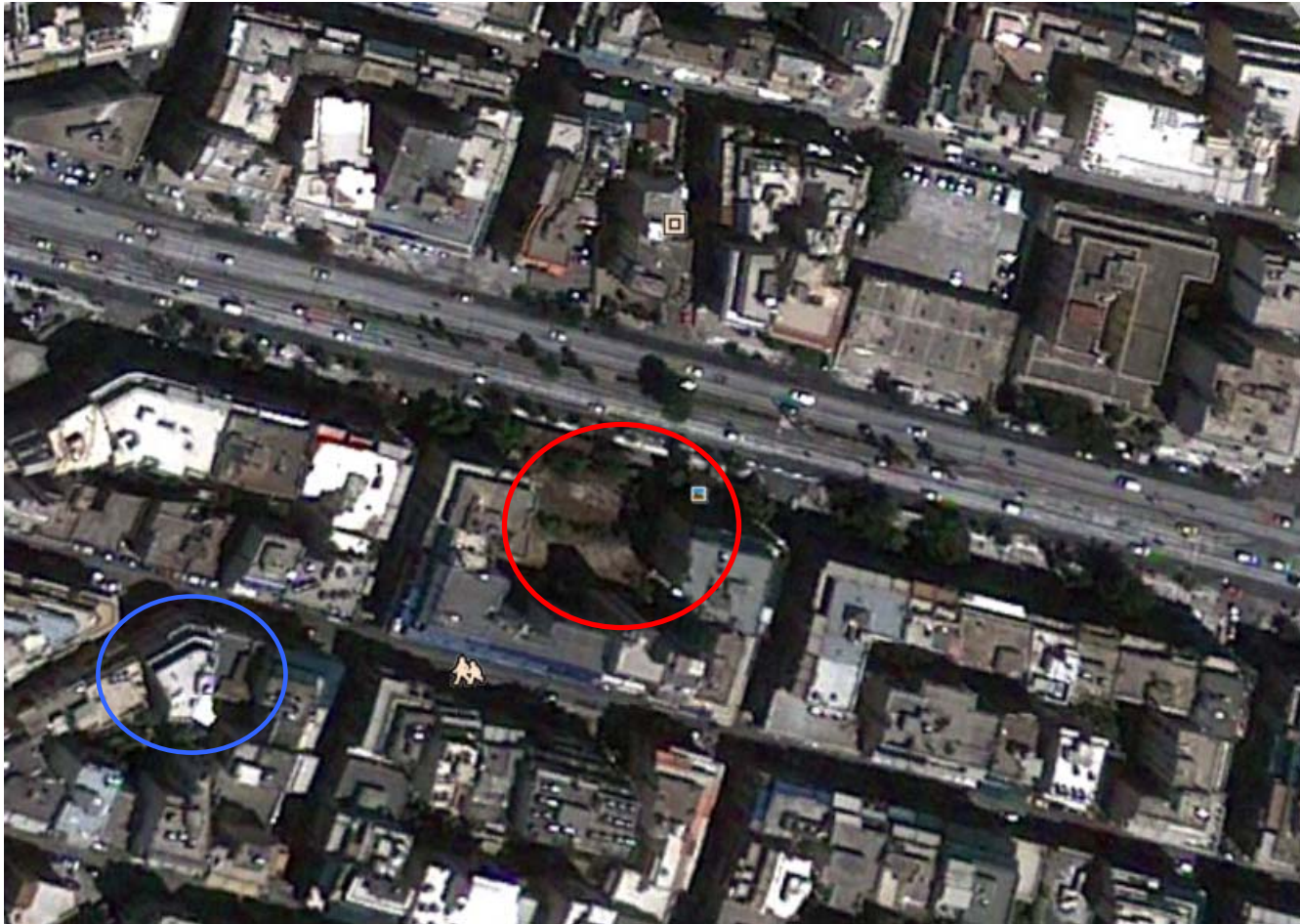


“Vibration pollution”



