



Management of sediments dredged in ports and harbours in Greece

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With the contribution of:

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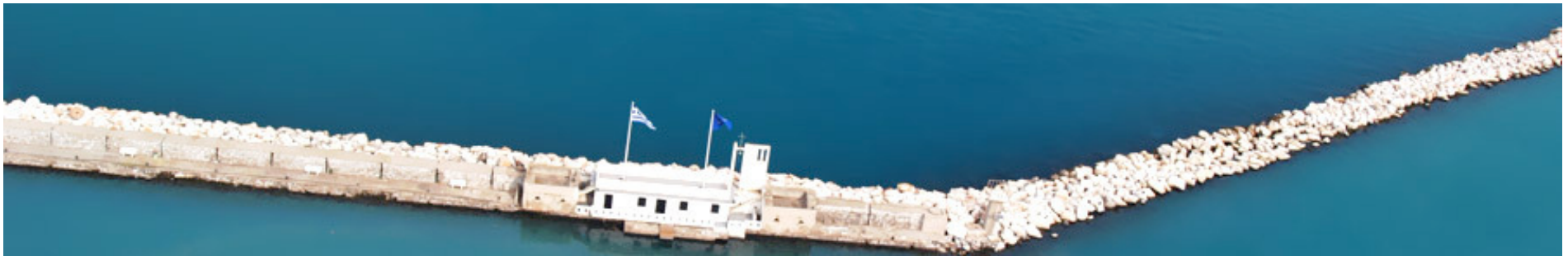
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General Direction Port Works - D4

General Secretariat of Public Works

Greek Ministry of Infrastructure, Transportation and Networks

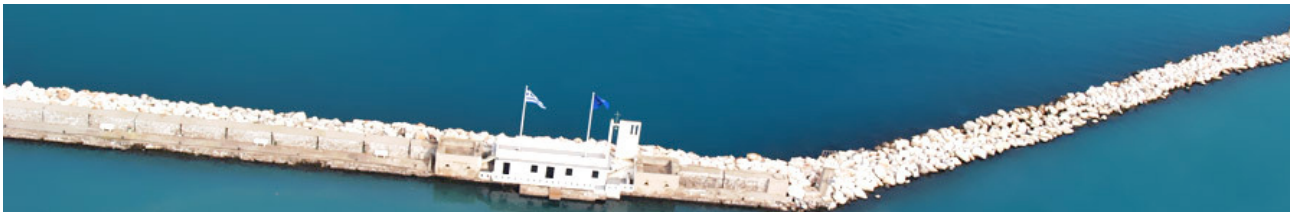




Port Sediment Management in Greece

Presentation outline:

- Basic data regarding major Greek ports
 - Brief review of major dredging Works & Projects completed / ongoing / planned
 - General port dredging sediments' management practices
 - Challenges



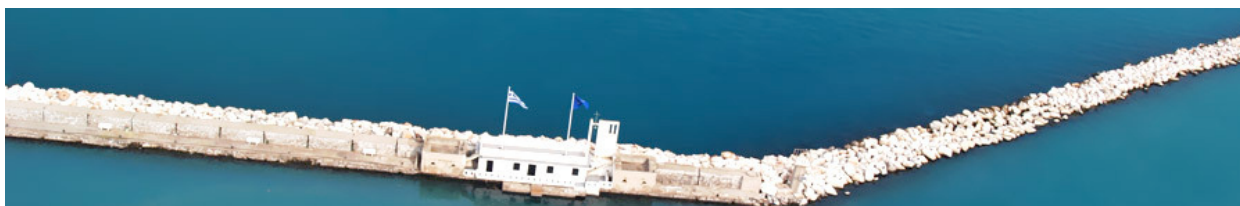


Ports and harbours in Greece - Basic Data:

- 140 Passenger and Commercial ports
- **12 International Gateway Ports**
- 19 marinas

Works & Projects:

