water Resources System Engineering
http://home.fau.edu/cpathak/web/CWR6818/CWR6818.html

GLY 4830 Engineering Geology
GLY 6835 Computer Watershed Modeling
GLY 4822 Introduction to Hydrologic Modeling

All the above graduate courses involved challenging projects derived from practical problems. The courses I taught provided unique learning environments in which I combined class-room instruction, field trip experiments, computational challenges in modeling and real-life data collection and problem solving. While teaching at FAU, I received consistently high scores for teaching methods from my students. These were recorded by the university under the SPOT (Student Perception of Teaching) program. Teaching at FAU also provided a chance to perfect my teaching skills through web-based and video-assisted instruction methods as a part of the FEEDS (Florida Engineering Education Delivery System) program. I have provided access to my lecture notes and teaching materials through the web. I am currently serving on the Departmental Advisory Committee (DAC) of the Civil Engineering department at FAU. As a member of this committee, I am involved in curriculum development, improvement, assessment and evaluation of departmental courses to meet ABET criteria.

In addition, I have been advising master's students as well as been involved in guiding and mentoring summer intern students at South Florida Water Management District for last three years.

Prior to moving to Florida, I have served as an adjunct professor in the Civil Engineering Department at the Howard University for several years. During this time, I taught several undergraduate and graduate courses. Also, I taught preparatory courses in Engineer-In-Training (now FE) and Civil Engineering Discipline for the professional engineering license.

I also taught short courses under continuing education program that was organized by American Society of Civil Engineers (ASCE). The courses included: Hydrologic Engineering for Design; Storm Water Management; Use of HEC-1 (now HEC-HMS) Hydrologic Simulation Model; and Application of HEC-2 (now HEC-RAS) Hydraulic Model. While working with consulting engineering firms, I was constantly involved in teaching hydrology and hydraulic courses to in-house staff engineers.

Teaching Philosophy

Undergraduate Courses

In my opinion, teaching undergraduate courses requires a two part effort. First, students need to understand and master the basic fundamental sciences of the subject matter. In the second part, students need to learn how to apply those basic principles in real world situations. Due to my several years of consulting experience as a practicing engineer, I bring unique problem solving experiences to undergraduate students, especially to senior year students, a significant number of them have joined consulting engineering firms. My involvement with ASCE for the past 20 years provides me a broad perspective, background and training in transforming young engineers into highly skilled professional engineers, practicing the profession with ethical and moral conduct. I believe teaching scientific advancements and changes in industry standards and design codes is a must for undergraduate course instruction.

Graduate Courses

I strongly feel that teaching graduate students requires instruction of advanced principles of engineering and their respective application in complex conditions to achieve feasible solutions. Graduate students need to develop an independent skill set to solve unique problem conditions as well as be exposed to the research arena. Ph.D. students should be trained to perform research and project work independently. I encourage all my graduate students to work on research projects in their courses, develop capabilities to write technical proposals, reports and papers. My instruction of courses will be geared to accomplish these activities and emphasize the importance of independent research activities.

Development of New Courses

In addition to existing graduate and undergraduate courses in water resources at FAU, I plan to develop detailed syllabi for new courses for students in the Civil Engineering Department. The following are the tentative titles these proposed six new courses:

Geospatial analysis of Hydrologic Data
Geospatial Modeling
GIS Application in Water Resources
Advanced Water Resources System Engineering
Rainfall Measurements using Multi-Sensors - Rain Gauges, Radar, and Satellite
Measurement of Hydro-meteorologic Parameters and Monitoring Network

All the above courses will involve practical problem solving techniques and they will seamlessly integrate theory and practice considering the most recent developments in water sciences. I strongly believe all the above courses will benefit from my experiences and background from several cutting edge research projects, I have worked on at South Florida Water Management District.

Reference

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Chandra S. Pathak, Ph.D., P.E. D.WRE., F.ASCE

Statement on Research

Summary of Research Experience

I have been working on three specific research topics over the last several years at the South Florida Water Management District (District). One is on *radar rainfall estimation*, the second is on the *estimation of regional evapotranspiration*, and the third is on *hydrologic monitoring network optimization*.

During the last three years, I have been very actively involved in organizing sessions on "NEXRAD Rainfall Data Analysis and Application" during EWRI/ASCE Annual Summer Conferences and American Geophysical Union – Annual Fall Meetings. I have taken the lead on this subject, inviting research papers from the top scientists and engineers in this area of work. In addition, I took lead to form a task committee on the subject within the Surface Water Hydrology Technical Committee under Watershed Council of EWRI/ASCE. I chair this committee during the last three years. This current year, I have proposed a new task committee to develop a manual of standard practice on radar rainfall estimation. The work will be done in collaboration with academic and industry engineers and professionals, and will begin this year.