Environmental Geotechnics Education

- Established topics: Geotech. Eng. Edu. Conf., 2000 [1]
 - Monitoring
 - Contaminant migration
 - Waste stability, Landfills
 - Contaminated land reclamation
 - Assessment of geoenvironmental hazards of dredging materials and non-traditional geotechnical construction materials
- Emerging topics: XV ECSMGE, 2011
 - Geothermal energy
 - Vibration pollution

[1] Manassero, and Spanna (2000), Basic aspects of Environmental Geotechnics education

Diversification of Environmental Geotechnics: Opportunities for Geotechnical Curricula

Marina Pantazidou

National Technical University of Athens

XV ECSMGE, Athens 2011, Sept. 15, Session 6.1: Geoenvironmental Issues

Classification of Geoenvironmental topics

- Environmental Geotechnics
 - Uses “traditional” geotechnics to address geotechnical aspects of environmental problems (e.g. waste disposal)
- Geoenvironmental Engineering [2]
 - Requires additional training
 - Contaminant transport
 - Heat transport

[2] Burns (2011), What is Geoenvironmental Engineering? Geostrata, March-April

A content view of geoenvironmental courses

- Thermo-hydro-bio-mechanical behavior of soils
 - Mitchell & Soga (2005), Fundamentals of Soil Behavior [3]
 - Gens (2010), Soil-environment interactions in geotechnical engineering, 47th Rankine Lecture, Geotechnique [4]
 - Mitchell & Santamarina, (2005), Biological considerations in Geotechnical Engineering, ASCE J. Geot. & Geoenv. Eng. [5]
- Landfills & containment systems
 - Qian, Koerner & Gray (2002), Geotechnical Aspects of Landfill Design and Construction [6]
- Contaminated land (characterization & remediation)
 - Sharma & Reddy (2004), Geoenvironmental Engineering: Site remediation, waste containment, and emerging waste management technologies [7]

An applications view of geoenvironmental material

- Soil dynamics
 - vibration pollution
- Landfills (leaching tests)
 - reuse of byproducts & “compromised” earth materials
- Contaminated land (contaminant transport & mass transfer)
 - disposal & reuse of dredged sediments

Opportunity in an Environmental Geotechnics course

- The overarching goal of the course is to develop environmental thinking related to
 - assessing the severity of a contaminant release in the subsurface
 - recognizing the physical-chemical-biological mechanisms that affect the fate and transport of the released contaminant
 - selecting appropriate remedial measures and/or technologies

Opportunity in an Environmental Geotechnics course

- The overarching goal of the course is to develop environmental thinking related to
 - assessing the severity of a contaminant release in the subsurface **or from sediments**
 - recognizing the physical-chemical-biological mechanisms that affect the fate and transport of the released contaminant
 - selecting appropriate remedial measures and/or technologies

