WATER

Prospectus

MS & PhD Programs

Fall 2015

U.S.-Pakistan Center for Advanced Studies in Water

Mehran University of Engineering and Technology (MUET), Jamshoro

I. Welcome to Jamshoro: The Education City

Jamshoro is located on the right bank of the Indus River, approximately 18 kms Northwest of Hyderabad and 150 kms Northeast of Pakistan's largest city, Karachi, that is also the capital of Sindh Province. The total geographical area of the Jamshoro district is 11,517 square kms.

The majority of the population of the district is rural and they are involved in farming. Approximately 20% of the district population works for the federal and provincial government. The district is rich in limestone, silica sand, gravels, silt, and marble.

Besides being a historical and picturesque site, Jamshoro is home to the three leading universities of Pakistan, including Mehran University of Engineering and Technology (MUET), ranked 1st in the province of Sindh and among top 10 Engineering Universities of Pakistan.

The MUET is located at Longitude 68°15'35.79" E and Latitude 25°24'54.64" N at an average altitude of 58 m above mean sea level (MSL) along Super Highway. Jamshoro Railway Station is at a distance of about 3 km while Hyderabad Airport is at a distance of 22 km from the MUET.

II. Basic Facts about MUET

- It is one of Pakistan's most research-intensive universities, with a high ratio of academic staff to students.
- The University offers undergraduate degree programs in 17 disciplines, ME/MS degree programs in 36 disciplines, and Ph.D. degree programs in 29 disciplines, including several advanced short-term training programs.
- Total students population is about 6,900 students, out of which 15 percent are females, including 5,800 undergraduate students, 1,000 MS/ME students, and 104 Ph.D. students.
- Research and teaching faculty consists of 450 staff, out of which 125 have Ph.D. degrees from international and Pakistani universities.
- The university is actively engaged in promoting activities leading to financial sustainability and growth, improvement in teaching and research excellence, up-gradation of academic programs, and short-term innovative professional training programs.

- Its development and growth is deep rooted in its philosophy to actively engage with local communities, students, alumni, faculty and private sector to be able to effectively respond to the market needs of the engineering industry.

- It promotes building strategic connections with students, faculty and administrators to enhance the quality of educational experience for students.

- It is ISO certified since 2003.

III. Facilities and Resources at MUET

MUET provides a range of facilities to its students, faculty and staff to create an atmosphere of shared vision for enhancing the lives and livelihoods of students. An overview of facilities and resources available to MUET students is provided below.

Student-Teacher Center: The University has recently constructed a Students-Teachers Center over an area of 20,000 sq. ft. Several facilities are provided under one roof including but not limited to: information service, student registration desk, indoor games, bank, shops, post office, cafeteria, a child/day-care center, and a supermarket.

Library: MUET's library and online information center contains more than 132,000 books related to Engineering, Science and Technology, and other related fields. Other key features of the library include:

- Access to 29 E-databases for e-journals and e-books both within the university campus and outside the campus under the Digital Library Program.

- More than 21,000 text books are available in the Book Bank. These are loaned to students for one term on a nominal rent.

- Other services include: inter-library loan, photocopying of material, internet, multi-media center, among others.

- Besides the main library and online information center, students can also access subject-specific books and literature from a dedicated library of USPCAS-W.

Transport: The University has a fleet of its own buses that makes commute within the campus as well as between the campus and main towns (Hyderabad, Qasimabad, Latifabad, and Kotri) fairly easy. This service will be provided to students of USPCAS-W free of charge.

Information and Communication Processing Centre: The Center is equipped with the latest devices and servers.

- It works round the clock to provide data and voice services to various parts of the universities including on-campus students' residences.

- To encourage research and development related activities between universities, the Center has connected MUET with fifty two (52) other universities through PERN (Pakistan Educational Research Network).

- It provides uninterrupted services to students through VPN accounts, which is provided on request, to enable them to work from their residences.

Medical: The campus has a part-time dispensary that is supported by a qualified doctor and a dispenser. It however deals with only minor ailments. Medical emergencies are referred to the nearby Liaquat University Hospital. An ambulance facility is also available.