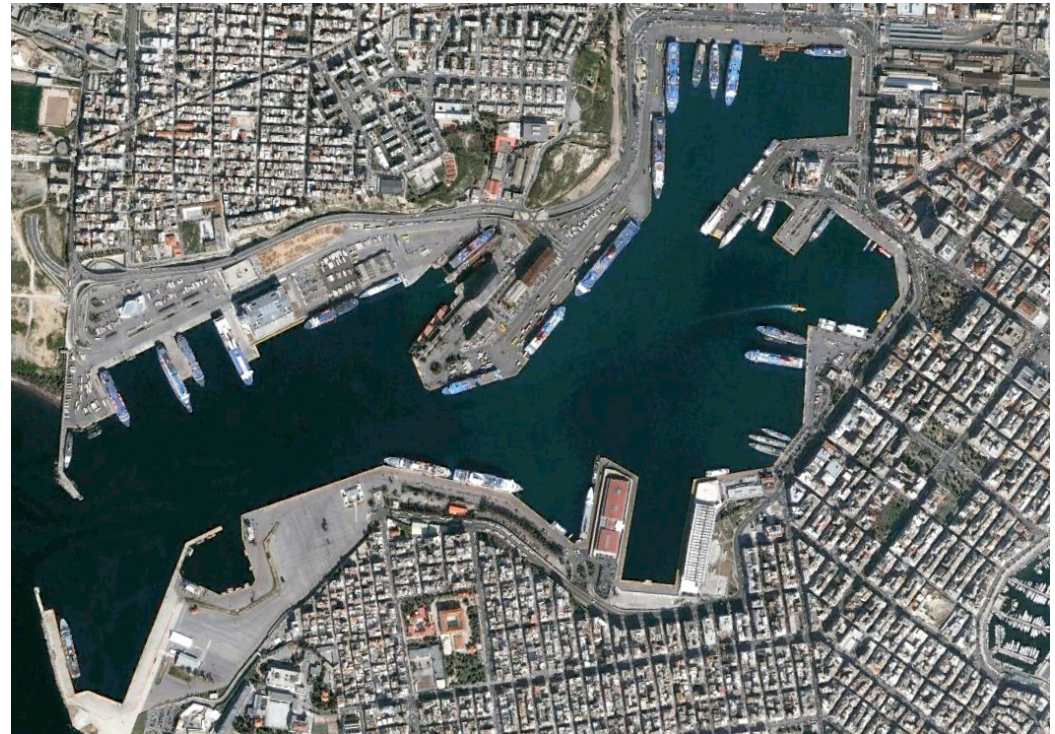
- 1995-2010:
 - ✓ Significant works executed in the 12 biggest co-financed by the EU & the Greek State, among others (Piraeus, Thessaloniki, Igoumenitsa, Alexandroupoli, Lavrion, Mykonos etc) and other local ports
- 2010- 2025:
 - ✓ Significant works planned at the aforementioned ports
 - ✓ Maintenance works for access channels and port basins (Igoumenitsa, Alexandroupoli, Patra, etc)
 - ✓ 20 additional marinas (some already under construction)



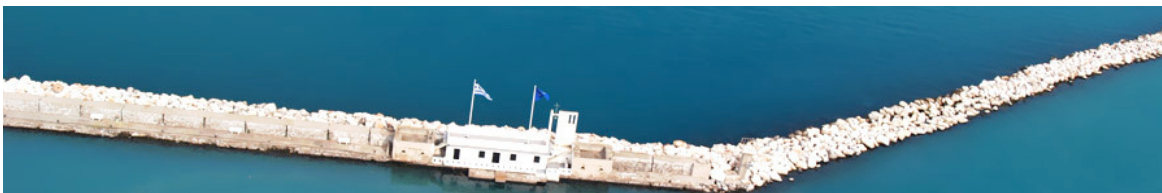
Indicative dredging projects:

Piraeus* (completed works)

- central basin maintenance dredging (2008/9):
 - ✓ Sedimentation from storm water collectors
 - ✓ 150,000m³
 - ✓ Mechanical dredging with silt curtain
 - ✓ Heavy Metals - toxicity above EPA acute limits
 - ✓ Confined Disposal in caissons used for the enlargement of Piers I & III



