

PAMELA L. NAGLER
U.S. GEOLOGICAL SURVEY,
Southwest Biological Science Center, Sonoran Desert Research Station
University of Arizona
125 Biological Sciences East, Building 43, Tucson, AZ, 85721
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EMPLOYMENT

Physical Scientist, GS-1301-12, Sept., 2005 - Present

U.S. Geological Survey, 125 Biological Sciences East, Tucson, AZ, 85721
Supervisor: Stephen P. Gloss, Ph.D.; T.520-670-5391; sgloss@usgs.gov

Assistant Research Scientist, June, 2000 – December, 2005

University of Arizona, Soil, Water, and Environmental Science Department (SWES),
Environmental Research Lab (ERL), 2601 E. Airport Dr., Tucson, AZ 85706
Supervisor: Edward P. Glenn, Ph.D.; Tel. 520-626-2664; eglenn@ag.arizona.edu

Graduate Research Associate, January, 1998 - May, 2000

University of Arizona; Soil, Water, and Environmental Science Department; Terrestrial
and Biophysics Remote Sensing (TBRS) Lab; Shantz, Bldg. 38, Tucson, AZ 85721
Supervisor: Alfredo R. Huete, Ph.D.; T.520-621-3228; ahuete@ag.arizona.edu

Fellow, 1996 - 1997 Intermittently

Japan Ministry of Agriculture, Forestry, and Fisheries; National Inst. AgroEnvironmental
Sciences; Remote Sensing Lab; 3-1-1 Kannondai, Tsukuba, Ibaraki, 305, Japan
Supervisor: Yoshio Inoue, Ph.D.; T.0298-38-8159; yinoue@niaes.affrc.go.jp

Graduate Research Assistant, June, 1994 - January, 1998

U.S. Department of Agriculture, Agriculture Research Service (ARS); Hydrology,
Remote Sensing and Modeling Lab; 5601 Sunnyside Ave; Beltsville, MD 20705-2350
Supervisor: Craig S.T. Daughtry, Ph.D.; T.301-504-5015; cdaughtry@hydrolab.arsusda.gov

Cartographer, GS-1370-09, September, 1992 - August, 1994

U.S. Department of Defense, Defense Mapping Agency;
Scientific Data, Hydro-Topo Center (HTC); 4600 Sangamore Rd, Bethesda, MD 20816:
Product Generation Department (PGD); 12310 Sunrise Valley Drive, Reston, VA 22090
Supervisors: Mrs. Grant (HTC); T.301-227-3252 and Mr. Howard (PGD); T.703-264-7268

Physical Scientist, GS-1301-09, May, 1991 - September, 1992

U.S. Environmental Protection Agency; Region IV, Office of Solid Waste; 345 Courtland
Street, NE, Atlanta, GA 30365
Supervisor: Mrs. Patricia S. Zwaig; T.404-347-2091

Intern, January, 1990 - August, 1990

The National Geographic Society; Research and Exploration Division; 16th and M Streets,
NW, Washington, DC 20036
Supervisor: Barry Bishop, Ph.D. (deceased); T.202-264-7268

Science and Mapping Technician, November, 1988 - December, 1989

KBN Engineering and Applied Sciences; 1034 NW 57th Street, Gainesville, FL 32605
Supervisor: Robert C. McCann, Ph.D.; T.904-331-9000

Hydrologic Technician, GS-1361-05, June, 1986 – April, 1991
U.S. Geological Survey, Water Res.; 6481-A Peachtree Ind. Blvd., Doraville, GA 30360
Supervisor: Norman J. Peters, Ph.D.; T.404-986-6860

EDUCATION

- 2001 Ph.D. University of Arizona, Tucson, Soil, Water, and Environmental Science,
(minor in Remote Sensing and Spatial Analysis)
Committee: Alfredo Huete, Ed Glenn, Stuart Marsh, Alan Matthias, Susan Moran
- 1997 M.A. University of Maryland, College Park, Geography (Remote Sensing)
Committee: Samuel Goward, Stephen Prince, Craig Daughtry (USDA-ARS)
- 1989 B. S. University of Florida, Gainesville, Geography (Physical Science)

RESEARCH INTERESTS

Remote sensing (RS) and geo-spatio-temporal applications, biogeography, land cover / land use change (LCLUC) analyses, landscape ecology, riparian and phreatophyte ecosystems, plant stress and water balance, empirical modeling for agricultural and natural decision support systems (DSS), environmental monitoring and assessment for natural resource conservation and management

My current research has been devoted to the creation of riparian and upland vegetation and evapotranspiration (ET) maps. Validated estimates of riparian ET using RS and ground methods could provide quantification of riparian water use, which would lead to more accurate water balance models, especially needed in the arid southwest USA. ET maps depend on having a network of ET eddy-covariance flux towers, then establishing a relationship between ET measured at towers with RS and meteorological data. In Nagler et al. (2005a, RSE), we correlated 16-day MODIS Enhanced Vegetation Index (EVI) data with ET tower data on the Middle Rio Grande, and produced a simple method for predicting ET from MODIS EVI and air temperature (T_a) measured at ground stations. The finding that ET predictions did not require species-specific equations was significant, since these western rivers have mixed vegetation zones that cannot be easily mapped at the species level. In Nagler et al. (2005b, RSE), this relationship was extended to three river systems and all the main riparian species, including saltcedar, cottonwood, giant sacaton grass, mesquite, and mixed stands of species. Furthermore, the strong relationship between ET and MODIS EVI * T_a ($r^2 = 0.76$ between predicted and measured ET over nine towers on three river systems) now permits point data on ET and carbon flux to be projected accurately over large river stretches, and to be incorporated into mapping and change detection programs. In Nagler et al. (2006), we extended this relationship from riparian to upland plant communities in the San Pedro watershed and found a similarly impressive relationship in this non-riparian land cover type. In Kim et al. (2006), both the spatial and temporal variability in ET estimates were examined using hyperspectral imagery (AVIRIS)

which was scaled to MODIS using the previously published algorithms. Further work in this arena, riparian water-use estimates using remotely sensed data, was extended to a geographic region which had no ground-based meteorological tower information. In Nagler et al., 2006c (submitted to *Environmental Management*) we related the riparian vegetation dynamics with evapotranspiration for the riparian corridor in the Delta of the Colorado River, Mexico. This research has implications for conservation and management in both the United States and Mexico. Lastly, our estimates of evapotranspiration using ground-based meteorological towers and satellite data was compared with tree-based sap flow sensors (transpiration via the heat-dissipation method) in a Cottonwood (*Populus fremontii*) restoration plantation on the Lower Colorado River at Cibola National Wildlife Refuge. This work has been submitted to the *Journal of Agricultural and Forest Meteorology* in addition to the Wildlife Refuge Managers and the Bureau of Reclamation. An ET map product can be used by scientists, managers and others to assess the seasonal and temporal change dynamics of western rivers, to monitor and protect natural resources, and to be incorporated into a robust, multiple-use system for ecological management.