Sports: MUET's sports culture is quite diverse and rich. Interested students take part in a range of sports, such as: basketball, shooting ball, squash, table tennis, badminton, athletics, cricket, football, hockey, handball, and Tennis, among others. In addition to organizing inter-departmental and inter-hostel competitions, MUET sports teams regularly participate in Inter-University Sports Events. A new gymnasium has been constructed over an area of 25,845 sq.ft.

Accommodation: Male and female students live in separate hostels. On-campus availability of accommodation for the postgraduate students however is limited. Therefore, several students live off-campus. Private accommodation in Jamshoro and Hyderabad is available at reasonable rates, and most of these areas are connected to campus through regular bus service.

IV. U.S.- Pakistan Center for Advanced Studies in Water (US-PCASW)

The US-PCASW is part of a broader higher education initiative recently launched in Pakistan with financial support from the United States Government through its Agency for International Development (USAID). The objective of this initiative is to enhance the capacity of Pakistan's higher education institutions to contribute solutions to Pakistan's development challenges.

The initiative entails the establishment of four Centers for Advanced Studies in water, energy and agriculture and food security in selected Pakistani universities. US-PCASW, is one of the four Centers, focused on identifying and developing solutions for the

multifaceted water-related challenges facing the country, the Center is housed at the Mehran University of Engineering and Technology (MUET), Jamshoro.
http://www.muet.edu.pk/institutes/iwrem-uspcasw.

The Center will contribute solutions to Pakistan's water-related challenges by educating and training the next generation of water sustainability leaders through advanced academic training in different water-related disciplines. The tangible deliverables of the Center include postgraduate degree programs, applied policy research, facilitation of public- private partnerships, and provision of policy advice in a range of water-related disciplines.

> The Center promotes partnerships with the academic institutions, government and the business community to seek applied research solutions that strengthen the effectiveness of policy-making and drive innovation, competitiveness and economic growth.

V. Center's Activities: An Overview

To meet the changing public and private sector needs for applied research and skilled graduates in a range of water-related disciplines, the Center is engaged in implementing wide-ranging activities and programs, including the following:

- Reforming academic curriculum for higher water education to bring it to international standards;
- Improving teaching methods, and strengthening technical capacities of the MUET faculty;
- Delivering most relevant and highest quality applied research to meet water sector's present and future needs, including informed policy-making;
- Developing and implementing multidisciplinary graduate and post graduate training programs;
- Strengthening engagement of stakeholders to support research-policy interface;
- Improving governance, and building strong links with industry, civil society and government for securing Center's long-term sustainability; and

- Providing increasing number of training and research opportunities to talented women as well as to students from economically or culturally disadvantaged backgrounds.

The Center is in process of establishing a Pakistan Water Sustainability Network that will bring together experts, practitioners, policy makers, private sector and civil society groups to share knowledge and raise awareness about the water sector challenges and their potential solutions

VI. Why Study at USPCAS-W?

Main thrust of our higher education program in water is to contribute solutions towards achieving water security in Pakistan. Accordingly, we aim at training and inspiring the next generation of water sector professionals to meet specialized demands of government, municipalities, and industry.

- We train students who not only excel in applied engineering, but aim to connect advances in engineering to society's most challenging problems.

- Our programs and courses respond to the present and projected needs of Pakistan's water industry. So one can expect high demand for the graduates of these programs across the board.

- Promising students, especially female students and those belonging to economically disadvantage groups, will benefit from opportunities for thesis research and short-term training in US universities (especially at the University of Utah).

- The students will be able to advance their professional growth and skills under the guidance of well reputed faculty both at the MUET and UU.

- We promote and facilitate students' interaction with the visiting faculty and outside experts to enhance their understanding about emerging water issues and their possible solutions.

- We facilitate networking opportunities for the students to enable them to explore internships with different institutions and stakeholders involved in water industry.

- Our applied research program is multidisciplinary in nature and developed within the broader context of the water-development nexus to support science-engineering-policy interface in Pakistan's water sector.

- The Center is constructing a new state of the art building with modern teaching and research infrastructure and learning facilities, all of which will contribute towards the professional growth and development of students.