At the District, I have been successfully seeking funding for the above three subjects over last several years. Additionally, I took the lead organizing and collaborating with other two water management districts - SJRWMD and SWFWMD (WMD) in doing the work on radar rainfall estimation.

During last five years, I have worked closely with USGS and other Florida WMDs in developing and performing a multi-year collaborative, funded project. The project titled "Satellite-Based Estimation of Potential and Reference Evapotranspiration over Florida" was performed over four years and was completed in December 2007.

In the last four years, I have worked on applied research on the following *hydrologic monitoring network* topics: *Rain Gauge Network Optimization*, *Surface Water Stage and Flow Network Optimization*, and *Solar Radiation Ground Sensor Network Optimization*. Currently, I am working on a project that will optimize the hydrologic monitoring network using a regional hydrologic simulation model, which utilizes the hydrologic data.

During the last three fiscal years (FY-06, -07, and -08), at the District, I was awarded over a million dollars for these projects. In FY09 fiscal year, which will begin on October 1, 2008, I have been awarded approximately $250,000 for the proposed projects.

Also, I am interested and would like to propose the some specific research projects and as are listed below.

A. Evaluation and Assessment of Radar Rainfall Data in the State of Florida
B. Hydrologic Impacts from Climate Change in the State of Florida
C. Comparative Performance of Potential Evapotranspiration Estimation Methods
D. Assessment of Hydrologic Monitoring Network in various parts of Florida
E. Optimization of Hydrologic Monitoring Network in various parts of Florida
F. Assessment and Evaluation of TMDL for Impaired Water Bodies in various parts of Florida

As an associate editor of the *Journal of Hydrologic Engineering* of the American Society of Civil Engineers (ASCE), I had opportunity to review several technical and research papers. This has helped me to keep up with current and state-of-the-art work being performed on various topics in the areas of the hydrologic engineering.

Recently, I have submitted a proposal to the Chief Editor of the *Journal of Hydrologic Engineering* for specialty issue on "*NEXRAD Rainfall Data analysis and Application*". This proposal was accepted and will take 12 to 18 months depending number of manuscripts submitted for the publication. I have written a forum article with other co-authors for this specialty issue. Enclosed is copy of the manuscript for your information.

In addition, I have been actively working on research projects with graduate students at the Florida Atlantic University (FAU). Courtney Skinner, a master's student, completed her thesis under my guidance in August 2006. A technical paper titled "Comparison of NEXRAD and Rain Gauge Precipitation Measurements in South Florida" was accepted for Publication in the Journal of Hydrologic Engineering on June 2008 (date of printing to be determined by ASCE/EWRI publisher). A manuscript of this paper is enclosed for your information.

References

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Chandra S. Pathak, Ph.D., P.E., D. WRE, F.ASCE

Professional Contributions above and beyond normal work assignment at the South Florida Water Management District during last six years (2002–2008)

1. Mentoring Ms. Ana Maria Hagan, Ph.D. water resources engineering student from University of Florida at the District during summer of 2008. June-August 2008.

2. At the invitation of the Massachusetts Institute of Technology, Department of Civil and Environmental Engineering presented a technical presentation on "Water Management in Central and South Florida". April 11, 2008.

3. At the invitation of the Georgia Institute of Technology, Department of Civil and Environmental Engineering presented a technical presentation on "Water Management in Central and South Florida". October 12, 2007.

4. Organized a seminar at the District titled "Opportunities for Total Water Use Management Solutions" by Dr. Avinash Patwardhan, CH2MHILL, October 11, 2007.

5. Organized a seminar at the District titled "Opportunities for collaboration with FAU's Laboratories for Engineered Environmental Solutions" by Dr. Daniel E. Meeroff, Department of Civil Engineering, Florida Atlantic University. August 24, 2007

6. Mentoring two students – Mr. David Baumgartner, senior engineering student from MIT and Patterson Haller, sophomore engineering student from University of Florida at the District during summer of 2007. June-August 2007.

7. Prepared a chart and table showing flow that were released to tide water for the months of April, may and June 2007 within three days at the request of Terrie bates and Susan Sylvester. July 5, 2007.