TEACHING EXPERIENCE

UA Teaching Assistantships: (i) Spring 2000, SWES 453/553 Remote Sensing of Environment, and (ii) Spring 2002, SWES 508 Technical Writing for the Life Sciences. Remote sensing topics covered included: Introduction to Radiometry, Soil and Vegetation Optical Properties, fAPAR, LAI, VI, BRDF, Image Processing/ PCA, Atmosphere, Surface Temperature. Instrument use includes hyper- and multi-spectral radiometers (such as the Barnes, SE-590, ASD), pyranometers, ceptometers, weather instruments, leaf-area meters, soil moisture and temperature sensors, and infra-red gun/sensors. Wrote and conducted labs, including the introduction, objectives and methods, and experimental design. Set up the field experiments and was responsible for transporting and operation of the equipment. Technical writing topics included how to put together a journal article, searching for literature and reading, writing, and reviewing research papers and publications, and applying for research grants. I am currently working with graduate students from Wright State University in Ohio on masters and dissertation projects.

HONORS / AWARDS / CERTIFICATES / TRAINING

| | |
|--|---------------|
| Reclamation Science & Technology Program Proposal Review | 09/06 |
| Visual Imaging Systems (Feature Analyst Professional) Training | 08/06 |
| NASA Biodiversity and Disturbance Review Panel | 07/06 |
| Radiation Protection Course for Neutron Probe | 07/06 |
| U.S.DOI STAR Award for outstanding efforts at SDRS | 06/06 |
| Wilderness First Aid and CPR | 06/06 |
| Photoshop Training | 06/06 |
| Adjunct Faculty, University of Arizona | 01/06 |
| Adjunct Faculty, Wright State University | 01/-06 |
| RCN-Colorado River Delta Executive Committee | 04/05-present |
| Research Specialist, Faculty, U.Arizona, SWES, ERL | 04/01-present |
| Grant Writing USA Certificate | 08/04 |
| Association of American Geographers | 2003- present |
| ArcView and Erdas Imagine Certificates | 07/02 |
| Internship, Ke Kua'aina Hanauna Hou, <i>intermittently</i> | 09/00-04/02 |
| Assistantships, U.Arizona Graduate Research | 01/98-04/01 |
| Society for Conservation GIS | 2000-present |
| Elinor Montgomery Scholarship | 10/99 |
| UA Leadership Program Certificate | 11/99 |
| EOS Terra MODIS Launch –Vandenberg AFB Invitee | 12/99 |
| National Institute of Agro-Environmental Sciences, Japan | 08/97 |
| Amer. Society for Photogrammetry and Remote Sensing | 1996- present |
| Japanese Language Training Certificate | 08/96 |
| Fellowship, National Science Foundation | 05-08/96 |
| Assistantships, U. Maryland Graduate Research | 06/94-97 |
| Federal Employee Point of Light Award | 12/91 |
| Internship, National Geographic Society | 11/89 |
| Environmental Studies Certificate | 12/89 |
| Gamma Theta Upsilon Honor Society | 11/88 |
| Internship, U.S. Geological Survey, WRD | 06/88 |

GRANTS

P. Nagler. 2007. DOI-USGS Lower Colorado River Landscape Funds for forecasting riparian vegetation. Estimating transpiration rates of a cottonwood plantation at Cibola NWR using sap flow sensors and remote sensing to scale riparian-plant water use to the landscape level for restoration efforts. Funded by USGS-BRD (\$45,000 for a half year).

C.Westenberg, J.L. Smith, **P. Nagler.** 2007. Delineating vegetation groups and quantifying ground-water evapotranspiration in Clarke County, Nevada with high-resolution multispectral satellite imagery data. Funded by USGS-WRD (\$22,404 for a half year).

P. Nagler. 2007. The Ohio Alliance Universities Evapotranspiration Project on the Lower Colorado River using eddy-covariance and Bowen-ratio flux towers in alfalfa and saltcedar land cover. Funded by Central State University, Ohio (\$58,000 for a half year).

L. Mexicano, K. Flessa, A. Guevara-Carrizales, A. Moreno-Valdez, R. López Wilchis, V. Sánchez-Cordero, S. Ticul Álvarez, J. Villegas, **P. Nagler.** 2006. Estado de conservación y evaluación del habitat de los murciélagos de la Reserva de la Biosfera del Alto Golfo de California y Delta del Rio Colorado (RBAGCDRC). Funded by Universidad Autónoma de Baja California. (\$5,500 (Pesos: 552,000) for one year).

P. Nagler. 2006. DOI-USGS Lower Colorado River Landscape Funds for forecasting riparian vegetation. Estimating transpiration rates of a cottonwood plantation at Cibola NWR using sap flow sensors and remote sensing to scale riparian-plant water use to the landscape level for restoration efforts. Funded by USGS-BRD (\$45,000 for a half year).

P. Nagler. 2006. The Ohio Alliance Universities Evapotranspiration Project on the Lower Colorado River using eddy-covariance and Bowen-ratio flux towers in alfalfa and saltcedar land cover. Funded by Central State University, Ohio (\$54,114 for a half year).

C.Westenberg, J.L. Smith, G. Reese, **P. Nagler.** 2006. Delineating vegetation groups and quantifying ground-water evapotranspiration in Clarke County, Nevada with high-resolution multispectral satellite imagery data. Funded by USGS-WRD (\$24,000 for a half year).

P. Nagler. 2006. Western North American Migratory Landbird Project: Wintering Habitats in Sonora, Mexico. Mapping land cover in the riparian zones in Sonora, Mexico. Funded by FWS, Sonoran Joint Venture. (\$10,000 for one semester).