Scholarship for all: Every student enrolled in any of Center's programs will be entitled to: (a) full tuition fee for all semesters; (b) a stipend of Rs.15,000 per month to cover living and accommodation costs; (c) free transport through university buses; and (d) training and research opportunity at University of Utah or its partner US

VII. MUET-University of Utah Partnership

The University of Utah (UU), USA (water.utah.edu), has been selected by USAID as the technical assistance partner of MUET for advancing the development and growth of US-PCASW.

As the state's flagship university, the UU offers more than 100 undergraduate majors and more than 92 graduate degree programs. With a long running tradition of academic and research excellence, the UU has long been involved in a range projects reaching across the globe.

Key organizational strengths of UU include: capacity building and international development, institutional development, change management, technology and venture commercialization, curriculum development and reform, research productivity, research infrastructure building, data modeling and analysis, effective teaching and training, distance education, global engagement and sustainability.

The MUET-UU partnership covers the following areas of cooperation: curriculum development, applied research, training, exchanges, governance, and cross-cutting issues (gender empowerment, outreach and networking, fundraising, technology commercialization, and institutional sustainability). Under the US-PCASW project, many of the promising MUET's post graduate students and faculty will have the opportunity to benefit from the most modern teaching and research infrastructure available at the UU.

At the UU, more than 100 faculty members are engaged in research on water related issues from different disciplinary perspectives, especially urban water, wastewater treatment, sanitation and health, and law and policy. Many of these faculty members are directly engaged in supporting USPCAS-W activities at MUET, especially with regard to curriculum advancement, strengthening research capacities and infrastructure, and capacity building of MUET faculty.

To support MUET in establishing a world-class center for research and education on water resources management, the UU has set up several committees and thematic working groups. A team of 28 faculty members drawn from UU as well as four partner institutions representing key fields relevant to the study of water resources are contributing to the work of these committees and working groups. The UU has also designed a Peer Teacher Partnering (PTP) program to train the trainers. It connects MUET faculty to UU faculty for seeking support in the design and delivery of courses and research projects.

List of faculty involved in supporting MUET can be found at: water.utah.edu

VIII. Academic Programs

A. Master of Science (MS) Degree Program (duration: 2 years)

The US-PCASW offers MS degrees in the following four specialized fields:

- Hydraulics, Irrigation and Drainage (HID)
- Integrated Water Resources Management (IWRM)
- Environmental Engineering (ENV.ENG)
- Water, Sanitation and Health (WaSH)

However, during the first year (2015), students will be admitted only under the first three programs, while the degree program in Water, Sanitation and Health will start from Fall Semester, 2016.

The HID program emphasizes learning in hydraulic engineering, river mechanics & stream restoration, irrigation and drainage engineering, and hydrologic science and engineering, and understanding of climate change on irrigation regimes.

The IWRM program enhances students' knowledge and capacities to deal with multi-disciplinary aspects of water resource allocation and use under conditions of uncertainties. Key topics constituting the program include: principles of IWRM, hazard

planning and management, water governance, institutions and policies, water dispute management, water valuation, and GIS and remote sensing in water resources.

The ENV.ENG program emphasizes the learning of students in conventional environmental engineering, physical chemical and biological processes, water and wastewater treatment design, air and noise pollution and control, hazardous and solid waste management, environmental impact assessment.

The WaSH program focuses on enhancing the knowledge and capacities of students in areas/subjects such as: access to drinking water and sustainable sanitation, sustainable development goals in water and sanitation, hygiene overview, water treatment technologies, management of rural water supply schemes, gender and WaSH, and research in WaSH Sector.

Course Work and Research Requirements

The MS/ME program in all three disciplines requires the students to take three common courses of 3 credit hours each, five core courses of 3 credit hours each and an elective course of 3 credit hours. Additionally, in each semester, a graduate seminar on water security in Pakistan has to be attended by the students. All courses will be subject to assignments/term papers, class room test/quizzes, mid-term examination, and final examination.

Common Courses: Students admitted in all three programs are required to go through rigorous training in specific topics such as issues surrounding Pakistan's water security, implications of water-energy-food nexus for sustainable development, hydro-informatics and studies in water policy, law and legislation. In addition, each specialized program will offer academic excellence in its respective areas with the objective to produce graduates having necessary breadth and depth of knowledge.

