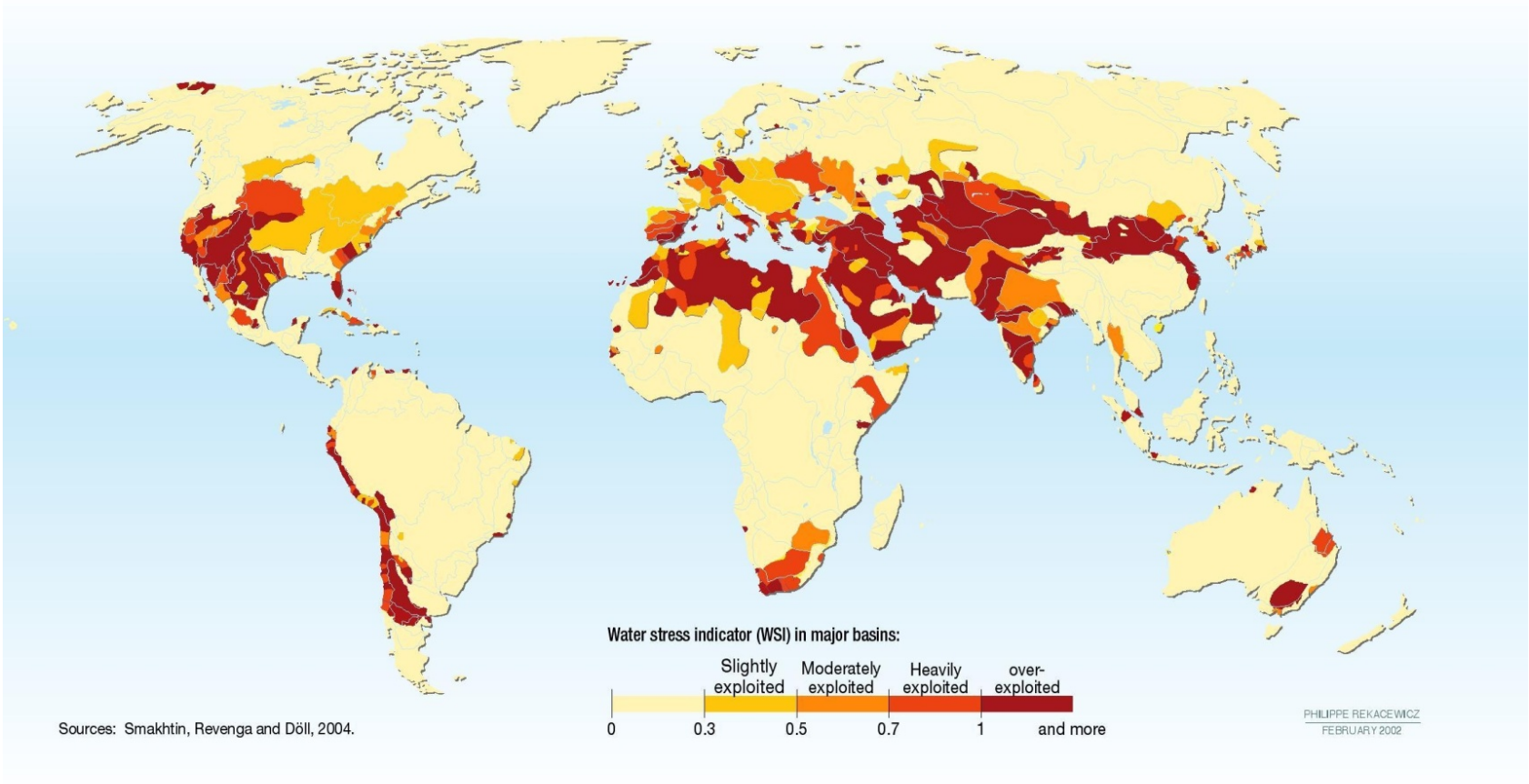
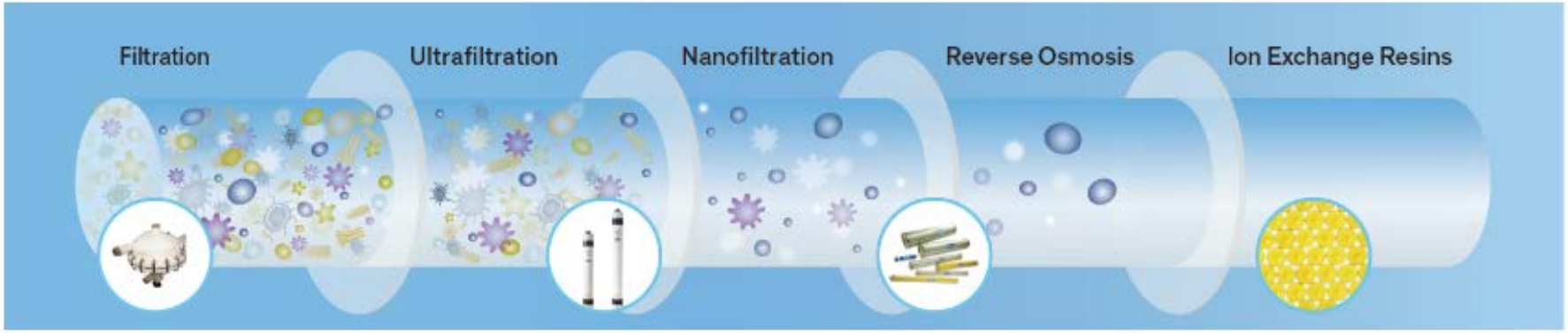
Global Water Stress



Forcing water providers to rely more on alternative sources

Water treatment technology spectrum



Filters High Suspended Solids
Sand, silt, organic particles, algae and fibers, even in the presence of fats, oils and greases

Filters Macromolecules
Microbiological species, bacteria, viruses, colloids, silt and more

Filters Small Molecules
Virtually all bacteria, viruses, cysts, humic materials, alkalinity and H_2O hardness

Removes Salts, Ions, Color, Low Molecular Weight Species
Nearly all inorganic contaminants, radium, pesticides, cysts, bacteria and viruses

Purifies and Changes
Further removes metal ions and mineral content to soften the water or improve its purity; changes water characteristics

"Mechanical" Water Treatment Under Pressure

"Chemical" Treatment at Molecular Level

Water Desalination and Purification

Focus: membrane separation processes to desalinate and purify a range of source waters
Innovations: materials and characterization, processes, and systems
Applications: desalination, wastewater reclamation, and treatment of industrial streams with complex solution chemistries.

Manish Kumar
Pennsylvania State University
Sustainability in Water Desalination

Chris Stafford
National Institute of Standards and Technology
Advanced Membrane Characterization Techniques

Baoxia Mi
University of California, Berkeley
New Materials for Emerging Desalination Technologies

Kevin Alexander
Hazen and Sawyer
High-Recovery Desalination and Water Treatment

Summary and path forward

- Overview of water purification technology and path forward for reclaim water and water reuse
- Thermodynamics and energy requirement
- RO membrane and need for structure-property, advanced analytical techniques
- New material needs for different water purification techniques
- System challenges, opportunity and importance of high recovery process