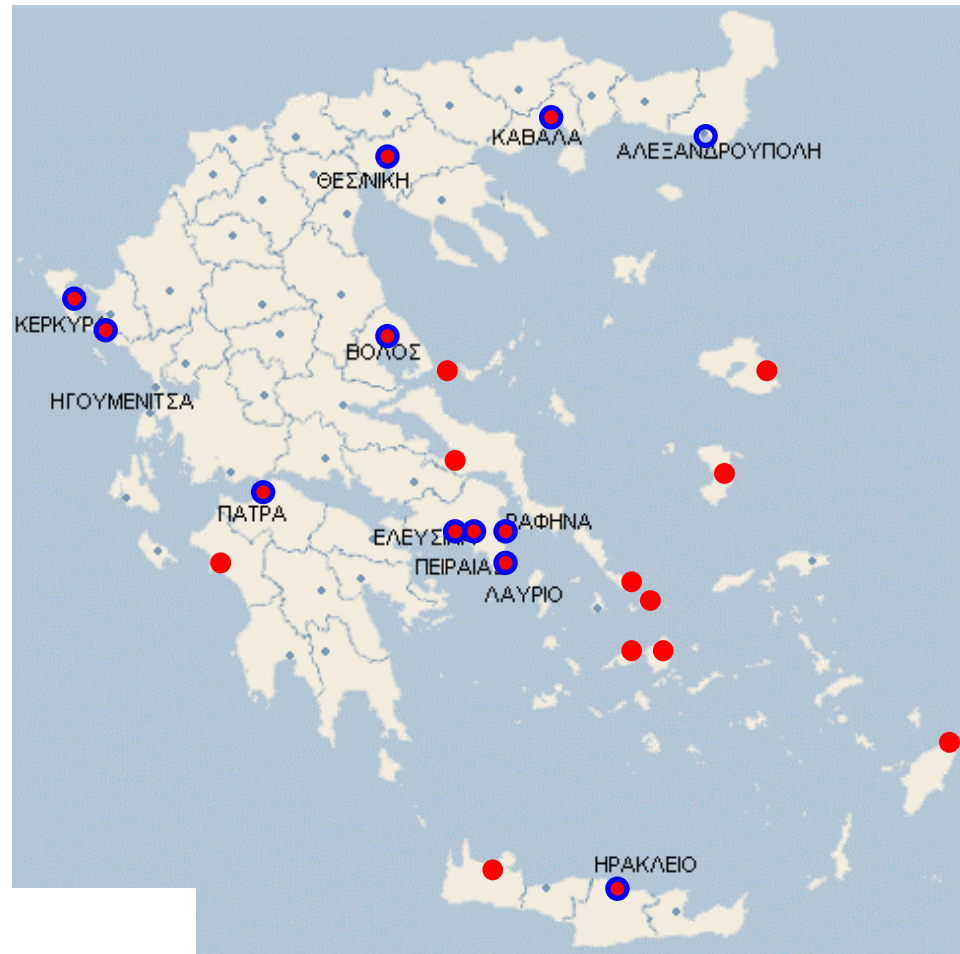
Dredged sediments in Greece

13780 km coastline

83 big and medium harbors

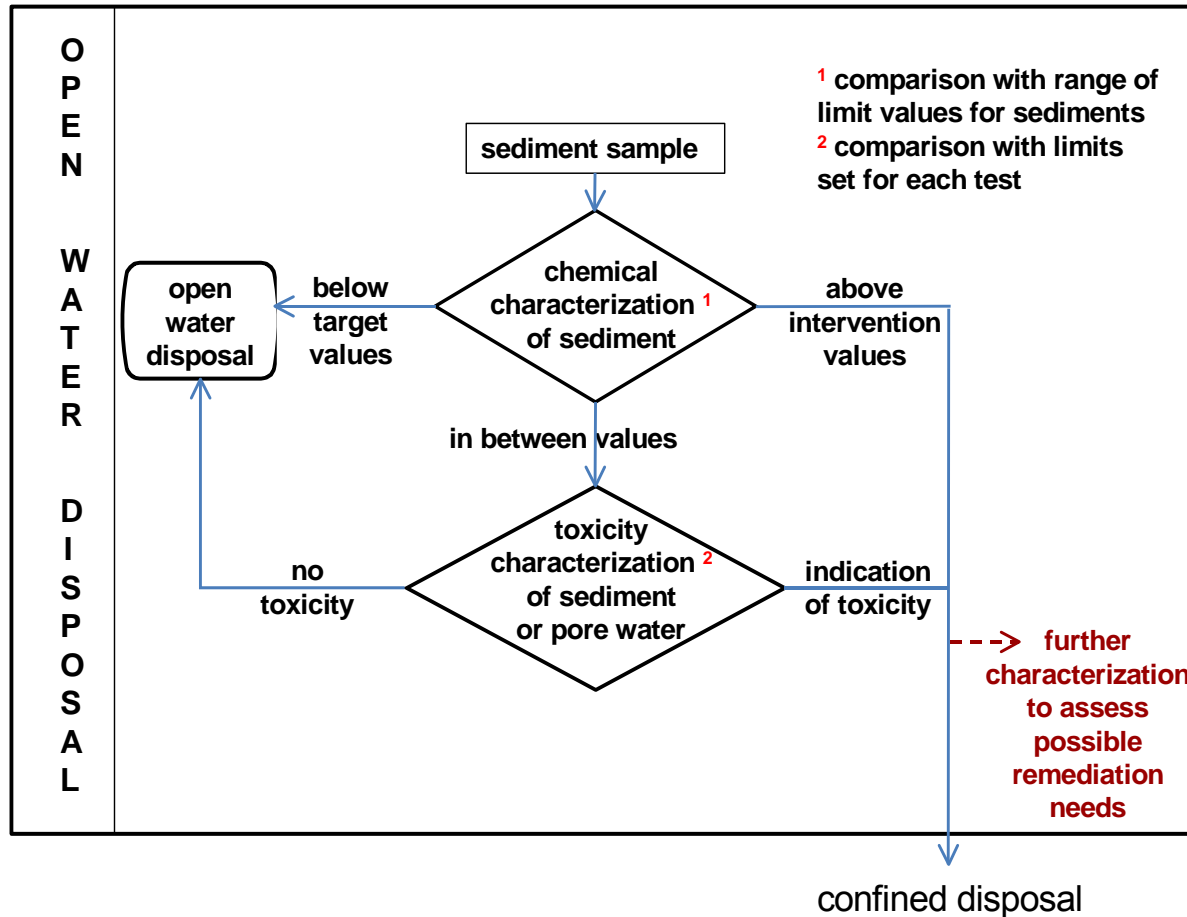
1250 regional and small harbors & marinas