Scheduling of Courses/Research (HID Program)

Sr. #	Course title	Credit hrs	Course type
First Semester			
1	Sustainable Development and WEF Nexus	3.0	Common
2	Irrigation Water Management	3.0	Core
3	Open Channel Hydraulics	3.0	Core
4	Agricultural Land Drainage	3.0	Core
5	Graduate seminar: Water Security in Pakistan	0.0	Common
	Total	12.0	
Second Semester			
1	Hydro-informatics: Data Management and Analysis	3.0	Common
2	Policy, Law and Community	3.0	Core
3	GIS and Remote Sensing Applications	3.0	Core
4	Groundwater Hydraulics	3.0	Core
5	Graduate seminar: Water Security in Pakistan	0.0	Common
	Total	12.0	
Third Semester			
1	Elective Course-1	3.0	Elective
2	Graduate seminar: Water Security in Pakistan	3.0	Common
3	Preparation of Research proposal, Data Collection, Seminar etc.	3.0	Common
	Total	12.0	
Fourth Semester			
1	Research/Thesis	6.0	Elective
	Grand Total	33.0	

Recommended Elective Courses

- Soil and Water Conservation
- Climate Change Impact on Water Resources
- Conjunctive Surface/Groundwater Management
- Sediment Transport and Management
- Hydraulic Structure Design

Scheduling of Courses/Research (IWRM Program)

Sr. #	Course title	Credit hrs	Course type
First Semester			
1	Sustainable Development and WEF Nexus	3.0	Common
2	Integrated Water Resources Management: Principles & Applications	3.0	Core
3	Water Infrastructure Planning and Management	3.0	Core
4	Catchment Hydrology	3.0	Core
5	Graduate seminar: Water Security in Pakistan	0.0	Common
	Total	12.0	
Second Semester			
1	Hydro-informatics: Data Management and Analysis	3.0	Common
2	Policy, Law and Community	3.0	Common
3	GIS and Remote Sensing Applications	3.0	Core
4	Hazard Planning and Management	3.0	Core
5	Graduate seminar: Water Security in Pakistan	0.0	Common
	Total	12.0	
Third Semester			
1	Elective Course-1	3.0	Elective
2	Graduate seminar: Water Security in Pakistan	0.0	Common
3	Preparation of Research proposal, Data Collection, Seminar etc.	0.0	Common
	Total	3.0	
Fourth Semester			
1	Research/Thesis	6.0	Elective
	Grand Total	33.0	

Recommended Elective Courses

- Water Dispute Management
- Systems Analysis and Optimization
- Climate Change Impacts on Water Resources
- Model Applications in IWRM
- Stochastic Hydrology
- Water Conservation and Rainwater Harvesting

Scheduling of Courses/Research (ENV.ENG Program)

Sr. #	Course title	Credit hrs	Course type
First Semester			
1	Sustainable Development and WEF Nexus	3.0	Common
2	Physical, Chemical, and Biological Processes	3.0	Core
3	Solid and Hazardous Waste Management	3.0	Core
4	Air and Noise Pollution Engineering	3.0	Core
5	Graduate seminar: Water Security in Pakistan	0.0	Common
	Total	12.0	
Second Semester			
1	Hydro-informatics: Data Management and Analysis	3.0	Common
2	Policy, Law, and Community	3.0	Common
3	Wastewater and Water Treatment Design	3.0	Core
4	Environmental Impact Assessment	3.0	Core
5	Graduate seminar: Water Security in Pakistan	0.0	Common
	Total	12.0	
Third Semester			
1	Elective Course-1	3.0	Elective
2	Graduate seminar: Water Security in Pakistan	0.0	Common
3	Preparation of Research proposal, Data Collection, Seminar etc.	0.0	Common
	Total	3.0	
Fourth Semester			
1	Research/Thesis	6.0	Elective
	Total	33.0	

Recommended Elective Courses

- Environmental Biotechnology for environmental sustainability
- Field Monitoring and Laboratory Analysis
- Environment and Ecology
- Environmental Management
- Industrial Pollution Control
- Water Quality Modeling
- Occupational Health and Safety
- Advanced Environmental Chemistry
- Solute Transport and Subsurface Remediation

B. Doctor of Philosophy (Ph.D.) Degree Program (duration: 3 years)

The Ph.D. program in above referred three areas is designed to provide students with detailed knowledge and critical understanding of subject specific issues within the context of water-development nexus, including the science behind the subject and the skills to translate science into practice.