*Information given by Piraeus Port Authority





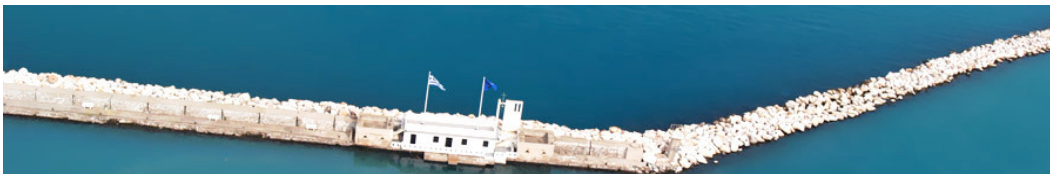
Indicative dredging projects:

Alexandroupoli* (Completed works)

- Central Port and 4.5km access channel:
 - ✓ 5,600,000m³ of dredged material
 - ✓ Cutter Suction Dredger & Hopper Dredger
 - ✓ Sediments' management
 1. Land reclamation for port piers
 2. Egnatia Highway earthfill
 3. Disposal of unsuitable material for land reclamation under special licence for a specified area at depths < 50m. (materials dredged for the access channel)



*Information given by Alexandroupolis Port Authority



Indicative dredging projects:

Alexandroupoli* (planned works- according to the Master Plan of the Port)

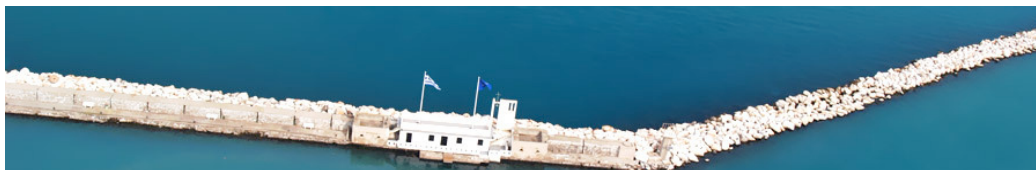
- Multipurpose port (draft to be extended from -12m to -15.5m)
- Access Channel (draft to be extended from -12 to -16m)
 - ✓ 1,500,000m³ of dredged material
 - ✓ Cutter Suction and hopper dredger
 - ✓ Use for land reclamation
 - ✓ Disposal at depths -50m or less under special licence.
- Access Channel annual maintenance
 - ✓ Required dredged material annually depending on various parameters (extreme meteo events, quantities of suspended solids by river Evros, etc)

*Information given by Alexandroupolis Port Authority



Sedimentation and Erosion Control is a major issue!

