

# Coupled Human and Natural Systems (CHANS): A Solution for Human Well-Being and Global Sustainability

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## ABSTRACT

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Since December 2019, links between health of a common man and the status of surrounding ecosystems has grown fast mainly with the spread of the COVID-19 pandemic. SARS COV-2, which was thought to have jumped from wildlife to humans, with bats and penguins considered a most expected source. However, the links between human disease and the natural world are extremely greater than that COVID-19 pandemic. Whether it is mosquito born malaria, dengue or tick-borne Lyme's Disease to excessive heat exposure in summer from loss of urban trees. Then again, rapid growth of towns and cities like Karachi, increased water variability related to climate change, water scarcity and water stress, saline intrusion, and eutrophication, have increased attention on the upstream resources that filter and regulate urban water supplies.

If disturbance in natural systems can contribute to people's health risks, restoring those systems can help reconcile. One evidence of health and conservation benefits in developed countries is vaccinating dogs and cats against rabies, to cut the chances that wildlife and people will get infected. Mass scale vaccination of people against polio, measles, HPV have made their communities free of these infections. The benefits of "primary prevention," strategy are clear and long lasting to help reduce the burden of infectious disease. Additionally, reduced deforestation, better management of wildlife trade and hunting, and better surveillance of zoonotic pathogens before they spill over into human populations are all "primary prevention" ways.

Waterborne infections are a major concern for Pakistani communities. Current flood had made it worst. In the context of global change, many solutions to water resources assessment and management challenges can be sought, using the approach of coupled human-natural systems. For example small scale irrigation using reclaimed sewage effluent or gray water. My team is focusing on advancing our understanding of sources of fecal and non-fecal human pathogens and their survival in various soil types, sedimentary type aquifers and natural water resources. Developing highly sensitive nano filtration units to make sewage effluent free of PFAS and microorganisms and make it suitable for potential reuse in order to save our natural resources for household consumption only. This work is also focusing on gathering new knowledge related to the social determinants of health for people living in communities that are lacking the infrastructure to support access to clean/potable water within Navajo Nation (Southwest of America).

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