The Ph.D. program is a combination of course work and research. The students are required to complete 18 credit hours of graded course work, and write a dissertation based on original/applied research. The course work requirements include the following:

- A course on Research Methodology (3 credit hours)
- A course on Modeling and Simulation (3 credit hours)
- Four courses relevant to the area of specialization (12 credit hours)

Additionally, the Ph.D. student must complete the following requirements:

- Complete the degree requirements within prescribed program duration;
- Pass the comprehensive examination;
- Present and pass a prospectus defense for advancement to candidacy;
- Present and pass the final oral dissertation defense; and
- Submit the written dissertation in compliance with the University guidelines and deadlines.

IX. Academic Calendar (2015-16)

Last date to apply	25 Jul 2015
Entry Test	01 Aug 2015
Merit List	08 Aug 2015
Orientation Day	31 Aug 2015
Start of Classes	01 Sep 2015

Note: Semester duration is 16 weeks.

First Semester (only course work)

- Classes start: 01.09.2015
- Classes end: 18.12.2015
- Examinations start: 28.12.2015

Winter Vacation/semester break: 04.01.2016 to 17.01.2016

Second Semester (only course work)

- Classes start: 18.01.2016
- Classes end: 06.05.2016
- Examinations start: 16.05.2016

Internship for students 23.05.2016 to 31.08.2016

Third semester (course work and research)

- Classes start: 01.09.2016
- Classes end: 23.12.2016
- Examinations start: 26.12.2016

This semester may also involve a trip to US University for research/training purposes.

Fourth Semester: MS students have to complete their research, including writing and defense of thesis. Ph.D. students will continue with their research work.

X. Eligibility Criteria for Admission

MS/ME Degree

Applicants must have obtained a Bachelor's degree in the subjects mentioned under each program area in the following table with 16 years of education; and first class or CGPA 3.0 and above out of 4.0.

HID	IWRM	ENV.ENG
BE/BSc in: Civil Engineering Agricultural Engineering Environmental Engineering	BE/BSc in: Civil Engineering Environmental Engineering Agricultural Engineering Water Resources Management Water Management	BE/BSc in: Environmental Engineering Civil Engineering Agricultural Engineering Or any other engineering discipline taken at least one subject environmental engineering

Ph.D. Degree

Applicants must have obtained a Masters' degree in the subjects mentioned under each program area in the following table with 18 years of education; and first class or CGPA 3.0 and above out of 4.0.

HID	IWRM	ENV.ENG
ME/MS in: HID or any other relevant discipline	ME/MS in: IWRM or any other relevant discipline	ME/MS in: Environmental Engineering

Other Requirements

- MUET will accept only on-line applications for admission. An application form and instructions to fill that form, as well as other documentation to be provided in support of application is available at http://www.muet.edu.pk/institutes/iwrem-uspcasw/admissions.

- A statement of purpose should be attached with the application. The statement should highlight your career goals, reasons for selecting the program you have applied for, and your anticipation of how this program will help you in meeting your goals (250 words maximum).

- To qualify for admission, applicants must obtain at least 60% of the marks in the entry test (for MS general GRE type and for PhD subject GRE type) to be conducted by the Center.

X. Faculty Profile

Dr. Bakhshal Lashari
Ph.D. in Sediment Transport from Agriculture University Krakow, Poland. Post-doctoral fellow under Fulbright Program in Integrated Water Resources Management at Colorado State University USA, and also under Endeavour Australia Program in Groundwater Governance from the University of South Australia, Australia.
Expertise: hydrology, irrigation, drainage, water resources management, water conservation

Dr. M. Munir Babar
Ph.D. in Computational Hydraulics from Kyoto University Japan.
Expertise: open channel hydraulics, computational hydraulics, design of hydraulic structures i.e. dams, barrages, spillways and canal design, analysis of hydraulic computations of dams, energy dissipaters and stilling basin, barrage design for surface and sub-surface flow conditions, and computer modeling of open channels and groundwater flows Using FEM techniques.