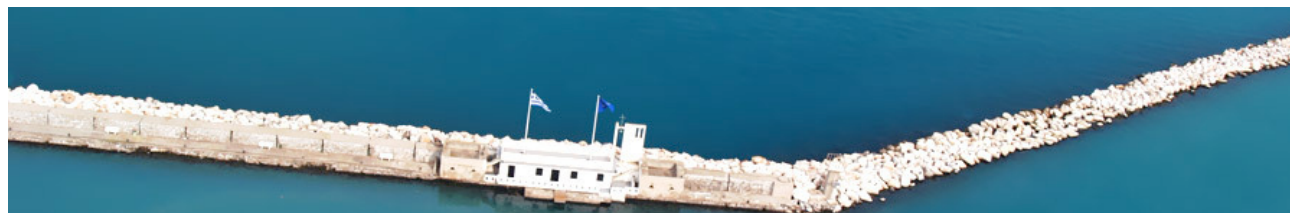
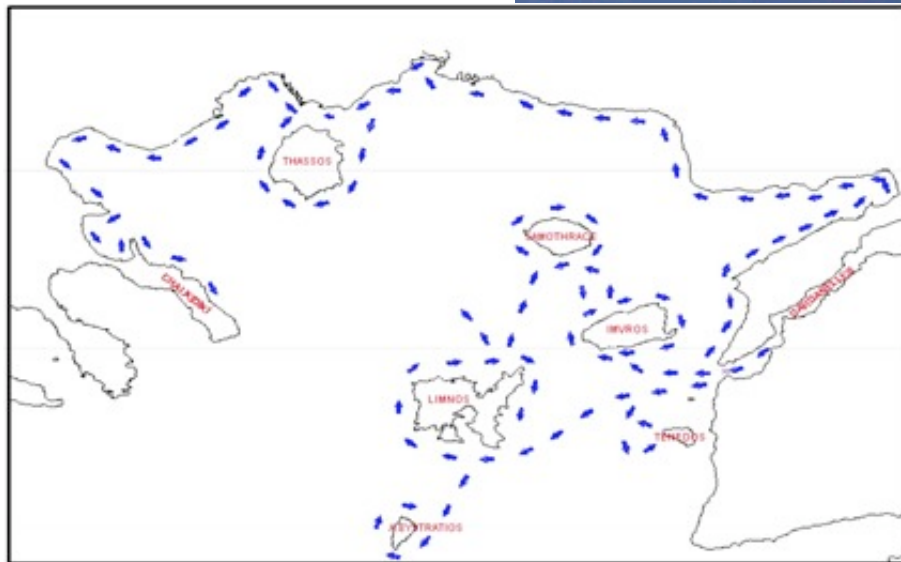
Need for sediment management when future projects will start



Alexandroupoli

Sedimentation and Erosion Control is a major issue!

Need for sediment management



Indicative dredging projects:

Igoumenitsa* (Completed - yellow)

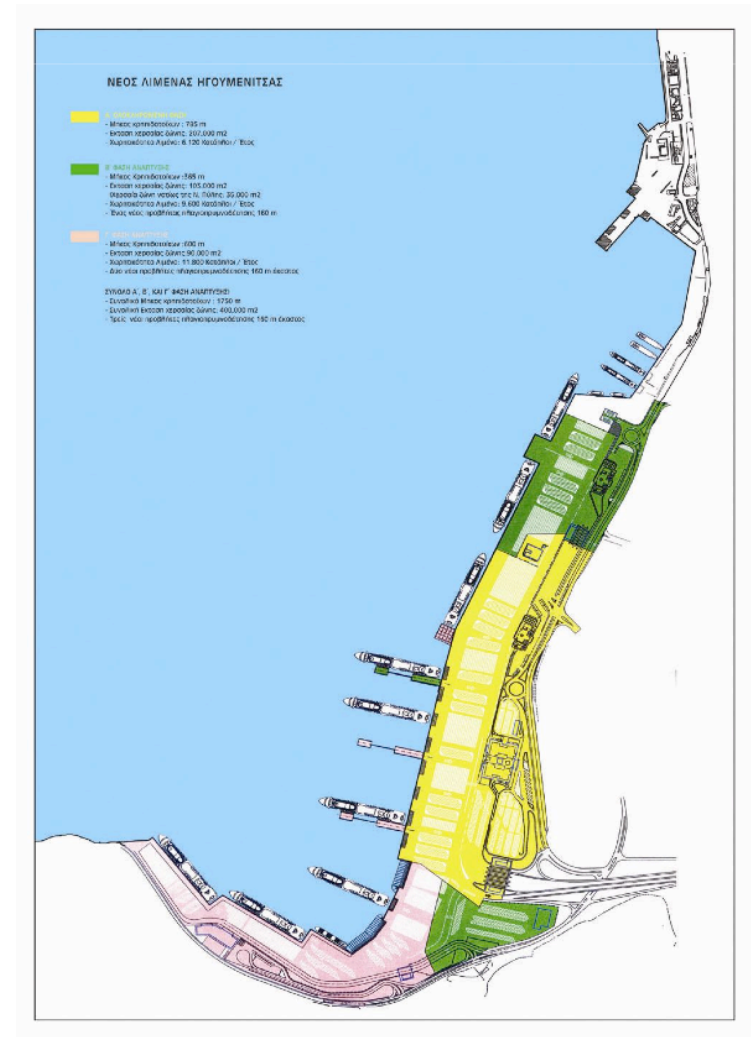
- Dredging of port basin and access channel
300,000m³
 - ✓ Cutter Suction with hopper
 - ✓ 33% disposal at depths -50m.
 - ✓ 67% use as earthfill for land reclamation in piers