- public limited company (Greek law)
- international port (EC law)
- PLC & international port



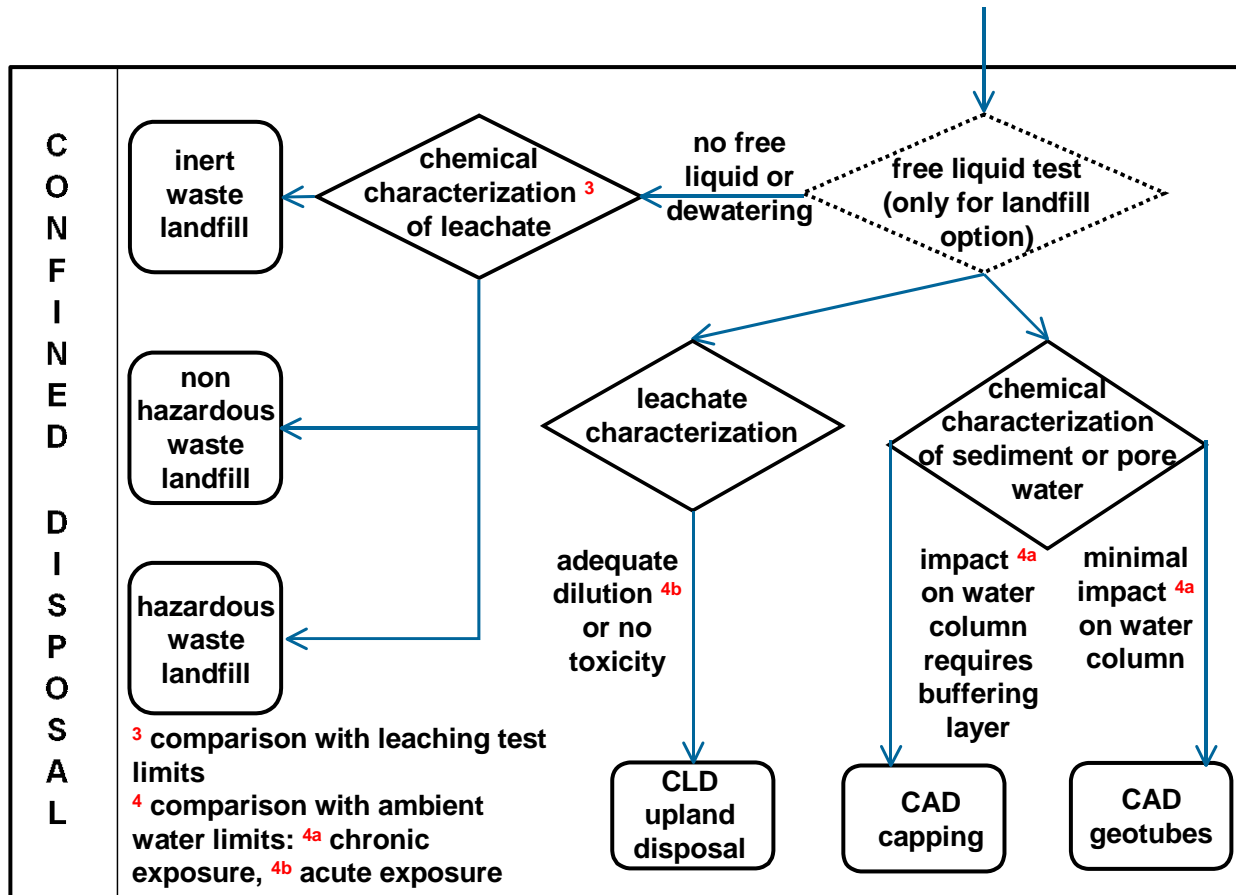
Need:
screening tools for disposal options