E. Glenn, J. Waugh, F. Jordan, C. McKeon, **Nagler, P.** 2006. Monument Valley Ground Water Remediation of a DOE Uranium Mine Site: Pilot Study Work Plan for estimating evapotranspiration rates of halophyte species on the Colorado Plateau. Funded by DOE. (\$15,000 for one semester).

E. Glenn, J. Waugh, F. Jordan, C. McKeon, **Nagler, P.** 2005. Monument Valley Ground Water Remediation: Pilot Study Work Plan. Funded by DOE. (\$36,000 for one semester).

Flessa, K., **P.Nagler**, et al. of the Executive Committee. 2005. The Colorado Delta Research Coordination Network, <http://www.geo.arizona.edu/~afortner/rcncrd/home/>. Announcement No. 04-567. Research Coordination Network in Biological Sciences. Funded by NSF.

Nagler, P. 2005. Soil Moisture Experiment (SMEX04) field participation, collection and processing of aerial imagery. Funded by USDA-ARS in Beltsville. (\$8,800 for one semester).

Nagler, P. 2004. Photographic atlas of esteros and other coastal wetlands of the Northern Gulf of California. Funded by Packard Foundation. (\$6,000).

Nagler, P., E.Glenn, and O.Hinojosa. 2004. Ecological Assessment of the Limitrophe Region of the Colorado River to Support Cocopah Tribal Resolution CT-02-14 to Assess Feasibility of an Intl. Wildlife Refuge. Funded by National Fish and Wildlife Federation. (\$30,000 for one year).

M.de la Garza, Y.Carrillo, M.Briggs, O.Hinojosa-Huerta, E.Glenn, and **P.Nagler**. 2003. Management Strategies for Restoration of the Colorado River Delta Floodplain (to Pronatura Sonora). Funded by the North American Wetlands Conservation Act Grants Program (NAWCA) Migratory Bird Conservation Commission. (\$50,000 for one year).

Nagler, P. and E.Glenn. 2002. Mapping the Ironwood Forest National Monument (IFNM). Funded by A.S.Desert Museum. http://www.desertmuseum.org/programs/ifnm_index.html (\$17,000 for one semester)

Nagler, P. and E.Glenn. 2001. Development of a GIS of the Colorado River delta, Mexico. Funded by Sonoran Institute. (\$30,000 for two years).

Glenn, E., A.Huete, **P.Nagler**. 2001. Remote sensing tools for monitoring and managing a sensitive, arid-zone riparian corridor: the lower Colorado River and delta in the US and Mexico. Funded by NASA, Research Announcement 00-OES-08. (Post-doc, co-PI: \$605,000 for three years).

PUBLICATIONS

Peer-Reviewed Publications

- Nagler, Pamela L.**, Edward P. Glenn, Kamel Didan, Doyle Watts, John Osterberg. 2007. Evapotranspiration by tamarisk from three 1-km² sites at Cibola NWR on the lower Colorado River. *Restoration Ecology* (To be submitted, Jan., 2007).
- Van Riper, C., Webb, R., K. Howard, P. Shafroth, S. Gloss, E. Glenn, **P. Nagler**. Potential for ecosystem recovery on the Lower Colorado River. *Bioscience* (To be submitted, Jan., 2007).
- Scott, R. L., W.L. Cable, T.E. Huxman, **P.L. Nagler**, D.C. Goodrich. 2006. Multiyear riparian evapotranspiration and groundwater use for a semiarid watershed. *Water Resources Research* (Submitted, September, 2006).
- Nagler, P.**, A. Jetton, J. Fleming, K. Didan, E. Glenn, K. Morino, J. Erker, J. Milliken, S. Gloss. 2006. Estimating Evapotranspiration in a Cottonwood (*Populus fremontii*) Restoration Plantation on the Lower Colorado River at Cibola National Wildlife Refuge Estimated by Sap Flow and Remote Sensing Methods. *Agricultural and Forest Meteorology* (Submitted, June, 2006).
- Nagler, Pamela L.**, Edward P. Glenn, Osvel Hinojosa-Huerta, Francisco Zamora, and Keith Howard. 2006. Riparian Vegetation Dynamics and Evapotranspiration for the Riparian Corridor in the Delta of the Colorado River, Mexico: Implications for Conservation and Management. *Environmental Management* (Submitted, September, 2006).
- Glenn, Edward P., Alfredo R. Huete, **Pamela L. Nagler**, and Paul Brown. 2006. Review: Integrating Remote Sensing and Ground Methods to Estimate Evapotranspiration. *Journal of Arid Environments* (Submitted, September, 2006).
- Glenn, Edward P., Karl W. Flessa, Michael J. Cohen, **Pamela L. Nagler**, Kristen Rowell, and Francisco Zamora-Arroyo. 2006. Just add water and the Colorado River still reaches the sea. *Environmental Management* (Submitted April, 2006).
- Nagler, Pamela L.**, Edward P. Glenn, HoJin Kim, William E. Emmerich, Russell L. Scott, Travis E. Huxman, and Alfredo R. Huete. 2006. Seasonal and Interannual Variation of Evapotranspiration for a Semiarid Watershed Estimated by Moisture Flux Towers and MODIS Vegetation Indices. Special Issue: Soil Moisture Experiment 2004 in Arizona and Sonora. *Journal of Arid Environments* (Submitted August, 2006).
- Kim, Hojin, Alfredo Huete, **Pamela Nagler**, Edward Glenn, William Emmerich, and Russell Scott. 2006. Spatial and Temporal Variability in Evapotranspiration Estimates from AVIRIS at the SMEX04 Site. Special Issue: Soil Moisture Experiment 2004 in Arizona and Sonora. *Journal of Arid Environments* (Submitted, September, 2006).