Igoumenitsa (Planned according to the Master Plan of the Port - green and pink)

- Access channel to be enlarged (from 90m to 180m)
- Dredging 300,000m³
 - ✓ Cutter Suction with hopper
 - ✓ disposal at depths -50m

*Information given by Department of Large Scale Works for West Greece, Ministry of Infrastructure, Transportation, Networks

Erosion Control is a major issue!
Need for sediment management when future projects will start, here as well!

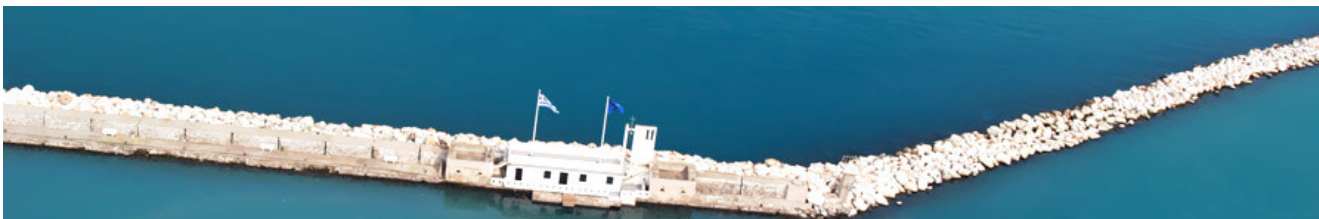




Igoumenitsa

Erosion Control is a major issue!

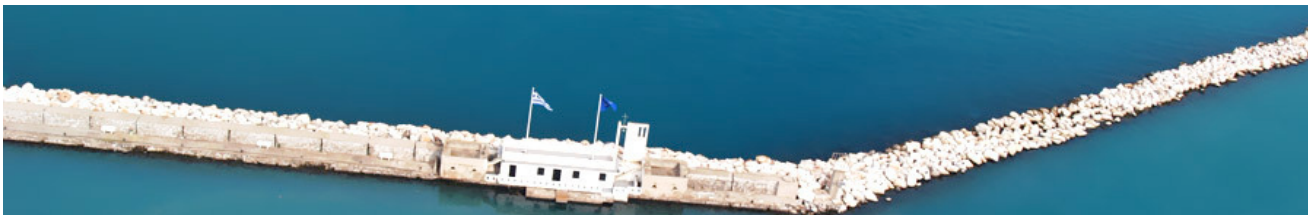
Need for sediment management here as well!



Indicative dredging projects:

Thessaloniki (Planned: Enlargement of Pier 6:

- 1,200,000m³ of dredged material for land reclamation
- Mechanical dredging with silt curtain
- 2m layer @ depths ranging from 13m to -22m over 60ha.
- Low toxicity
- Environmental concerns for borrow site:
 - Poseidonia prairies close-by,
 - vicinity with the Epanomi Wetland = Natura 2000 site.