8. At the invitation of the District Managers, presented a technical paper on "Water Management in South and Central Florida" to the 15-member Dutch delegation during its visit to the District on "Florida Everglades fact finding mission on water". June 10-13, 2007.

9. At the invitation of the District Managers, presented a technical paper on "Hydrologic Monitoring Network in South and Central Florida" during the 9th Water Information Summit Organized by Florida Atlantic University, Water Web Consortium, UNESCO and South Florida Water Management District. June 5-7, 2007.

10. Organized several brown bag sessions at the District where a total of 14 technical papers were presented. These presentations were recently made by the District staff during the ASCE/EWRI Tampa Conference from May 15 to 19, 2007. Several scientists and engineers attended these sessions who could not attend the conference. June 2007.

11. Led in developing STA–2 Hydraulic Model (Mike Flood) for improving operation of water control structures. Presented results of the hydraulic model to operations and STA managers, several scientists and engineers. 2006–2007.

12. Led a team engineers in developing a technical report on "Hydrologic Monitoring Network of South Florida Water Management District". The report was planned for external peer review by nationally known experts. 2006–2007.

13. Prepared a two-page draft document within three days of request on “2006 State of the Water Management System” at the request of Carol Wehle, Executive Director of the District. April 2007.

14. Chaired and moderated a one-day USGS Workshop on “ET Estimation Methods” at USGS Office in Orlando on November 13, 2006. The presentations were attended by staff from various agencies including USGS, Florida Department of Environment, Three Water Managements Districts, University of Florida, and University of South Florida.

15. Co-author of a detailed report, “Consideration of Long-Term Climatic Variability in Regional Modeling for SFWMD Planning & Operations”. The report was externally peer reviewed by a team of nationally well known engineers and scientists. September 2006.

16. Contacted and brought in several nationally reputed engineers including Prof. Rafael Bras, Ph.D., P.E. from MIT and Prof. David Maidment, Ph.D., P.E. from University of Texas at Austin as external peer reviewers for hydrologic monitoring network optimization studies. 2002–2006.

17. Mentored Philip Chanen, junior engineering student from University of Florida at the District during summer of 2006. June-August 2006.

18. In a volunteer role, received training in water management and day-to-day operations at the Operation Control Center. January–June 2005.

19. Led a group of engineers and scientists from other two Water Management Districts on Radar (NEXRAD) Rainfall Estimates Data Quality projects and provided technical advice on procurement of “NEXRAD Data Products”. 2002–2007.

20. Led a group of engineers and scientists from other Water Management Districts (WMDs), USGS and Florida Department of Environment Protection (FDEP) for Estimation of Potential Evapotranspiration and Reference Evapotranspiration Data Using GOES Satellite-based Solar Radiation Data Project. 2002–2007.

21. First in the District to develop a map-based data retrieval application, using ArcMap system for NEXRAD rainfall data. Led a group of GIS and database experts to develop ArcHydro compatible geo-database for the NEXRAD data. 2004–2006.

22. Attended annual conferences of the American Society of Civil Engineers/Environment and Water Resources Institute (ASCE/EWRI) in every year since 2001 and presented papers.

23. Volunteered to write several white papers including Evapotranspiration (ET) Data Issues, Topographic Survey Needs of the Department and others. 2005–2007

24. Serving as chair for the District Evapotranspiration (ET) Work Group and have a lead role in coordinating and planning on evapotranspiration data related projects within the District. 2005–2007.

25. Developed training course in Basin Hydrology and Basic Hydraulics and taught several classes. 2004–2005.

26. Organized a one-day workshop at the District entitled “Lessons Learned – Stormwater Treatment Areas”. August 2002.

Professional Work and Awards Outside the South Florida Water Management District (2002–2008)

1. General Conference Chair for "*International Perspectives on Current and Future State of Water Resource Systems*" conference of the ASCE/EWRI at the Indian Institute of Technology, Chennai, India, planned for January 4–6, 2010.

2. Proposal pending with EWRI/ASCE as a General Conference Chair for "*International Conference on Hydrological Applications and Data Analysis of Weather Radar Rainfall*". Proposal to be reviewed by ASCE/EWRI governing board in February 2009. Responsible for organizing the specialty conference, planned to be held in Miami, FL December 15–18, 2012.

3. Invitation from the Severe Storm Prediction and Global Climate Impact in the Gulf Coast Conference, Rice University, Houston, Texas to present a technical presentation on *"Water Management Under Severe Storm Conditions in Central and South Florida"*. October 29-31, 2008.