- Franklin, K., K. Lyons, **P. Nagler**, D. Lampkin, E. Glenn, F. Molina-Freaner, T. Markow, and A. Huete. 2006. Estimating buffel grass land conversion and productivity in the plains of Sonora, Mexico using satellite imagery. *Biological Conservation* 127: 62-71.
- Glenn, E.P., **P.L. Nagler**, R.C. Brusca. 2006. Coastal wetlands of the northern Gulf of California: inventory and conservation status. *Aquatic Conservation: Marine and Freshwater Ecosystems* 16: 5-28.
- Nagler, P.L.**, Hinojosa-Huerta, O., E. Glenn, J. Garcia-Hernandez, R. Romo, C. Curtis, A. Huete, S. Nelson. 2005a. Regeneration of Native Trees in the Presence of Saltcedar: Results of an Inadvertent, 20 Year Pulse-Flood Experiment in the Colorado River Delta, Mexico. *Conservation Biology* 19(6): 1842-1852.
- Nagler, P.**, R. Scott, C. Westenburg J. Cleverly, E. Glenn, A. Huete. 2005b. Evapotranspiration on western U.S. rivers estimated by the Enhanced Vegetation Index from MODIS and data from eddy covariance and Bowen ratio flux towers. *Remote Sensing of Environment* 97(3): 337-351.
- Nagler, P.**, J. Cleverly, D. Lampkin, E. Glenn, A. Huete, and Z. Wan. 2005c. Predicting riparian evapotranspiration from MODIS vegetation indices and meteorological data. *Remote Sensing of Environment* 94(1): 17-30.
- Nagler, P.L.**, Glenn, E.P., K. Hursh, C. Curtis, and A. Huete. 2005d. Vegetation Mapping for Change Detection on an Arid Zone River. *Environmental Monitoring & Assessment* 109(1-3): 255-274.
- Glenn, E. and **P. Nagler**. 2005a. Comparative ecophysiology of saltcedar and native trees in western U.S. riparian zones. *J. Arid Environments* 61: 419-446.
- Glenn, E. and **P. Nagler**. 2005b. New Life for the Colorado River Delta, in *Dry Borders*. Eds. William Broyles and Richard Felger, University of Utah Press, 700 pages.
- Nagler, P.L.**, E.P. Glenn, and A. R. Huete. 2004. Leaf Area Index and Normalized Vegetation Difference Index as predictors of canopy characteristics and light interception by riparian species on the lower Colorado River. *Agricultural and Forest Meteorology* 125(1-2): 1-17.
- Nagler, P.L.**, Y. Inoue, E.P. Glenn, A. Russ, C.S.T. Daughtry. 2003. Cellulose Absorption Index (CAI) to quantify mixed soil-plant litter scenes. *Remote Sensing of Environment* 87:310-325.
- Nagler, P.L.**, E.P. Glenn, and T.L. Thompson. 2003. Comparison of transpiration rates among saltcedar cottonwood and willow trees using sap flow and leaf temperature methods. *Agricultural and Forest Meteorology* 110: 1-17.
- Nagler, P.L.**, E.P. Glenn, S. Nelson, and S. Napoleon. 2003. Effects of fertilization treatment and stocking density on the growth and yield of the economic seaweed *Gracilaria parvispora* (Rhodophyta) in cage culture at Moloka'i, Hawai'i. *Aquaculture* 219 (1-4): 379-391.
- Hinojosa-Huerta, O., **P.L. Nagler**, Y. Carrillo-Guerrero, E. Zamora-Hernandez, J. Garcia-Hernandez, F. Zamora-Arroyo, and E.P. Glenn. 2002. Andrade Mesa Wetlands of the All-American Canal. *Natural Resources Journal* 42 (4): 899-914.

Glenn, E.P., F. Zamora-Arroyo, **P.L. Nagler**, M.Briggs, W. Shaw, K.Flessa. 2001. Ecology and conservation biology of the Colorado River Delta, Mexico. *J. of Arid Environments* 49(1):5-16.

Nagler, P.L., E.P. Glenn, A.R. Huete. 2001. Assessment of spectral vegetation indices for riparian vegetation in the Colorado River delta, Mexico. *J. of Arid Environments* 49(1): 91-110.

Zamora-Arroyo, F.,* **P.L.Nagler***, M.Briggs, D.Radtke, H.Rodriquez, J.Garcia, A.Huete, C.Valdez, E.P. Glenn. 2001. Regeneration of native trees in response to flood releases from the United States into the delta of the Colorado River, Mexico. *senior co-authors. *J. of Arid Environments* 49: 49-64.

Nagler, P.L. 2001. Remote Sensing Applications: Environmental Assessment of the Colorado River Delta, Mexico. University of Arizona, Tucson, Arizona. *UA Doctoral Dissertation*.

Nagler, P.L., K. Gillon, J. Pitt, B.Snape, E.P. Glenn. 2000. Editorial: Application of the U.S. Endangered Species Act across international borders: the case of the Colorado River delta, Mexico. *Environmental Science and Policy* 67-72.

Nagler, P.L., C.S.T. Daughtry, S.N. Goward. 2000. Plant Litter and Soil Reflectance. *Remote Sensing of Environment* 71(2) 207-215.

Nagler, P.L. 1997. Plant Litter and Soil Reflectance. *University of Maryland Masters Thesis*.

Daughtry, C.S.T., **P.L. Nagler**, M.S. Kim, J.E. McMurtrey III, and E.W. Chappelle. 1996. Spectral Reflectance of Soils and Crop Residues. In A.M.C. Davies and Phil Williams (Eds.) *Near Infrared Spectroscopy: The Future Waves*. NIR Publications, Chichester, UK. pp.505-511.