Dr. R.B. Mahar
Ph.D. in Environmental Engineering from Tsinghua University, Peoples Republic of China.
Expertise: water and waste treatment design, removal of metals from water through nano-fibers, constructed wetland, solid waste treatment, anaerobic digestion and kinetic modeling.

Dr. Abdul Latif Qureshi
Ph.D. in Hydraulics and Irrigation Engineering from Mehran University of Engineering and Technology, Pakistan.

Expertise: water resources planning, optimization of water resources, surface water hydrology

Dr. Mohammad Shafi Kori
Ph.D. in Groundwater Hydrology from Mehran University of Engineering and Technology, Pakistan.
Expertise: groundwater hydrology, surface water hydrology, irrigation management, drainage

Dr. Altaf Ali Siyal
Ph.D. in Soil and Water, Canfield University at Silsoe, UK
Post-doctorate on 'Subsurface irrigation simulations' at USDA salinity Lab Riverside, CA under Fulbright Fellowship Program and also post-doctorate under Australian Endeavour Research Fellowship Program in 'Soil Water and Crop Environment' from CSIRO, Townsville.
Expertise: Soil waterlogging and salinity, irrigation water management, groundwater, soil and water conservation, GIS and remote Sensing

Dr. Kamran Ansari
Ph.D. in Open Channel Hydraulics, University of Nottingham, UK.
Expertise: Open channel hydraulics, hydrology, water resources engineering, irrigation and drainage.

Mr. Ghulam Hussain Dars
M.S. in Civil and Env Engineering, Portland State University, Oregon, USA
Expertise: Hydrology, Climate Change Impact Analysis, Flood Modeling, water resources engineering, water quality, GIS, project planning, IWRM

Mr. Waqas Ahmed
M.Sc in Water Resources Engineering and Management, University of Stuttgart, Germany
Expertise: GIS and remote sensing, marine ecosystems, hydromechanics, water resource engineering

Mr. Awais Anwar Chandio
M.S. Env. Eng, AIT, Bangkok, and MA (Econ) Sind University
Expertise: environmental engineering, economics, chemistry, microbiology, community mobilization, water quality

Mr. Wali Muhammad Daudpota
M.E. in Land and Water Management, Sindh Agriculture University, Tandojam
Expertise: pressurized irrigation systems, community mobilization, irrigation technology, groundwater quality

Dr. Syed Sara Hassan
Ph.D. in Analytical Chemistry, University of Sind, Jamshoro, including research at Monash University, Australia
Expertise: chemistry, water quality, WaSH

Ms. Rakhshinda Bano
M.Sc in Environmental Science, State University of New York, USA
Expertise: wetlands conservation, water management and human health, environmental economics, sustainable development

Ms. Zahida Jamali
MS in Rural Development and Masters in English Literature, Sindh University, Jamshoro
Expertise: law, rural development, livelihoods, WASH, rural sanitation