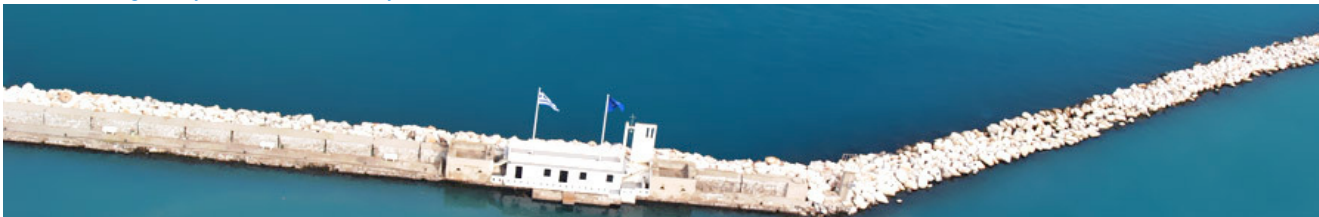
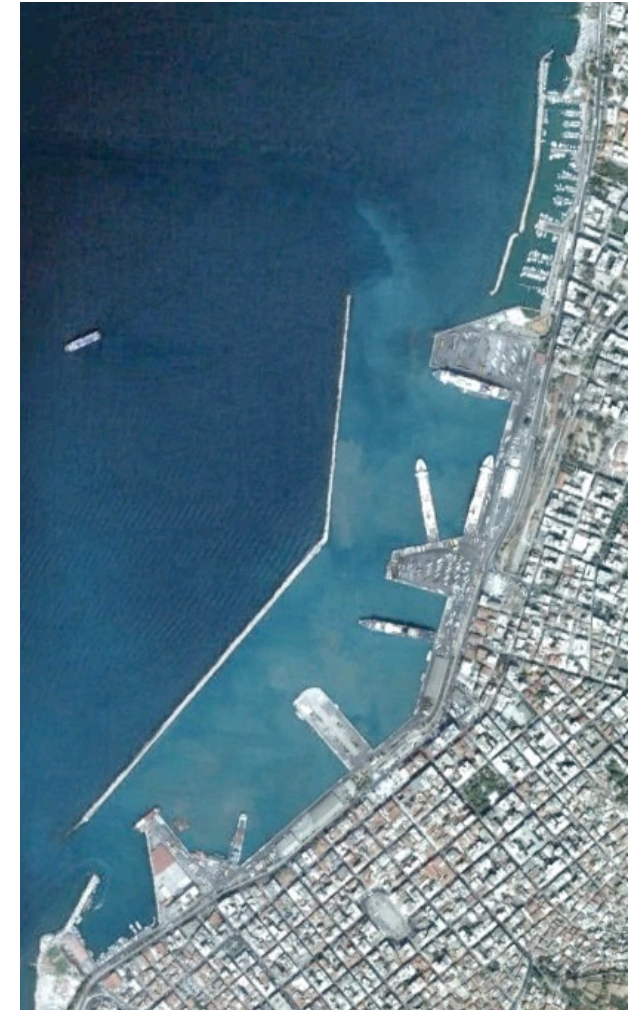


Indicative dredging projects:

Patra* (Completed 2008):

- Maintenance dredging
 - 150,000m³
 - Sedimentation due to
 - ✓ storm water collectors
 - ✓ Morphology altered by ships' manoeuvres (propellers & bow thrusts)
 - Mechanical dredging with silt curtain and hopper dredger
 - Environmental concerns:
 - ✓ use of dredged material on land reclamation - deemed not suitable
 - ✓ Suction dredging was not allowed
 - ✓ Material disposed at depths -50m with strict environmental terms concerning dispersion during disposal due to toxic substances

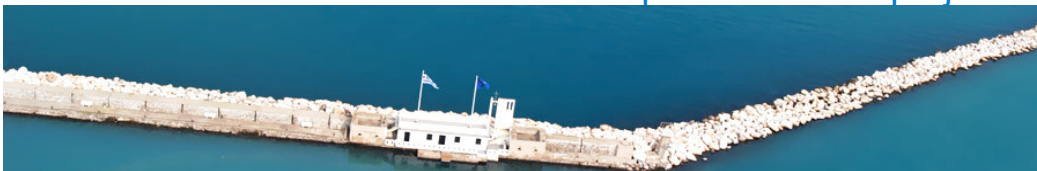
Information given by Patras Port Authority





General port dredging sediments' management practices:

- Quantities: Modest
 - ✓ 1995-2010: ~Above 7,000,000m³ Quantities given are a rough approximation because on the large number of authorities involved in port works (Commercial, passenger ports - major or local, marinas, fishing harbours etc)
 - ✓ 2010-2025: Above ~7,000,000m³ of which 4,500,000m³ (?) for the Alexandroupoli port and access channel (estimate depends on financial criteria for the project's construction and further planning of public works)
- Goals: Maintenance dredging due to sedimentation from
 - ✓ Currents
 - ✓ storm water collectors outflowing into the port basins
 - ✓ Extreme meteorological events
- Technology:
 - ✓ Mechanical dredging in most cases
 - ✓ Suction systems for big projects, not as frequent, in general
- Sediment management practices:
 - ✓ Re-use as earthfill for land reclamation
 - ✓ Disposal at depths over -50m and at distance >2km from the shore, when not polluted and when they cannot be used for land reclamation
 - ✓ Confined Disposal Facility (caissons), when polluted
 - ✓ Far from poseidonia prairies and environmentally sensitive areas
 - ✓ **Beach nourishment** applied rarely after request from local stakeholders
- Sediments are state property
- Strict environmental terms specific to each project



Challenges:

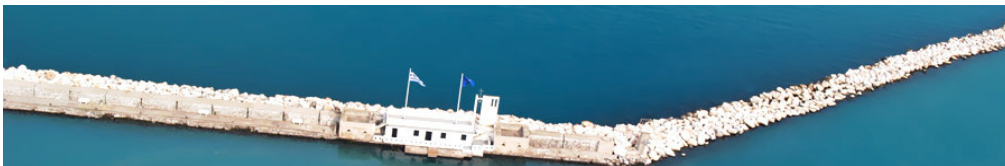
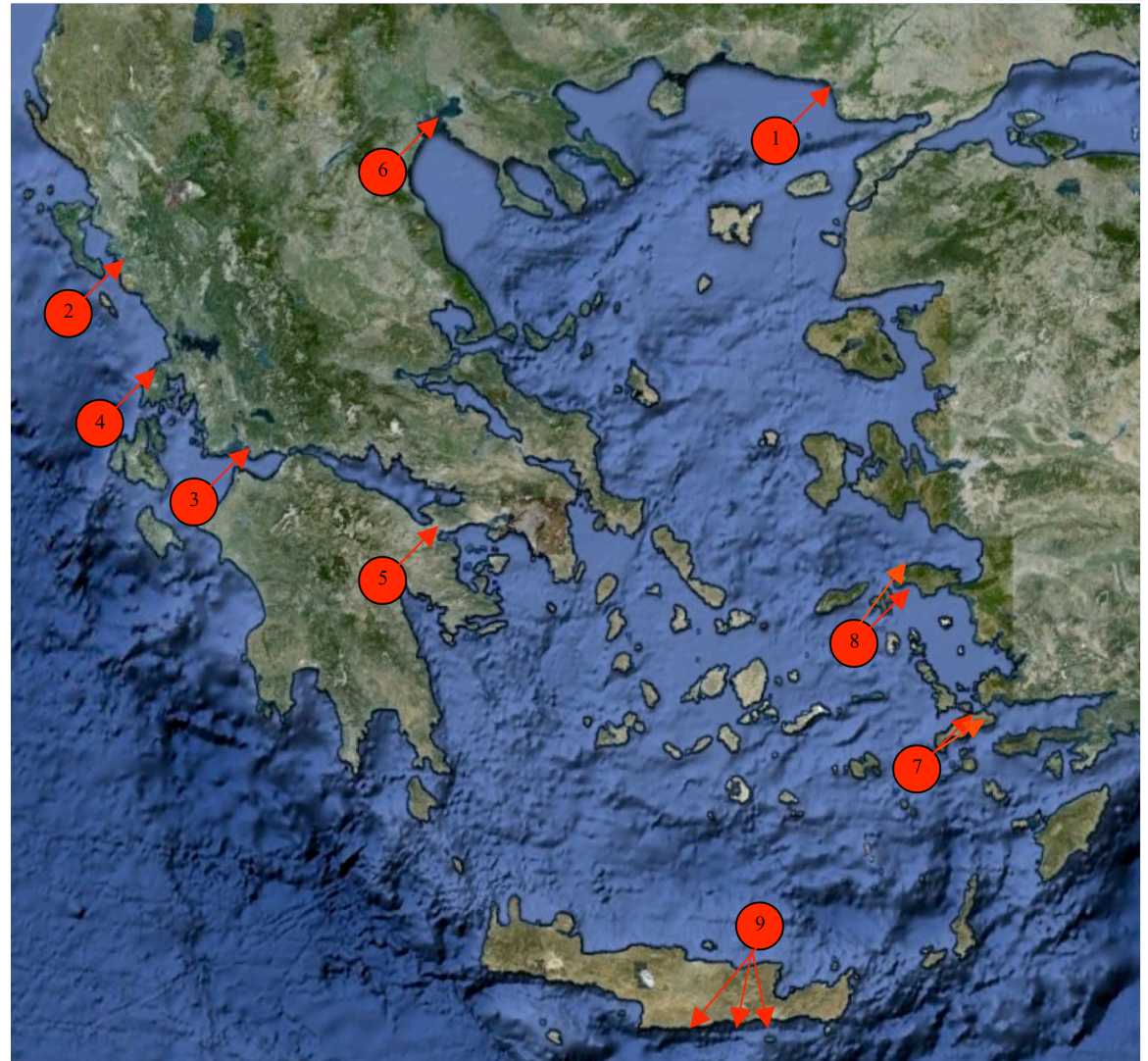
1. Sedimentation problems