Other Publications

- Inoue, Y., P.Nagler, et al., 2006. International collaborator for scientific research on ecosystem and remote sensing technology through the National Institute for Agro-Environmental Sciences (NIAES), Japan.
- Mesta, R., M.L. Scott, J.F. Villaseñor, **P. Nagler**, E. Gomez, E.W. Reynolds, C.L. Jones, J. Duberstein. 2006. Western North American Land Bird Project: Wintering Habitats in Sonora, Mexico. A Neotropical Migratory Bird Conservation Act Funded Project, U.S. Fish and Wildlife Service, Migratory Bird Office, Tucson, Arizona. 146 pp.
- Brusca, R., R. Cudney-Bueno, M. Moreno-Baez. Gulf of California Esteros and Estuaries: Analysis, State of Knowledge and Conservation Priority Recommendations. Final Report to the David and Lucile Packard Foundation from the Arizona-Sonora Desert Museum. Acknowledged for my contribution of all aerial photographs and collaboration with research efforts (*see Glenn, E.P., **P.L. Nagler**, R.C. Brusca. 2006. Coastal wetlands of the northern Gulf of California: inventory and conservation status. *Aquatic Conservation: Marine and Freshwater Ecosystems* 16: 5-28.)
- Zamora-Arroyo, F., S. Cornelius, J. Pitt, E. Glenn, **P.L. Nagler**, M. Moreno, J.Garcia, O. Hinojosa-Huerta, M. de la Garza, and I. Parra. 2005. Conservation Priorities in the Colorado River Delta Mexico and the United States. Sonoran Institute, Tucson, Arizona.
- Natural Channel Design, Inc. and Fred Phillips Consulting, LLC. 2006. Restoration Ecology: A preliminary design for enhancement of native riparian habitats. Lower Colorado River, Limitrophe Reach U.S.-Mexico. A report submitted to Environmental Defense in May, 2006. Acknowledged for my contribution to the research conducted in the Limitrophe Zone, US-Mexico Border, 1998-2005.
- Norman, L., A. Donelson, E. Pfeifer, A. Lam. 2006. Colonia development and land use change in Ambos Nogales, United States-Mexican Border. USGS Open-File Report 2006-1112. Acknowledged for my contribution of the cover photo.
- Nagler, P.L.** Curtis, C.C., and E.P. Glenn. 2005. An inexpensive digital vegetation mapping system. *ISPRS Journal of Photogrammetry and Remote Sensing*.
- Flessa, K., **P. Nagler**., et al. 2005. \$200 per acre-foot: Nature's Services and the Natural Value of Water in the Colorado Delta and Estuary. (In preparation).
- Huckelbridge, K., J. Drakeup, E.Glenn, R. Romo, and **P.Nagler**. 2005. Hydrology of the Limitrophe Region of the Colorado River. *Hydrological Modeling J.* (to be submitted).
- Glenn, E., **P. Nagler**, R. Romo, and O. Hinojosa-Huerta. 2004. The re-emergence of the Colorado River Delta. *Southwest Hydrology* Vol.3/No.1, January-February.
- Ryder, E., S.Nelson, E.Glenn, **P.Nagler**, S.Napolean, and K.Fitzsimmons. 2004. Review: Production of *Gracilaria parvispora* in two-phase polyculture systems in relation to nutrient requirements and uptake. *January, Bull. Fish. Res. Agen. Supplement*.

Daughtry, C.S.T. and C. L. Walthall. 1998. Acknowledged for my contribution (1994-96) to Spectral Discrimination of Cannabis sativa L. Leaves and Canopies. *Remote Sensing of Environment* 64 (2): 192-201.

N. Peters. 1994. Hydrological chemical and biological processes of transformation and transport of contaminants. In N.Peters, R.J. Allen, and V.Z.Tsirkvov (Eds.) *Aquatic Environments. IAHS Pub. #219*. Rostov-on-don, Russia. 458pp. Assisted with this work.

N. Peters. 1993. Tracers and Hydrology. In N.Tase, D.E. Walling, E.Hoehn, and C.H. Leibenbgut (Eds.). *IAHS Pub. #215*. Yokohama, Japan. 350 pp. Assisted with this work.

Shanley, J. 1992. Acknowledged for my contribution (1986-1991) to Sulfate retention and release in soils at Panola Mountain, Georgia. *Soil Science* 153 (6)499-508.

Shanley, J. 1992. Acknowledged for my contribution (1986-1991) to Sulfate retention and release in soils at Panola Mountain, Georgia. *Soil Science* 153 (6)499-508.

N. Peters. 1991. Sediment and water quality. In N.Peters and D.E. Walling (Eds.) *Changing Environmental Trends and Explanations. IAHS Pub. #203*. Wallingford, England. 374pp. Assisted with the preparation of this work.

Reviewer for Peer-Reviewed Publications

Scientia Agricola (1)

Soil and Tillage Research (1)

Journal of Arid Environments (7)

Hydrological Processes (1)

Remote Sensing of Environment (6)

Agronomie (1)

Journal of Tropical Forest Science (1)

Rangeland Ecology and Management (1)

Canadian J. of Remote Sensing (2)

Agricultural and Forest Meteorology (5)

Forest Ecology and Management (1)

Ecological Applications (1)

Water Resources Research (1)

Restoration Ecology (1)

CONFERENCE PRESENTATIONS, PROCEEDINGS, AND POSTERS

Nagler, P. 2006. Presentation: Careers in Environmental Science, University of Arizona undergraduate class for environmental science majors. Tucson, AZ, Oct. 24.

Nagler, P. 2006. Presentation: Evapotranspiration by *tamarisk* from three 1-km² sites at Cibola NWR on the lower Colorado River. Tamarisk Research Symposium. Fort Collins, CO. Oct. 3-4.

Nagler, P. 2006. Poster: Water-use by *tamarisk* using MODIS EVI and neutron probe soil moisture data from three 1-km² sites at Cibola NWR on the lower Colorado River. MODIS Specialty Group Meeting and Proceedings from the Global Vegetation Workshop III, Missoula, Montana. August 7-10. <http://www.ntsg.umn.edu/VEGMTG>

Nagler, P. 2006. Participant: NASA IDS 2006 Panel – Biodiversity and Disturbance panel of the NASA Research & Education Support Services (NRESS). Crystal City, VA, July 25-27.

Nagler, P. 2006. Presentation: Seasonal and Interannual Variation of Evapotranspiration for a Semiarid Watershed Estimated by Moisture Flux Towers and MODIS Vegetation Indices. American Geophysical Union (AGU) Joint Assembly Meeting, Special Session H07: Monitoring the Terrestrial Water Cycle Through the Merger of Land Surface Models and Remote Sensing Observations. Baltimore, MD. May 23-26.

Nagler, P. 2006. Poster: Measuring and Scaling Evapotranspiration of a Cottonwood Restoration Plot on the Lower Colorado River. American Geophysical Union (AGU) Joint Assembly Meeting, Special Session H07: Monitoring the Terrestrial Water Cycle Through the Merger of Land Surface Models and Remote Sensing Observations. Baltimore, MD. May 23-26.

Nagler, P. 2006. Presentation: Ecological Relationships and Water Use by Native Vegetation and Exotic Saltcedar on Western U.S. Rivers. The 6th Conference on Research and Resource Management in the Southwest Deserts: Borders, Boundaries and Time Scales. Tucson, AZ. May 2-5.