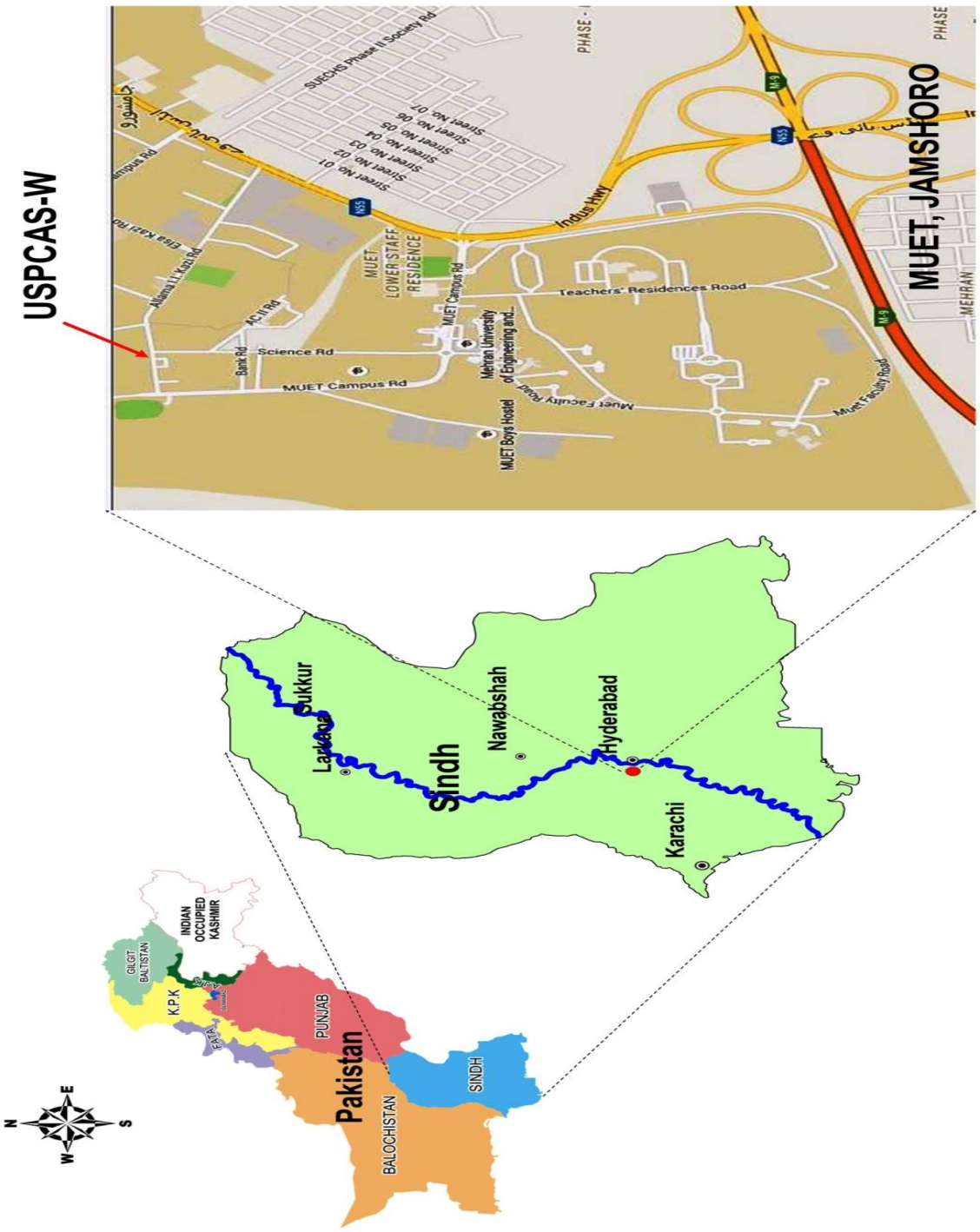
Mr. Muhammad Ali
Masters Int'l Public Policy, University of Tsukuba, Japan
Expertise: public policy, economics, monitoring and evaluation, networking

Contact us:

US-PCASW (Pakistani Partner University)
MUET, Jamshoro, Sindh, Pakistan
Phone: 92-22-2771226
E-mail: admissions.uspcasw@admin.muet.edu.pk
URL: www.muet.edu.pk/institutes/iwrem-uspcasw

US-PCASW (US Partner University)
University of Utah
Salt Lake City, Utah 84112
E-mail: steve.burian@utah.edu; aslam.chaudhry@utah.edu
URL: www.water.utah.edu

Campus Map


USPCAS-W
MUET, JAMSHORO
Indus Hwy
Teachers' Residences Road
MUET Campus Rd
Science Rd
Bank Rd
AC III Rd
Allama I.I. Kazi Rd
MUET LOWER STAFF RESIDENCE
SUECHS Phase II Society Rd
Mehran University of Engineering and...
MUET Boys Hostel
Muet Faculty Road
Sindh
Sukkur
Larkana
Nawabshah
Hyderabad
Karachi
Pakistan
INDIAN OCCUPIED KASHMIR
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