4. Chair and Co-convener for a session on "Rain Gage- Radar (NEXRAD) Rainfall Data Relationships: Emerging Data Quality Issues, Concepts, and Applications for Hydrologic Modeling" at the American Geophysical Union (AGU) Fall 2008 Meeting, San Francisco, CA December 15-19, 2008.

5. Chair and Co-convener for a session on "Weather and Climate Change Impacts on Water Resources and the Environment" at the American Geophysical Union (AGU) Joint Assembly Program Meeting Spring 2008, Ft. Lauderdale, FL, May 27-30, 2008.

6. Chair and Co-convener for a session on "Rain Gage- Radar (NEXRAD) Rainfall Data Relationships: Emerging Data Quality Issues, Concepts, and Applications for Hydrologic Modeling" at the American Geophysical Union (AGU) Fall 2007 Meeting, San Francisco, CA December 10-14, 2007.

7. Nominated for a two-year term as a member of Civil Engineering Department Advisory Council at the Florida Atlantic University, Boca Raton, FL. November 2007.

8. Awarded a prestigious ***Fellow of the American Society of Civil Engineers*** (ASCE). August 2007

9. Awarded a certification of *Diplomate, Water Resources Engineer* by American Academy of Water Resources Engineers, which is affiliated with the American Society of Civil Engineers (ASCE). April 2007

10. Performed outreach activities for the District and was invited for technical presentations at University of Connecticut, Florida International University, Florida Atlantic University, and University of Florida. 2005–2007.

11. Member of the Student Advisory Council of Suncoast Community High School, Rivera Beach, FL. This is the only magnet high school with *Math, Science and Engineering (MSE) Program* in Palm Beach County. The school was 3rd in the United States during 2007-08. Member since 2006 to present.

12. Presented a technical paper on “Radar Rainfall Uncertainty” during the 7th International Workshop on Precipitation in Urban Areas – Extreme Precipitation, Multi-source Data Measurement and Uncertainty, organized by Swiss Institute of Technology (ETH) in St. Moritz, Switzerland. December 7–10, 2006.

13. Presented a technical paper on “Water Management in Central and South Florida” during the American Society of Civil Engineers – Environmental and Water Resources Institute Conference on An International Perspective on Environmental and Water Resources in New Delhi, India. December 18–20, 2006.

14. Served on the review panel for the National Defense Science and Engineering Graduate Fellowship Program. The panel selected 200 U.S. Citizens from a pool of 3,000 applicants for fellowship in 15 science and engineering disciplines. Each recipient was awarded approximately $100,000 over three-year period for graduate research. February 2005.

15. **Associate Editor**, *Journal of Hydrologic Engineering*, published by American Society of Civil Engineers (ASCE). Over a two-year appointment, responsible for completing peer reviews of technical papers for publication in the journal. July 2006–present.

16. Chair for NEXRAD Application and Data Analysis track for ASCE/EWRI 2007 Congress, Tampa, FL. Responsible for reviewing 30 abstracts and papers for publication in conference proceedings. May 2006–May 2007.

17. Chair of WSR 88-D Doppler Radar Task Committee under the Surface Water Hydrology Technical Committee of EWRI. Over a three-year term, providing leadership on improvement and application of this technology in civil engineering profession. June 2005–present.

18. Control member of the Wetland Hydrology Technical Committee of EWRI during 2007–2008. Active member over a three-year term, providing leadership on this subject in civil engineering profession. 2005–present.

19. Adjunct Professor at the Florida Atlantic University in the Civil Engineering Department, Boca Raton, FL. Teaches graduate courses and is a Graduate Research Committee member. Graduate courses have included: Streams, Lakes and Estuarine Pollution – Fall 2006; Dynamic Hydrology – Fall 2005; Water Resources System Engineering – Fall 2005 Engineering Geology – Spring 2003; Computer Watershed Modeling – Fall 2002, and Surface Water Hydrology – Spring 2000.

20. Adjunct Professor, Palm Beach Community College, Lake Worth, FL. As a team member, developed the course curriculum for Associate in Science Degree in Environmental Science Technology – Hydrology Track Program. 2000–2001.

21. At the invitation of the National Aeronautical and Space Administration (NASA), presented a paper on “Water Resources Management in South and Central Florida” during Global Precipitation Measurement (GPM) Workshop. February 2002.

22. NASA-invited member of International Applications Advisory Pilot Group for evaluation of new technology as developed during NASA’s Global Precipitation Measurement (GPM) Program. November 2002.

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