Nagler, P. 2006. Poster: Ecological Relationships and Water Use by Native Vegetation & Exotic Saltcedar: Results from studies on Western U.S. Rivers. The 6th Conference on Research and Resource Management in the Southwest Deserts: Borders, Boundaries and Time Scales. Tucson, AZ. May 2-5.

Nagler, P. 2006. Presentation of pre-results to the Ohio Alliance Universities and the USBR: Estimation of evapotranspiration by *tamarisk* from three 1-km² sites at Cibola NWR on the lower Colorado River. Sponsored by Central State University, Dayton, OH. April 6-7.

Nagler, P. 2006. Presentation: Lower Colorado River Ecological Restoration Project at Cibola National Wildlife Refuge: Studies of Soil Moisture, Salinity and Cottonwood Tree

Evapotranspiration. Meeting sponsored by the USBR to discuss DOI Landscape Funds for studies on the Lower Colorado River. Boulder City, NV. March 9.

Nagler, P. 2006. Presentation: Measuring and scaling evapotranspiration of a cottonwood restoration plot on the Lower Colorado River. Sponsored by Dr. Georgianne Moore of the Department of Rangeland Ecology and Management at Texas A&M University for the seminar series, "Ecological Restoration." College Station, TX. Feb. 20-22.

Nagler, P. 2006. Presentation: Estimates of Riparian Trees and Saltcedar in the Delta of the Colorado River in Mexico. A bi-national Lower Colorado River conservation meeting on the Lower Colorado River Limitrophe and Delta in the U.S. and Mexico. Sponsored by the National Wildlife Federation, Environmental Defense, and Pronatura Noroeste-Sonora. Tucson, AZ. Feb. 15-16.

Kim, H., A. Huete, **P.Nagler**, E. Glenn, W. Emmerich, R.Scott. 2006. Poster: Spatial and Temporal Variability in Evapotranspiration Derived Through Scaling Flux Tower with AVIRIS and MODIS Data at the SMEX04 Site. Sponsored by USDA-ARS RISE and UA. Tucson, AZ.

Nagler, P. 2006. Presentation: Ecological Relationships and Water Use by Native Vegetation and Exotic Saltcedar on Western U.S. Rivers. Sponsored by the University of Arizona, Soil, Water, and Environmental Science Department for evaluating me for Adjunct Faculty. Tucson, AZ. Jan. 30.

Nagler, P. 2006. Presentation: New Methods to Measure Riparian Evapotranspiration Rates of Cottonwood Forests at Cibola National Wildlife Refuge. Sponsored by the Dept. Interior, Lower Colorado River Research Group at the USGS Sonoran Desert Research Station. Tucson, AZ. Jan.10.

Kim, H., A. Huete, **P.Nagler** et al. 2005. Poster: Monitoring Riparian and Semi-Arid Upland Vegetation Using Vegetation and Water Indices from the MODIS Satellite Sensor. Sponsored by the USDA-ARS RISE and UA. Tucson, AZ. Oct. 5.

Nagler, P. 2005. Presentation: Response of Riparian Vegetation to River Flow in the Colorado River Delta. Research Coordination Network (RCN) for the Colorado River Delta Executive Board - Flessa, K., **Nagler, P.**, Alvarez, S., Conway, M., Hastings, P, Krantz, P. Sponsored by the National Science Foundation. Tucson, AZ. Aug. 8-10.

Huete, A., H.Kim, E. Glenn, and **P. Nagler**. 2005. Land surface water variability and dynamics during a severe drought in the southwest, USA. International Symposium on Remote Sensing of Environment. St. Petersburg, Russia. June 20-24. <http://www.symposia.org/>

Nagler, P. 2005. Poster: MODIS EVI as a tool for estimating evapotranspiration in riparian and phreatophyte ecosystems. Special Session H19: Estimation of Large-Scale Evaporation Using Remote Sensing. Sponsored by the NASA Water and Energy Cycle Program. American

Geophysical Union (AGU) Meeting, New Orleans, LA. May 23-27.

<http://www.agu.org/meetings/sm05/>

Nagler, P. 2005. Attendance: The Ecological Modeling for NASA Applied Sciences Workshop. March 29 – April 1.

Nagler, P. 2005. Attendance: Follow-up meeting to the USBR-USGS University ET Workshop. Henderson, NV. March 22-25.

Nagler, P. 2005. Presentation: Ecological Relationships and Water Use by Native Vegetation and Exotic Saltcedar on Western U.S. Rivers as Determined by Ground-Truthed Remote Sensing Data. Reclamation ET Workshop: State-of-the-Art Review of ET Remote Sensing Science and Technology. Fort Collins, CO. Feb. 8-10.

Nagler, P. 2005. Poster: Evapotranspiration on western U.S. rivers estimated by MODIS Enhanced Vegetation Index and eddy covariance flux tower temperatures. Reclamation ET Workshop: State-of-the-Art Review of ET Remote Sensing Science and Technology. Fort Collins, CO. Feb. 8-10.

Nagler, P. 2005. 2nd Conference on the Gulf of California: "Working Group for the Conservation and Research Status of Gulf of California Estuaries/Esteros." Sponsored by the Arizona-Sonora Desert Museum and the Packard Foundation. Tucson, AZ. Jan. 25.

Nagler, P. 2004. Interview Presentation: Remote sensing tools for monitoring riparian ecosystems. U.S.D.A. Agricultural Research Service (ARS), Hydrology and Remote Sensing Laboratory. Beltsville, MD. Dec. 7. <http://hydrolab.arsusda.gov/>

Kim, H., A. Huete, W. Emmerich, **P. Nagler**, and E. Glenn. 2004. Poster: Drought and Water Content Analysis of Semiarid Riparian and Upland Vegetation Communities with Remotely Sensed Data and Eddy-Flux Measurements. USDA-SW Watershed. Tucson, AZ. Nov. 13.

Nagler, P. 2004. Poster: Application of MODIS Vegetation Indices and Land Surface Temperatures to Predict Riparian Evapotranspiration across the Semi-Arid Southwest, Using Micrometeorological Tower Data from the Middle Rio Grande, San Pedro River, and the Lower Colorado River. Proceedings from the Geological Society of America. Vol. 36, No. 5, p. 515. Denver, Colorado. November 7-10. <http://www.geosociety.org/meetings/2004/>.