Characteristic cases with acute problems requiring maintenance dredging:

- ✓ Ports (8, 9)
- ✓ Navigation / Access channels (1, 2, 3, 4, 6, 7)

In most cases, closely related to coastal erosion of neighbouring beaches!

Major Marine safety & Environmental concerns!





Challenges:

2. Legal framework:

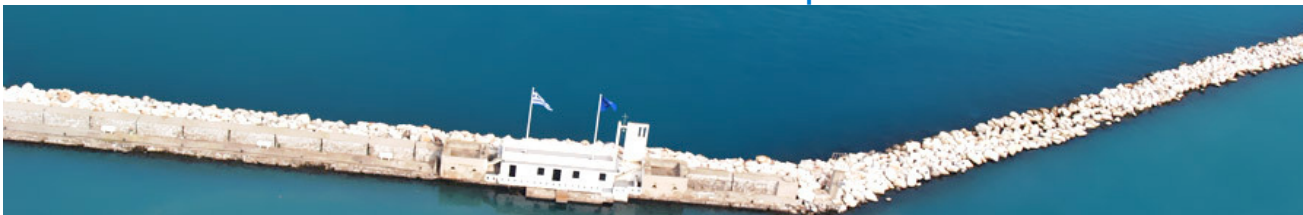
- ✓ Not specifically designed for dredging activities
- ✓ Environmental licence obligatory at the phase of Planning of port works and strict environmental terms specific to each project
- ✓ Dredged sediments are considered as “waste”
- ✓ Does not give standardized procedures
- ✓ Beneficial uses are not always considered - ICZM
- ✓ Outdated and not optimized disposal practices (disposal at -50m and >2km from the shore in most cases)
- ✓ When designing new ports or enlarging existing ones, a coastal engineering study is required

3. Study of environmental impacts & side effects:

- ✓ Erosion in beaches within a morphodynamically closed system (sedimentary cell)
- ✓ Polluted sediments within port basins.

4. More efficient sediment management practices in the future:

- ✓ ICZM to be considered when planning port & marine works
- ✓ Non-polluted sediments to be treated as a natural resource, not as waste
- ✓ Sediment re-use potential





THANK YOU!

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Data supplied by:

✓ Greek Ministry of Infrastructure,
Transportation and Networks

General Direction Port Works - D4

✓ Port Authorities of:

•Piraeus,

•Patra,

•Thessaloniki,

•Igoumenitsa,

•Alexandroupoli

✓Greek National Tourism Association