Decision framework for dredged sediment disposal – Tier I



[9] Pantazidou, Katsiri & Reddy (2009), Evaluating management options for the disposal of dredged sediments, J. of ASTM Int., 6:6

Decision framework for dredged sediment disposal – Tier II



CLD = confined land disposal, CAD = confined aqueous disposal

Opportunities for Geotechnical Curricula

- Keep an eye on institutions leading the way on emerging topics in environmental geotechnics
- Build the knowledge base & consolidate knowledge base in key textbooks
- Teach the knowledge base in dedicated courses
- Expand application repertoire of students by enriching existing geotechnical courses

References

- [1] Manassero, M. and C. Spanna (2000), Basic aspects of Environmental Geotechnics education, 1st. Int. Conf. on Geotech. Eng. Edu. & Training, Sinaia, Romania
- [2] Burns, S.E. (2011), What is Geoenvironmental Engineering? *Geostrata* 15:2, 14-15.
- [3] Mitchell, J.K. and K. Soga, 2005, *Fundamentals of Soil Behavior*, 3rd edition, Wiley
- [4] Gens, A. (2010), Soil-environment interactions in geotechnical engineering, *Géotechnique*, 60:1, 3-74 (47th Rankine Lecture, 21 March 2007).
- [5] Mitchell, J. K. and Santamarina, J. C. (2005), Biological considerations in Geotechnical Engineering, *ASCE J. of Geotech. and Geoenviron.Eng.* 131:10, 1222-1233.
- [6] Qian, X., R.M. Koerner and D.H. Gray (2002), *Geotechnical Aspects of Landfill Design and Construction*, Prentice Hall.
- [7] Sharma, H.D. and Reddy, K.R. (2004), *Geoenvironmental Engineering: Site remediation, waste containment, and emerging waste management technologies*, Wiley
- [8] Pantazidou, M. (2010), The Scholarship of Teaching: A Case in Environmental Geotechnics, In: *Inquiries into European Higher Education in Civil Engineering*, 9th Vol., Erasmus Thematic Network: European University Civil Engineering Education and Training (EUCEET), I. Manoliu (Ed.), pp. 125-152.
- [9] Pantazidou, M., A. Katsiri and K. Reddy (2009), Evaluating management options for the disposal of dredged sediments, *J.of ASTM International*, 6:6: 14 pages.