Nagler, P., E.Glenn, A.Huete, J.Cleverly, Z.Wan. 2004. Poster: MODIS Vegetation Indices, MODIS Land Surface Temperatures and Micrometeorological Variables to Predict Riparian Evapotranspiration along the Middle Rio Grande. Proceedings from the MODIS Vegetation Workshop II, Missoula, Montana. August 17-19. <http://www.ntsug.umt.edu/MODISCon/index.html>.

Nagler, P., E.Glenn, and R.Brusca. 2004. Conf. Gulf of California, sponsored by the Arizona-Sonora Desert Museum and the Packard Foundation. The workshop "Conservation and Research

Status of Gulf of California Estuaries/Esteros" was established to form the Gulf of California Esteros Working Group (EWG) to develop a benchmark report on state of knowledge and research and conservation needs of coastal marine wetlands (esteros and estuaries) in the Sea of Cortez, inclusive of the Colorado River Delta. Produced "Photographic Atlas of Esteros and Other Coastal Wetlands of Conservation Interest in the Northern Gulf of California." Tucson, AZ. June 17-23. <http://www.gulfconference.org/>

Huete, A., K. Didan, D. Lampkin, E. Glenn, and **P. Nagler**. 2004. Presentation: Multi-Year MODIS Time Series Analysis of Land Conversion Processes in Semiarid Regions. Proceedings from the 70th ASPRS Imaging and Geospatial Information Society, Multi-temporal Image Analysis and Applications – Part VIII: Land Cover Trend Analysis. Denver, Colorado, May 23-28. <http://www.asprs.org/denver2004/index.html>

Nagler, P.L. Curtis, C.C., and E.P. Glenn. 2004. Presentation: An inexpensive digital vegetation mapping system. Proc. 4th Intl. Symp. Mobile Mapping Technology. Kunming, China, March 29-31. <http://www.geoict.net/mmt2003/index.htm>

Kim, H.J., Huete, A., Glenn, E., and **Nagler, P.** 2004. Spatial and Temporal Vegetation Dynamics and Relationships to Water Availability in the San Pedro Riparian Zone, Arizona. Proceedings of the AVIRIS 2004 Workshop, Sponsored by the Jet Propulsion Lab, California Institute of Technology, Pasadena, California. March 31-April 2. <http://aviris.jpl.nasa.gov/html/wrkshpletter2004.html>

Nagler, P.L. et al. 2004. Presentation: Riparian species ET rates as measured by micro-meteorological variables, and MODIS EVI and LST data. USGS and USBR. Henderson, Nevada. March 18.

Glenn, E., **P. Nagler**, et al. 2003. Presentation: Remote Sensing Tools for Vegetation Mapping and ET Estimation on the Lower Colorado River. USGS. Henderson, Nevada. Dec.10.

Nagler, P., O. Hinojosa-Huerta, R. Romo, E. Glenn, A. Huete, and C. Curtis. 2003. Presentation: Quantifying land cover in the delta of the Colorado River. Proceedings from the 30th International Symposium on Remote Sensing of Environment. Honolulu, Hawai`i. November 10-14. <http://isrse.pdc.org/>

Nagler, P. and E. Glenn. 2003. Presentation: Salt Cedar and Native Trees: Stress Tolerance, ET Rates, and Ecophysiology. Proceedings from the Tamarisk Symposium. Grand Junction, CO. October 22-24. <http://www.coopext.colostate.edu/TRA/saltcedar2003.html>

Nagler, P., E. Glenn, L. Thompson. 2003. Poster: Comparison of transpiration rates among riparian trees using sap flow and leaf temperature methods. Author on (i) Priority Conservation Areas – Colorado River Delta, and (ii) Hyperspectral characterization of riparian and wetland communities along the Colorado River with the EO-1 Hyperion sensor. The Lower Colorado River Workshop, sponsored by the U.S. Geological Survey. Parker, AZ. June 17-18.

Nagler, P. and E. Glenn. 2003. Presentation: Remote sensing tools for mapping and monitoring the lower Colorado River and its delta in the United States and Mexico. University of Arizona, Dept. of Geosciences. April 9.

Nagler, P., E. Glenn, L.Thompson. 2003. Poster: Comparison of transpiration rates among riparian trees using sap flow and leaf temperature methods. Spectral Remote Sensing of Vegetation Conference, sponsored by the U.S. Environmental Protection Agency. Las Vegas, Nevada. March 12-14.

Nagler, P. 2002. Presentation: Building upon the Anderson-Ohmart vegetation classification system: Improved methods of mapping vegetation in the CR delta using satellite imagery, aerial photographs and ground-data. University of Arizona, Dept. of Geosciences. Dec.10.

Nagler, P. 2002. Presentation: Colorado River Delta. Geology Dept., CICESE, Ensenada, Mexico. November 17-19.

Nagler, P., et al. 2002. Conf. on Priorities in the Colorado River Delta: A State-of-Knowledge. Participated as a workshop host for Mapping Conservation Priorities. Organized the GIS committee to produce working maps during the workshop and published maps for the final report. Participated as a group expert for the GIS Mapping group with the Riparian Habitat/Vegetation Committee. Produced "Ground, Aerial, and Satellite Images of the Colorado River Delta." Tijuana, Mexico. October 15-17.

Ryder, E., K. Fitzsimmons, **P.L. Nagler,** E.P. Glenn, S. Nelson. 2002. Production of *Gracilaria parvispora* in two-phase polyculture systems in relation to nutrient requirements and uptake. *Proceedings of the Japanese Scientific Fisheries Society*, Tokyo, Japan. September 23-28.

Nagler, P., et al. 2002. Attended the Workshop for the Intl. Wildlife Refuge (IWR) of the Limitrophe Region of the Lower Colorado River. Cocopah Indian Tribe, Environmental Protection Office. Yuma, AZ. Sept. 18.

Nagler, P., E. P. Glenn, and T.L. Thompson. 2002. Presentation: Comparison of transpiration rates among riparian trees using sap flow and leaf temperature methods. Ecological Society of America (ESA). Proceedings of the ESA 87th Annual Meeting and SER 14th Intl.Conf. Tucson, AZ. August 4-9. <http://www.esa.org/publications/>

Nagler, P. 2002. Attended the Bi-National Bird Conservation Meeting, sponsored by Sonoran Joint Venture (SJV). Tucson, Arizona. August 7-8.

Nagler, P. 2002. ArcView Training. University of Arizona, Tucson, Arizona. July 30-31.

Rodriguez, P., A.Huete, D.Schaub, K.Didan, T.Miura, E.Glenn and **P.Nagler.** Application of MODIS Vegetation Indices to Monitor the Seasonal Responses and Water Use Impacts over the Colorado River Delta Area, NW Mexico. (i) Presentation: 29th Intl. Symposium on Remote Sensing of Environment, Buenos Aires, Argentina, April 8-12. (ii) Proceedings from the

MODIS Vegetation Workshop I, sponsored by the Numerical Terradynamic Simulation Group (NTSG). Missoula, Montana, July 15-18.

<http://www.ntsg.umt.edu/MODISCon/html/posters.html>

Nagler, P. 2002. Presentation: Colorado River delta vegetation response to river flow. Geosciences Dept., UA. May 20.

Nagler, P. 2002. Attended CLE Intl. Conf.: The Law of the River. Tucson, AZ. May 3-4.

Nagler, P. 2002. Attended the Workshop on the Discussion and Strategy for Binational Protection and Restoration for the Colorado River Delta. Tucson, Arizona. May 1-2.

Nagler, P. 2002. Presentation: Remote Sensing Applications: Environmental Assessment of the Colorado River delta, Mexico. USDA-ARS, Water Conservation Lab, Phoenix, AZ. Jan. 28.

Nelson, S., **P.L. Nagler**, and E.Glenn. 2002. Effects of fertilization treatment and stocking density on the growth and yield of the economic seaweed *Gracilaria parvispora* (Rhodophyta) in cage culture at Moloka'i, Hawai'i. Presentation at the 2002 Aquaculture America, World Aquaculture Society meeting, San Diego, CA. Jan. 27-30.

Nagler, P. and E. Glenn. 2001. Poster: Aerial extent of habitat types in the Colorado River Delta. Intl. Boundary Water Commission (IBWC), USDOJ, and Mexican Secretariat of Environment and Natural Resources (SEMARNAT). US-Mexico Colorado River delta Symp., U.Baja California. Mexicali, Mexico. Sept. 11-12, 2001.

Nagler, P. 2001. Attended ESRI 21st Annual Intl. User Conf.. Training: (i) GIS Hydrological Data Modeling & its Application; (ii) Managing a GIS. San Diego, CA. July 7-13, 2001.

Glenn, E., V. Gerhart, S.Nelson, D. Moore, **P.Nagler** and C. Machado. 2001. A community-based polyculture system in Hawai'i that incorporates all the life stages of *Gracilaria parvispora* (Rhodophyta). *Proceedings of the XVIIth International Seaweed Symposium*. Pp. 65-73. University of Cape Town, South Africa. January 29, 2001.

Gerhart, V., E.Glenn, S.Nelson, D.Moore, **P.Nagler**, M.Akutagawa. 2001. Sustainable Aquaculture on Molola'i, Hawai'i. World Aquaculture Society meeting, Johannesburg, South Africa. Jan. 29, 2001.

Nagler, P. 2000. Presentation: The distribution and abundance of riparian vegetation covering the Pinacate Mtns.-Altar Desert-Cienega de Santa Clara, Colorado River delta, Mexico, Gila River, Cibola Wildlife Refuge, Bill Williams River, Las Vegas Wash, Lake Mead, Virgin River, and the Grand Canyon. USBR. April 18, 2000.

Nagler, P., et al. 2000. Poster: Predicting the effect of river flows on vegetation in the Colorado River delta, Mexico. Hosted by IWG Committee on Remote Sensing and Spatial Analysis. Tucson, AZ. April 11, 2000.

Nagler, P. 2000. Presentation: Monitoring vegetation in the Colorado River delta using air- and space-borne remote sensing techniques. USFWS. Jan. 21, 2000.

Nagler, P. 1999. Meeting: Proposed mapping classification techniques for the lower Colorado River. USBR. Sacramento, CA. November, 1999.

Nagler, P.L. 1999. Awarded: Elinor Montgomery Scholarship: Strategy for Binational Protection and Restoration for the Colorado River delta. Env. Def. 9th Annual Benefactors Symp. Denver, CO. October, 1999.

Nagler, P.L. 1999. Attended U.S. Fish and Wildlife Service Seminar on the Willow Flycatcher. Roosevelt Lake, AZ. May, 1999.

Nagler, P.L., Y. Inoue, C.S.T. Daughtry, A.L. Russ. 1998. Shortwave Infrared Reflectance of Mixed Scenes of Soils and Crop Residues. *Proceedings of the American Society of Agronomy Conference*, Baltimore, Maryland. Oct 18-22, 1998.

Nagler, P.L., Y. Inoue, C.S.T. Daughtry. 1997. Shortwave Infrared Reflectance of Mixed Plant Litter and Soils Samples for Quantitative Estimation of Percent Cover. *Proceedings of the IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Singapore. Aug. 3-8, 1997.

Nagler, P.L., Y. Inoue, C.S.T. Daughtry. 1996. Shortwave Infrared Spectral Reflectance of Plant Litter and Soils, *Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS)*, Burnham Yates Conference Center, Lincoln, Nebraska. May 26-31, 1996.

Nagler, P.L. Shortwave Infrared Spectral Reflectance of Plant Litter and Soils, National Institute of Agro-Environmental Sciences (NIAES), Japan. July 23, 1996.

Nagler, P.L., C.S.T. Daughtry, M.S. Kim, S.N.Goward. 1995. Shortwave Infrared Spectral Reflectance of Crop Residues and Soils, *Proceedings of the American Society of Agronomy Conference*, St. Louis, Missouri, Oct 30-Nov 2, 1995.

C.S.T. Daughtry, **P.L. Nagler**, M.S. Kim, J.E. McMurtrey III, and E.W. Chappelle. 1995. Spectral Reflectance of Soils and Crop Residues. *Proceedings 7th Int. Symposium on Near Infrared Spectroscopy*, Montreal, Quebec, Canada. August 6-11, 1995.

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